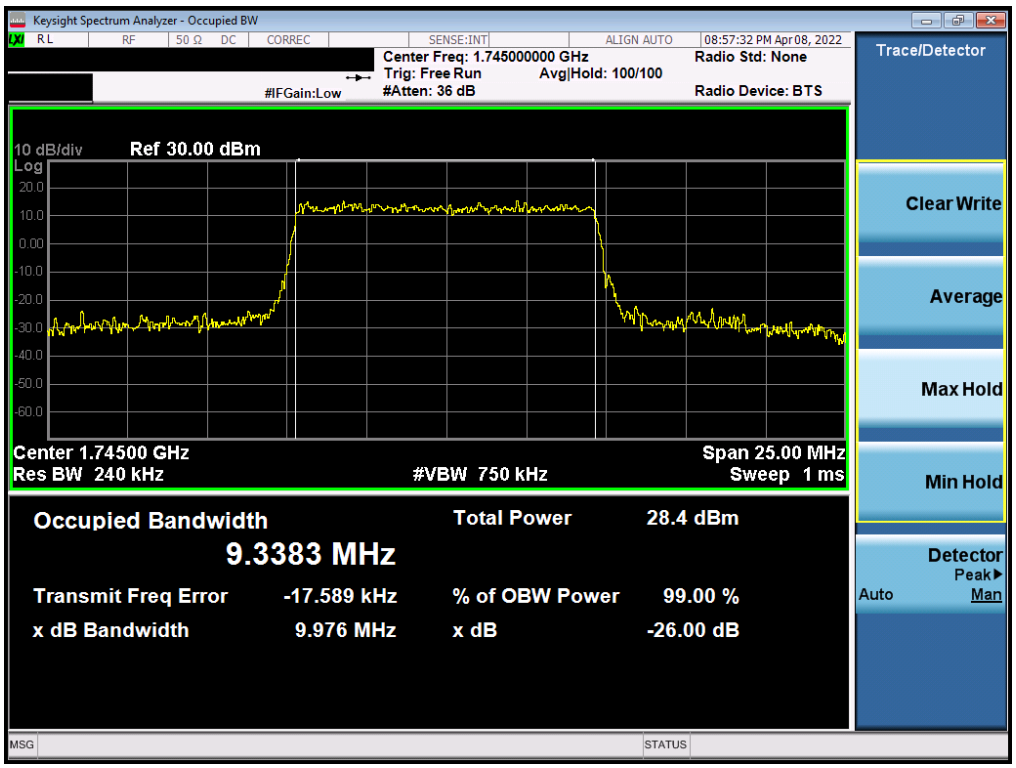
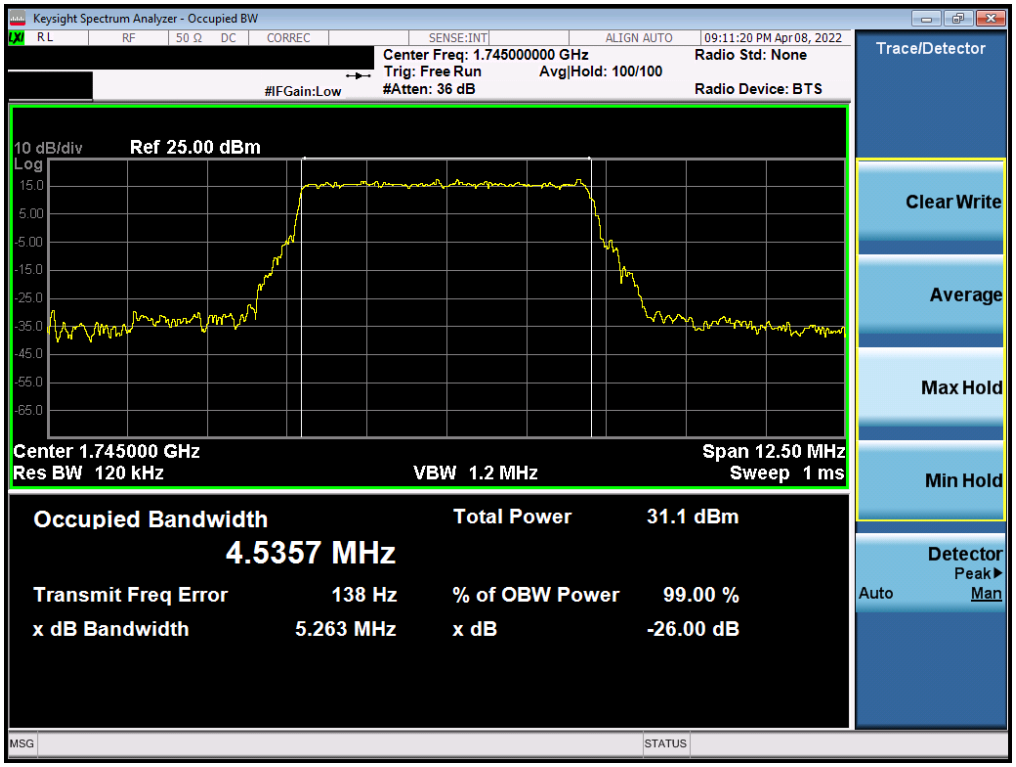


