

7.3 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c.2) §27.53(g) §27.53(h) §27.53(m) §27.53(a.4)

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. 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.

For Band 30, the minimum permissible attenuation level of any spurious emission <2288MHz and >2365MHz is $70 + \log_{10}(P_{[Watts]})$.

For Band 7 and 41, the minimum permissible attenuation level of any spurious emission is $55 + \log_{10}(P_{[Watts]})$.

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 frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

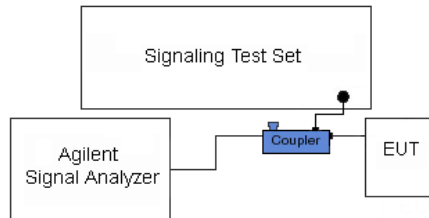


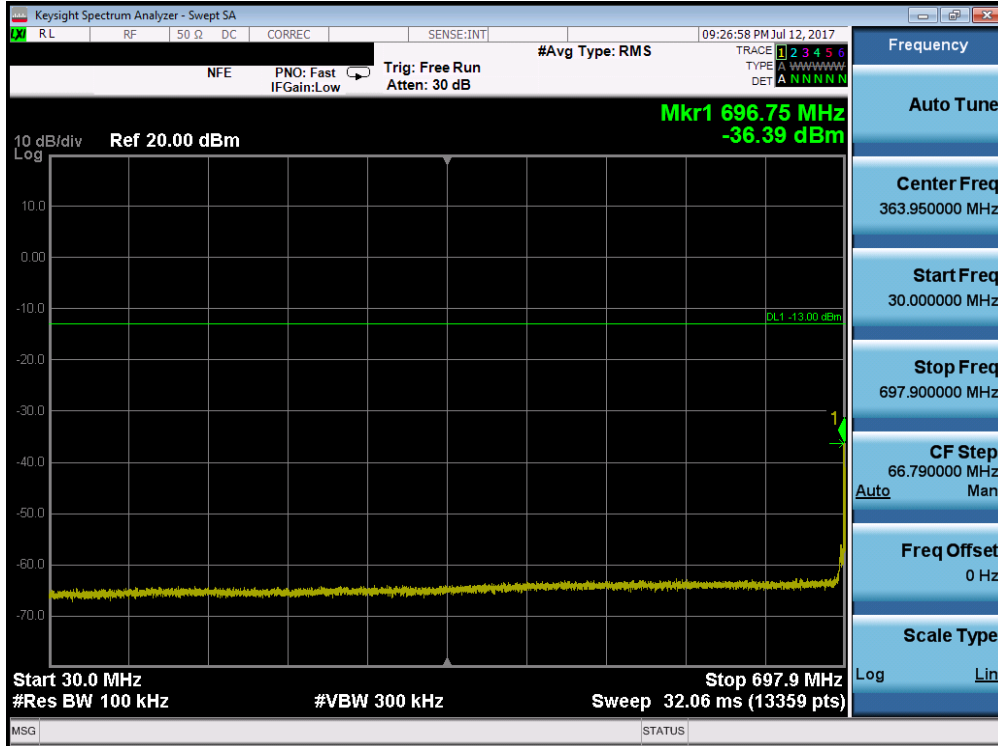


Figure 7-2. Test Instrument & Measurement Setup

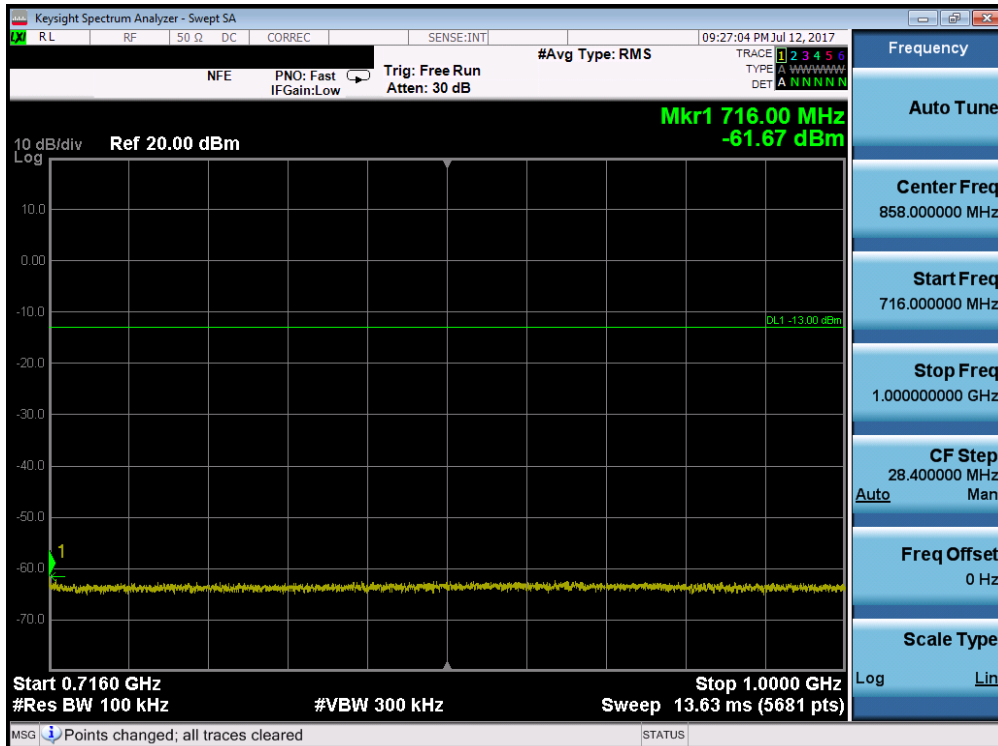
Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, 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. 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.

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Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset	Page 67 of 216	



Plot 7-100. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

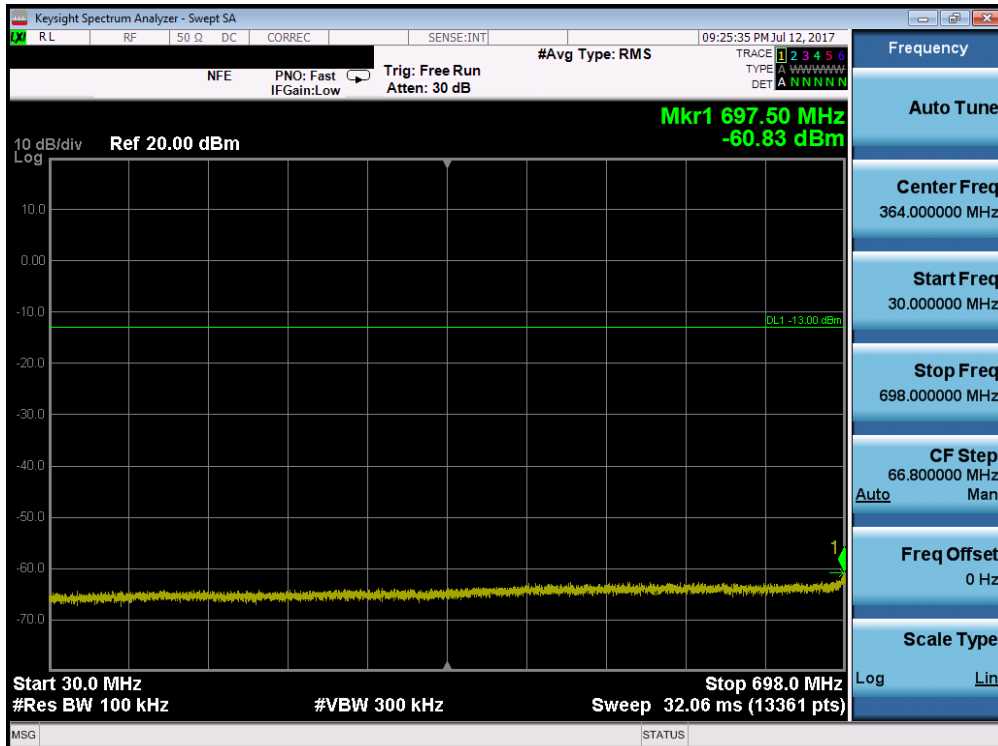


Plot 7-101. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 68 of 216

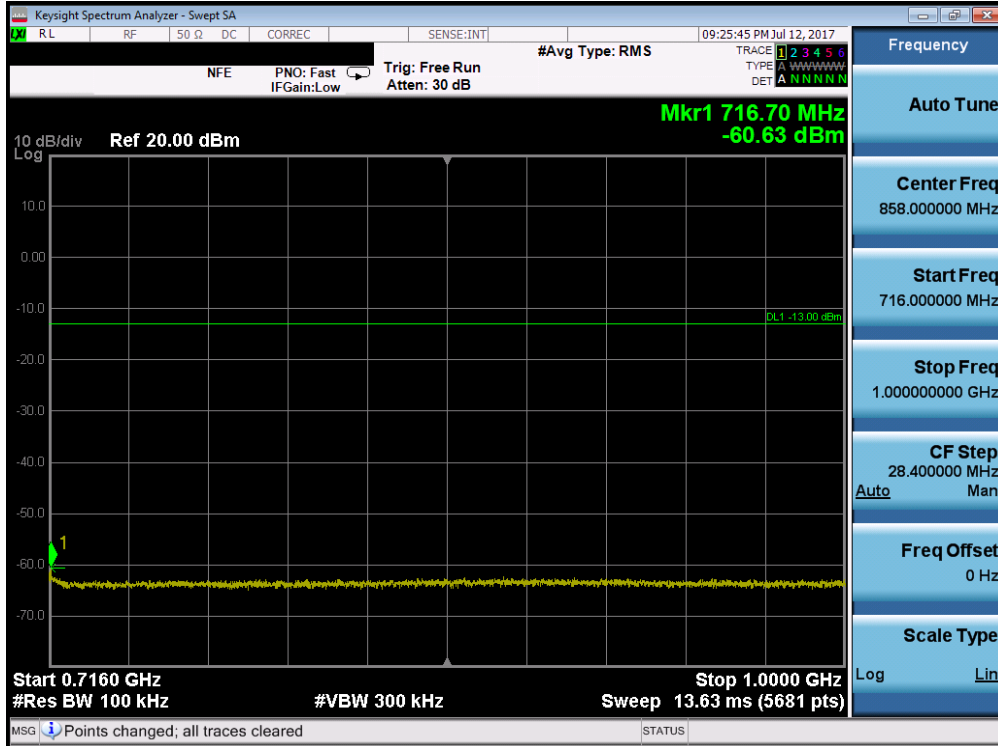


Plot 7-102. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



Plot 7-103. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

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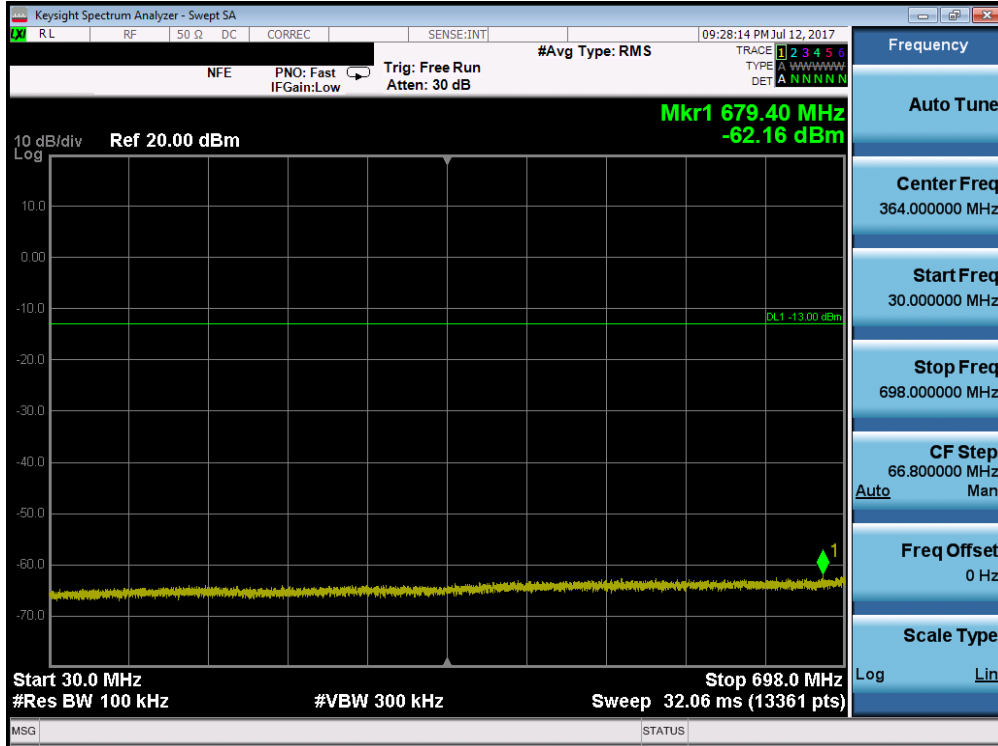


Plot 7-104. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

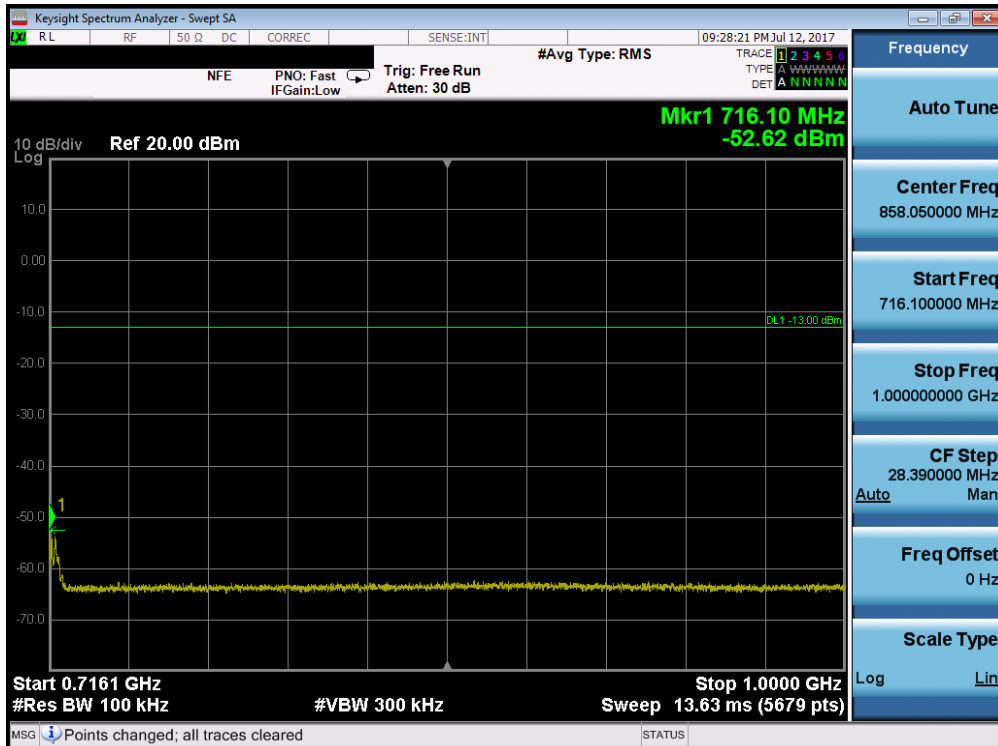


Plot 7-105. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

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Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 70 of 216



Plot 7-106. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

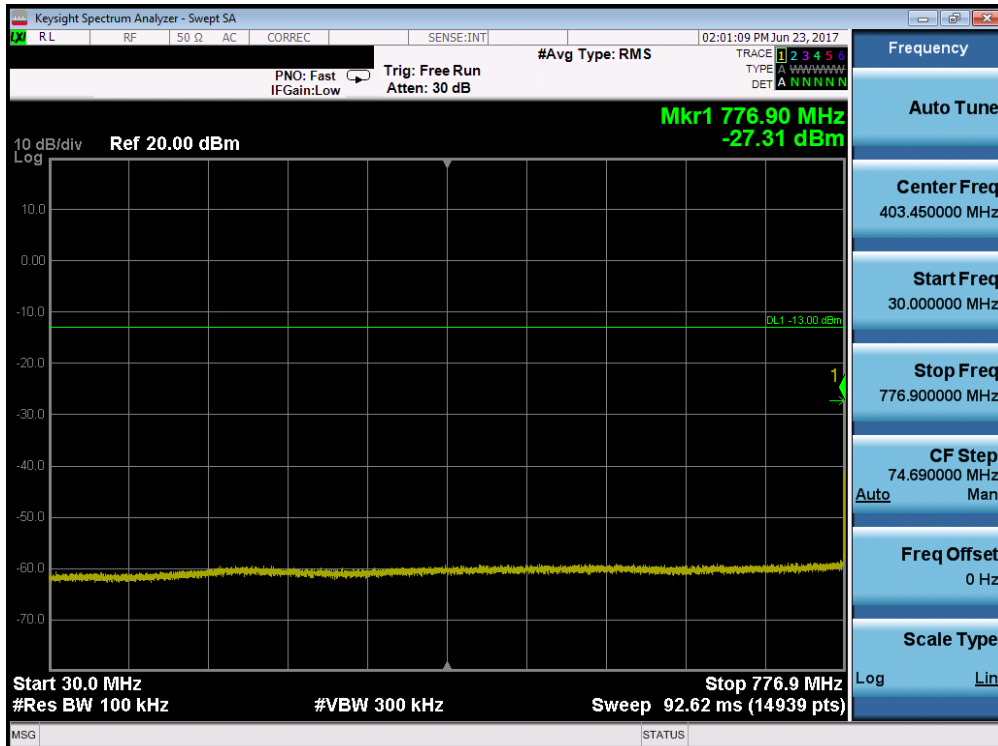


Plot 7-107. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 71 of 216

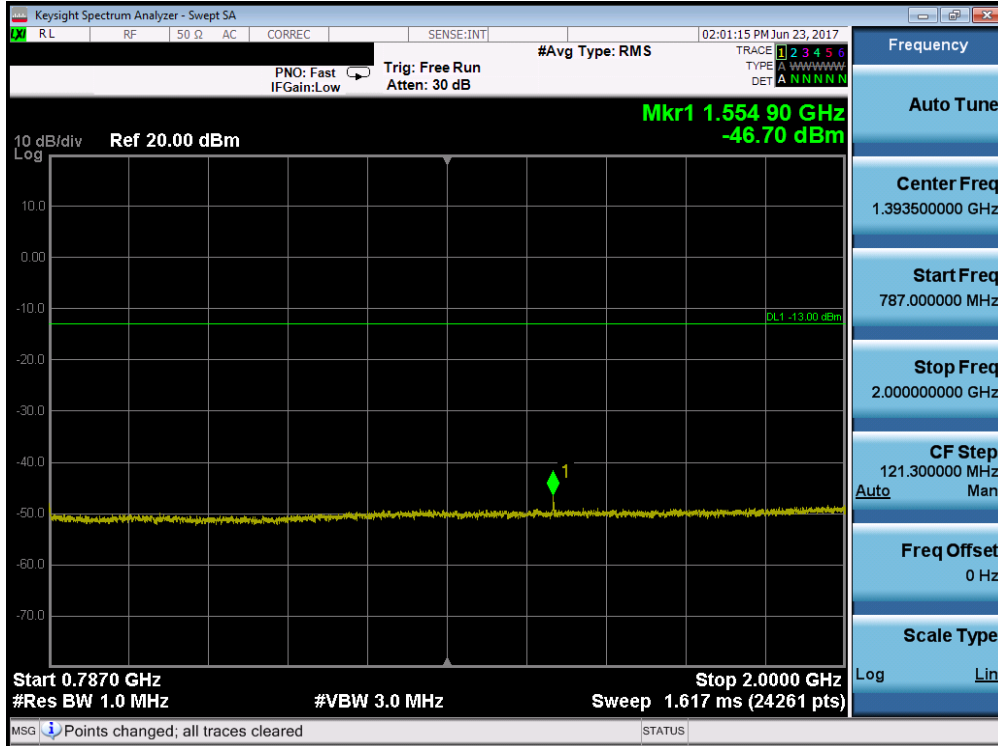


Plot 7-108. Conducted Spurious Plot (Band 12 – 3.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

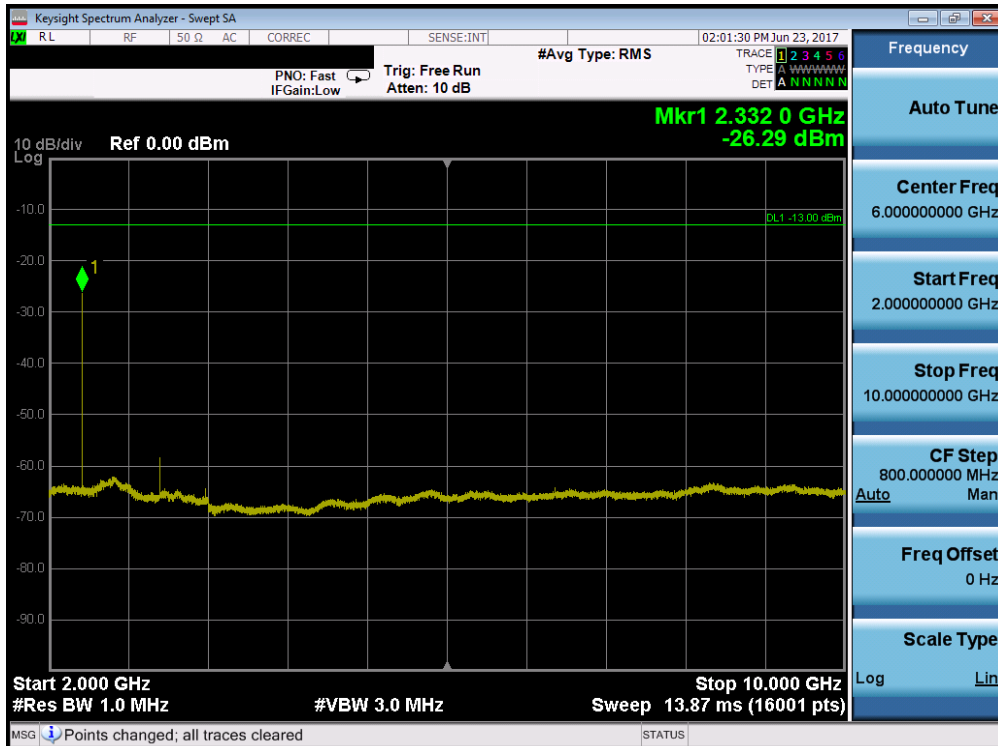


Plot 7-109. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 72 of 216

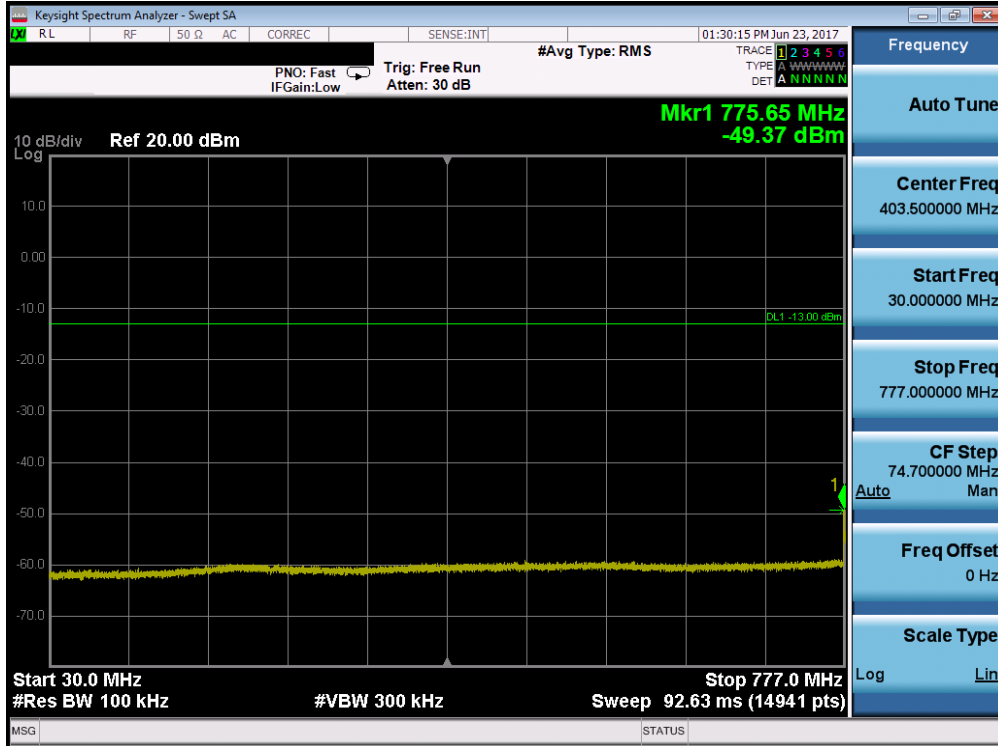


Plot 7-110. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

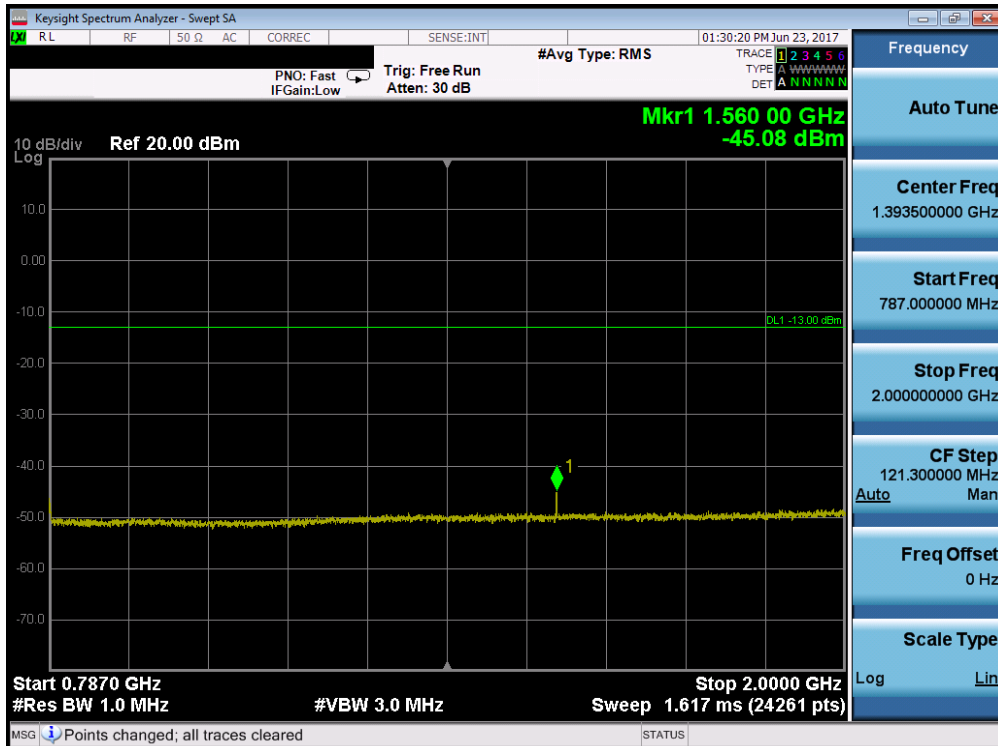


Plot 7-111. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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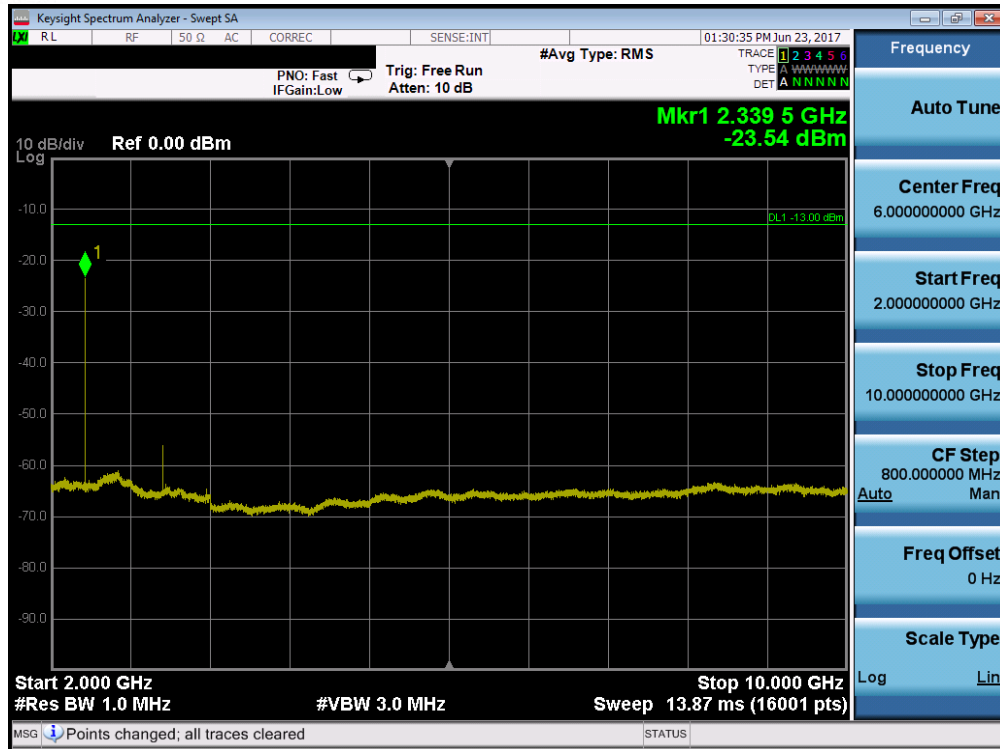


Plot 7-112. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

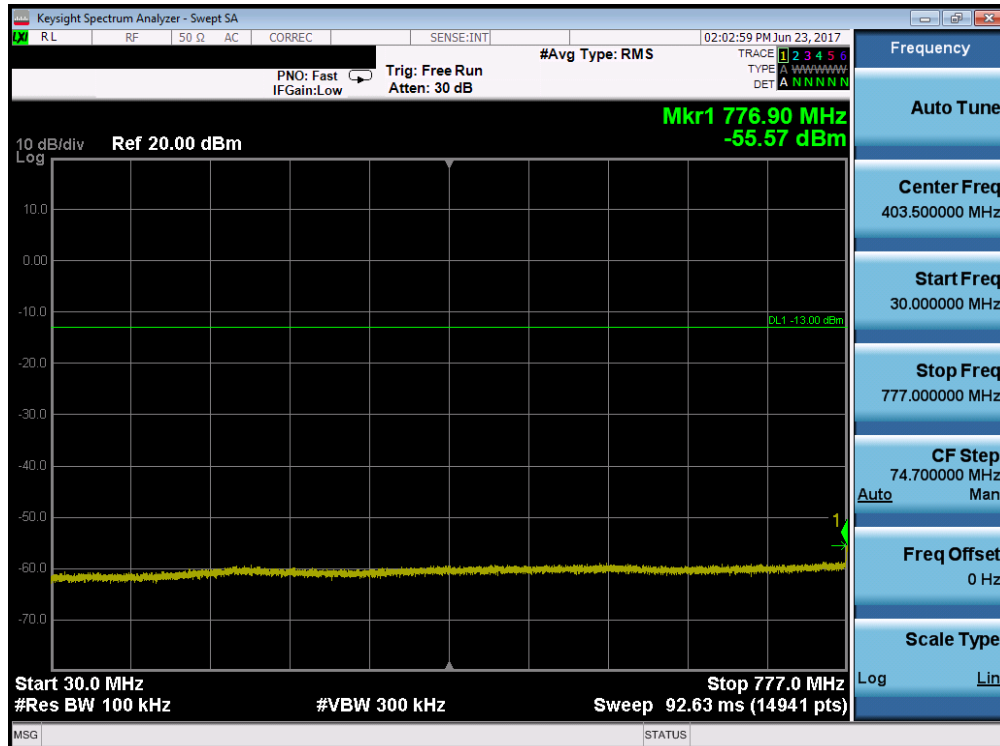


Plot 7-113. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 74 of 216

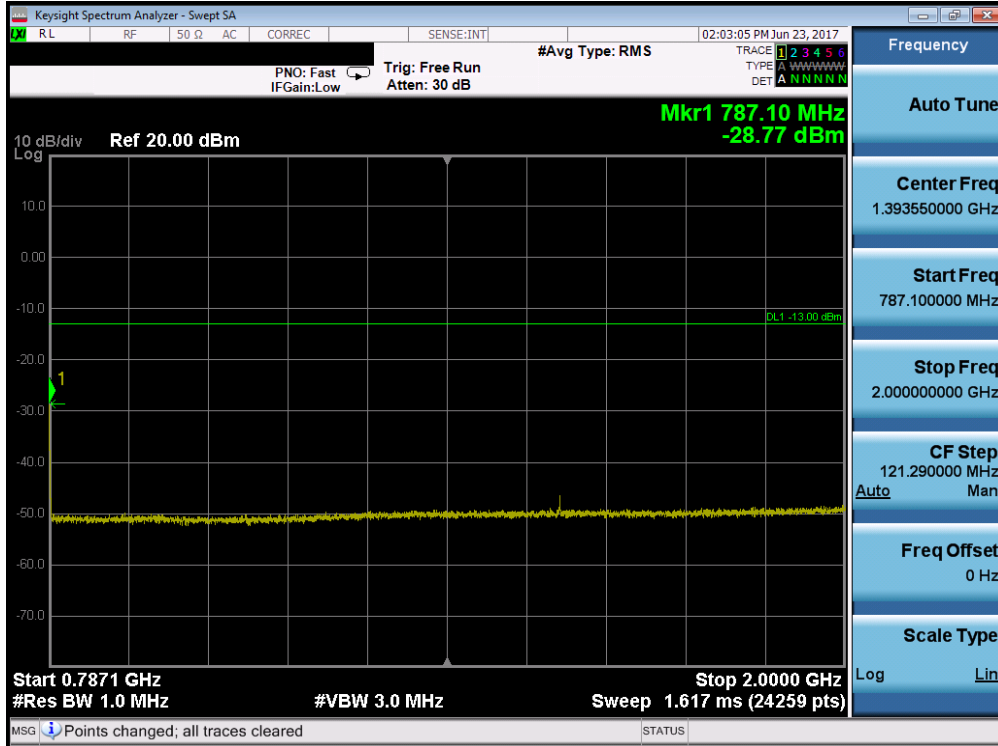


Plot 7-114. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

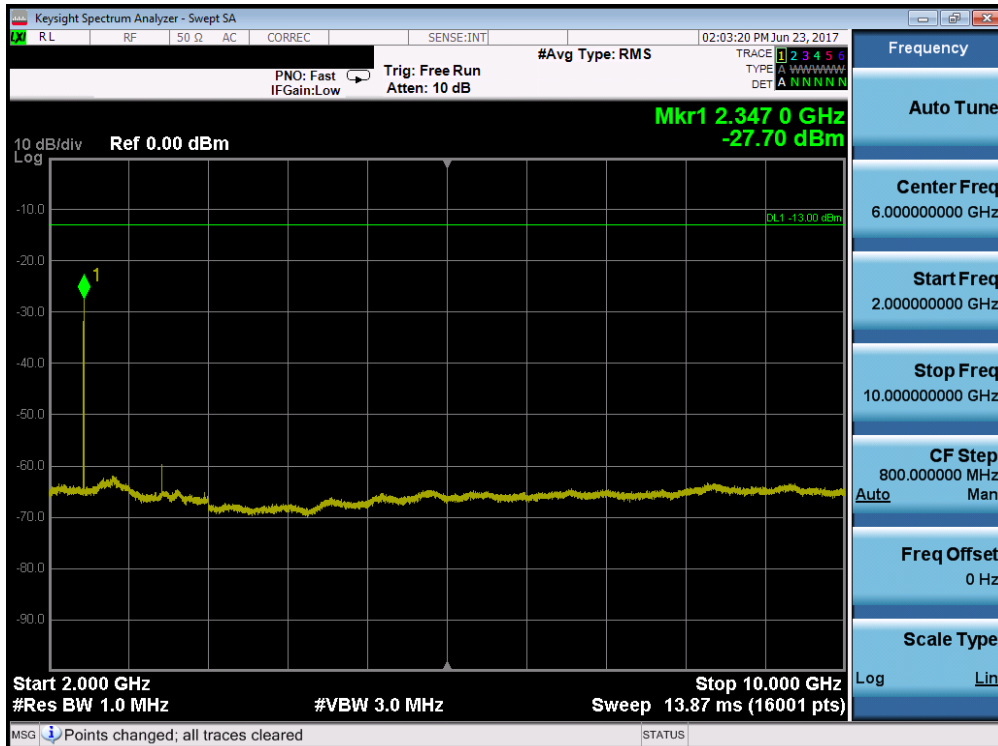


Plot 7-115. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 75 of 216

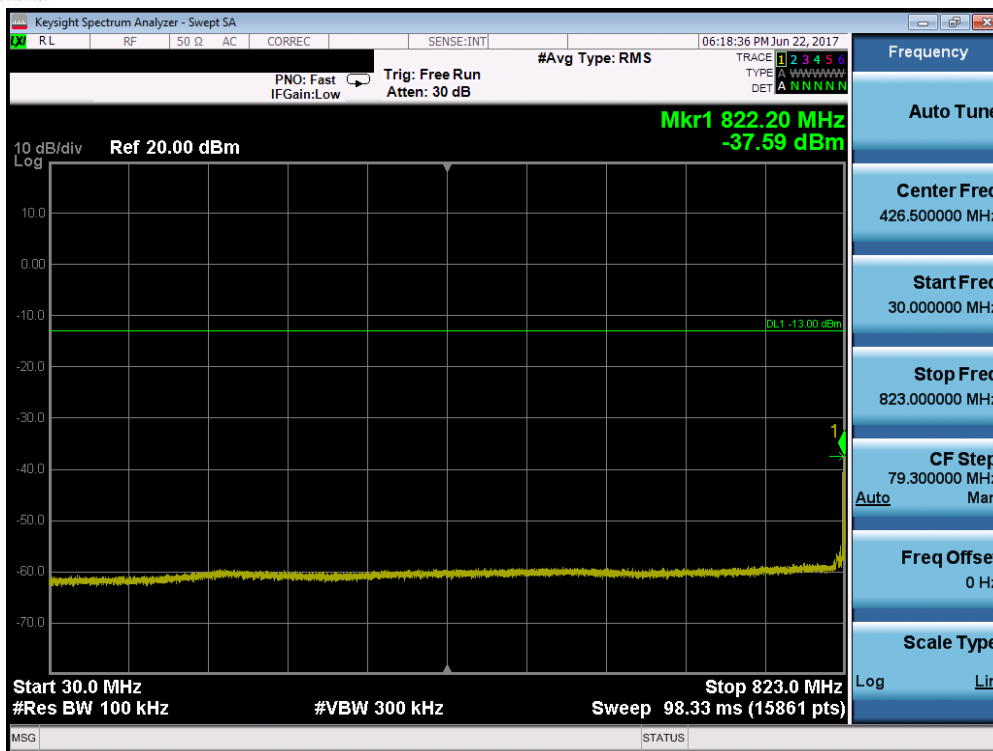


Plot 7-116. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

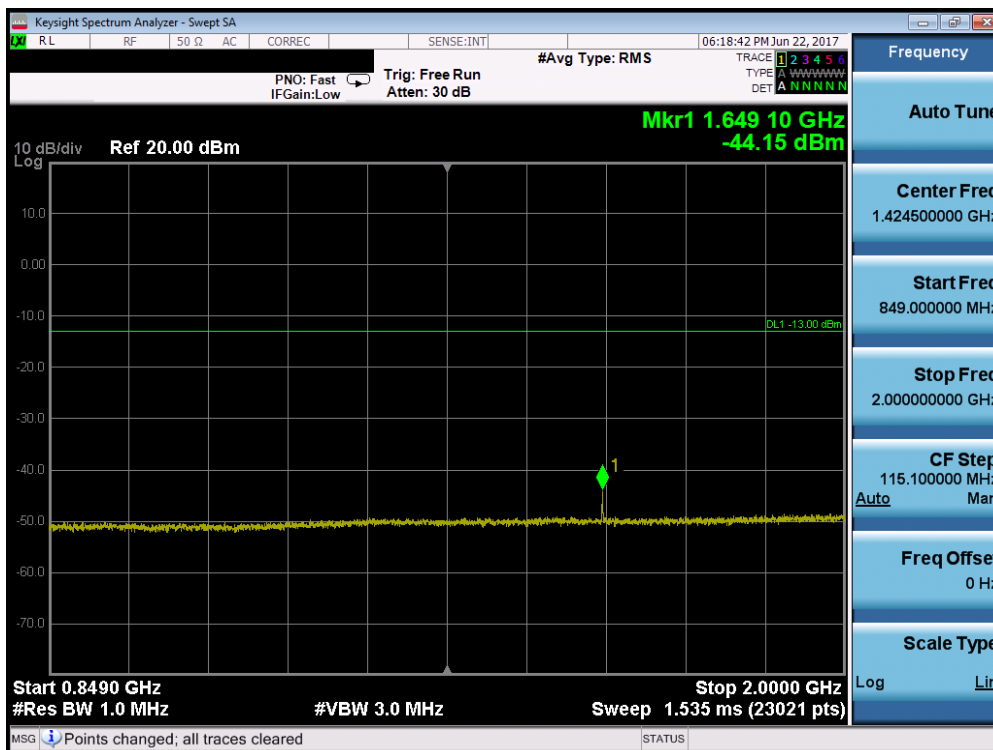


Plot 7-117. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 76 of 216

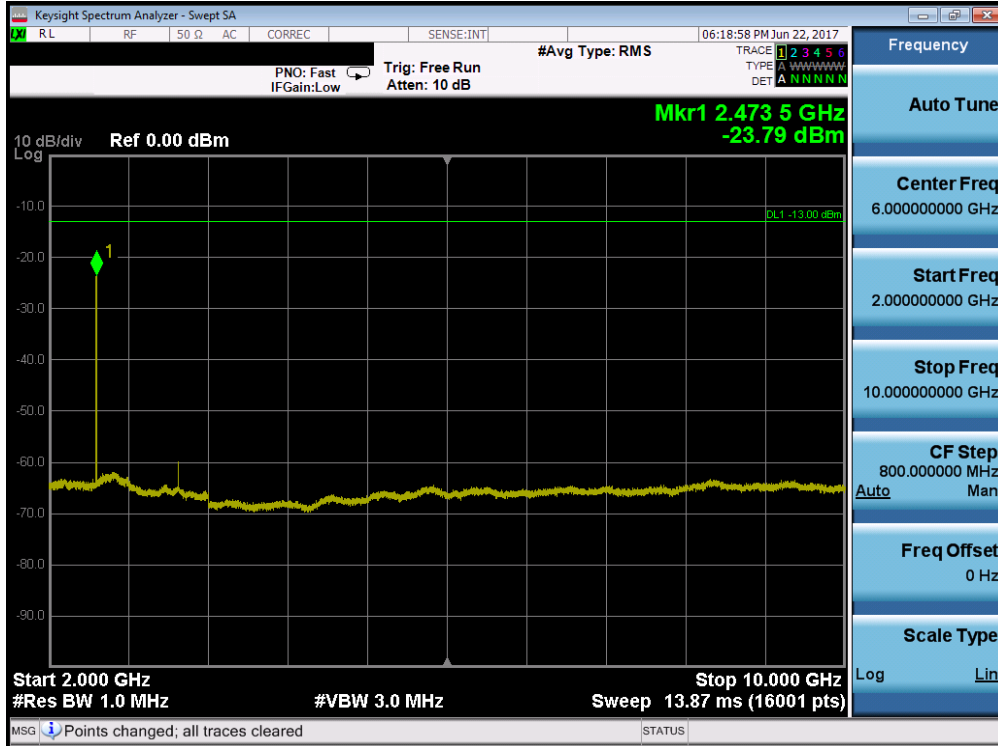


Plot 7-118. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

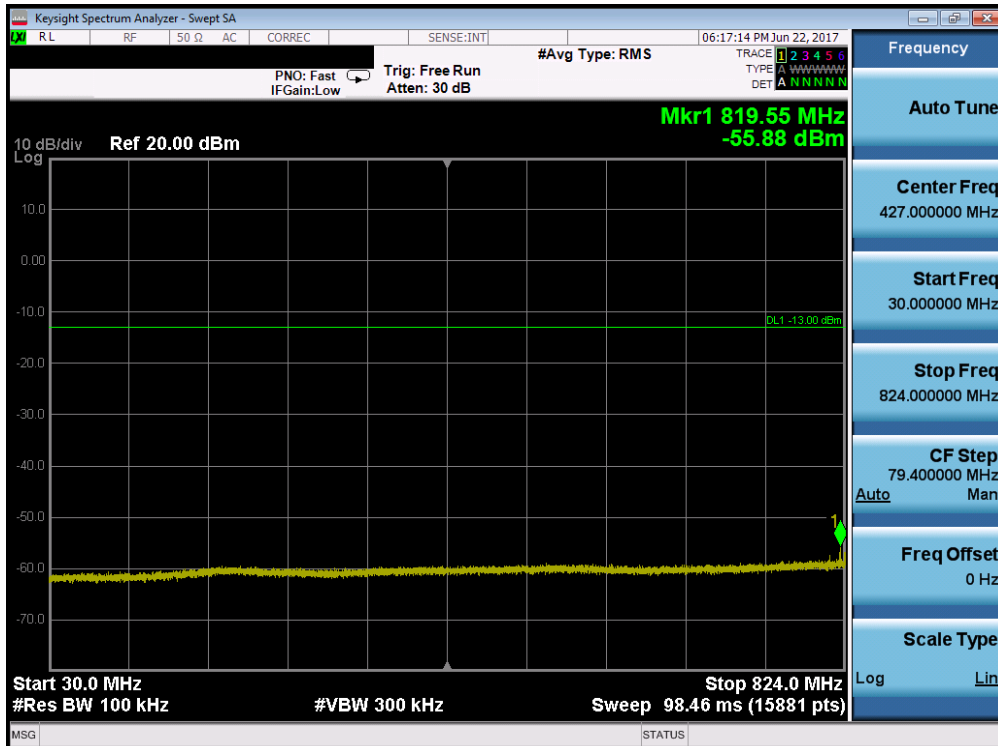


Plot 7-119. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 77 of 216

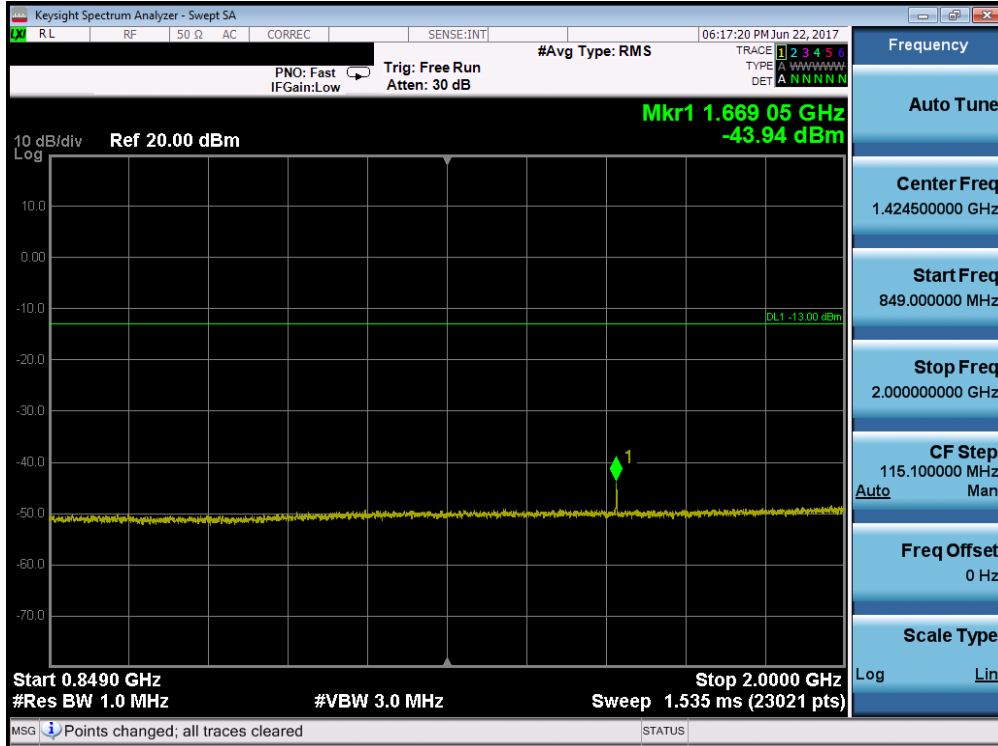


Plot 7-120. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

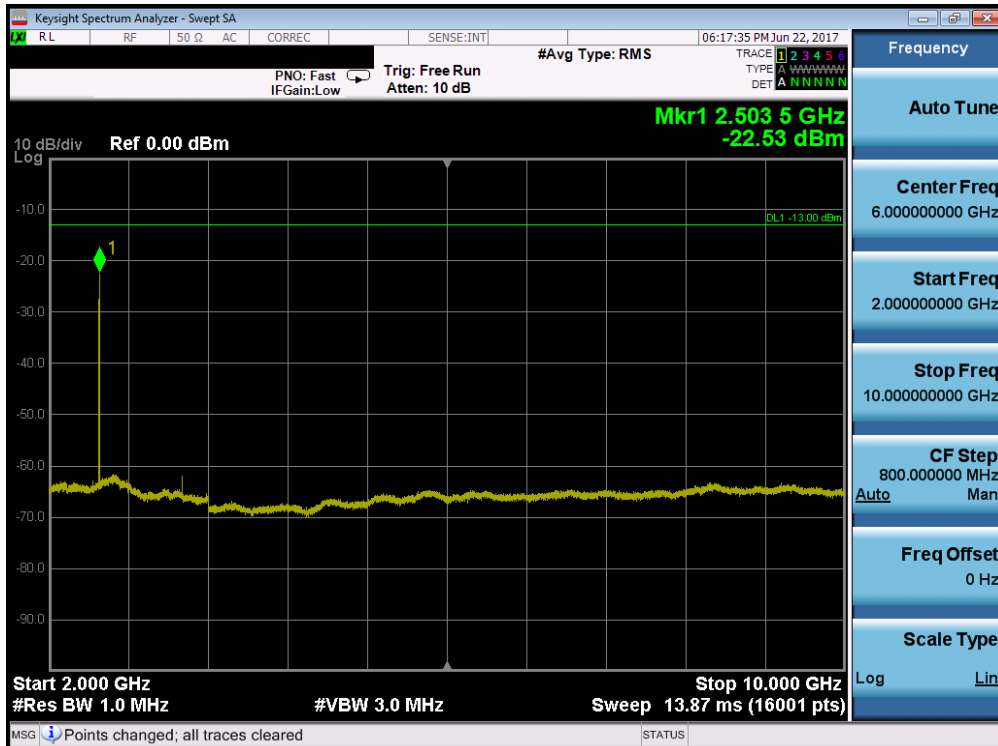


Plot 7-121. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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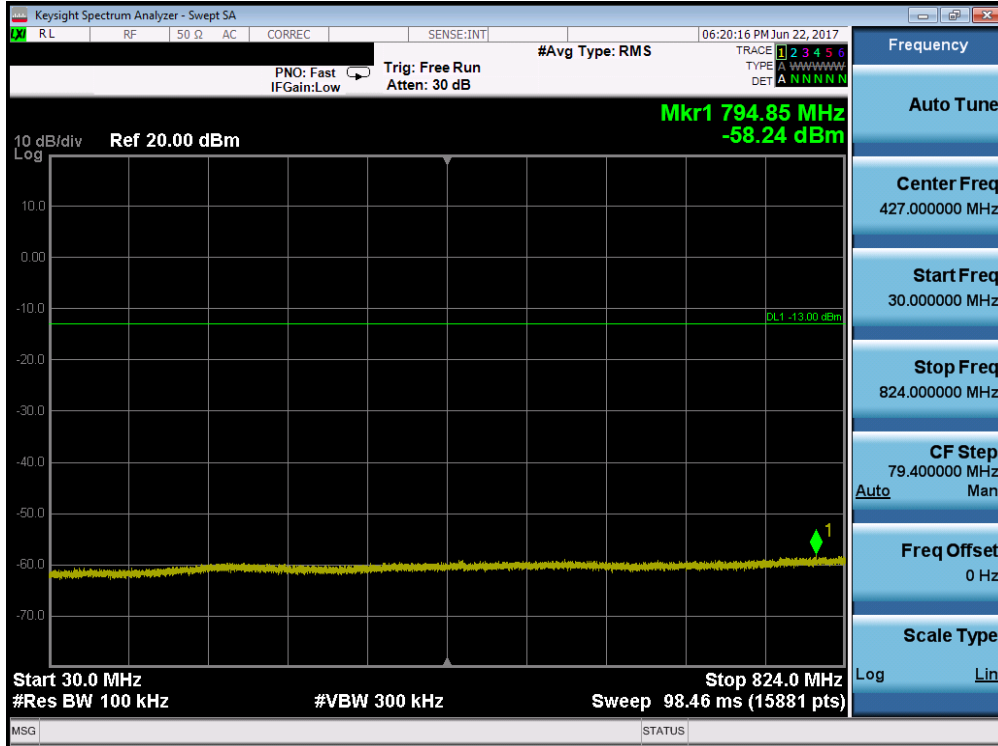


Plot 7-122. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

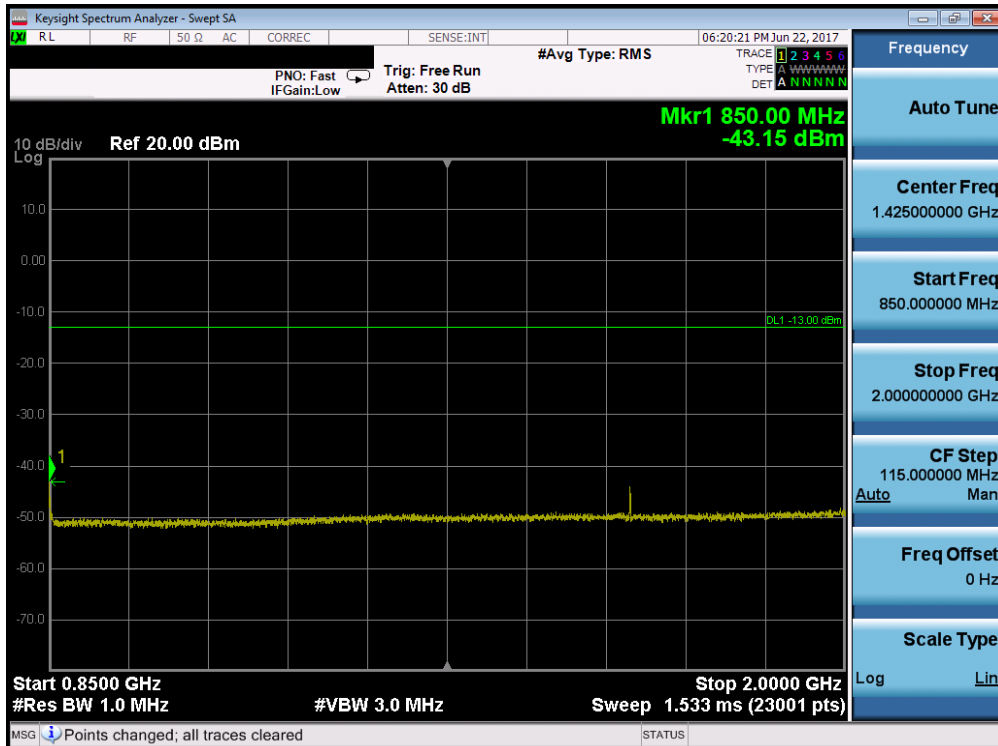


Plot 7-123. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 79 of 216

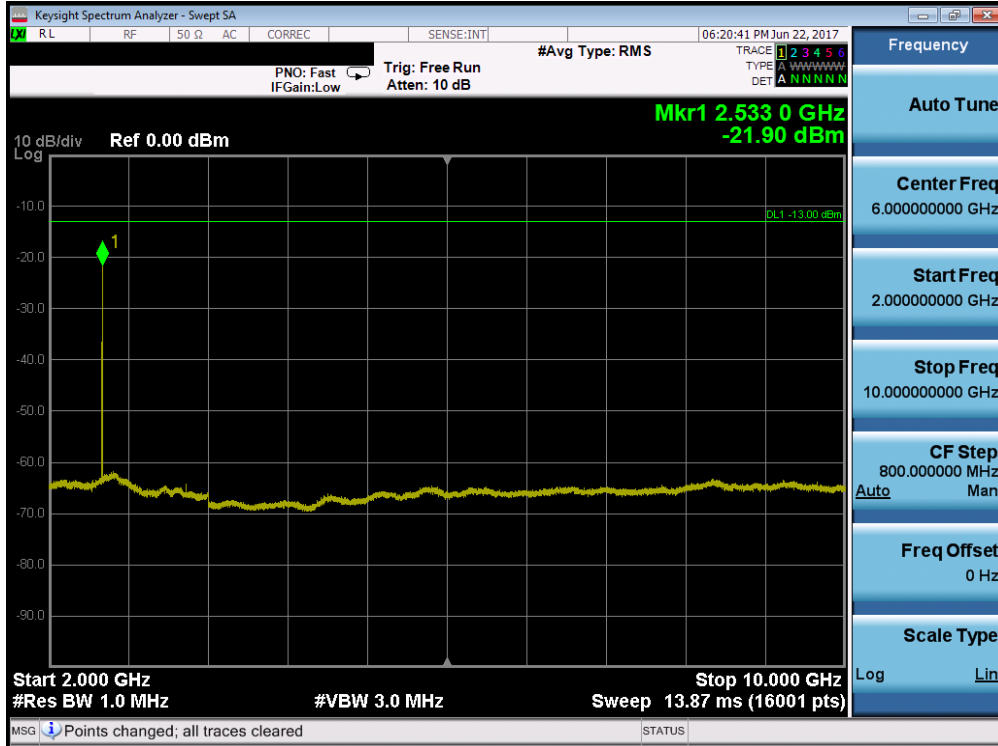


Plot 7-124. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

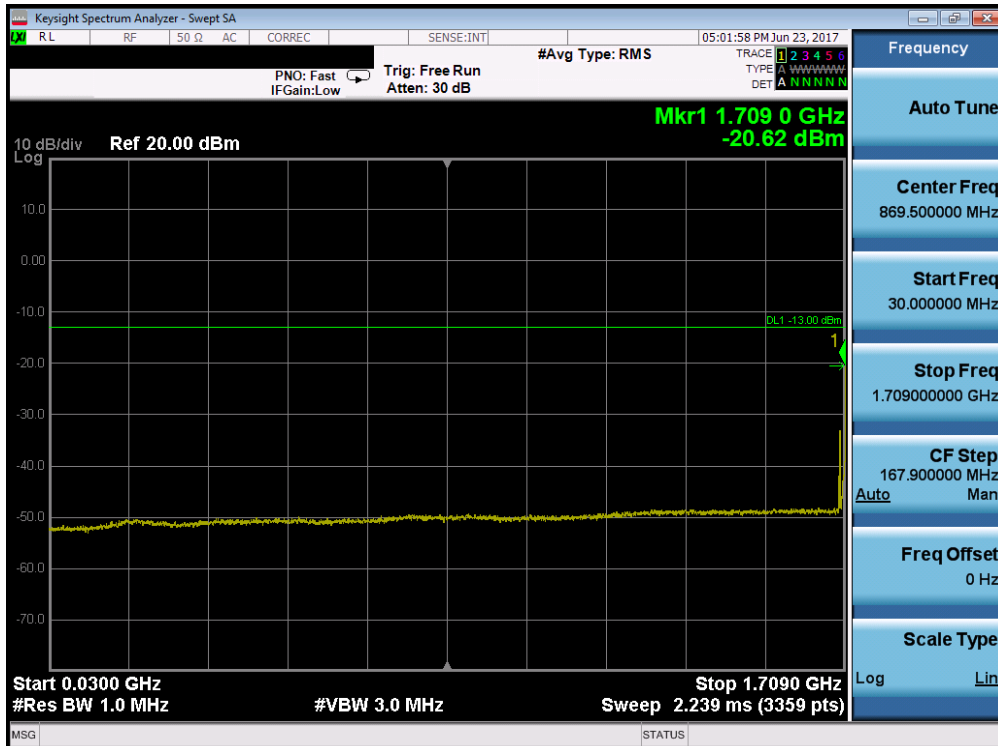


Plot 7-125. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 80 of 216

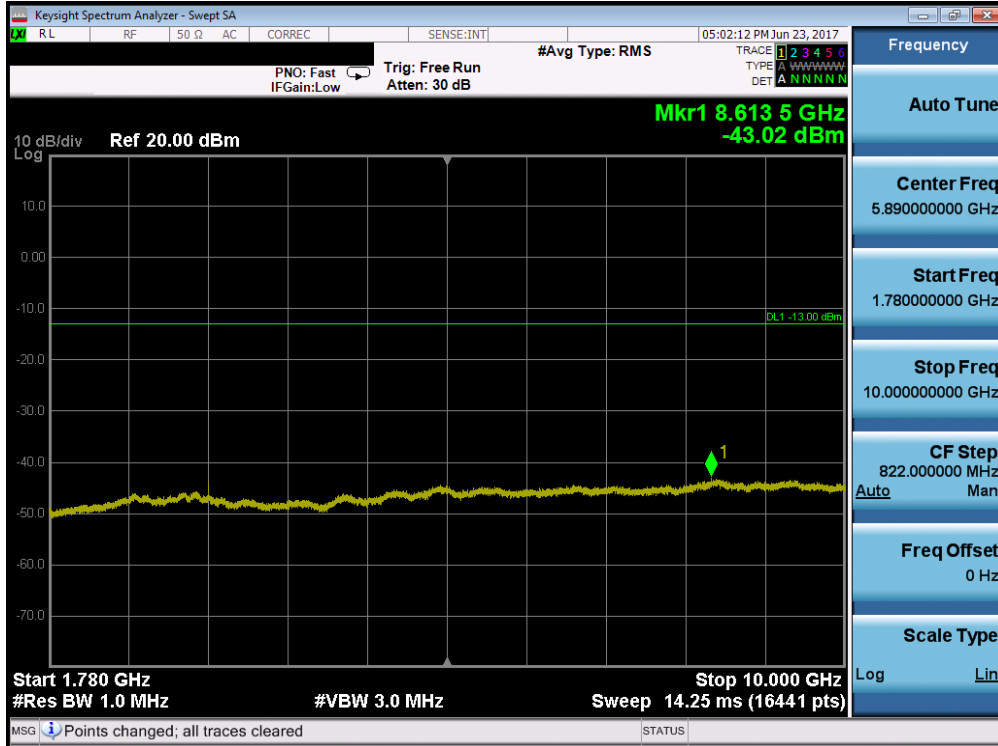


Plot 7-126. Conducted Spurious Plot (Band 5/26 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

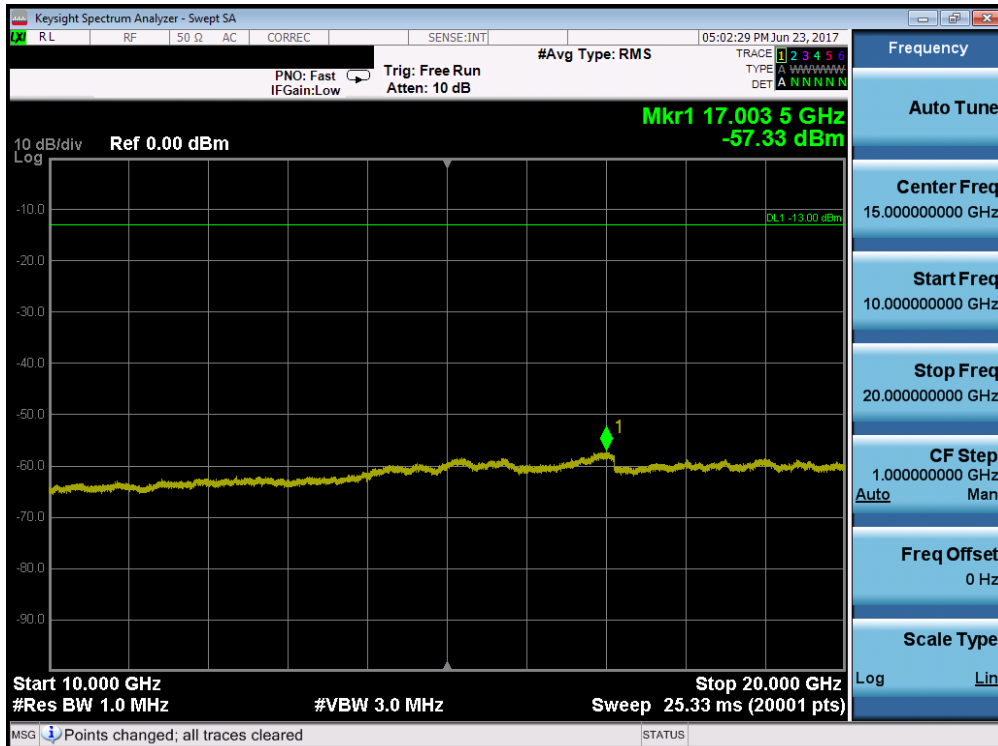


Plot 7-127. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 81 of 216

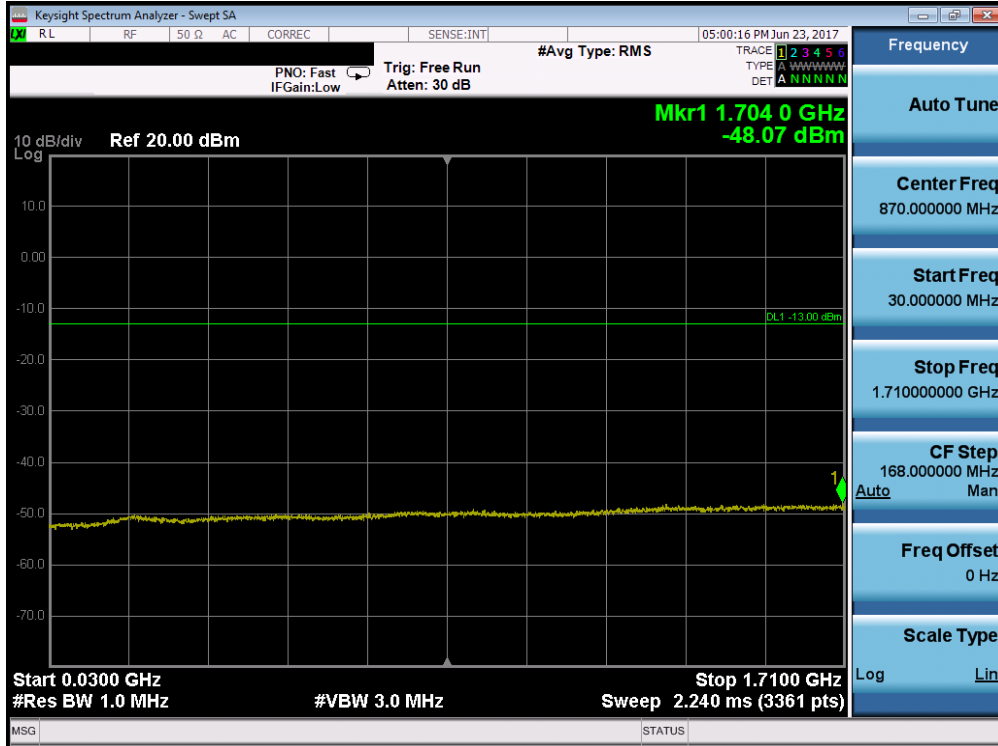


Plot 7-128. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

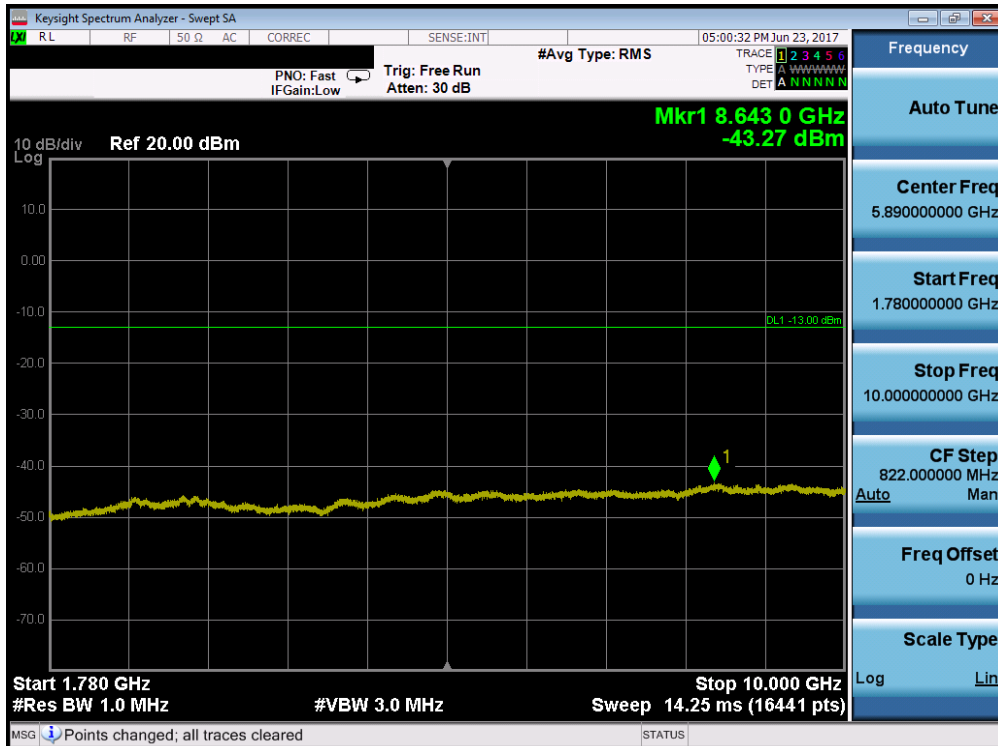


Plot 7-129. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 82 of 216

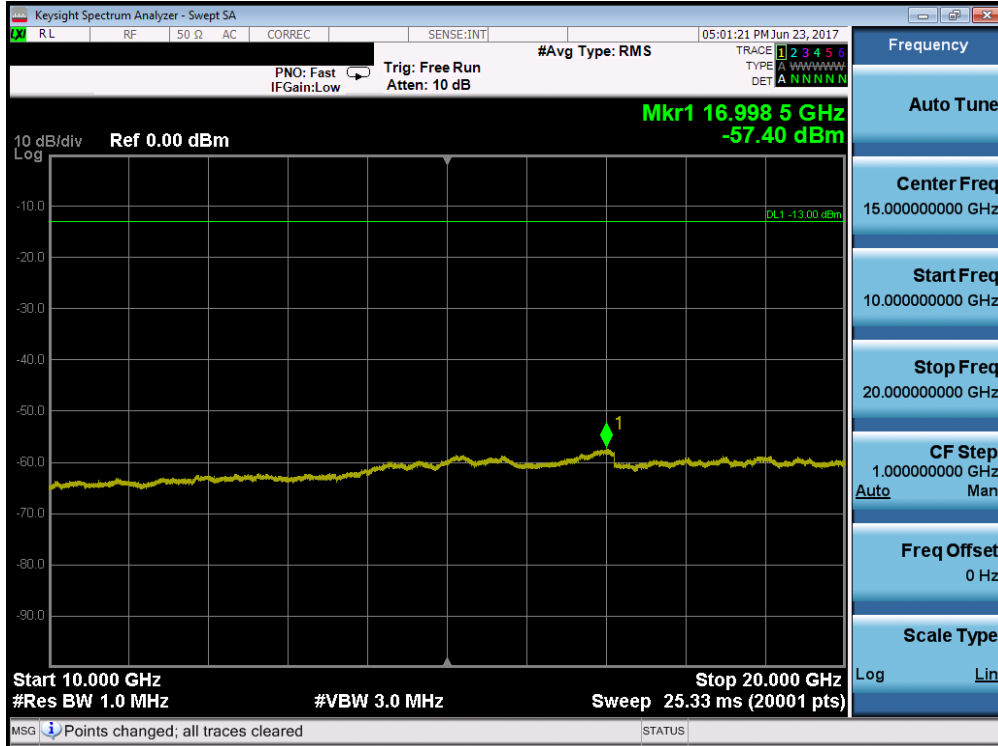


Plot 7-130. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

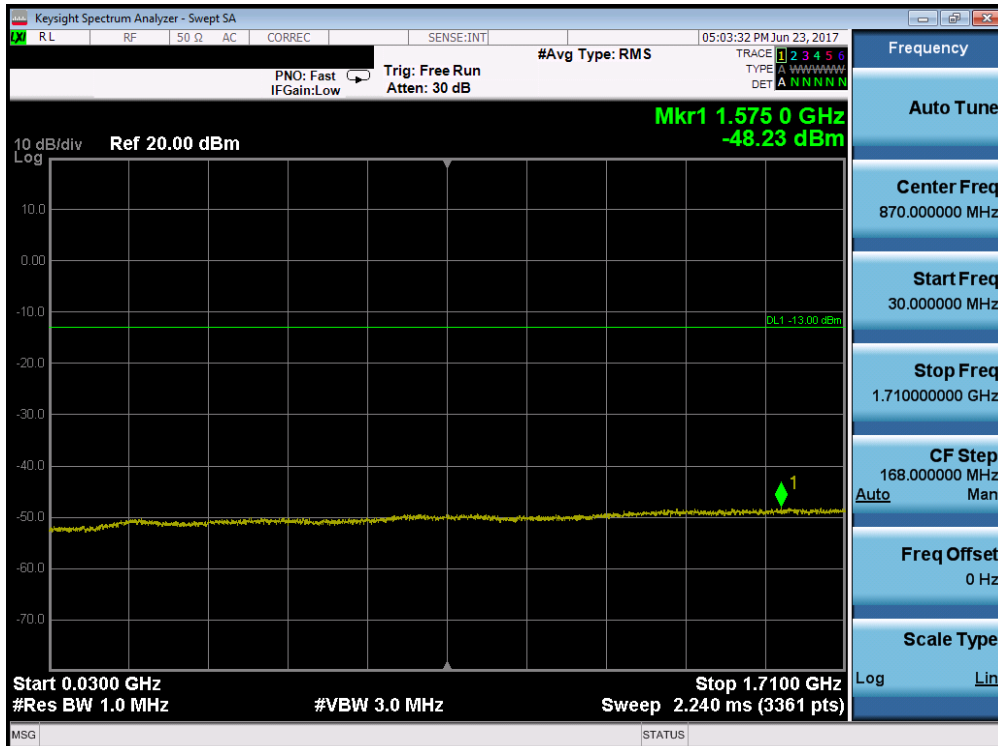


Plot 7-131. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 83 of 216

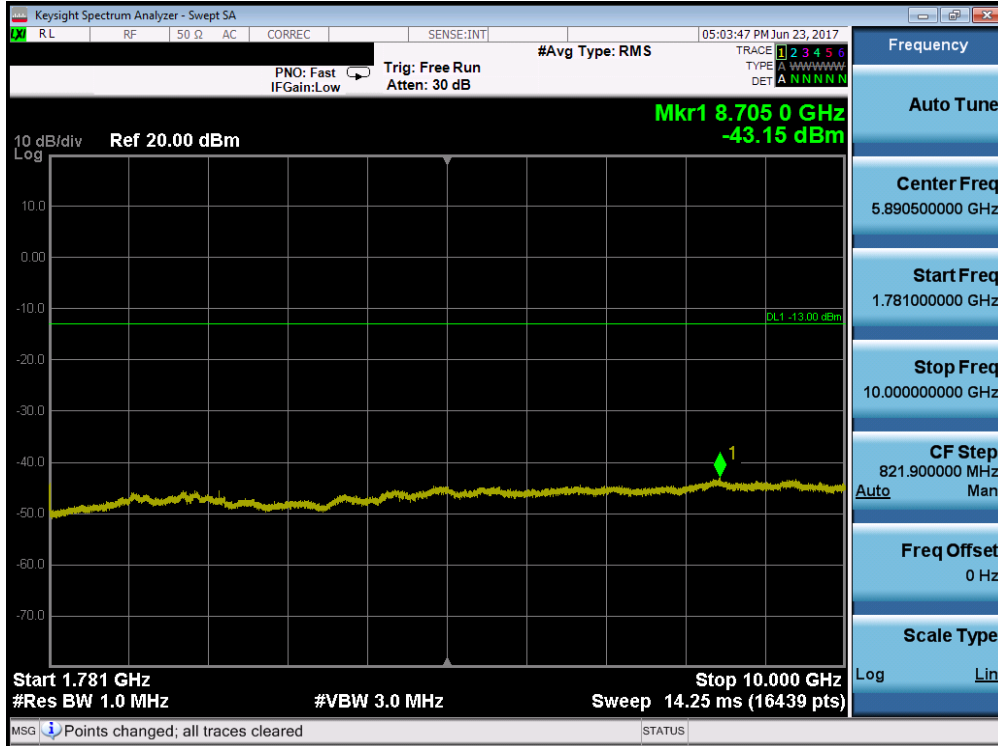


Plot 7-132. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

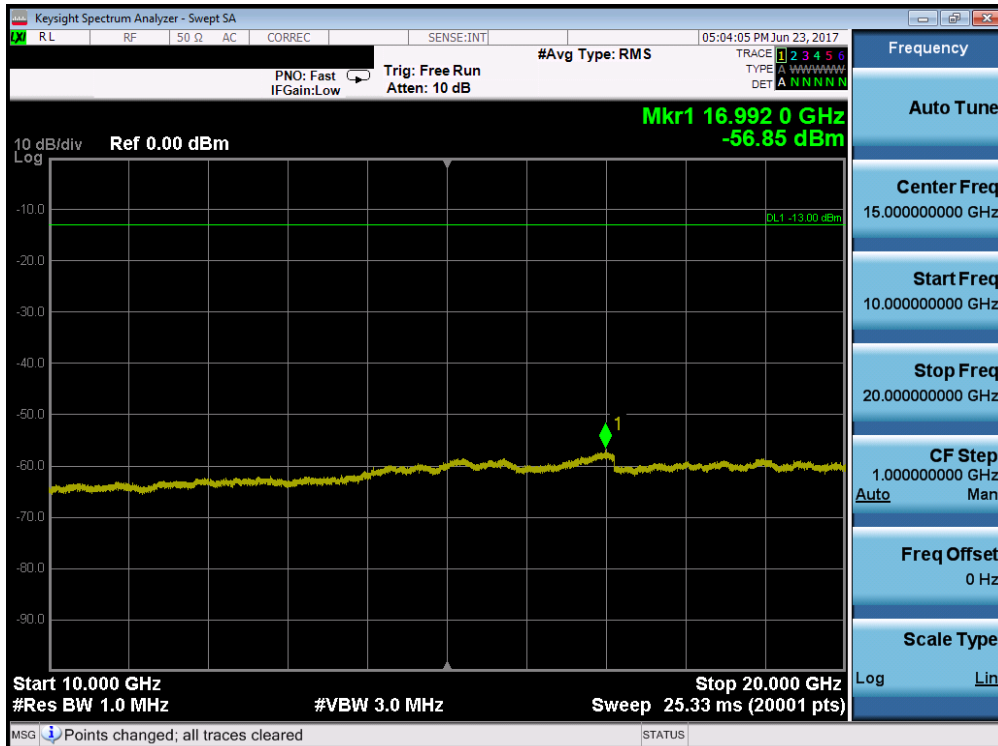


Plot 7-133. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 84 of 216

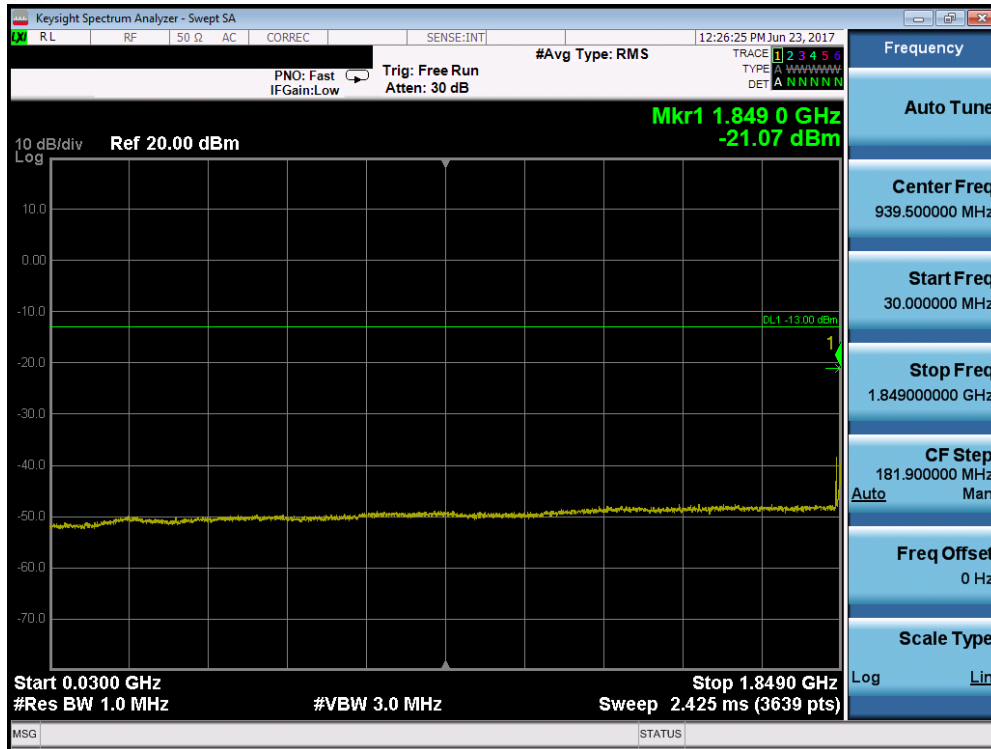


Plot 7-134. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

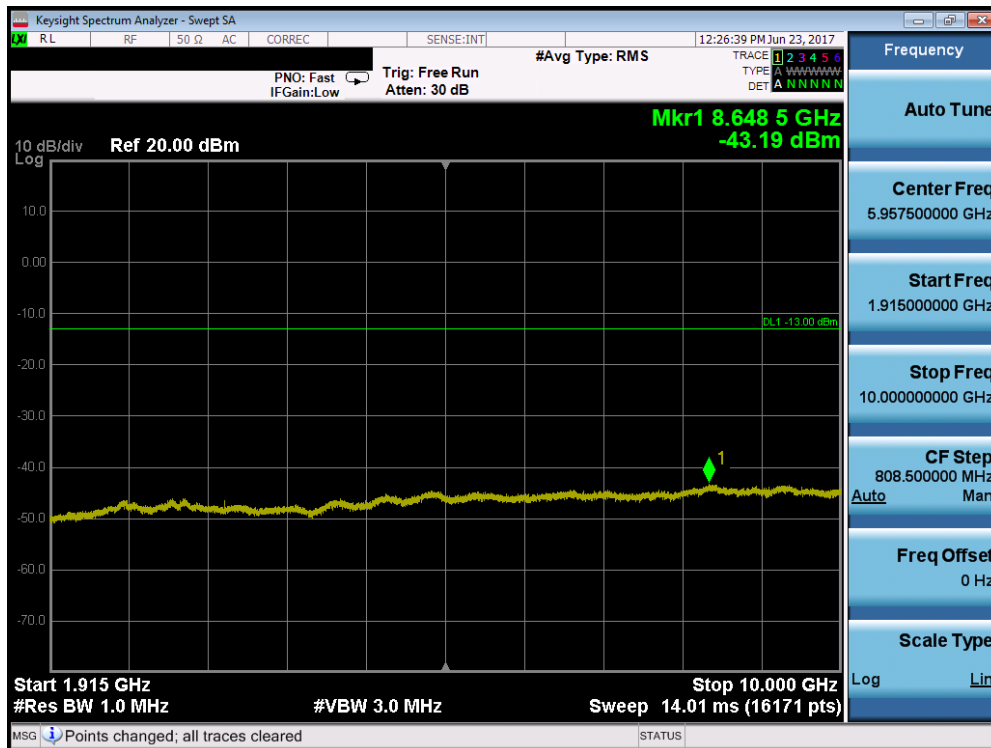


Plot 7-135. Conducted Spurious Plot (Band 4/66 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 85 of 216

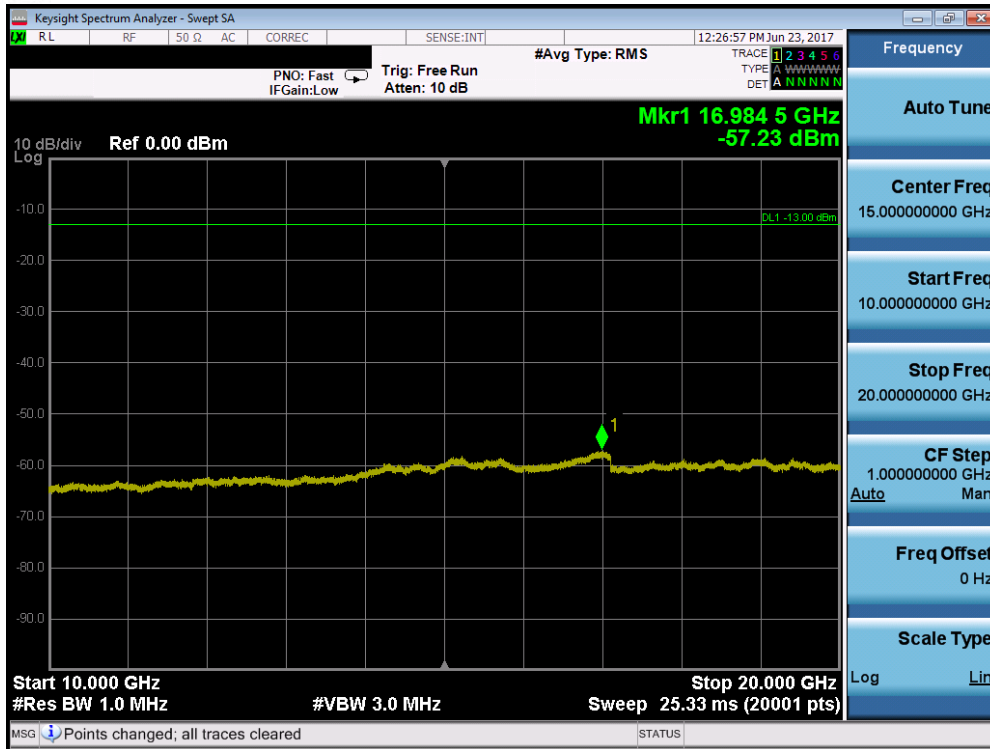


Plot 7-136. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

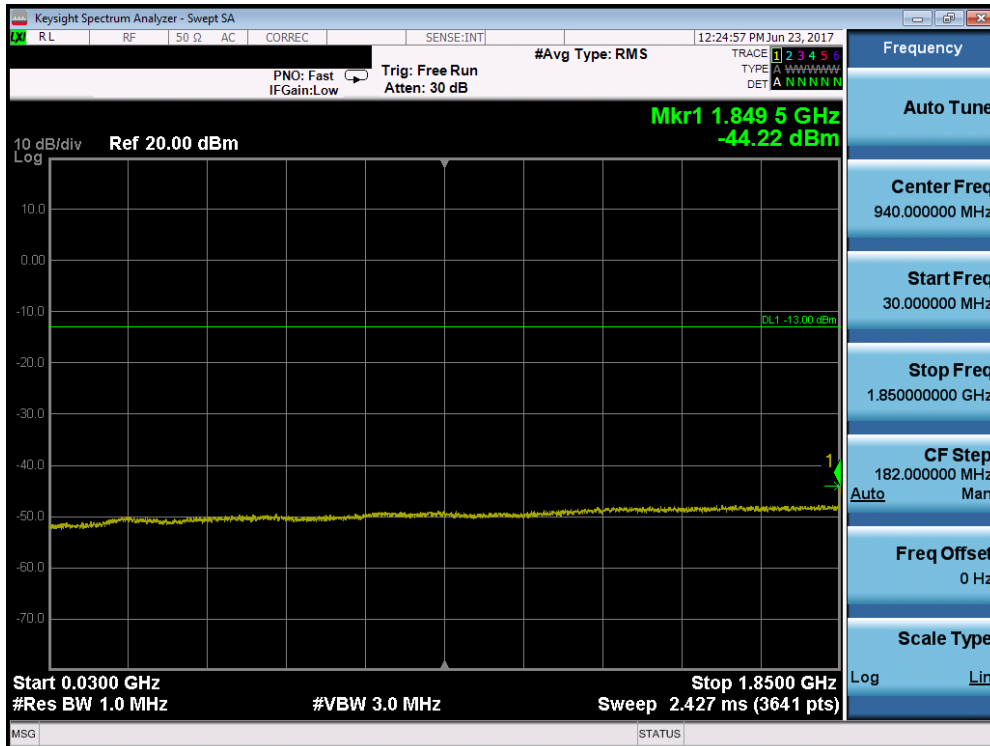


Plot 7-137. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 86 of 216

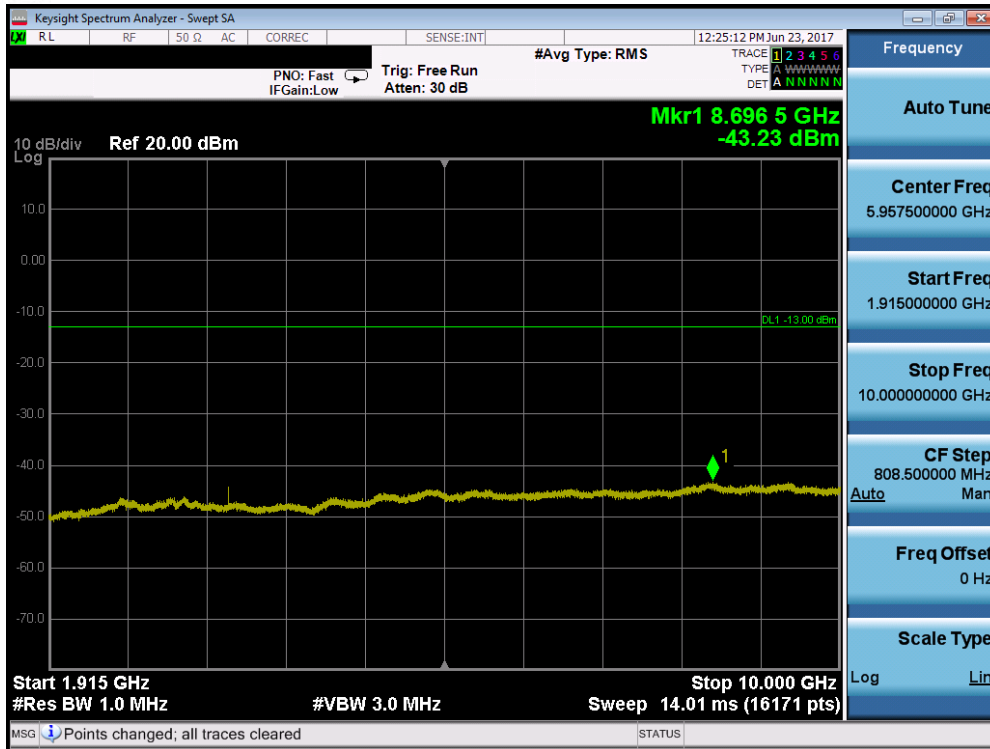


Plot 7-138. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

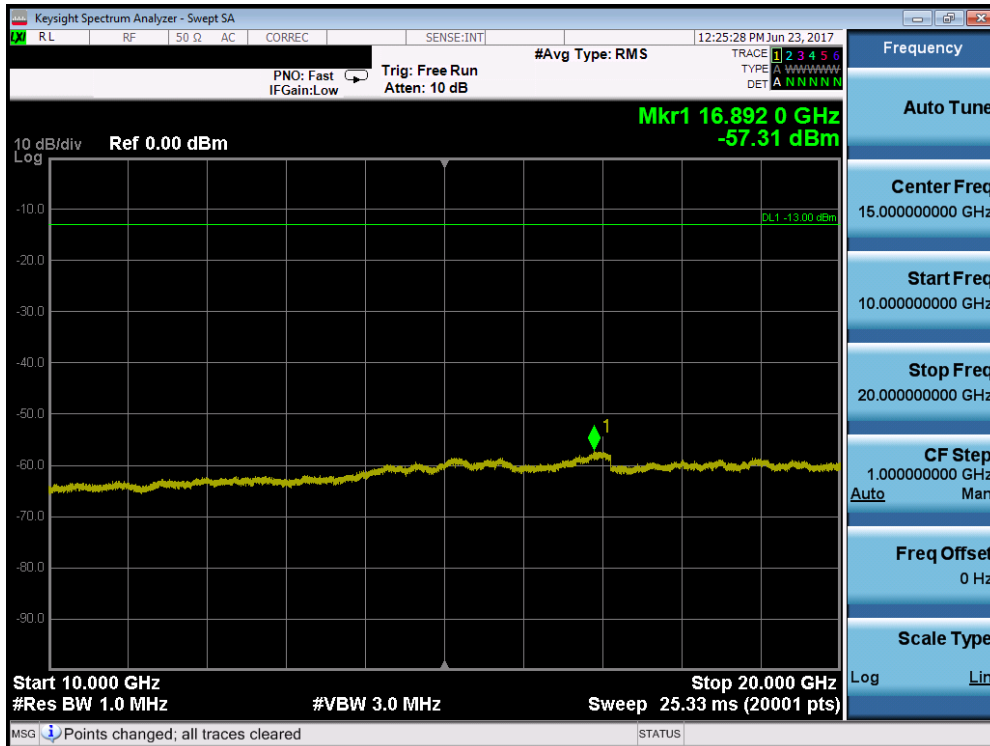


Plot 7-139. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 87 of 216

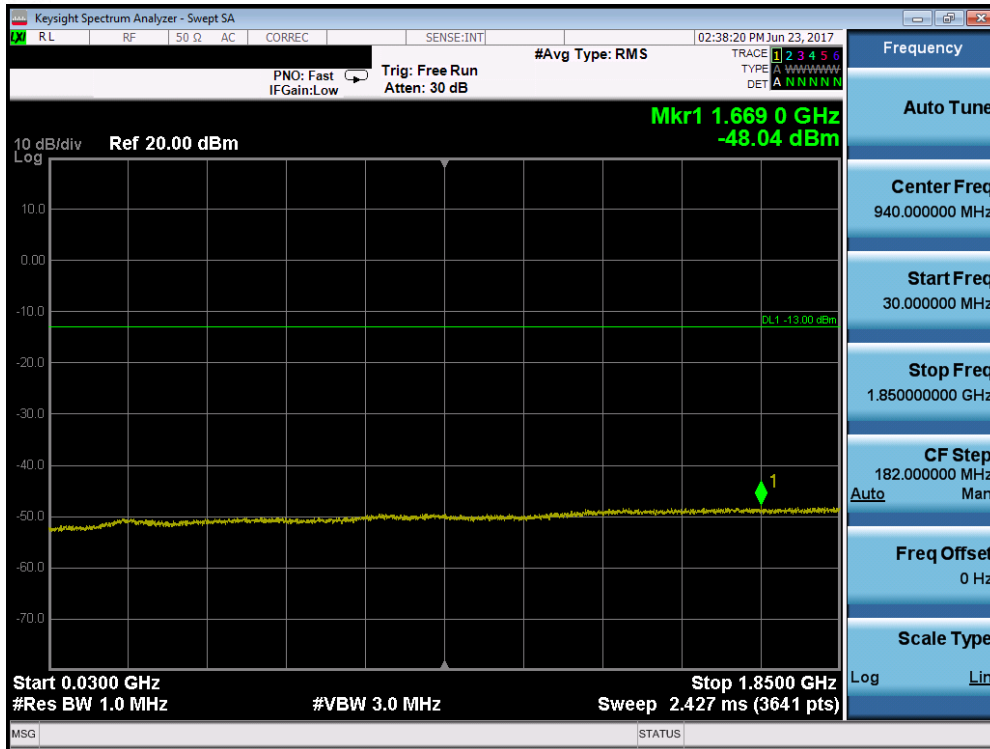


Plot 7-140. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

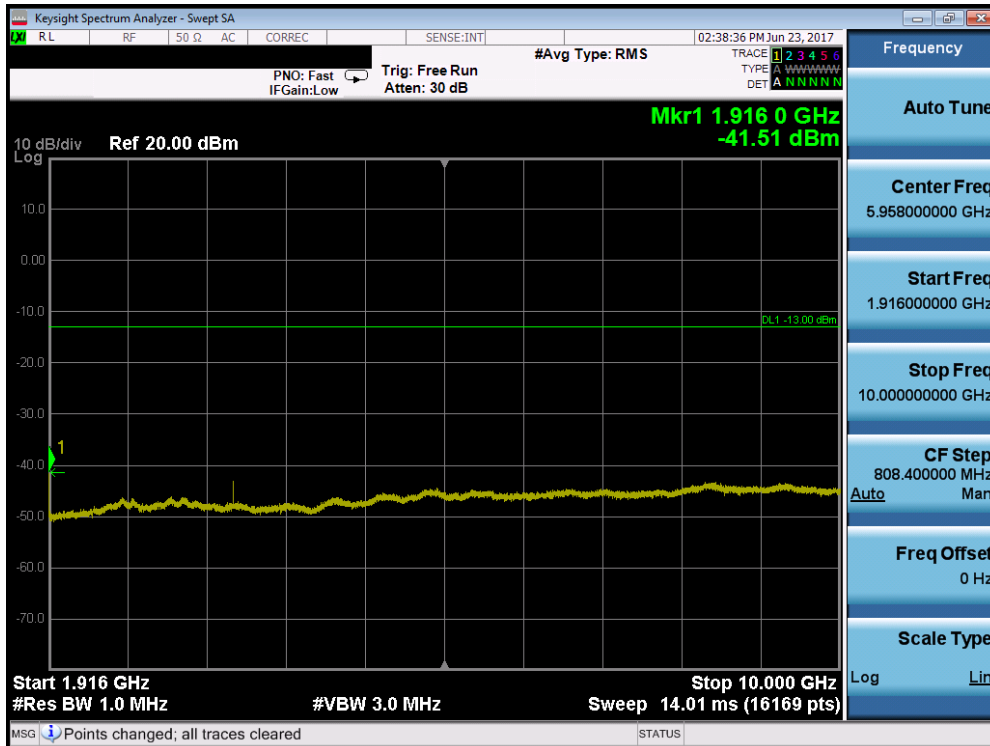


Plot 7-141. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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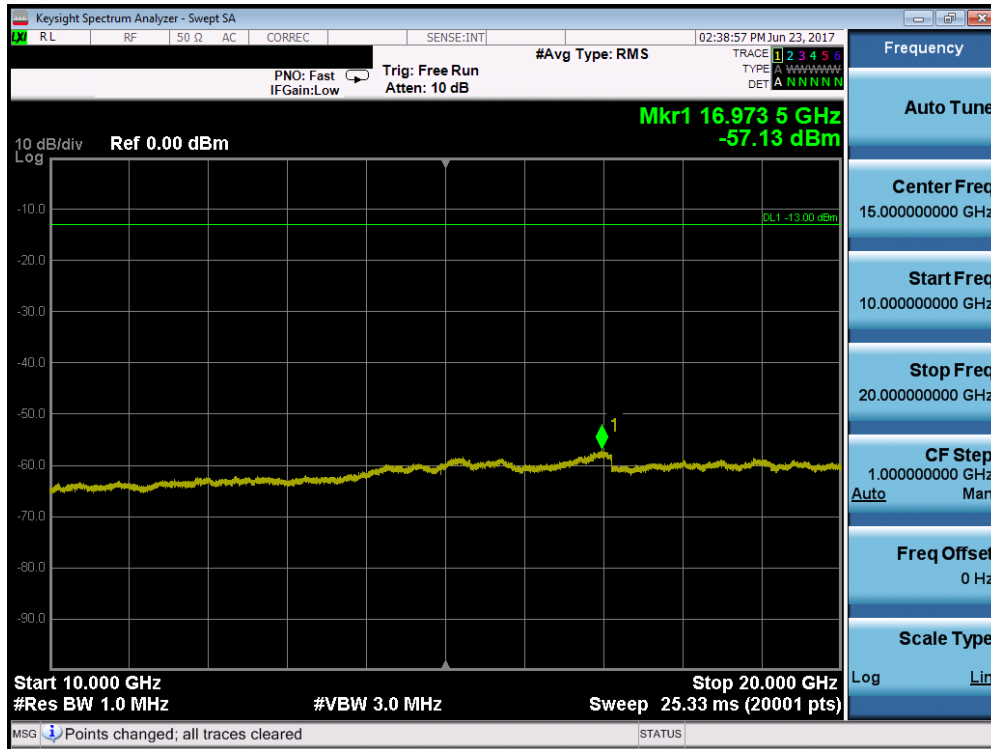


Plot 7-142. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

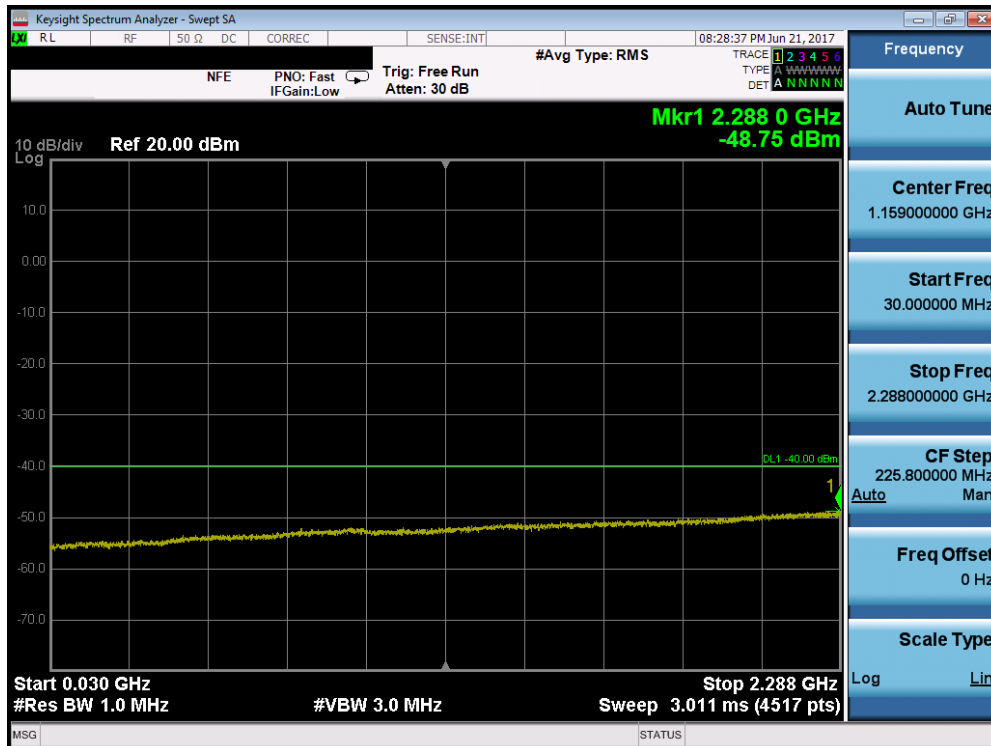


Plot 7-143. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 89 of 216

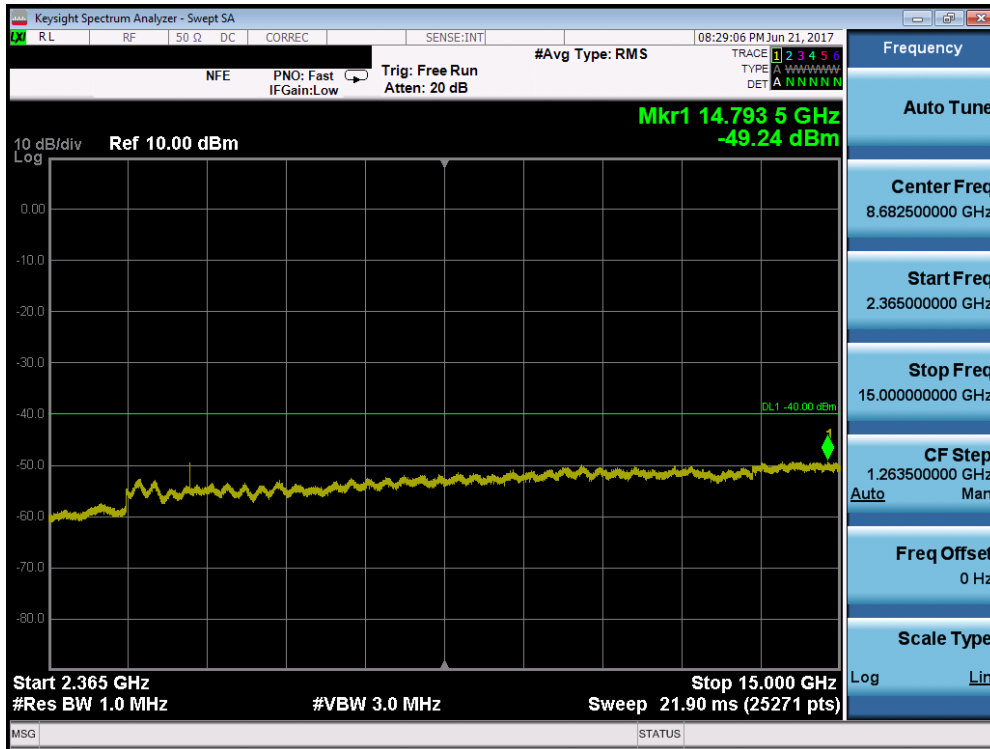


Plot 7-144. Conducted Spurious Plot (Band 2/25 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-145. Conducted Spurious Plot (Band 30 – 10.0MHz QPSK – RB Size 1, RB Offset 0– Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2-ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 90 of 216

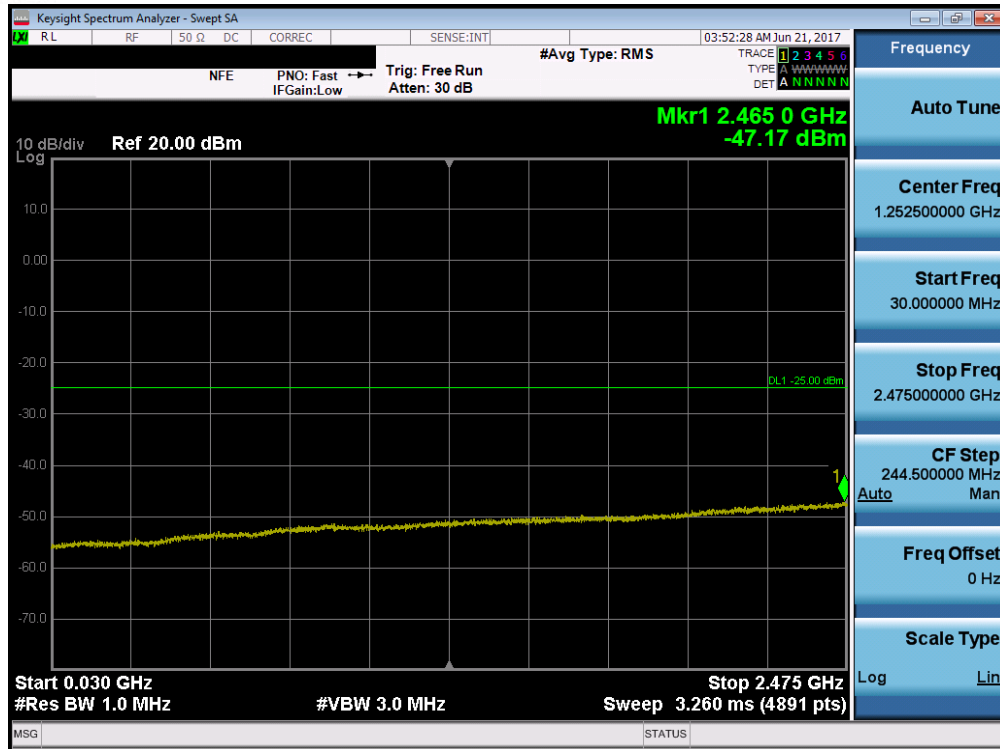


Plot 7-146. Conducted Spurious Plot (Band 30 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

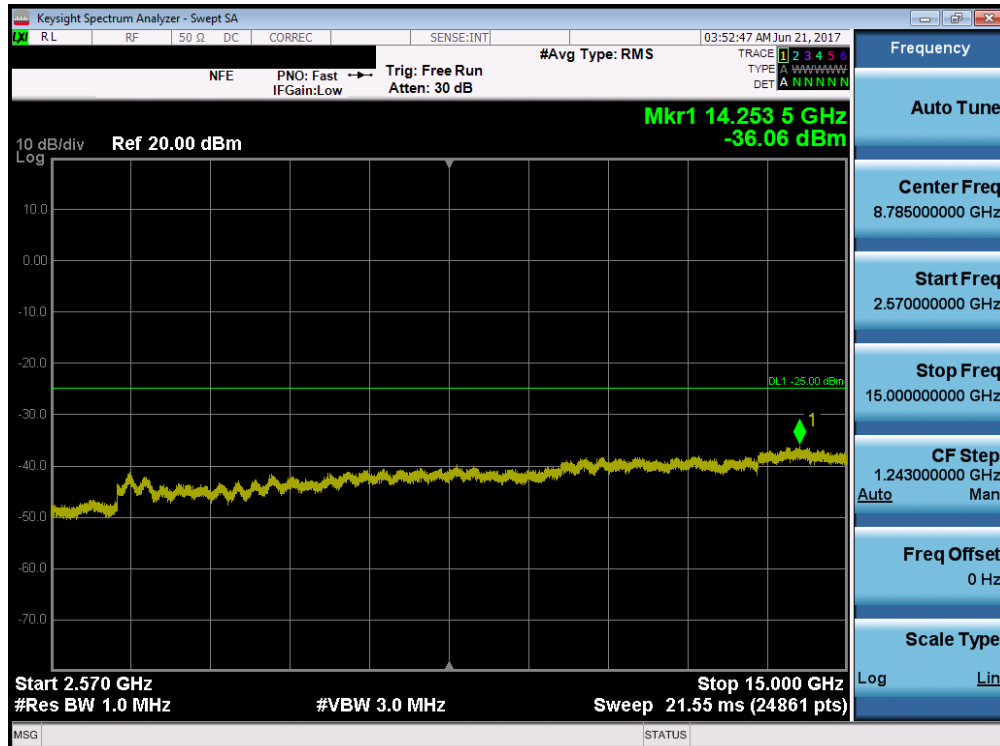


Plot 7-147. Conducted Spurious Plot (Band 30 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 91 of 216

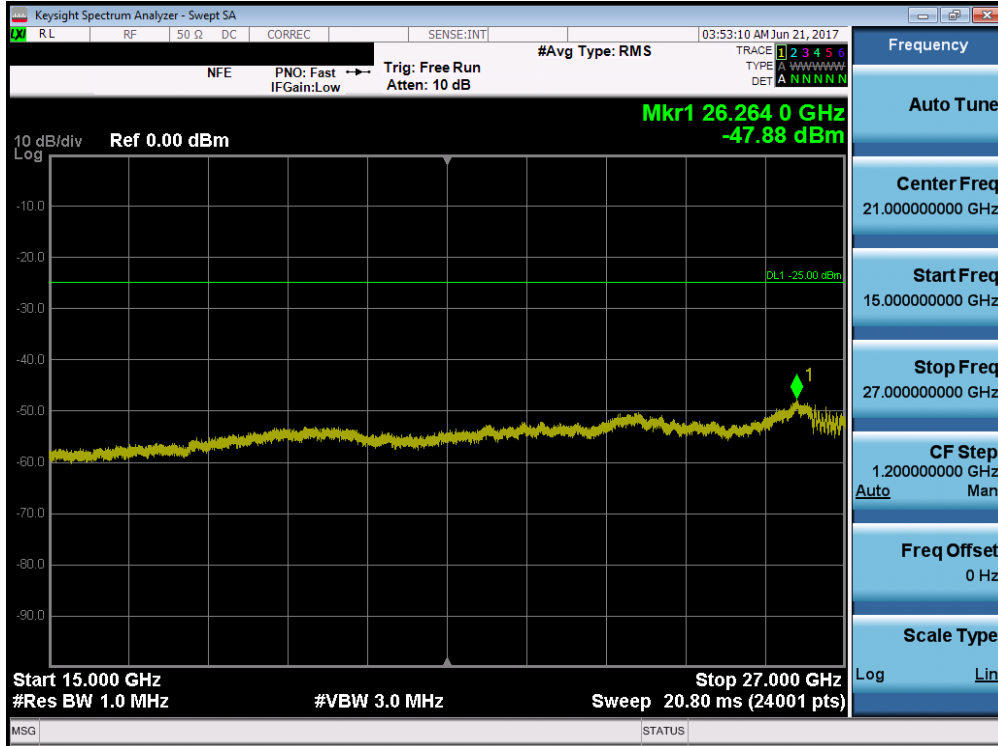


Plot 7-148. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)



Plot 7-149. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 92 of 216

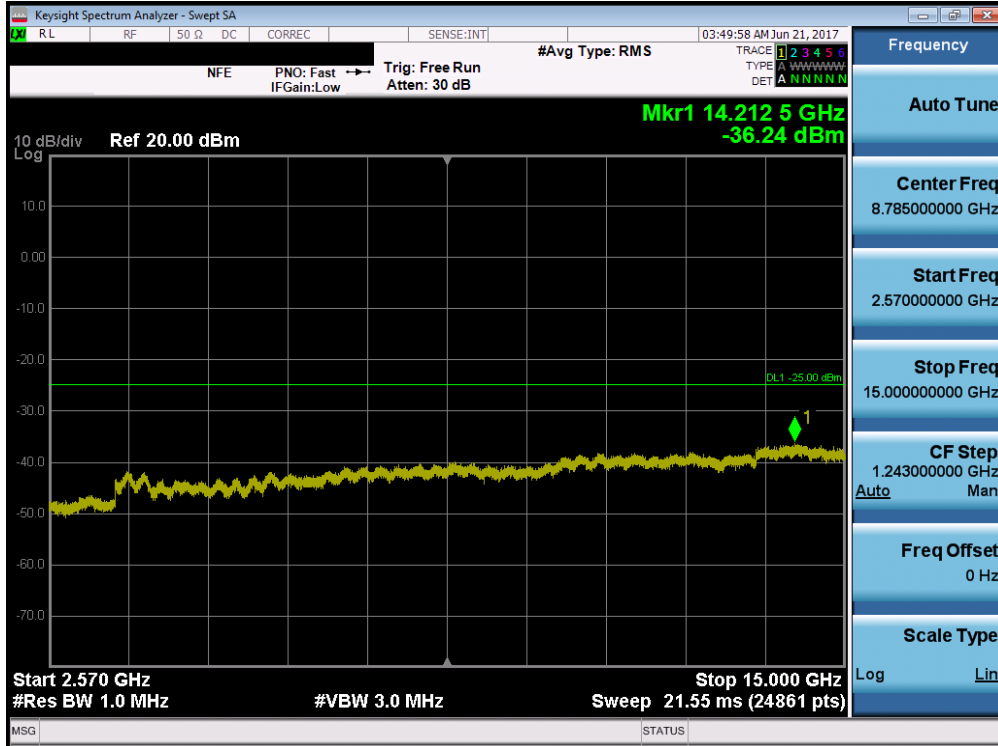


Plot 7-150. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

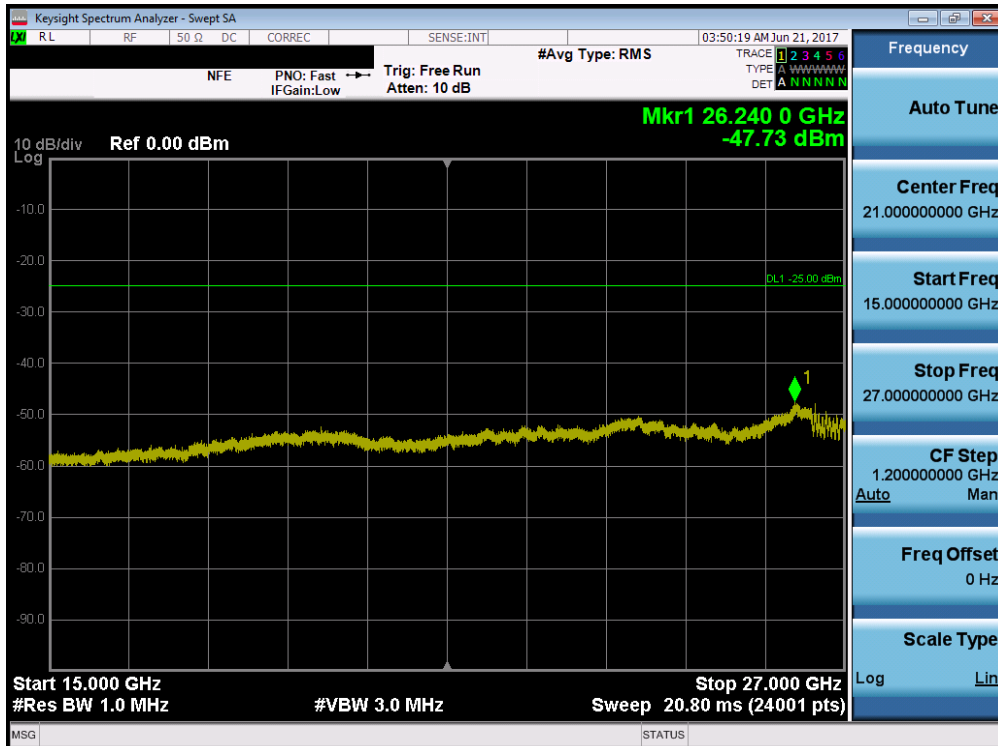


Plot 7-151. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 93 of 216

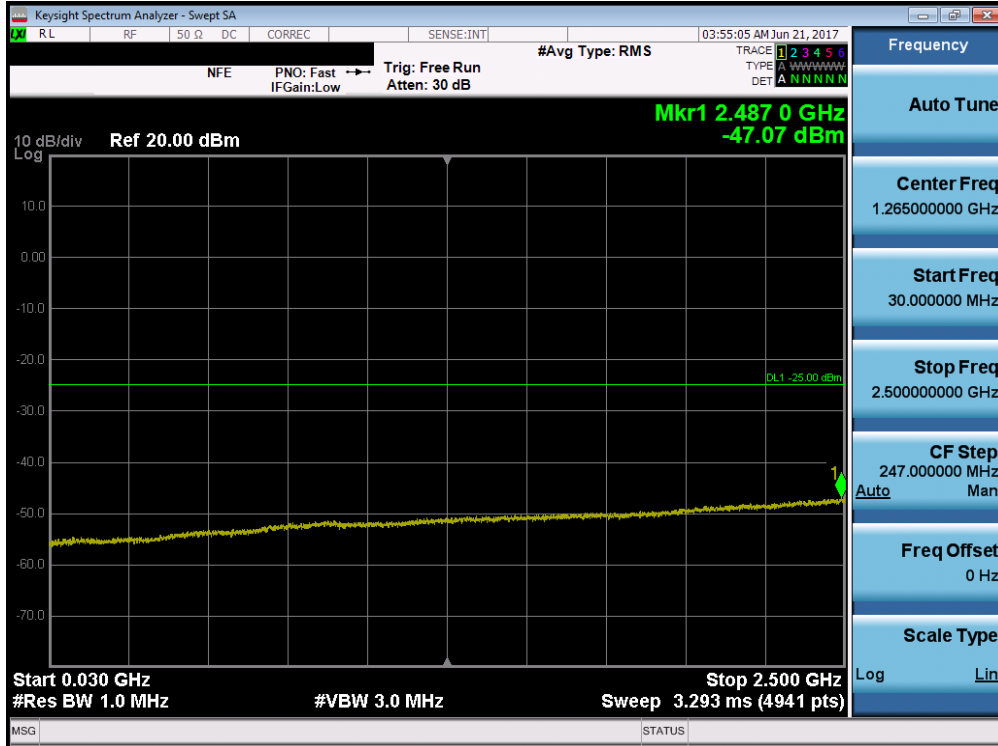


Plot 7-152. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

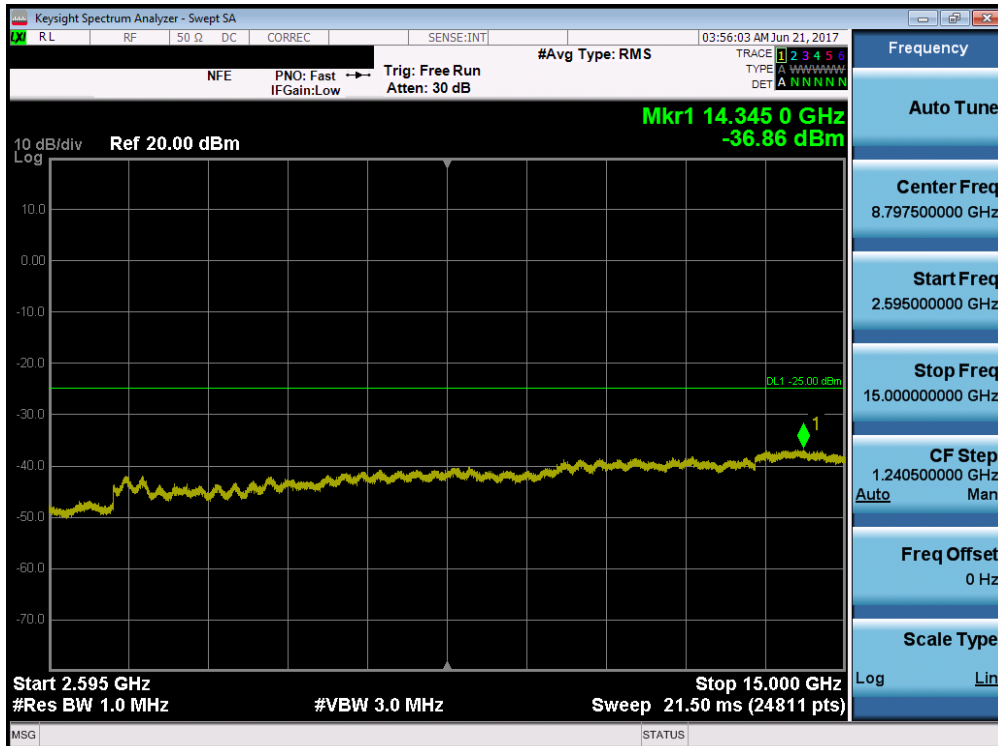


Plot 7-153. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 94 of 216

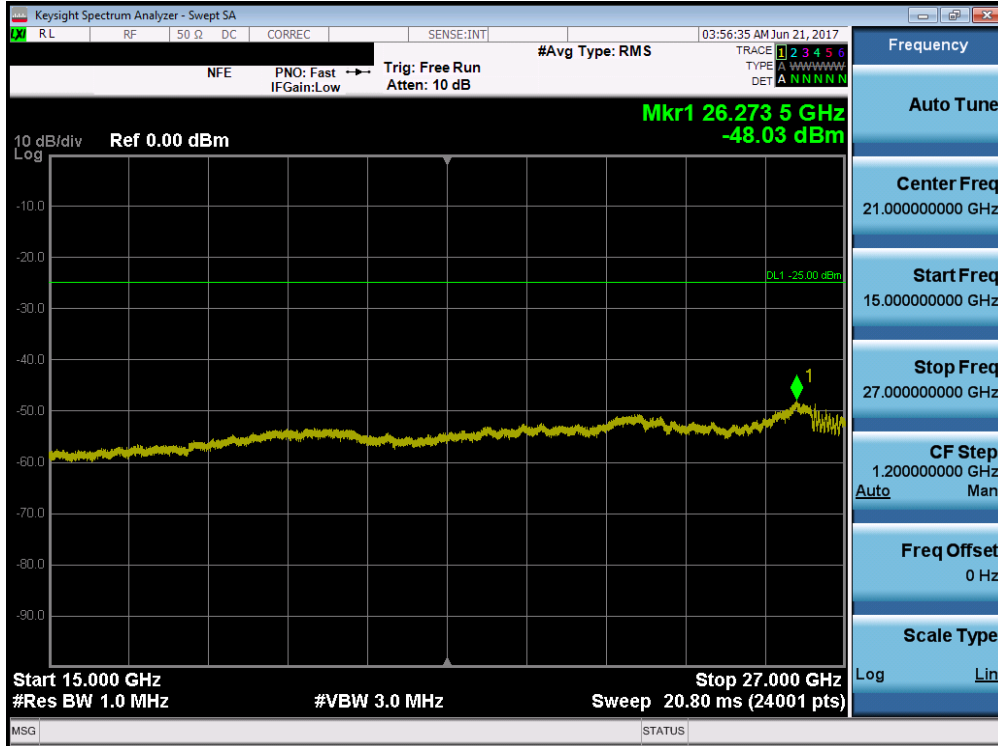


Plot 7-154. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

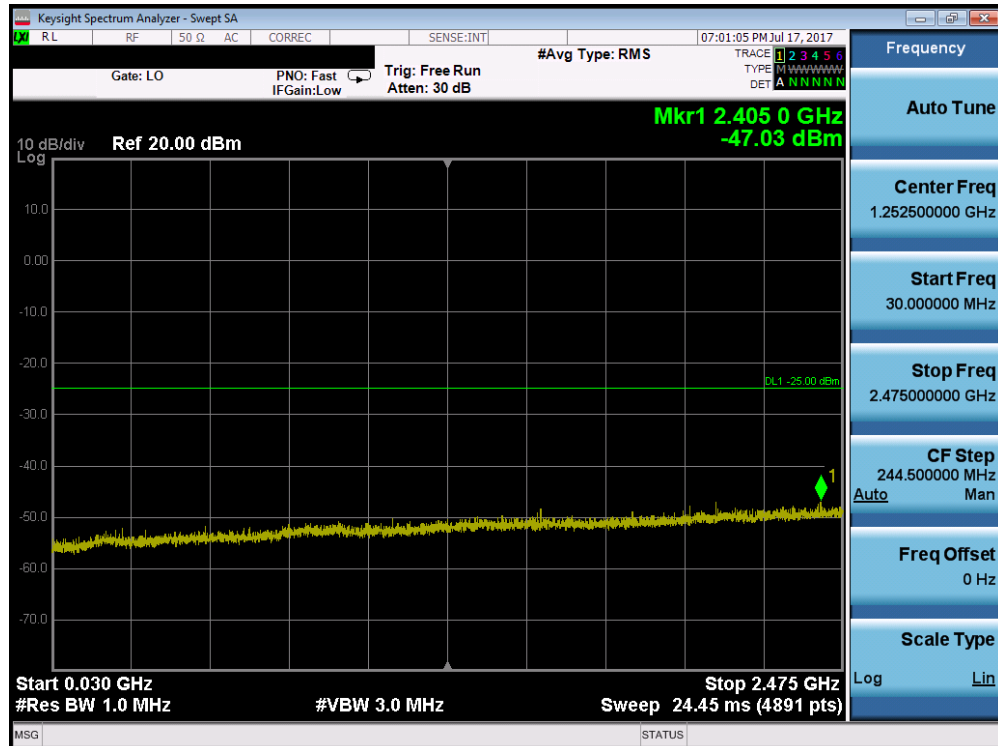


Plot 7-155. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 95 of 216

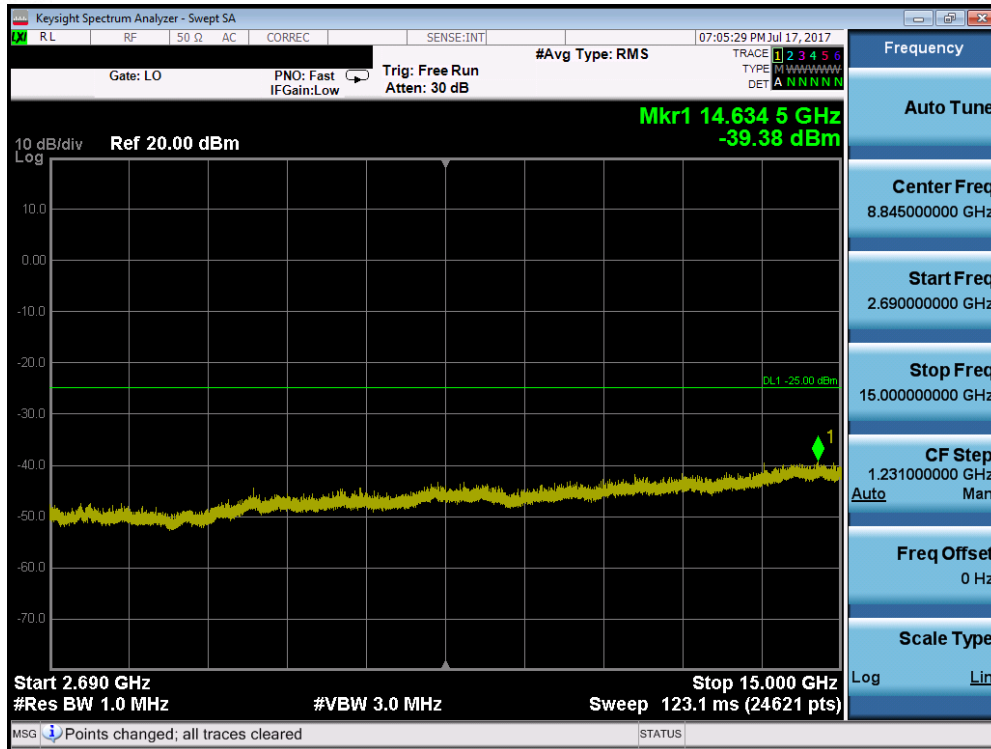


Plot 7-156. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

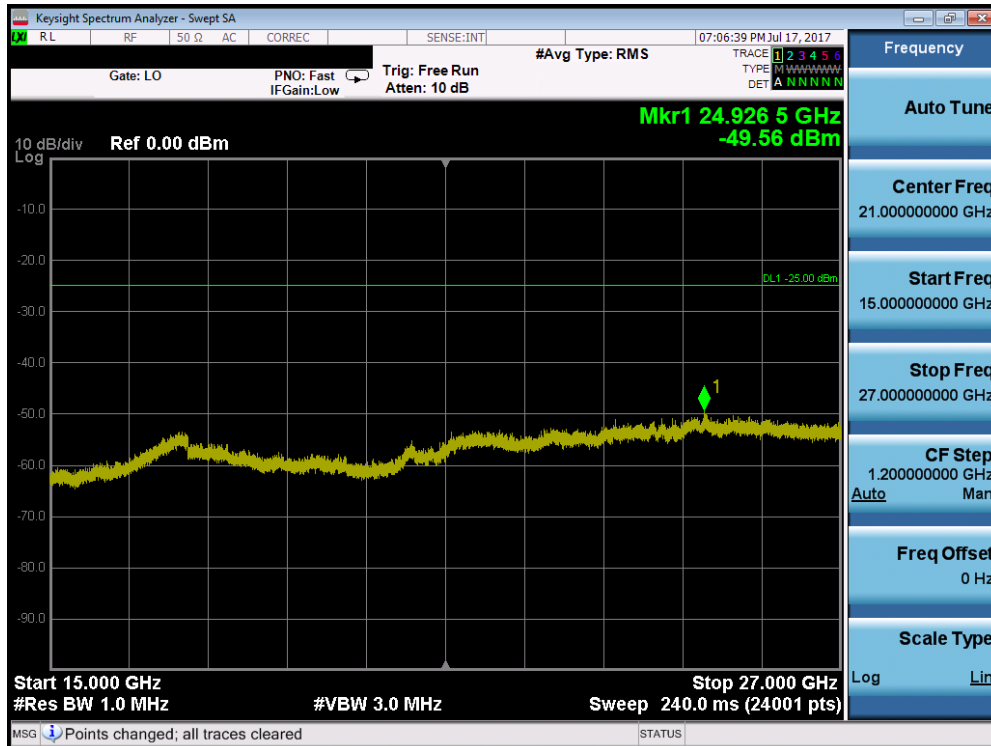


Plot 7-157. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 96 of 216

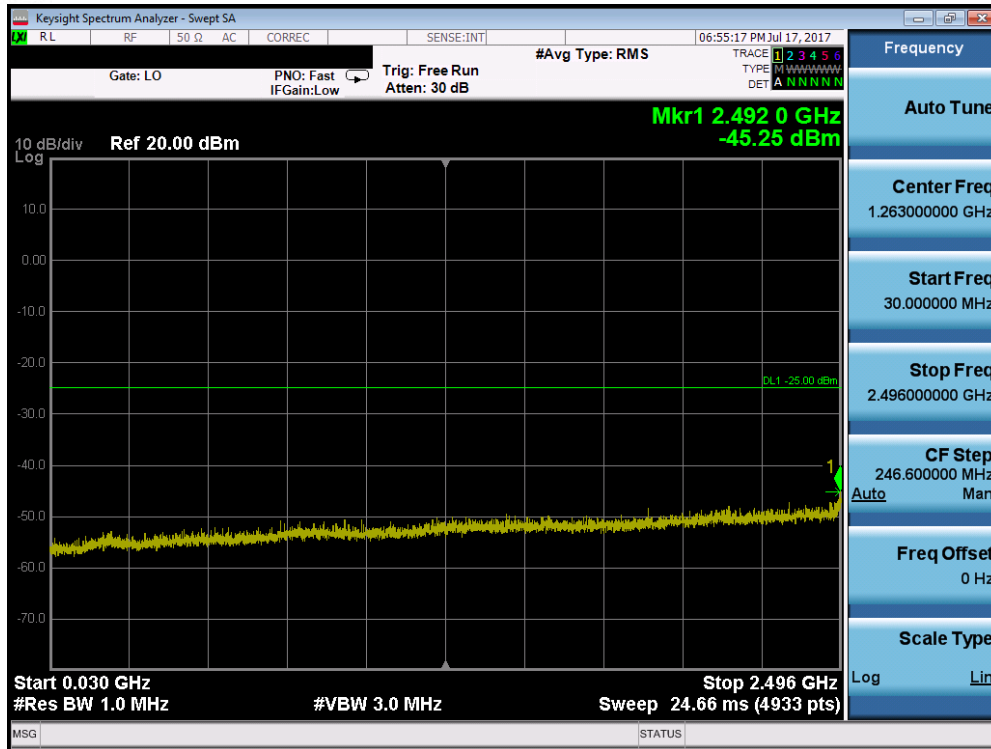


Plot 7-158. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

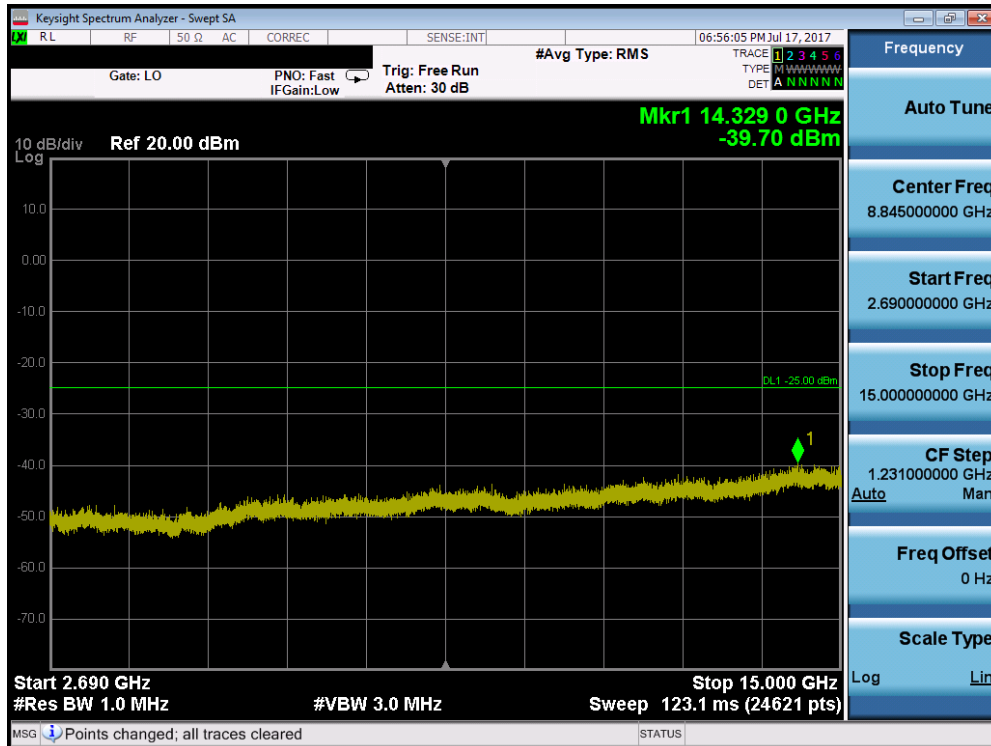


Plot 7-159. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 97 of 216



Plot 7-160. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

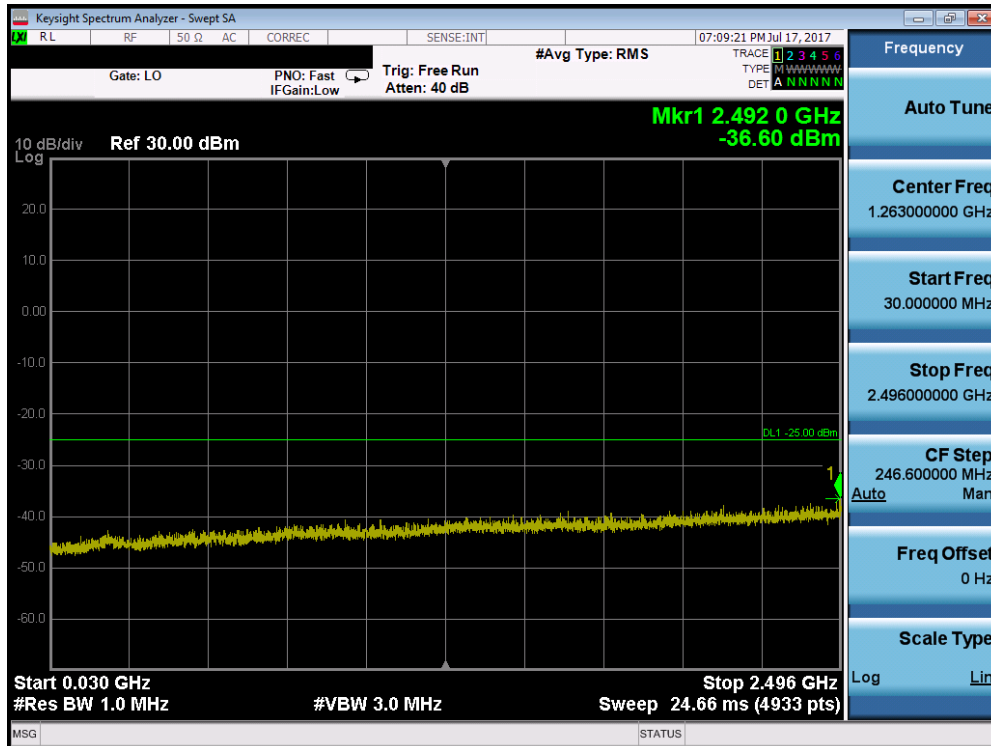


Plot 7-161. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 98 of 216

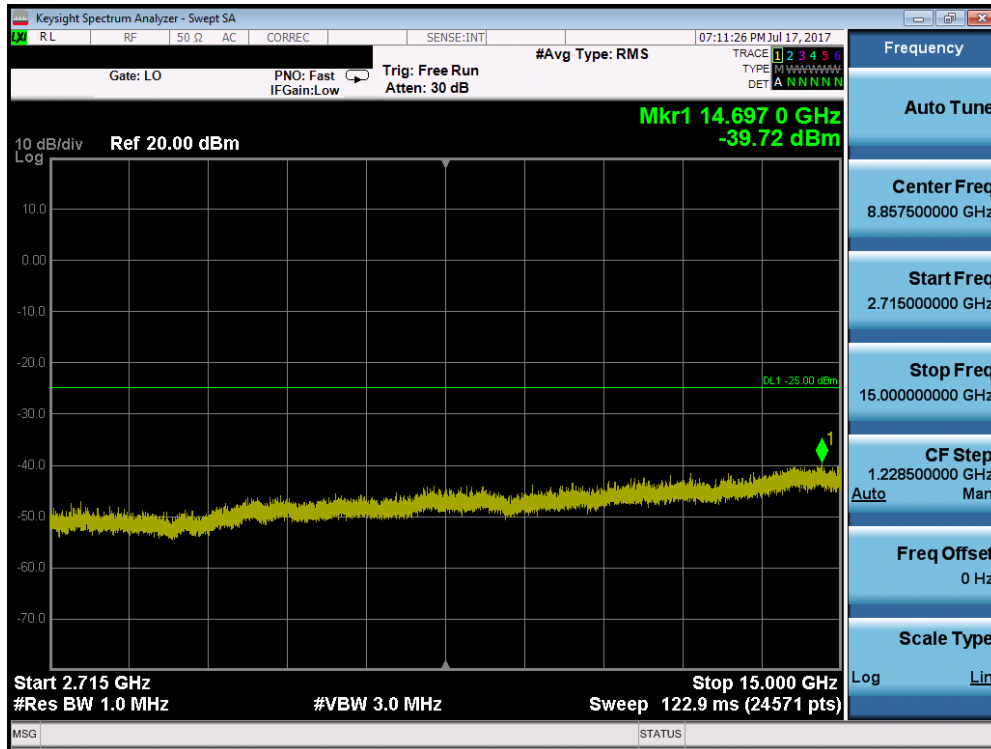


Plot 7-162. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

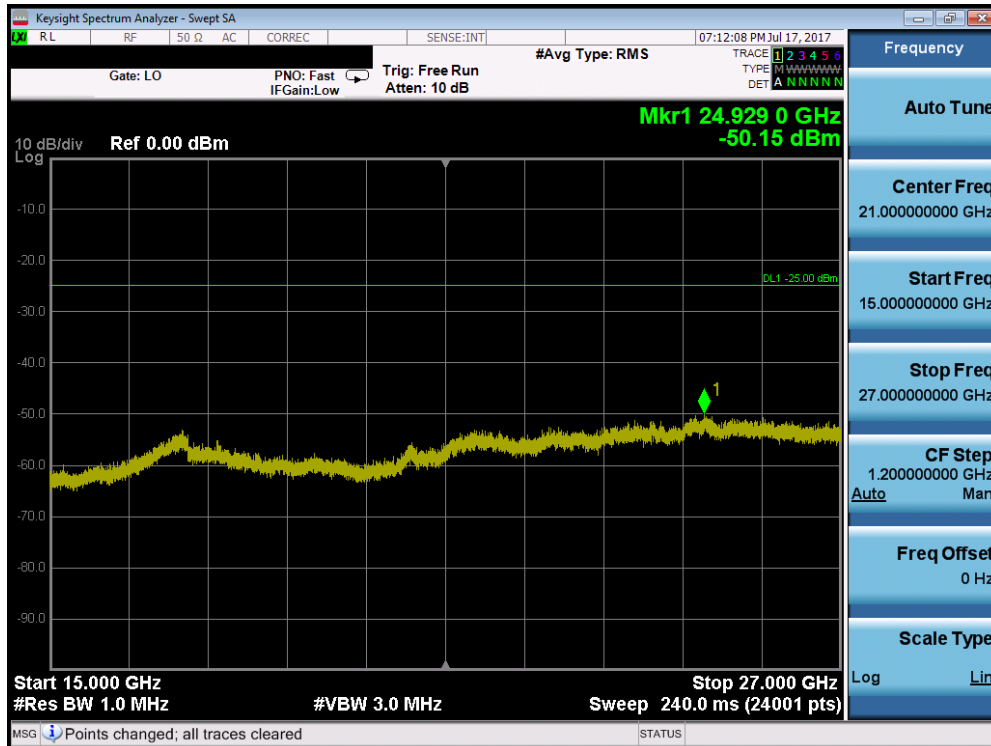


Plot 7-163. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 99 of 216



Plot 7-164. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-165. Conducted Spurious Plot (Band 41 – 15.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 100 of 216

7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) §27.53(m) §27.53(a.4)

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level for Band 30 is $> 43 + 10\log_{10}(P[\text{Watts}]$ at 2300-2305MHz & 2345-2360MHz, $> 55 + 10\log_{10}(P[\text{Watts}]$ at 2320-2324MHz & 2341-2345MHz, $> 61 + 10\log_{10}(P[\text{Watts}]$ at 2324-2328MHz & 2337-2341MHz, $> 67 + 10\log_{10}(P[\text{Watts}]$ at 2288-2292MHz & 2328-2337MHz, and $> 70 + 10\log_{10}(P[\text{Watts}]$ at frequencies $< 2288\text{MHz}$ & $> 2365\text{MHz}$.

The minimum permissible attenuation level for Band 7 and 41 is as noted in the Test Notes on the following page.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v02r02 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW \geq 1% of the emission bandwidth
4. VBW \geq 3 x RBW
5. Detector = RMS
6. Number of sweep points \geq 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

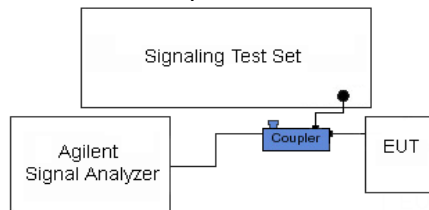


Figure 7-3. Test Instrument & Measurement Setup

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 101 of 216

Test Notes

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



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

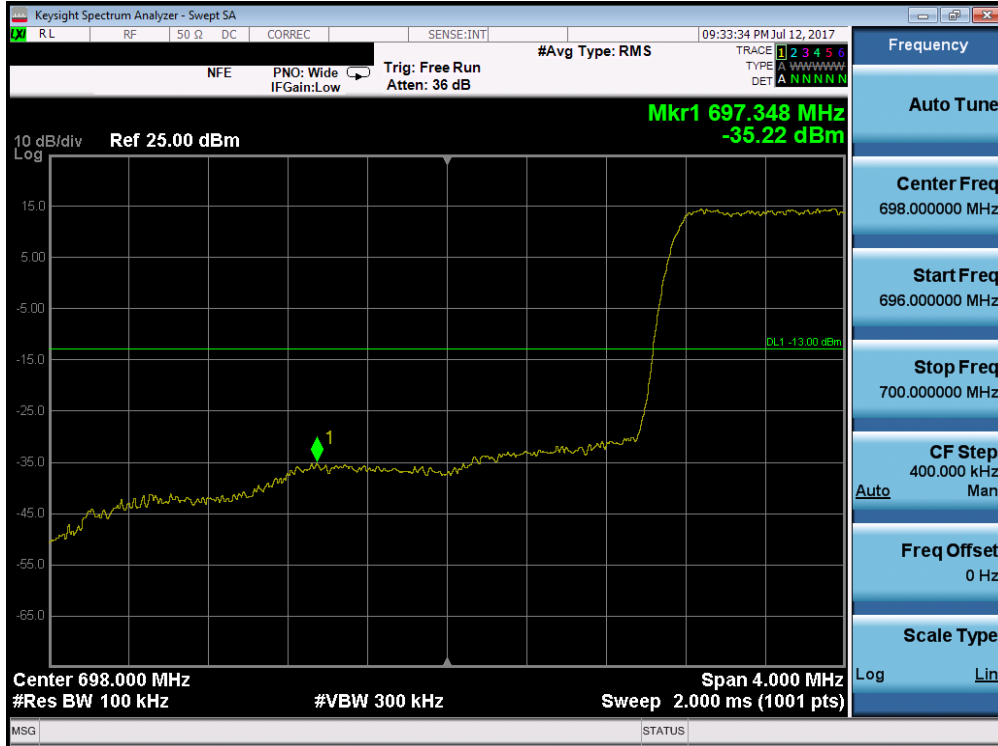
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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.

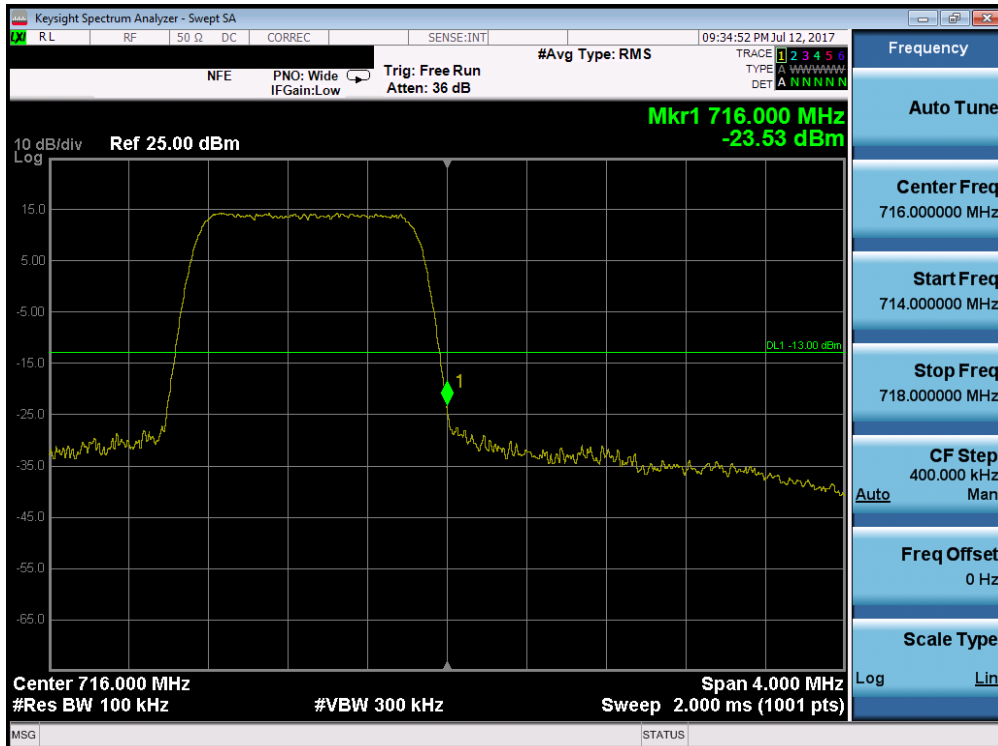
Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz.

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset	Page 102 of 216	

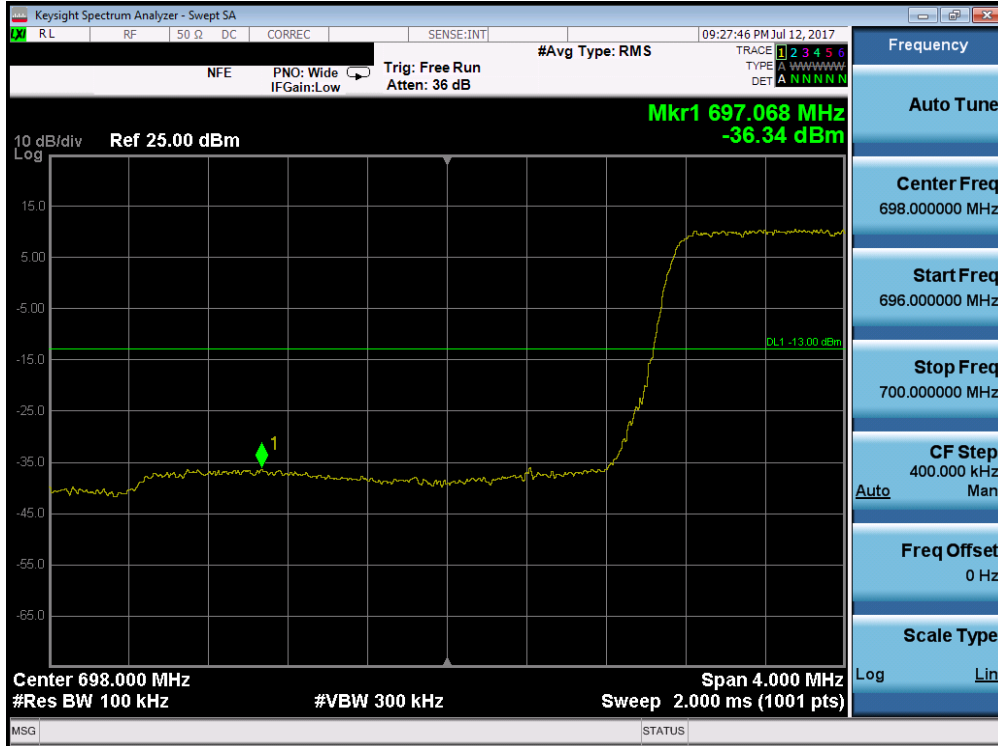


Plot 7-166. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

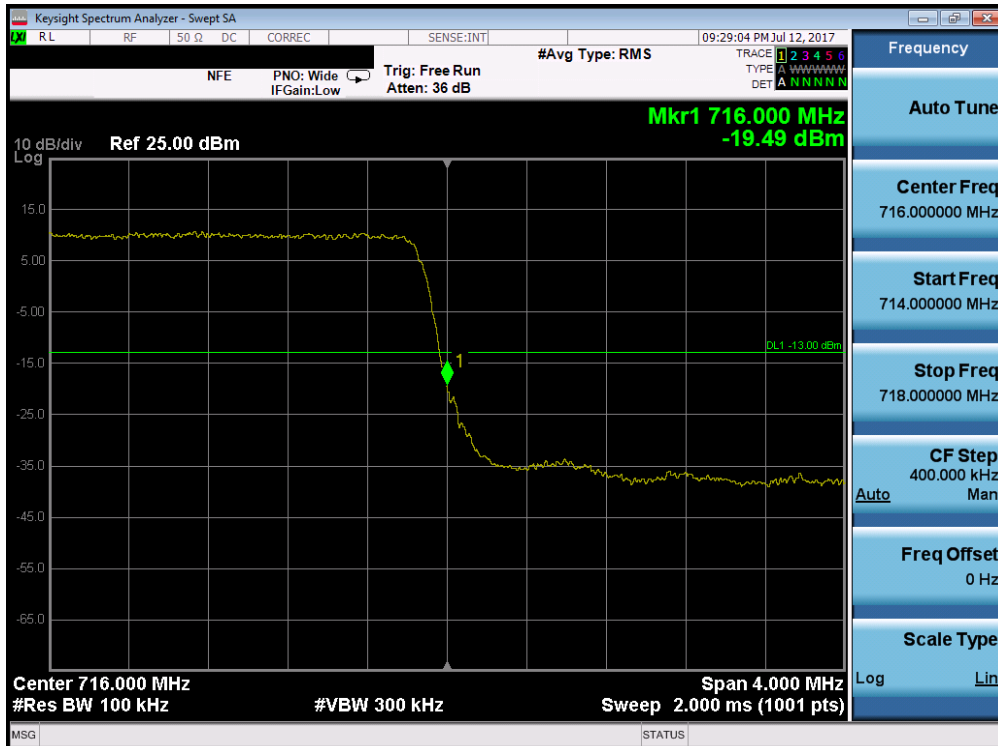


Plot 7-167. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 103 of 216

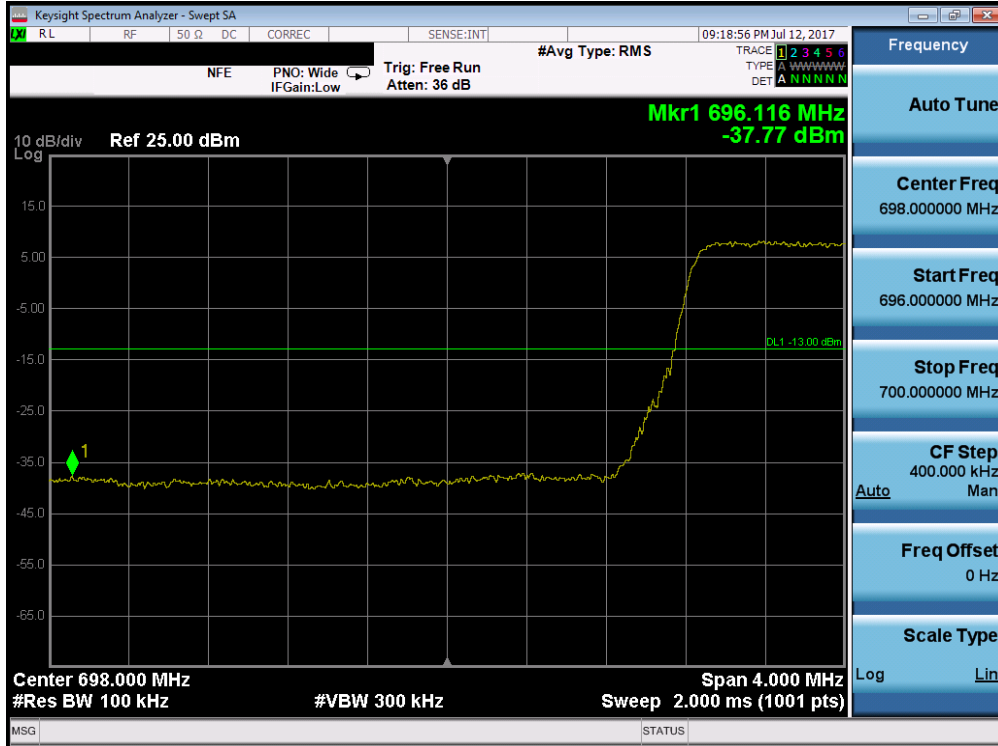


Plot 7-168. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-169. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 104 of 216

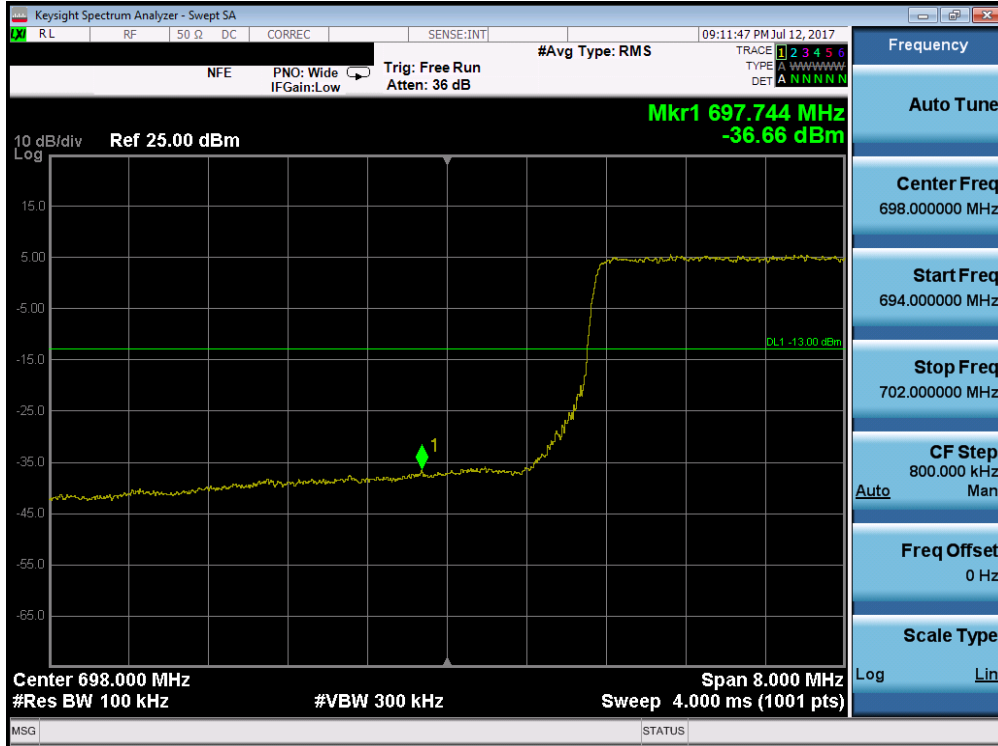


Plot 7-170. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-171. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 105 of 216

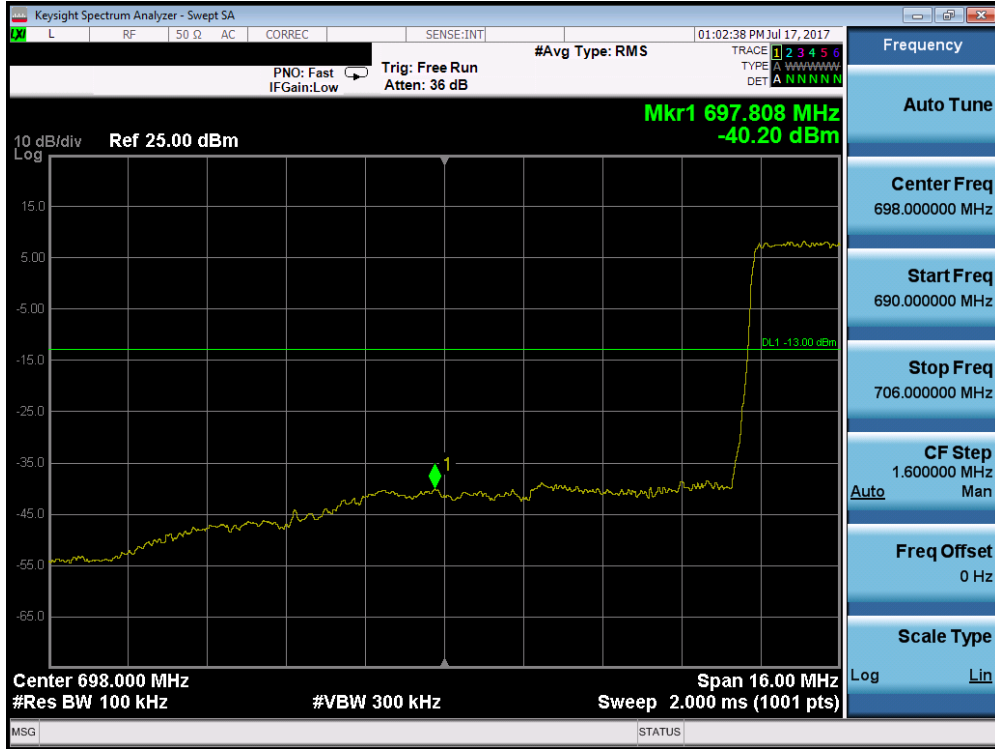


Plot 7-172. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

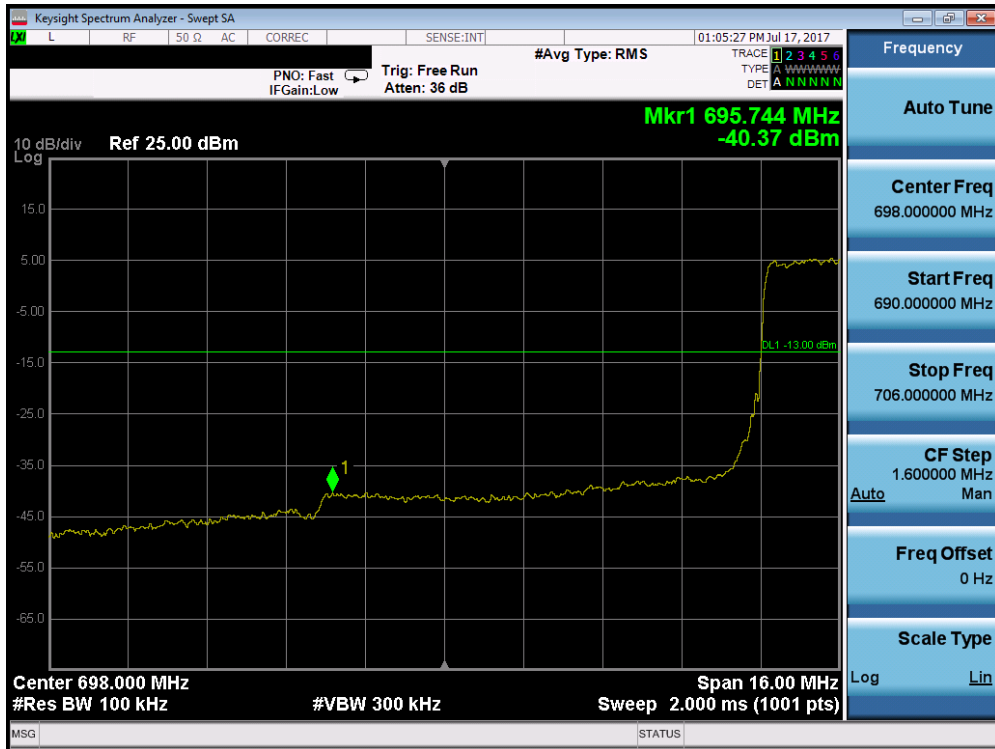


Plot 7-173. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 106 of 216

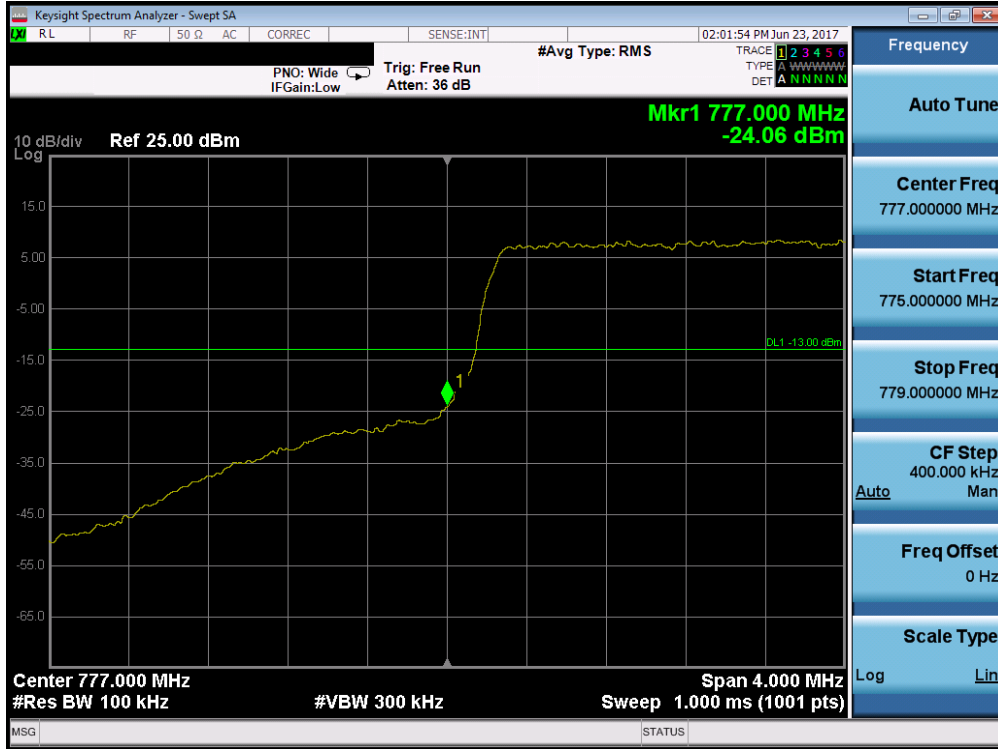


Plot 7-174. Lower Band Edge Plot (Band 17 – 5.0MHz QPSK – RB Size 25)

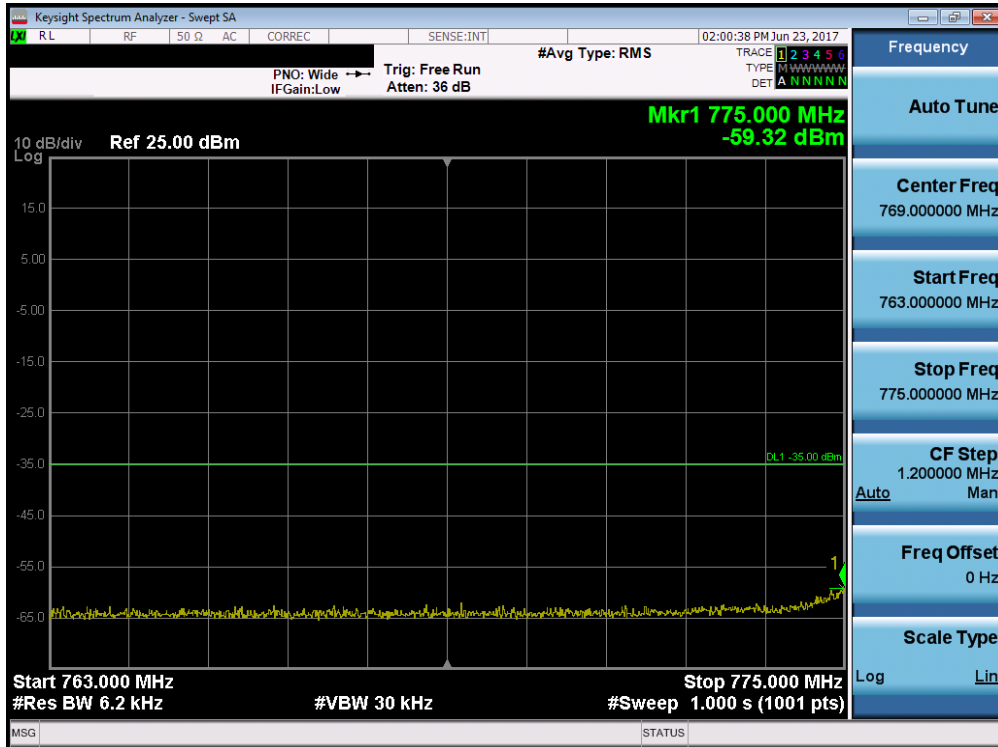


Plot 7-175. Lower Band Edge Plot (Band 17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 107 of 216



Plot 7-176. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

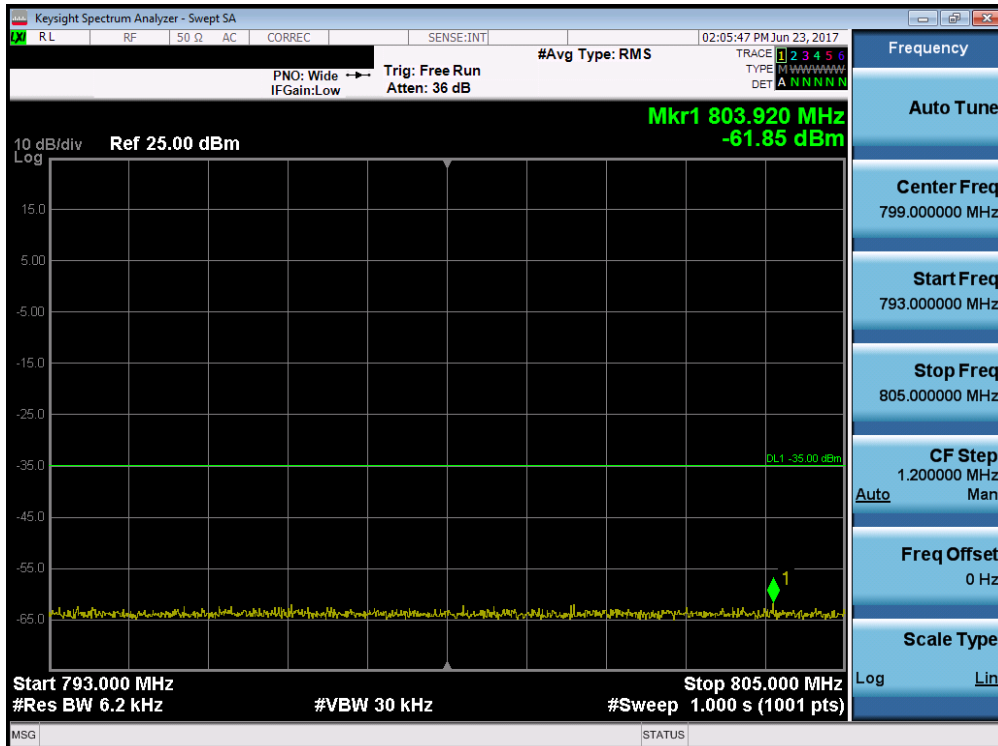


Plot 7-177. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 108 of 216

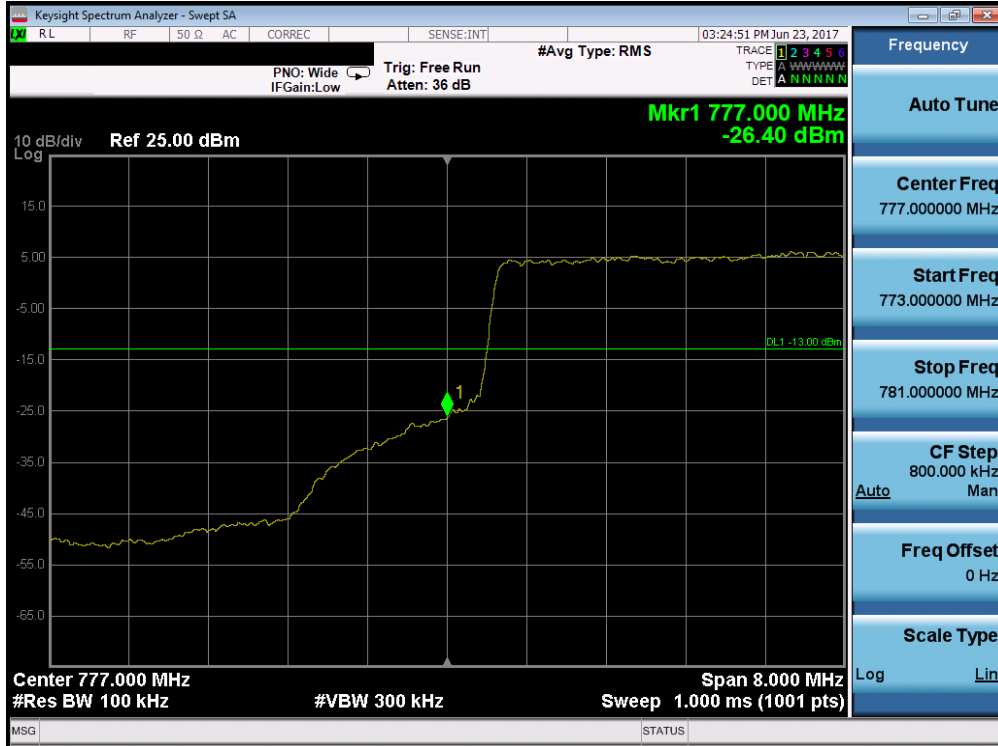


Plot 7-178. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

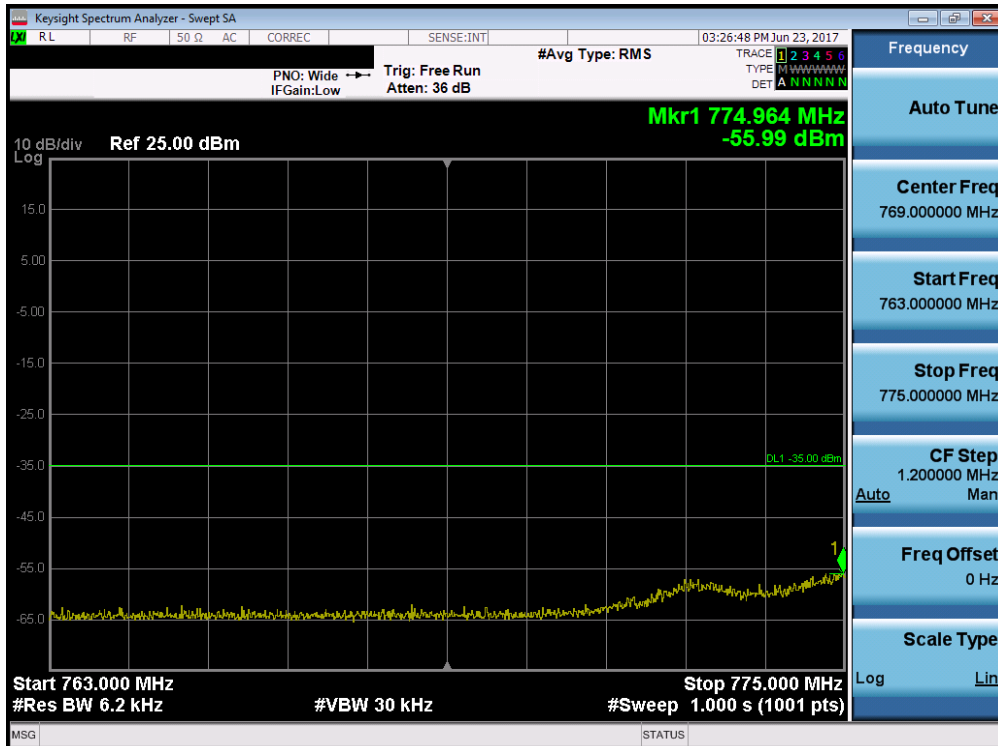


Plot 7-179. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 109 of 216



Plot 7-180. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

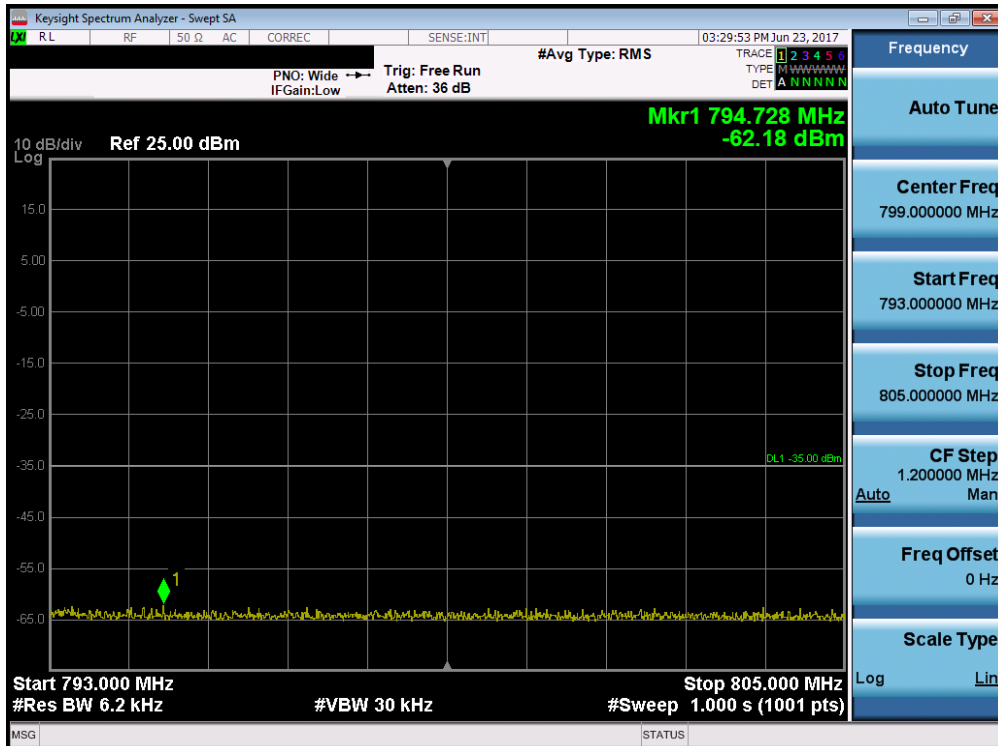


Plot 7-181. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 110 of 216

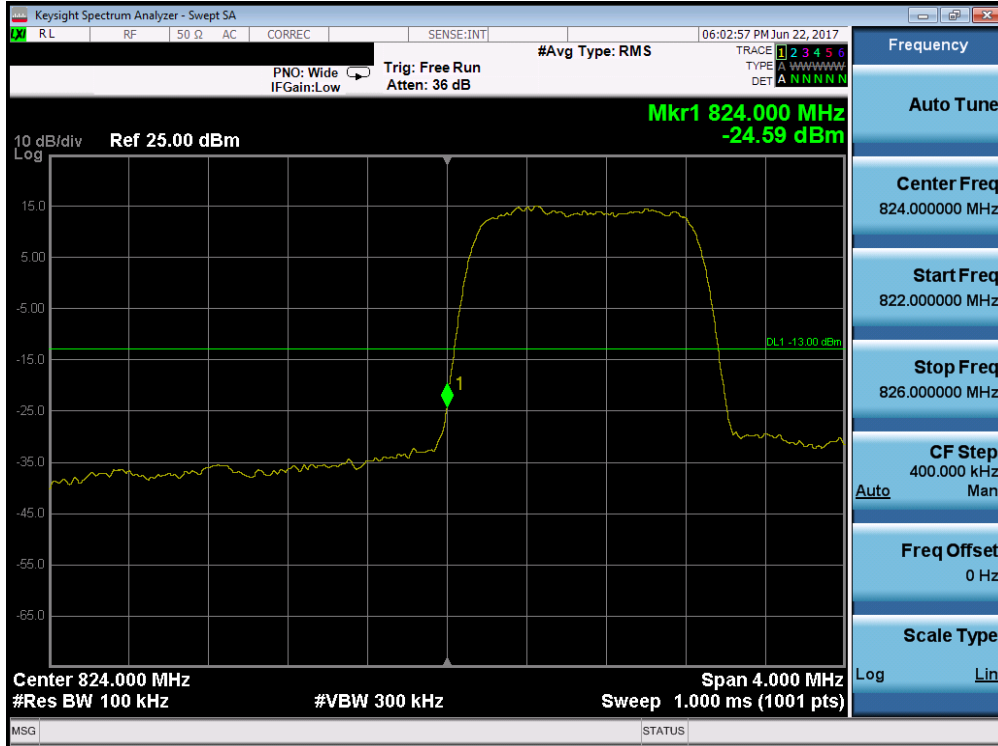


Plot 7-182. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

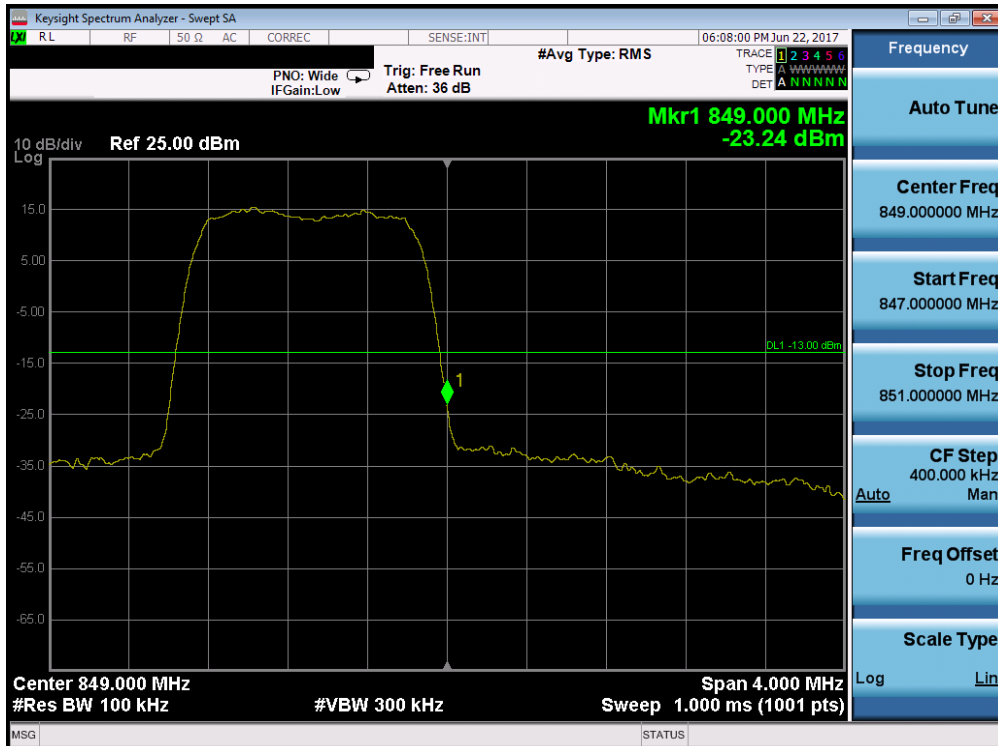


Plot 7-183. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 111 of 216

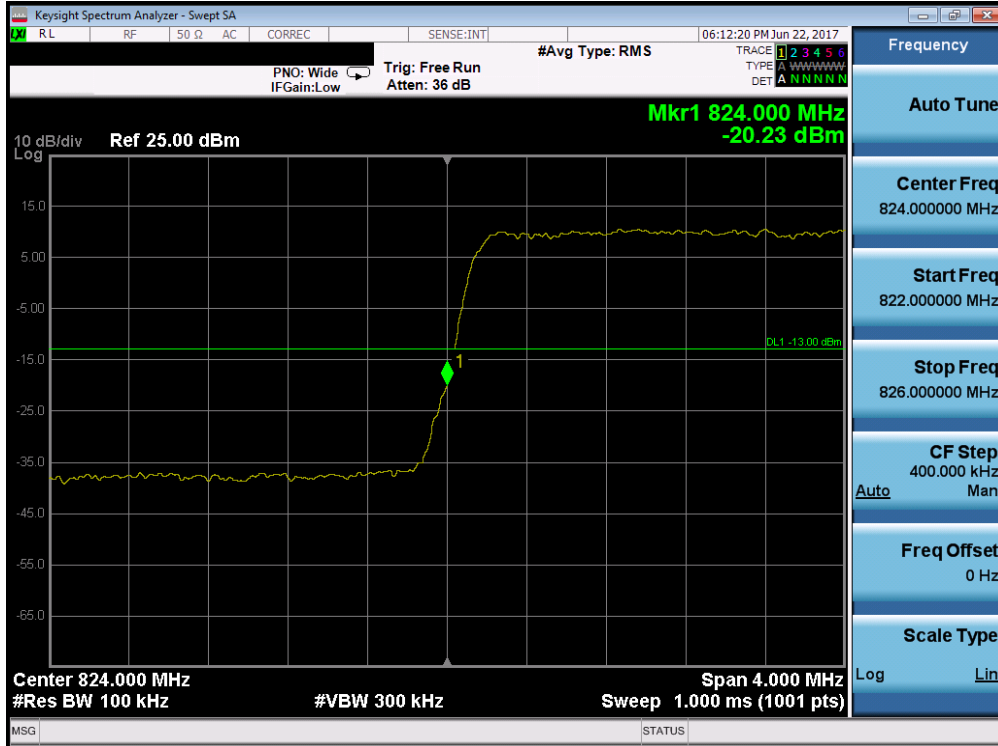


Plot 7-184. Lower Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

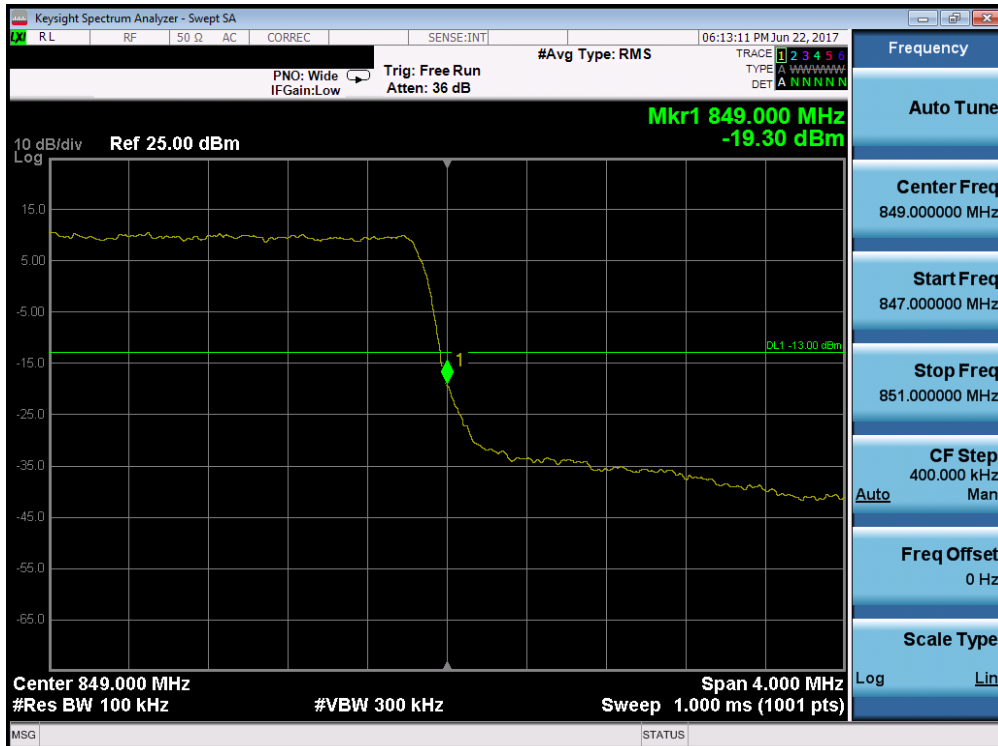


Plot 7-185. Upper Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 112 of 216

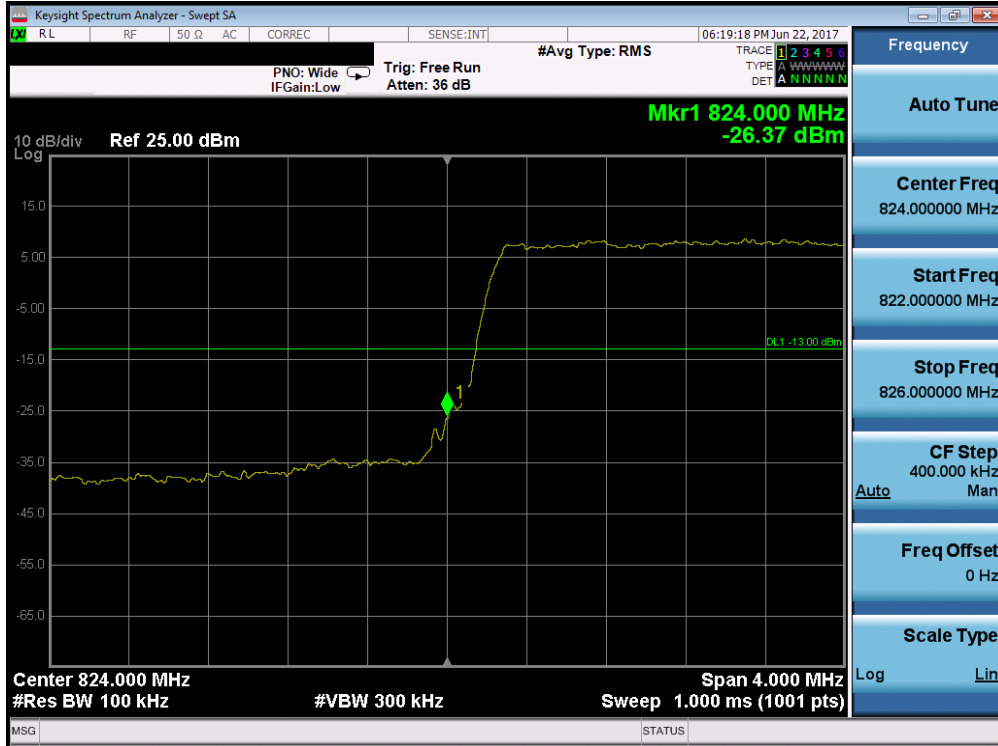


Plot 7-186. Lower Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)



Plot 7-187. Upper Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 113 of 216

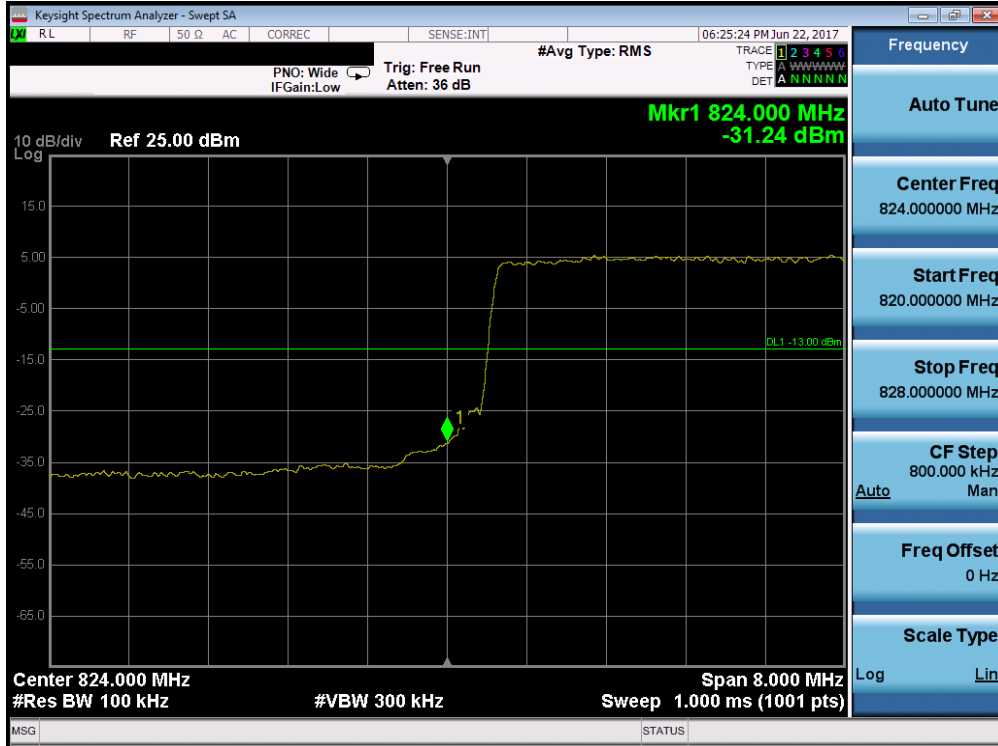


Plot 7-188. Lower Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

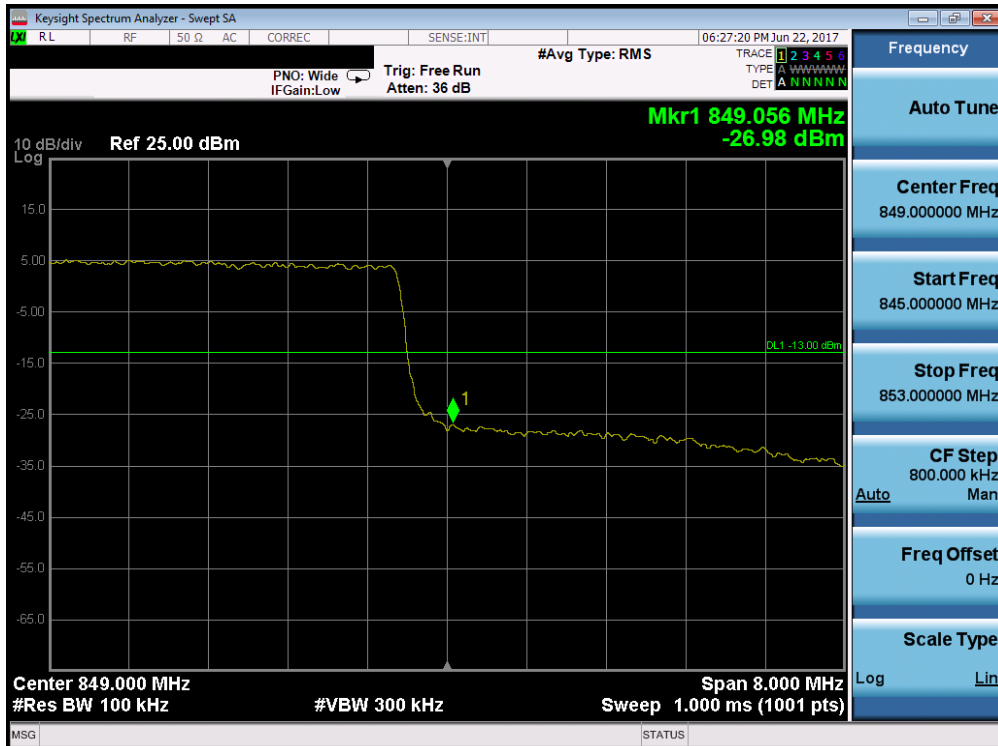


Plot 7-189. Upper Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 114 of 216

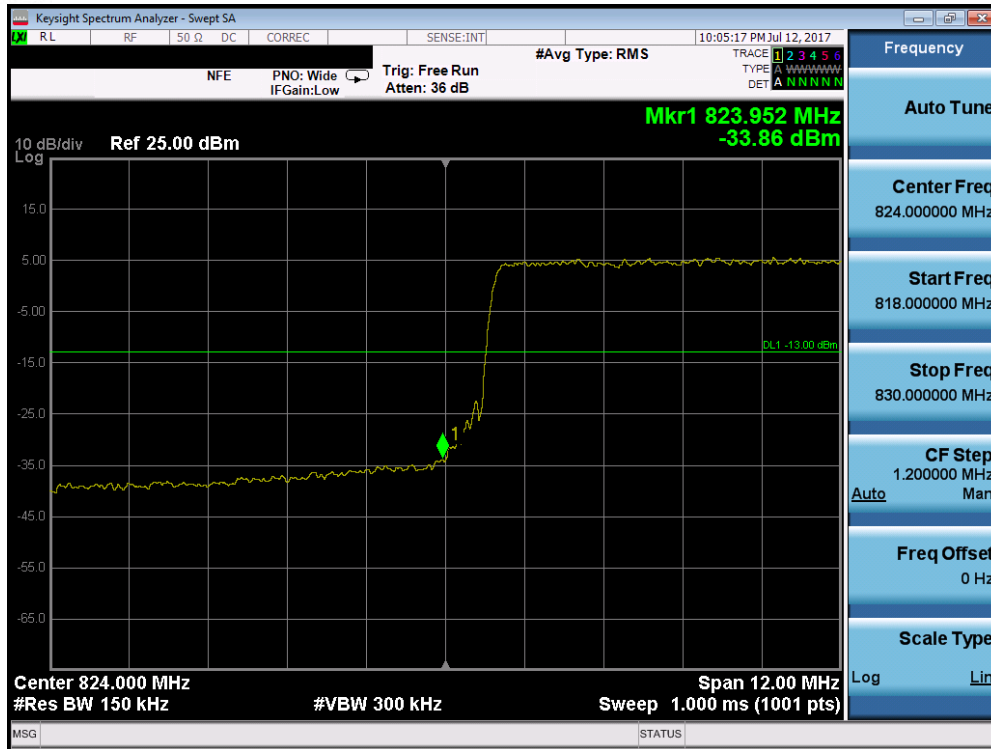


Plot 7-190. Lower Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)



Plot 7-191. Upper Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 115 of 216

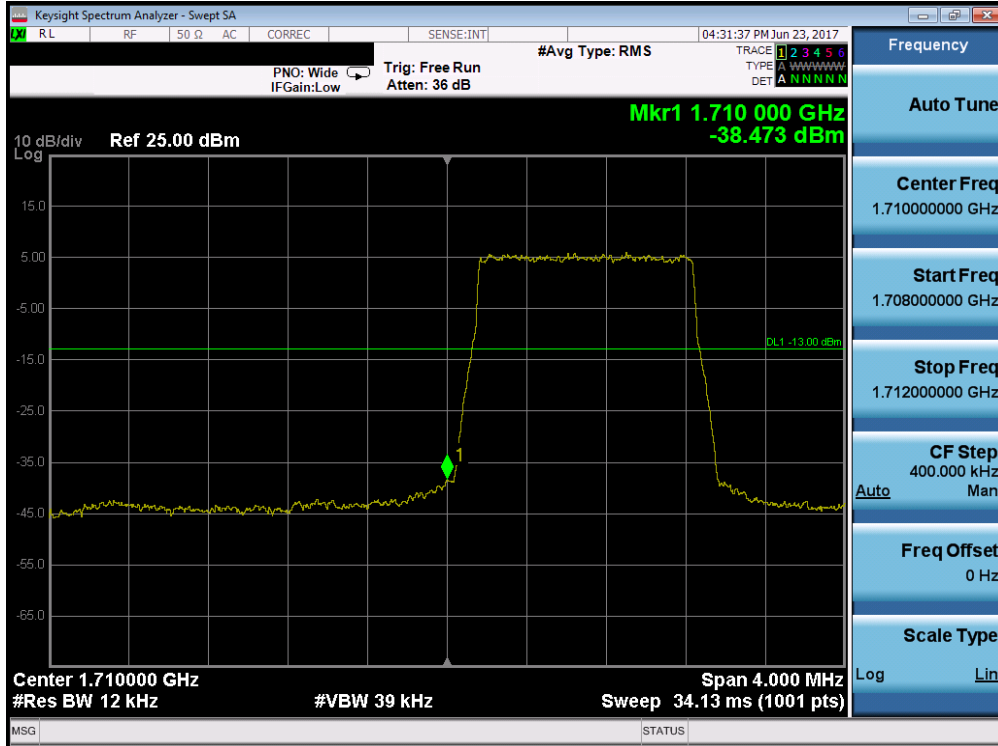


Plot 7-192. Lower Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

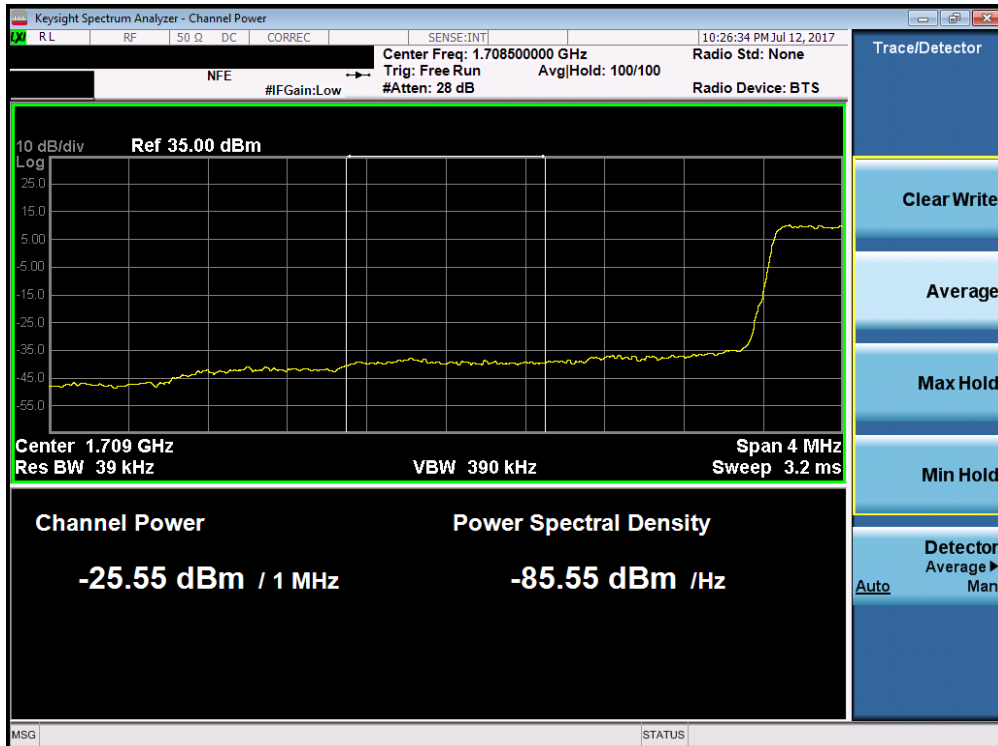


Plot 7-193. Upper Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 116 of 216

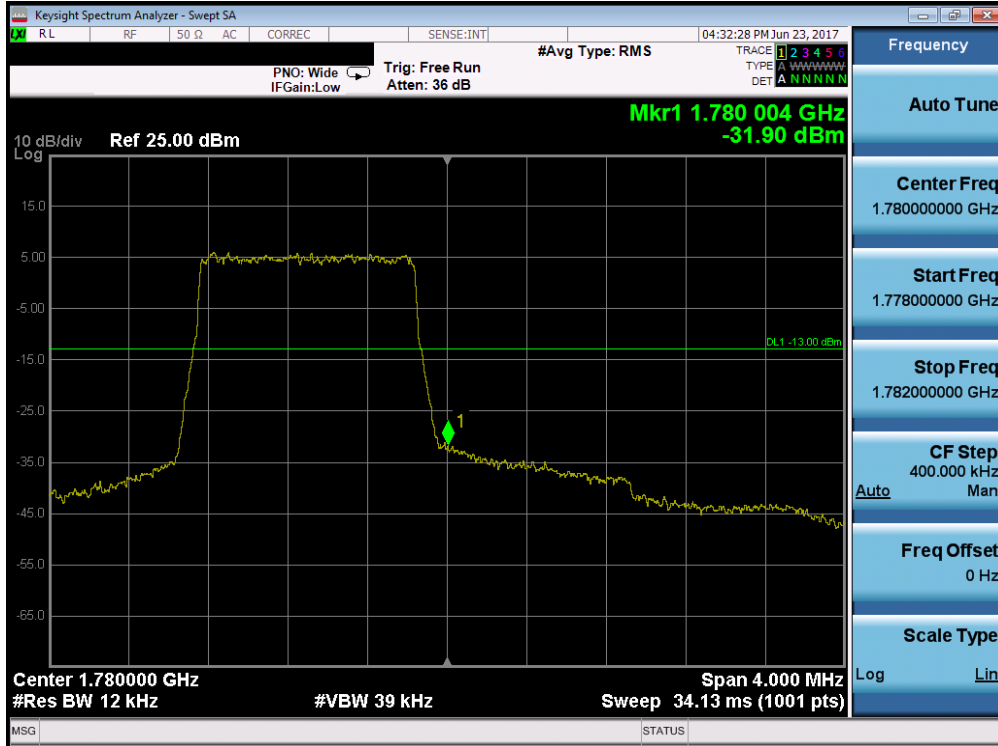


Plot 7-194. Lower Band Edge Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

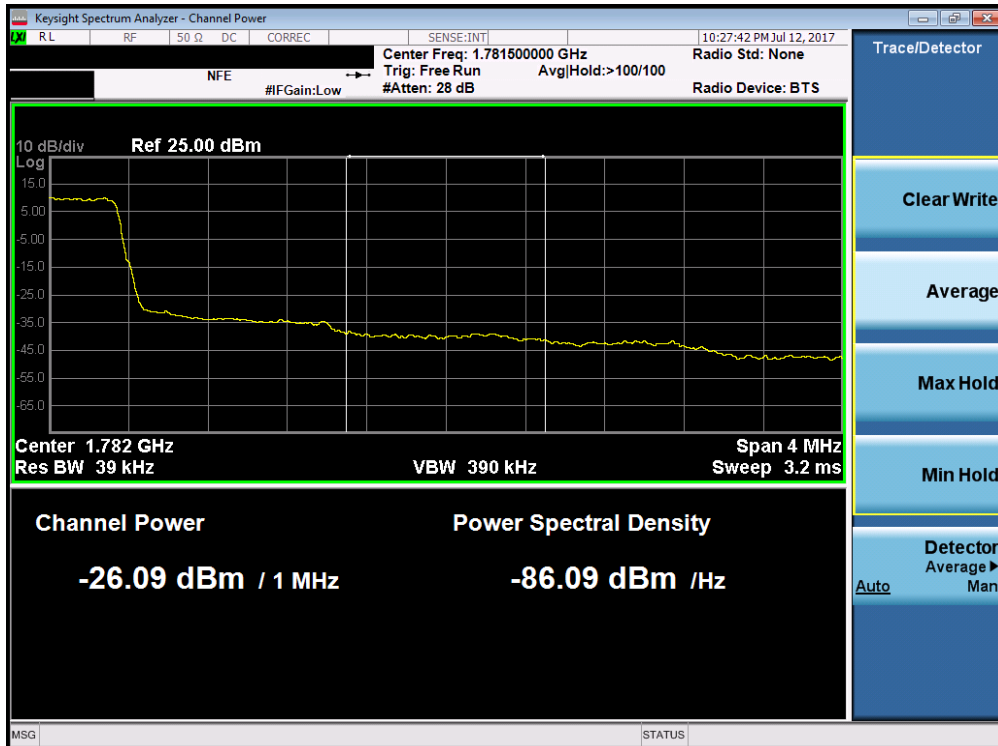


Plot 7-195. Lower Extended Band Edge Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2-ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 117 of 216

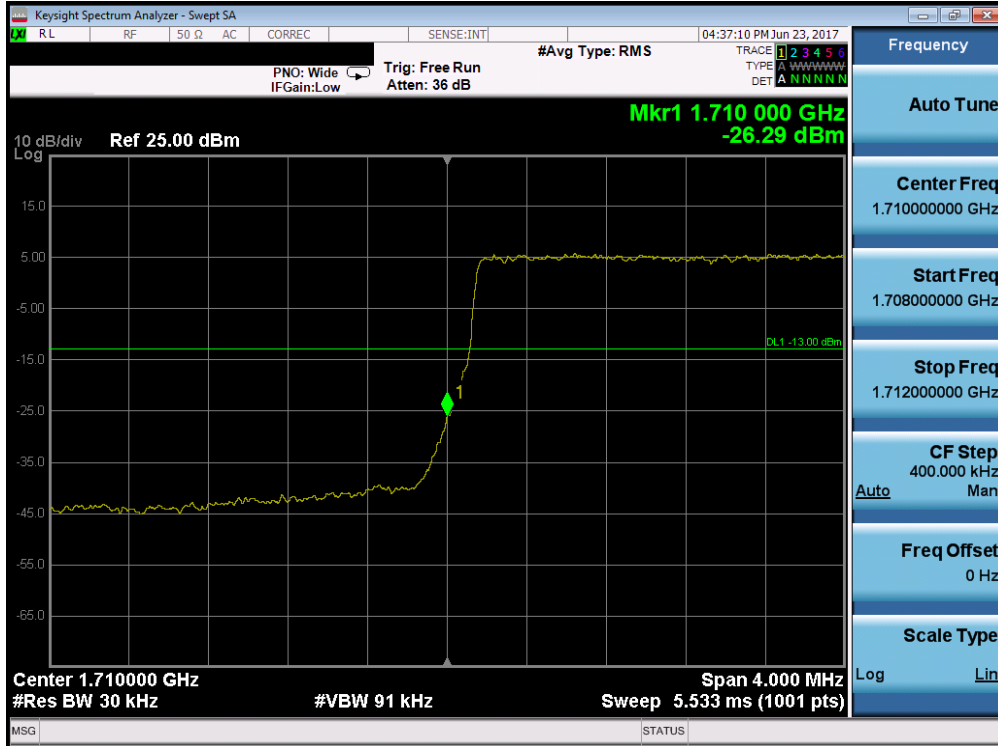


Plot 7-196. Upper Band Edge Plot (Band 66 – 1.4MHz QPSK – RB Size 6)

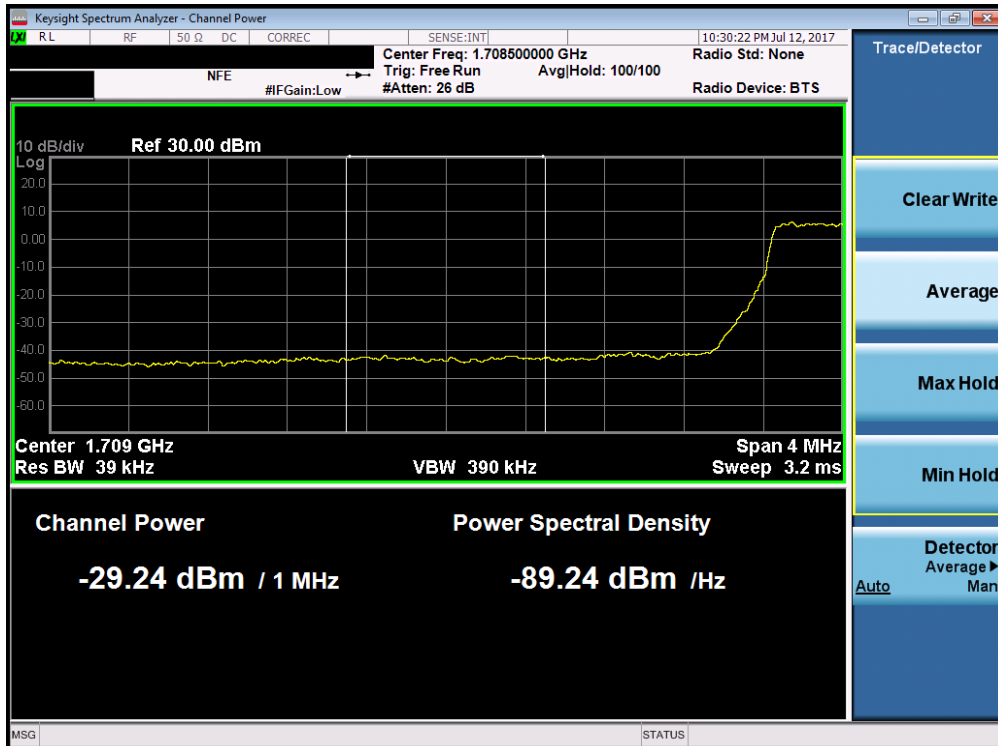


Plot 7-197. Upper Extended Band Edge Plot (Band 66 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 118 of 216

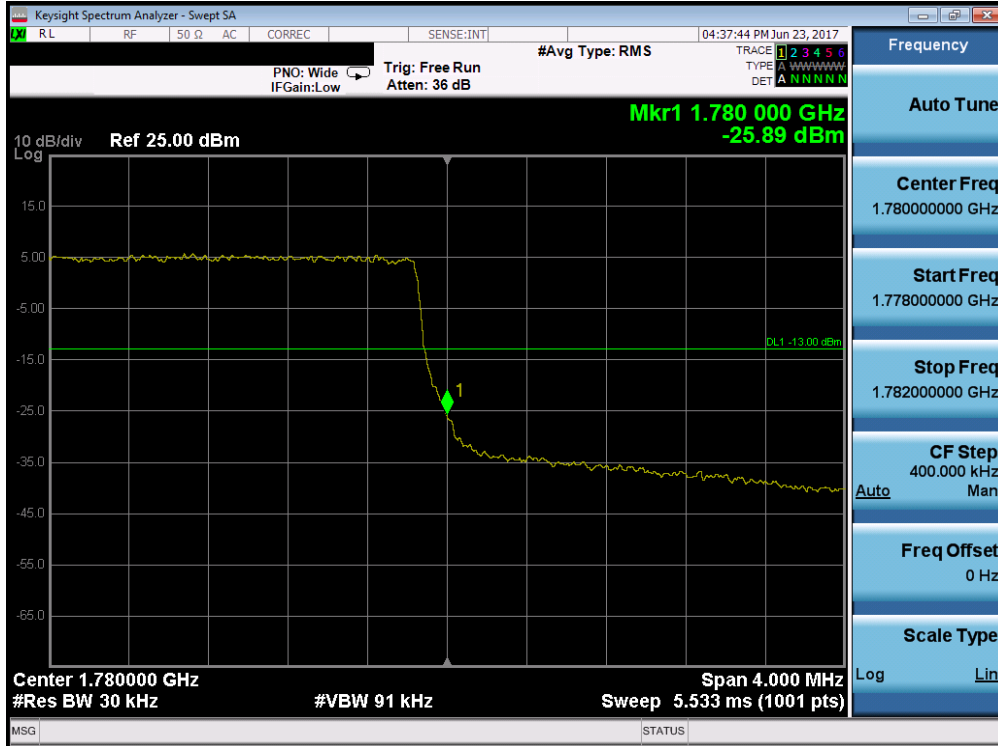


Plot 7-198. Lower Band Edge Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

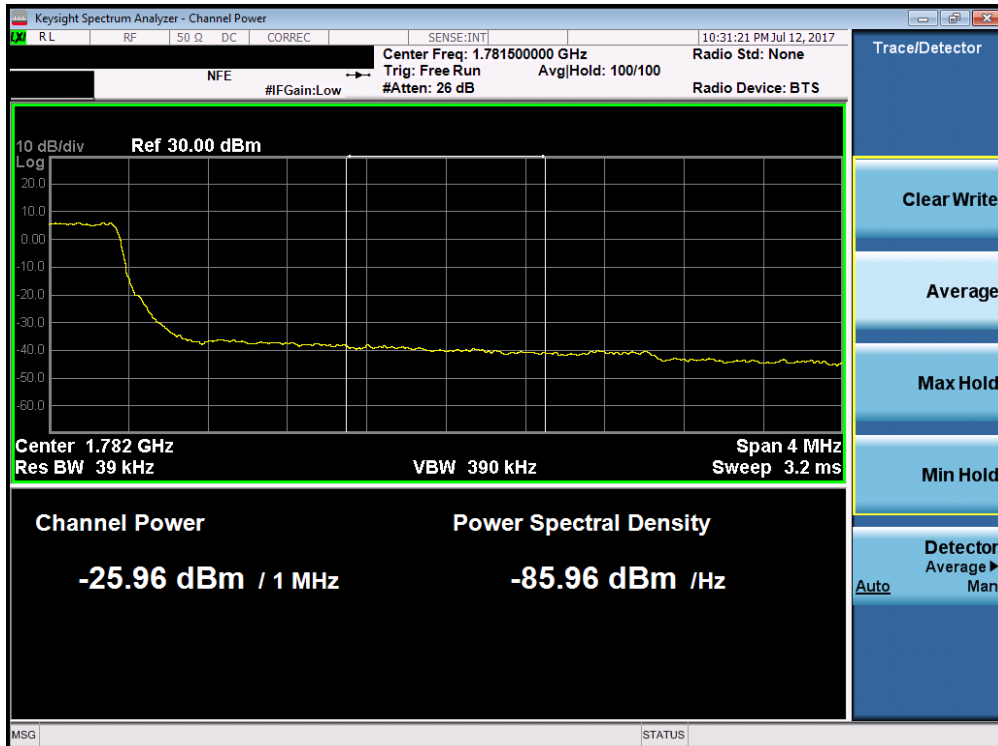


Plot 7-199. Lower Extended Band Edge Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2-ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 119 of 216

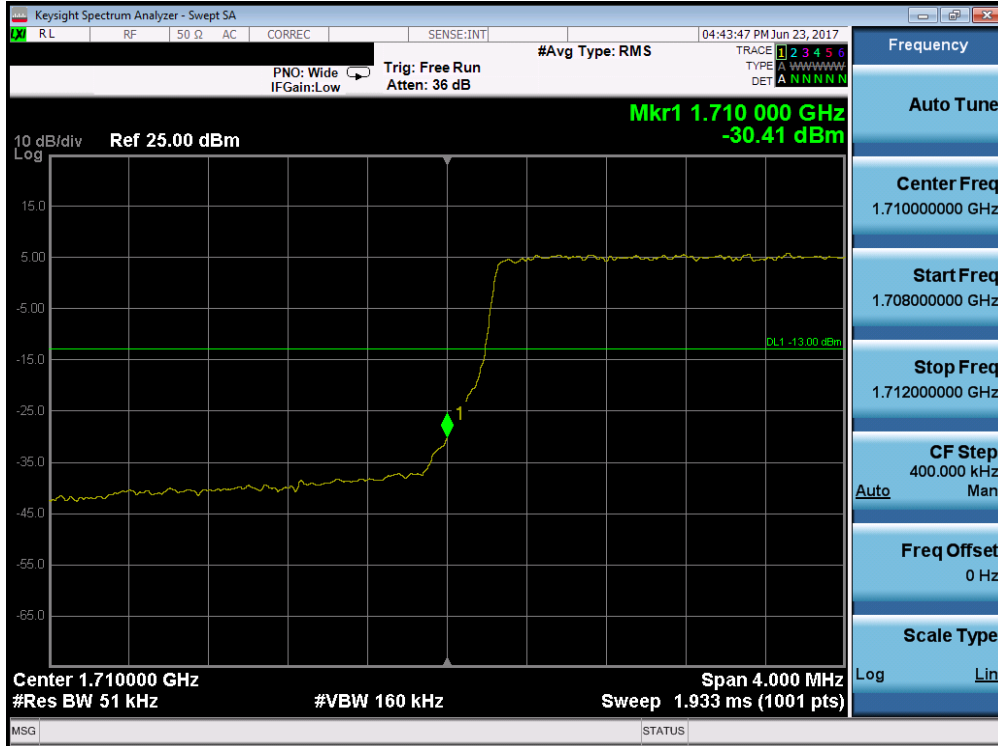


Plot 7-200. Upper Band Edge Plot (Band 66 – 3.0MHz QPSK – RB Size 15)

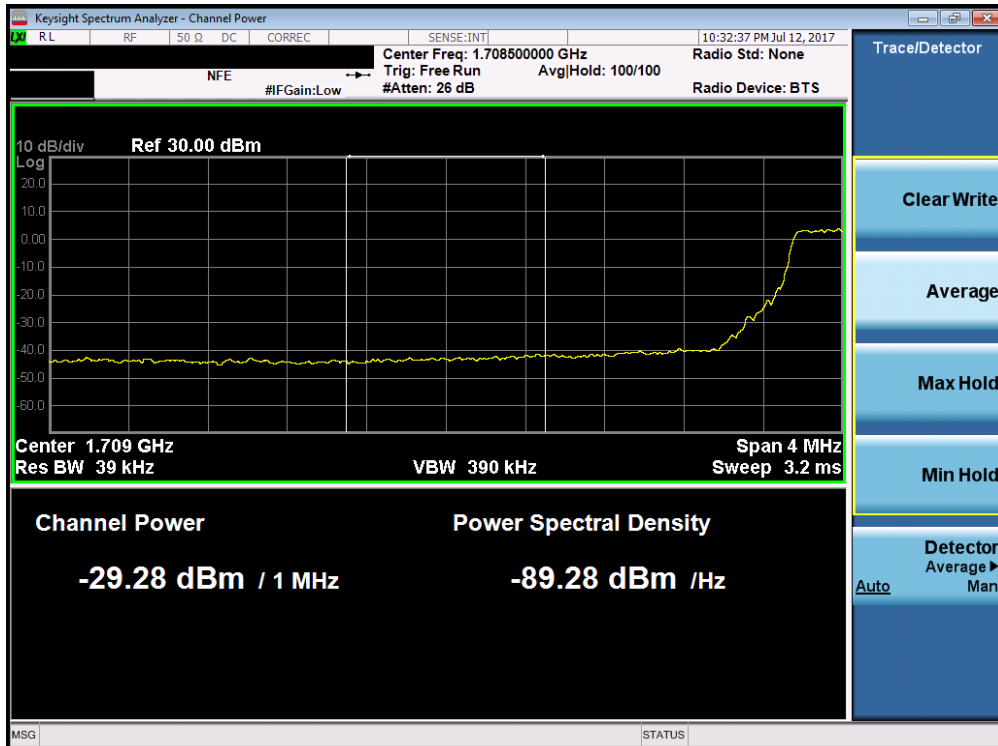


Plot 7-201. Upper Extended Band Edge Plot (Band 66 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 120 of 216



Plot 7-202. Lower Band Edge Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

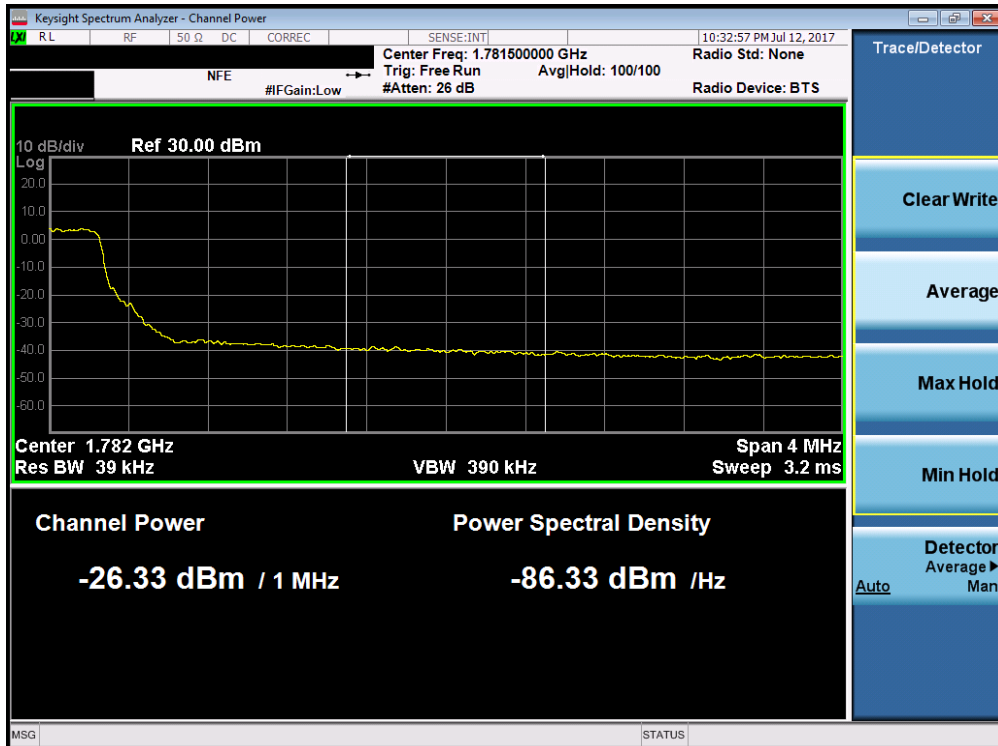


Plot 7-203. Lower Extended Band Edge Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2-ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 121 of 216

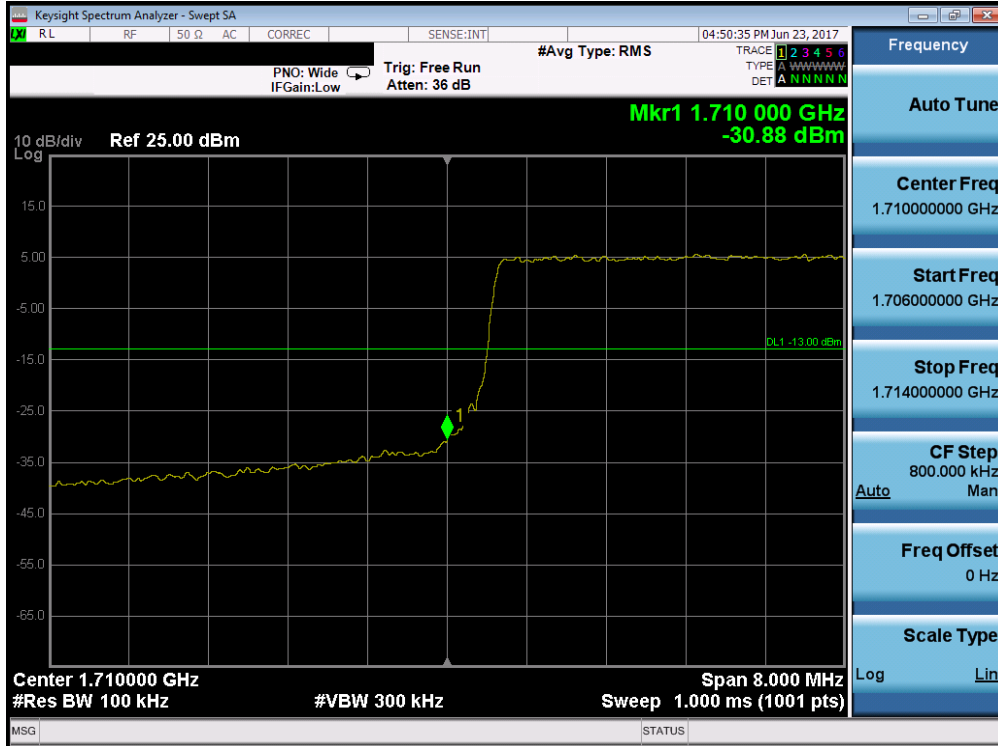


Plot 7-204. Upper Band Edge Plot (Band 66 – 5.0MHz QPSK – RB Size 25)

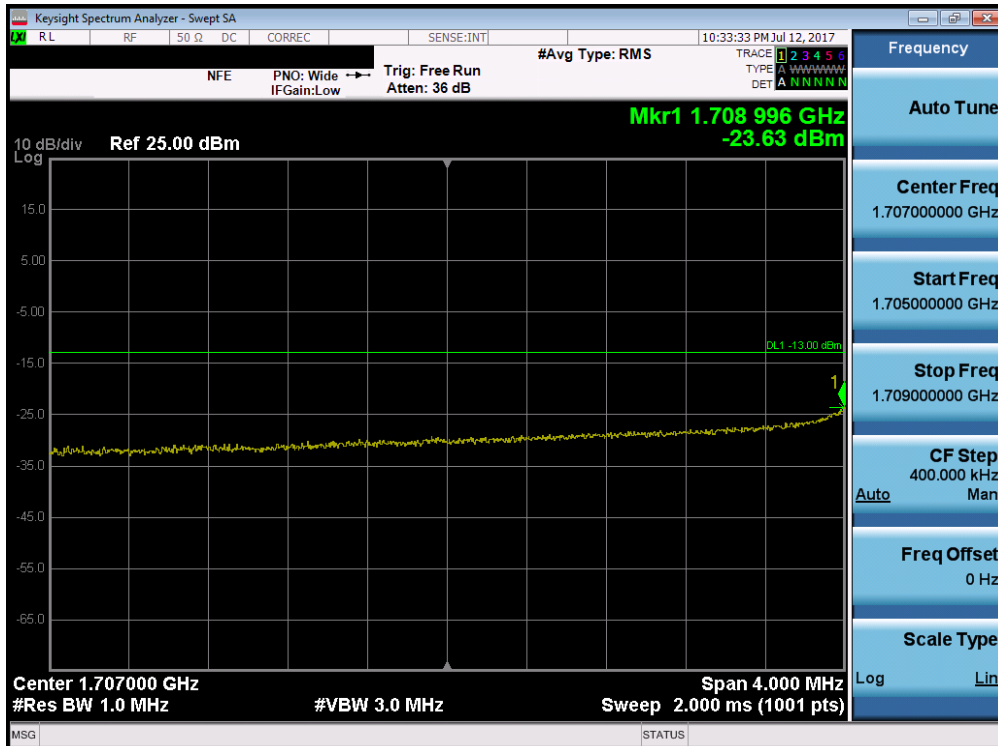


Plot 7-205. Upper Extended Band Edge Plot (Band 66 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2-ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 122 of 216

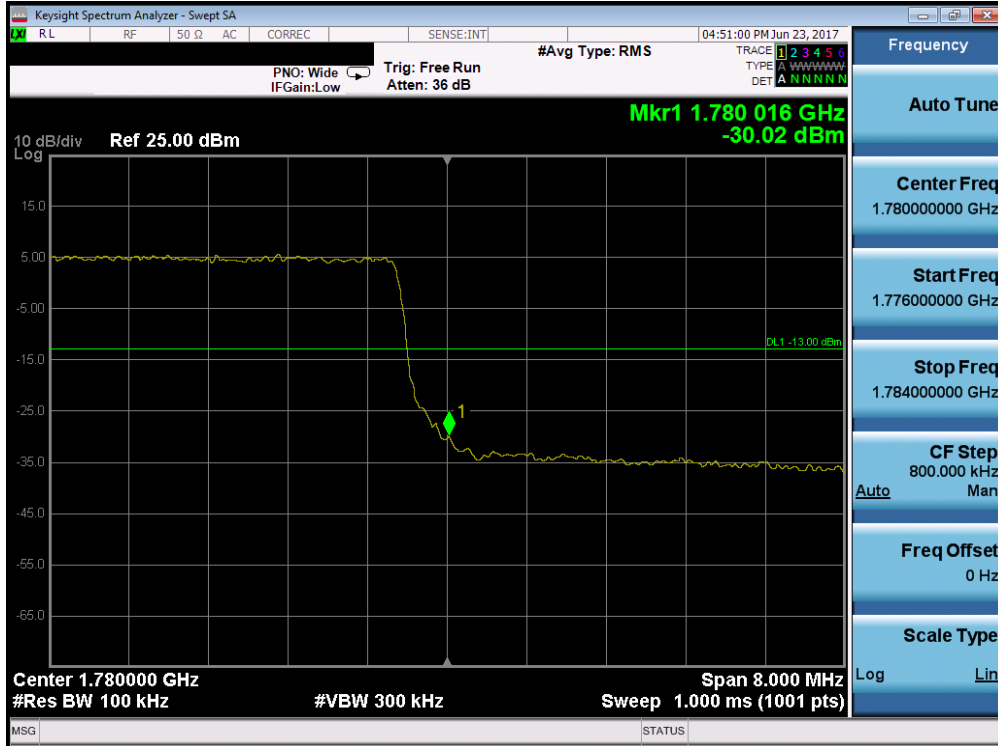


Plot 7-206. Lower Band Edge Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

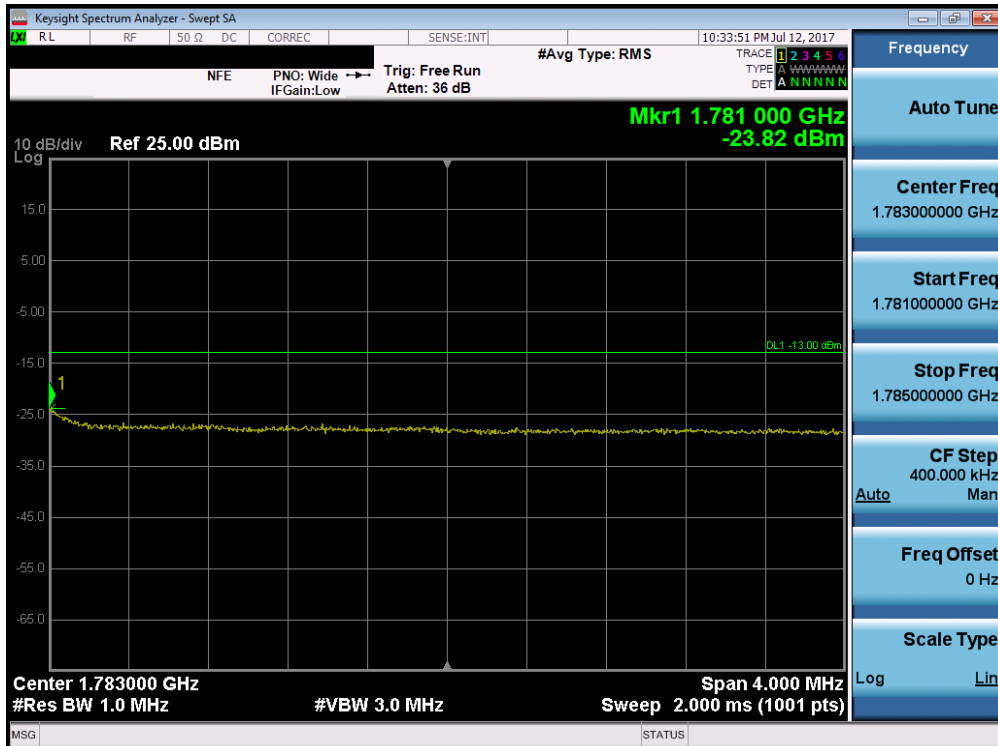


Plot 7-207. Lower Extended Band Edge Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 123 of 216

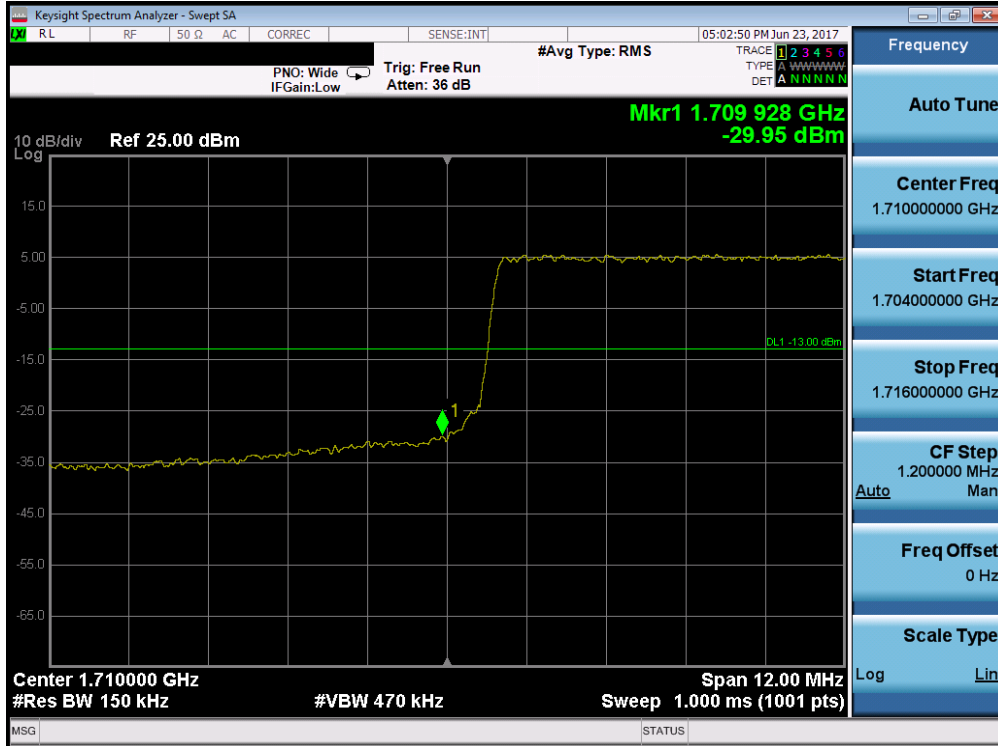


Plot 7-208. Upper Band Edge Plot (Band 66 – 10.0MHz QPSK – RB Size 50)



Plot 7-209. Upper Extended Band Edge Plot (Band 66 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 124 of 216

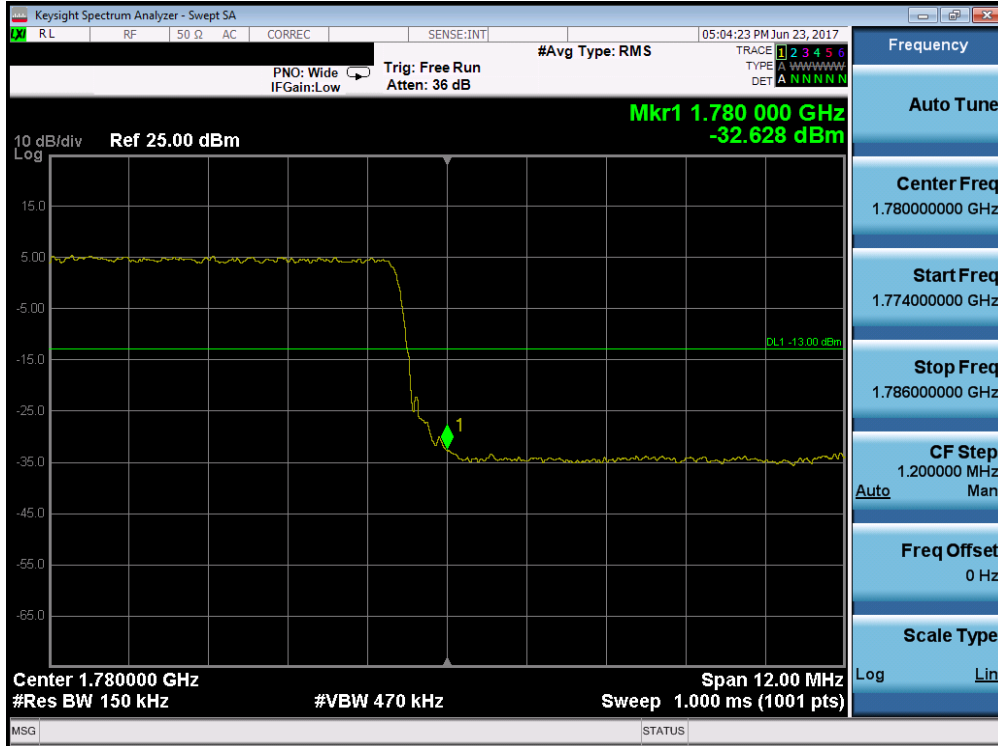


Plot 7-210. Lower Band Edge Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

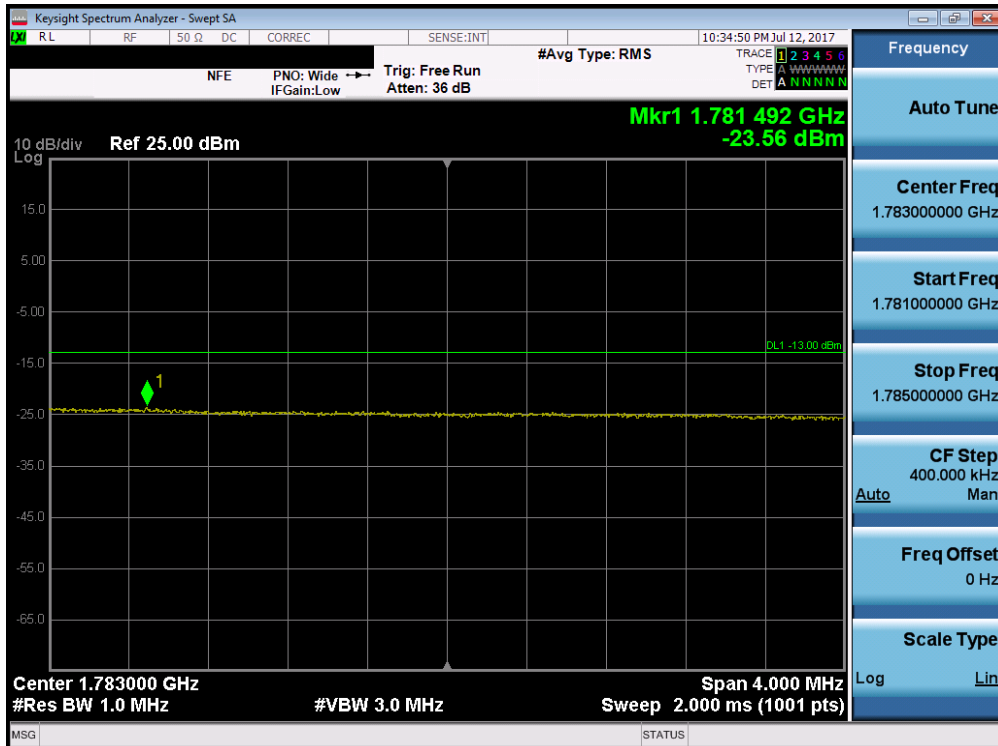


Plot 7-211. Lower Extended Band Edge Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 125 of 216

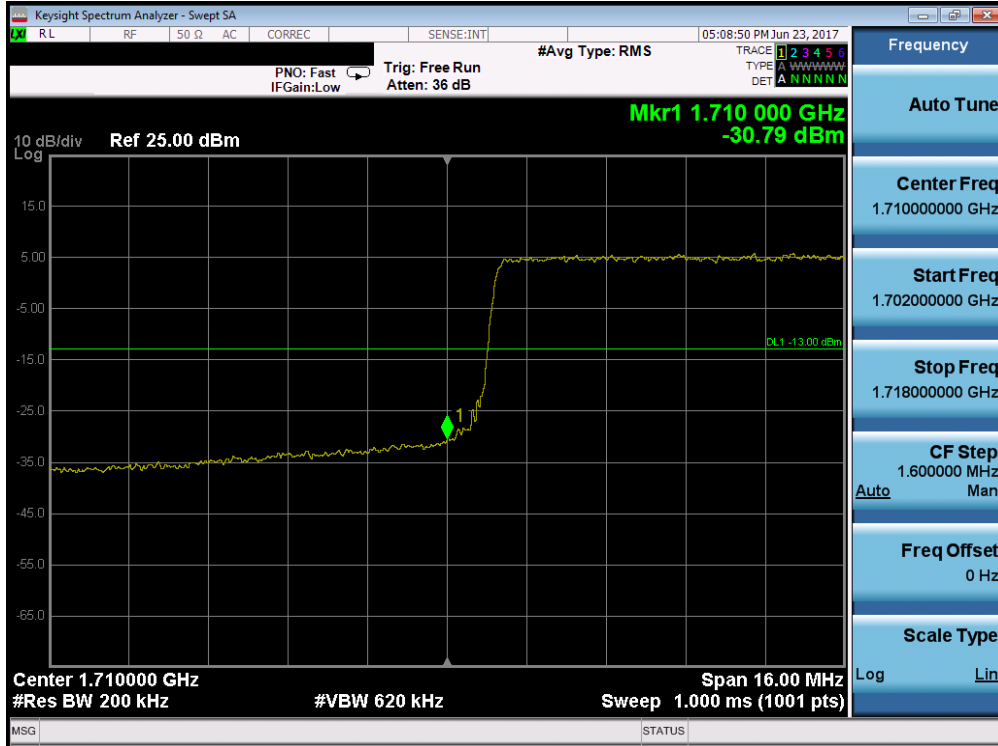


Plot 7-212. Upper Band Edge Plot (Band 66 – 15.0MHz QPSK – RB Size 75)

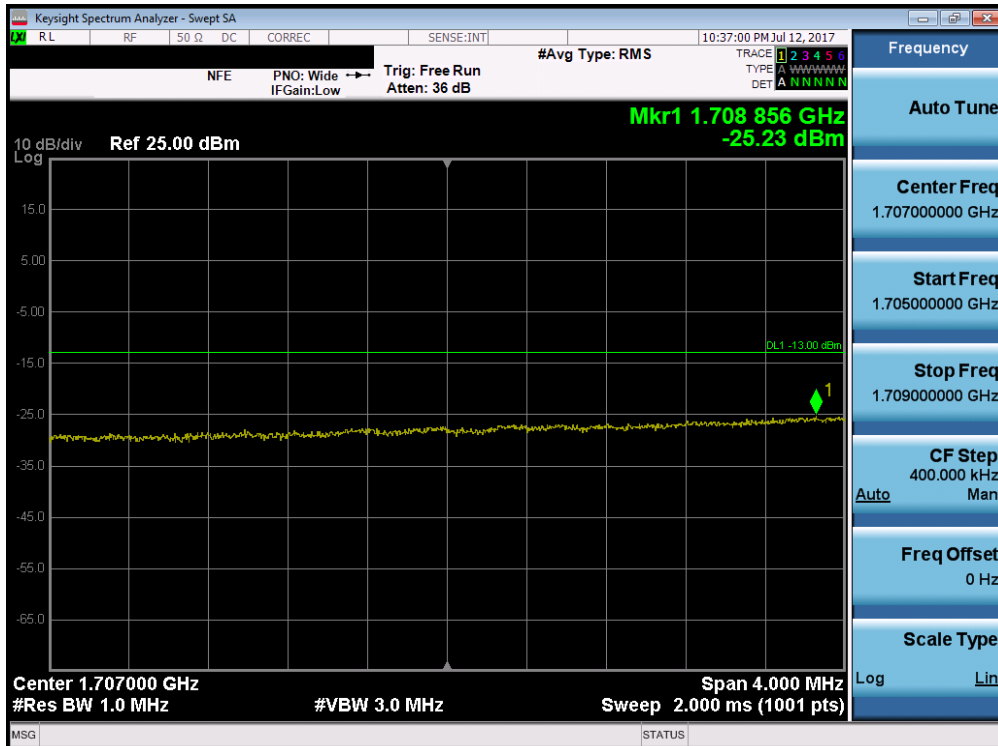


Plot 7-213. Upper Extended Band Edge Plot (Band 66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 126 of 216

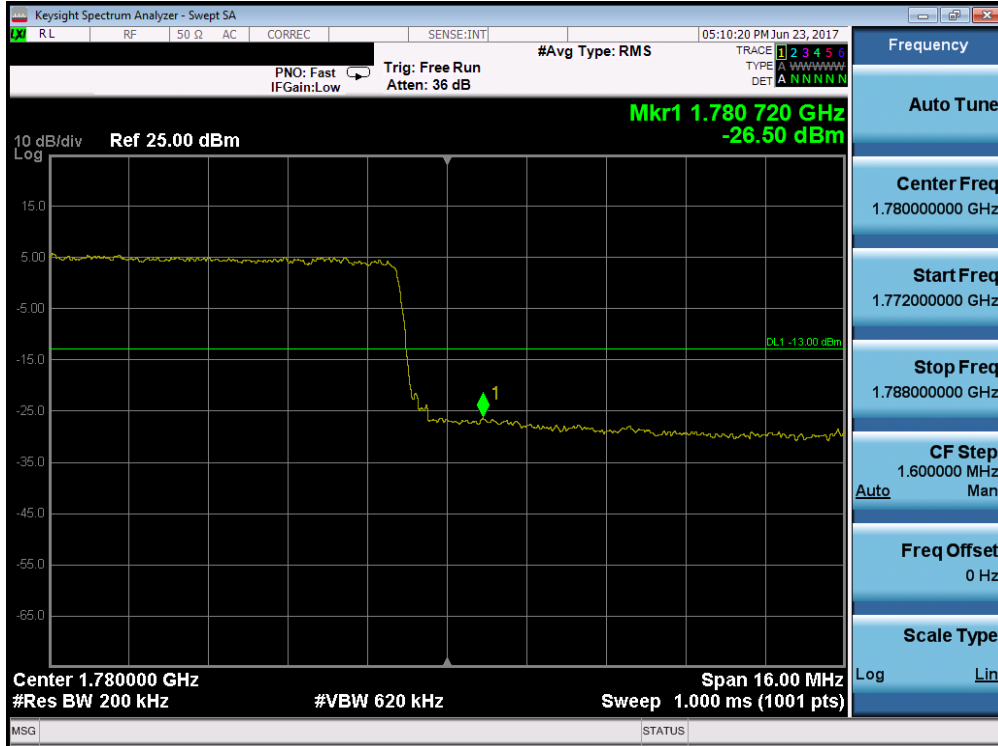


Plot 7-214. Lower Band Edge Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

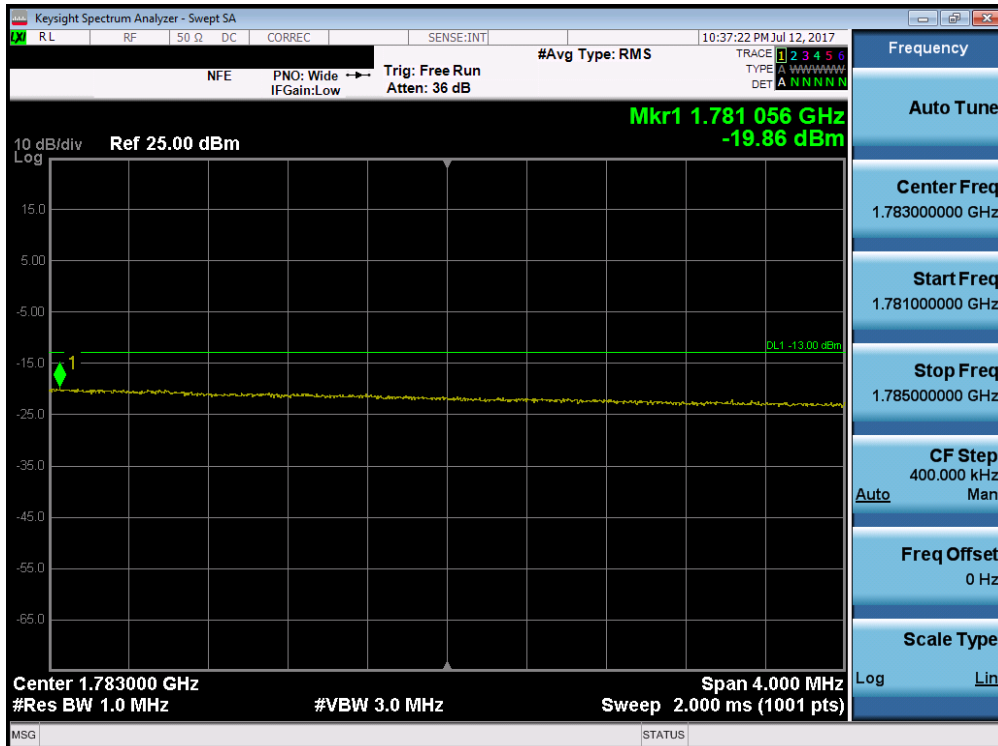


Plot 7-215. Lower Extended Band Edge Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 127 of 216

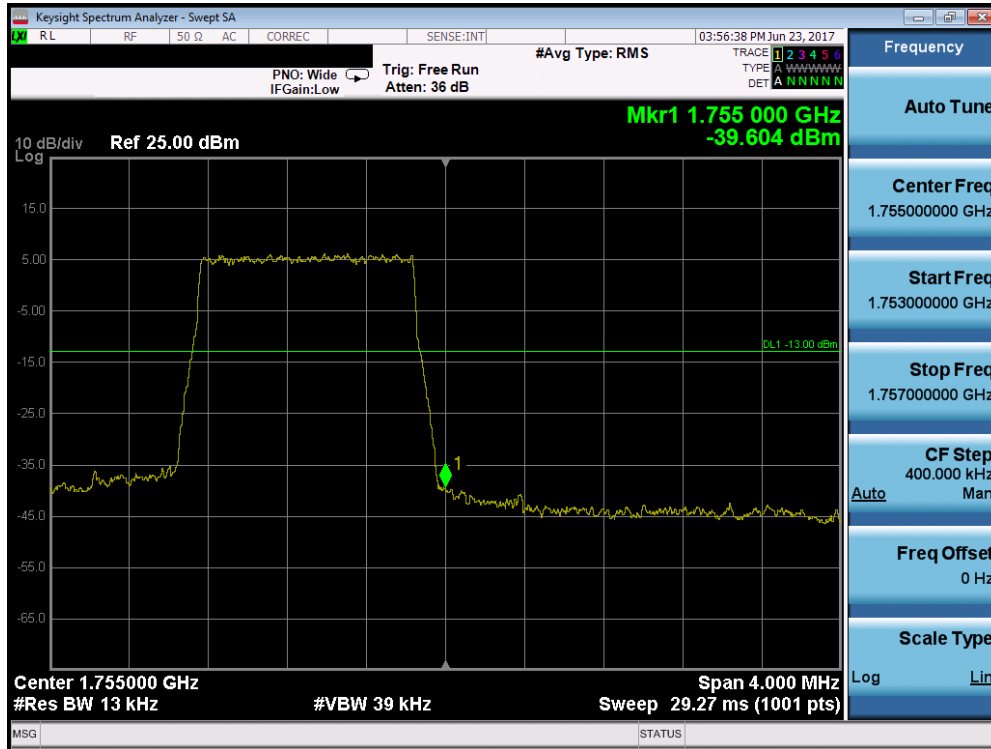


Plot 7-216. Upper Band Edge Plot (Band 66 – 20.0MHz QPSK – RB Size 100)

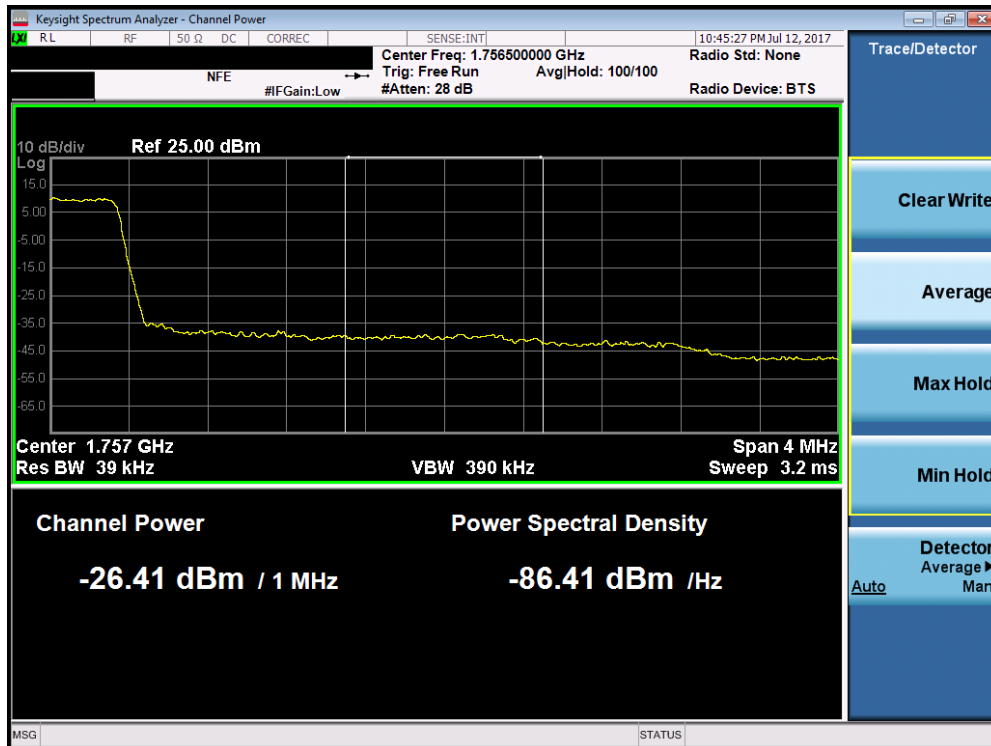


Plot 7-217. Upper Extended Band Edge Plot (Band 66 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 128 of 216

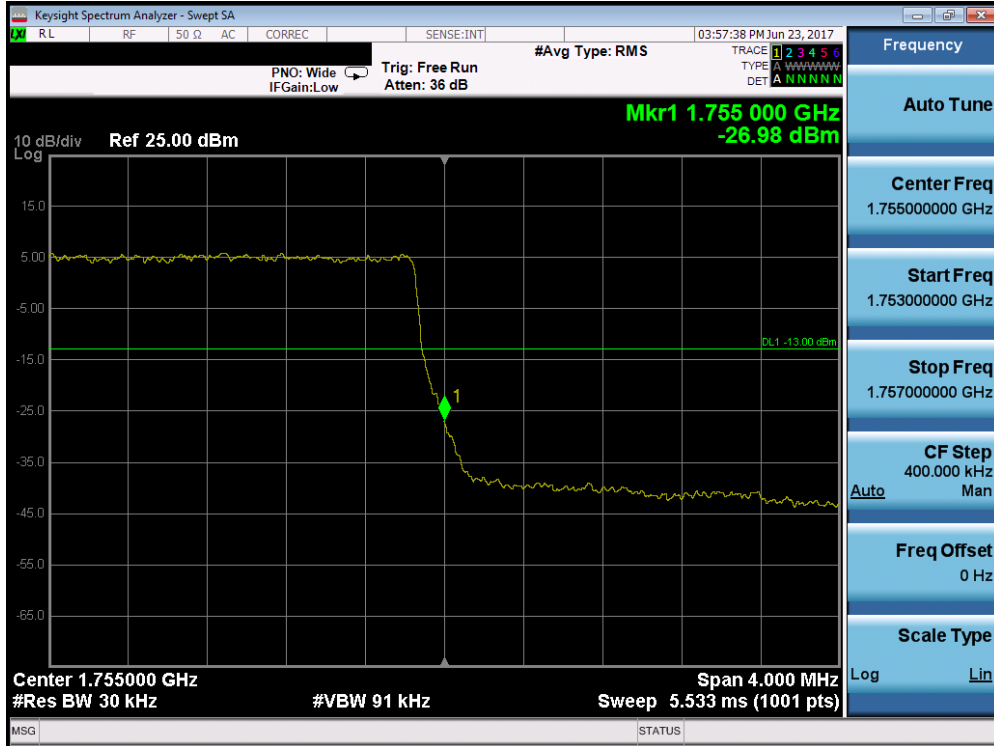


Plot 7-218. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

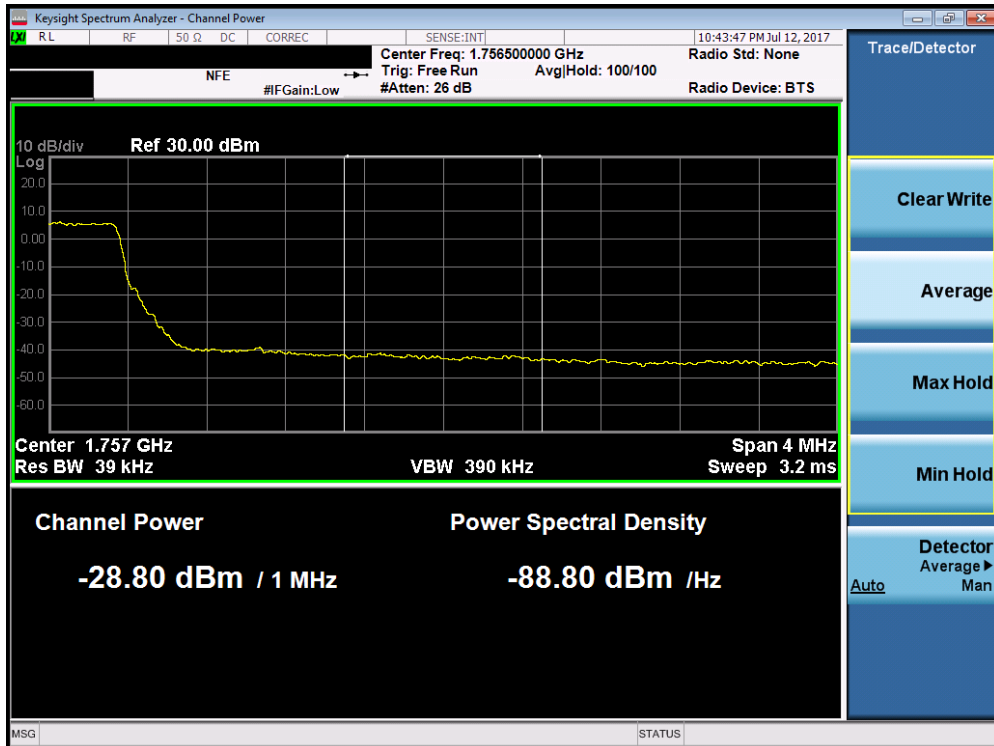


Plot 7-219. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 129 of 216



Plot 7-220. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

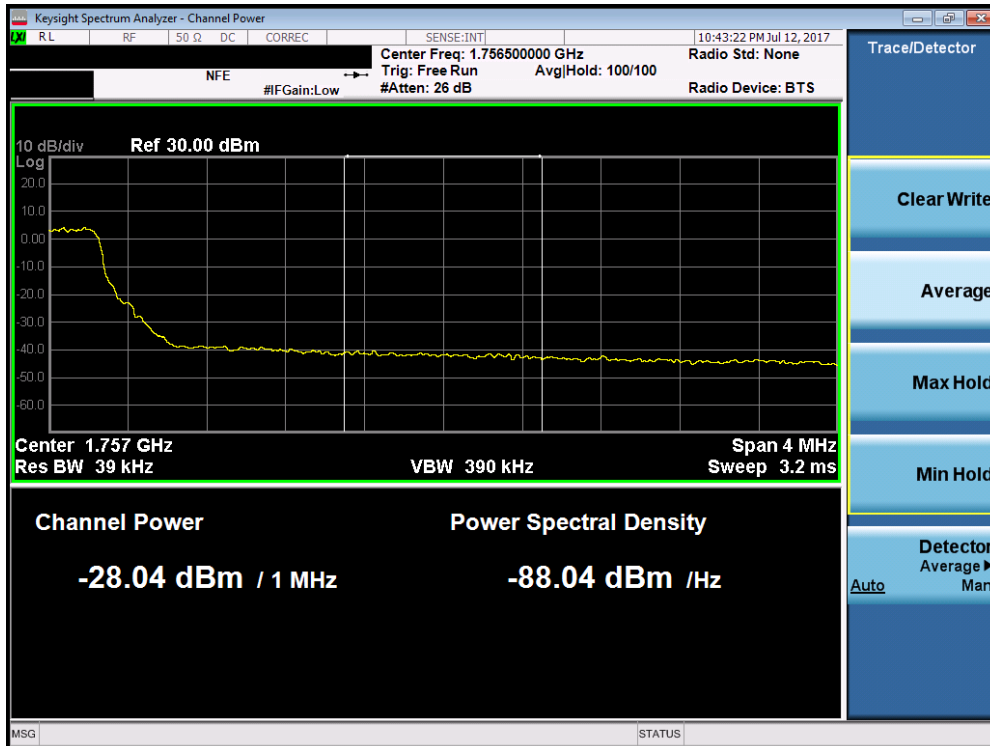


Plot 7-221. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 130 of 216

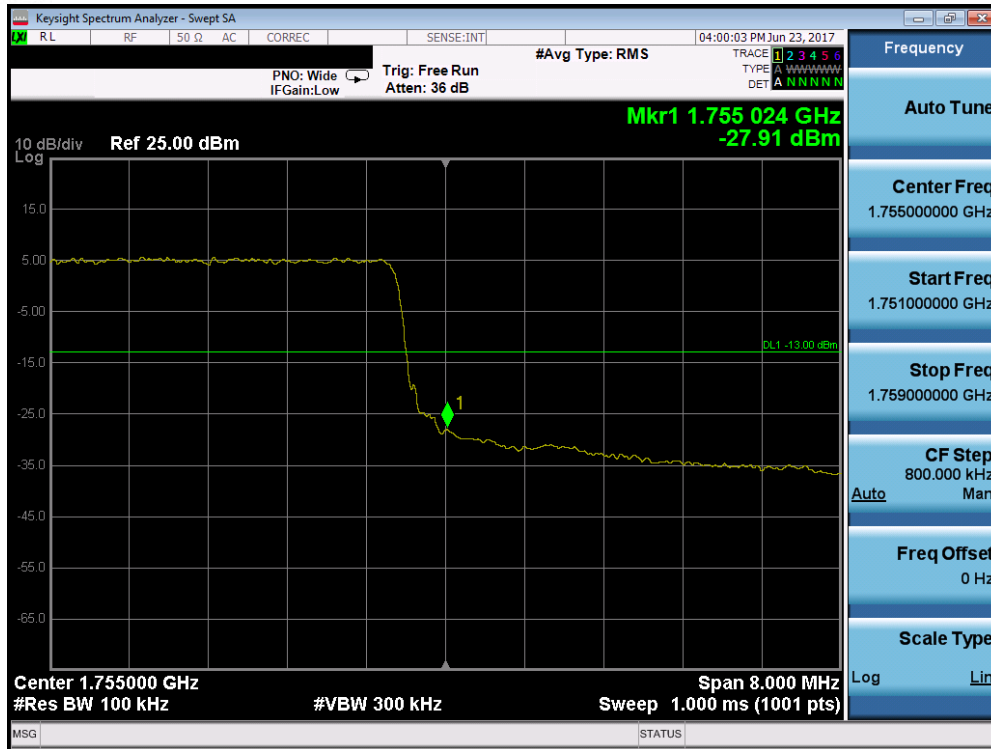


Plot 7-222. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

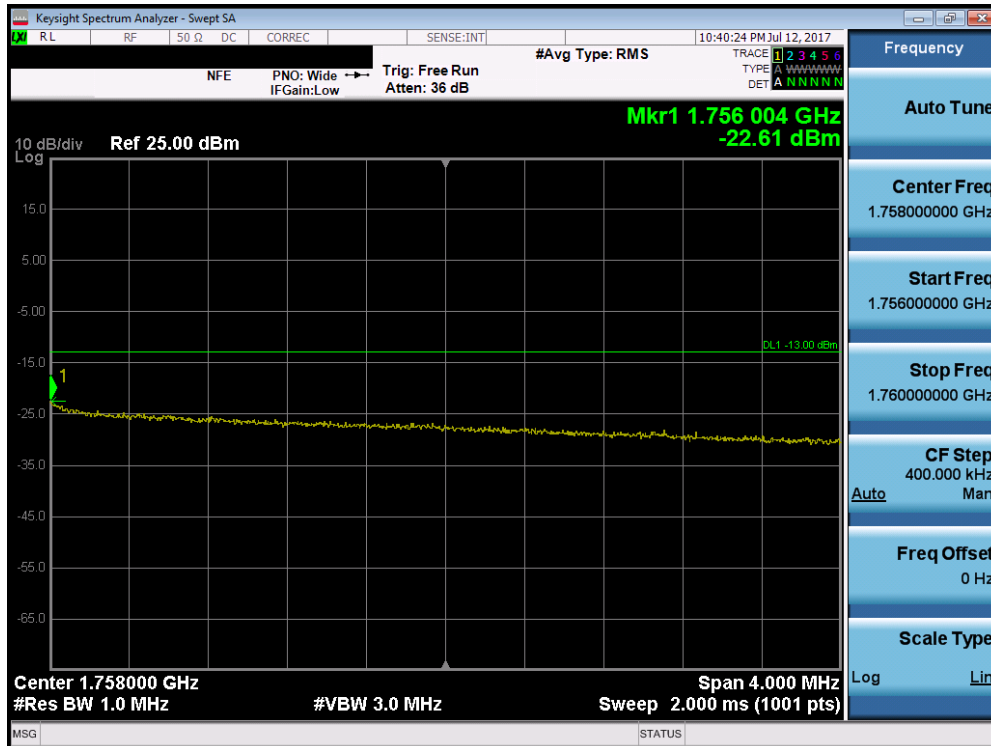


Plot 7-223. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 131 of 216

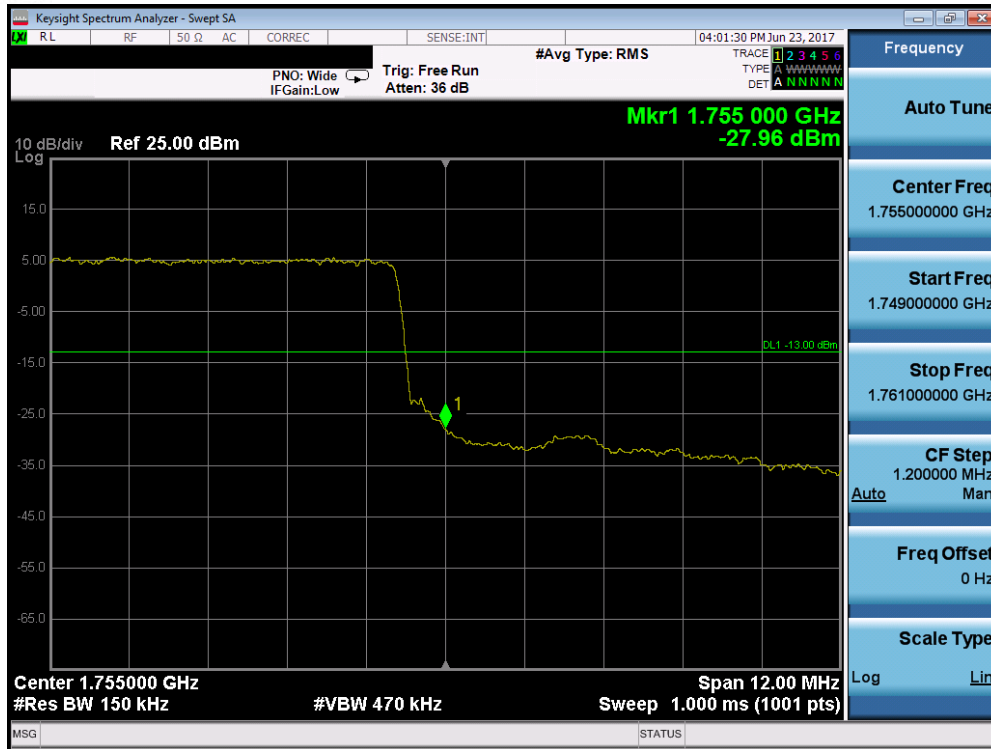


Plot 7-224. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

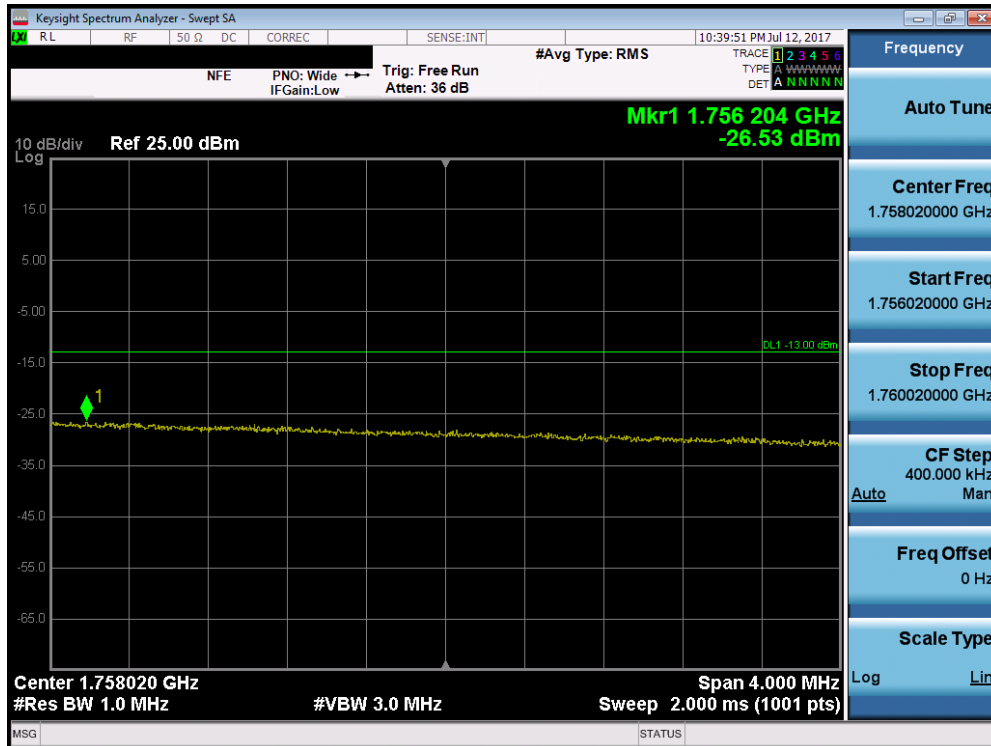


Plot 7-225. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 132 of 216



Plot 7-226. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 7-227. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFG011C	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1706200200-03-R2.ZNF	Test Dates: 06/21 - 07/17/2017	EUT Type: Portable Handset		Page 133 of 216