Plot 7-99. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB – Ant F)



Plot 7-100. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-S-OFDM BPSK - Full RB – Ant F)

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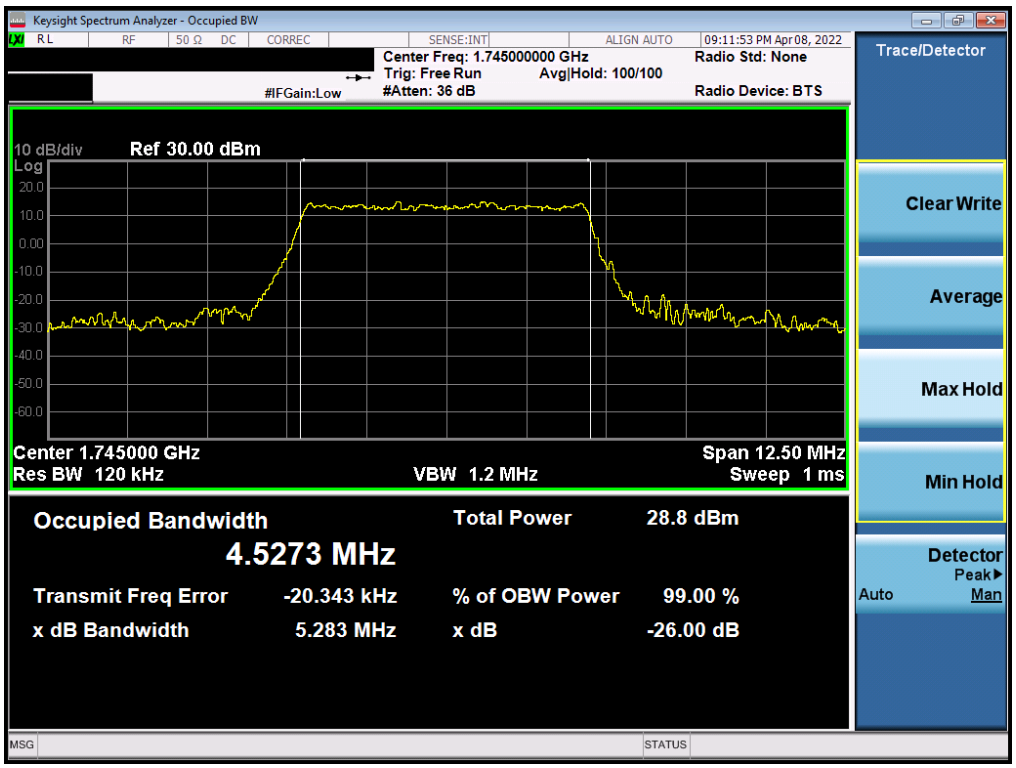
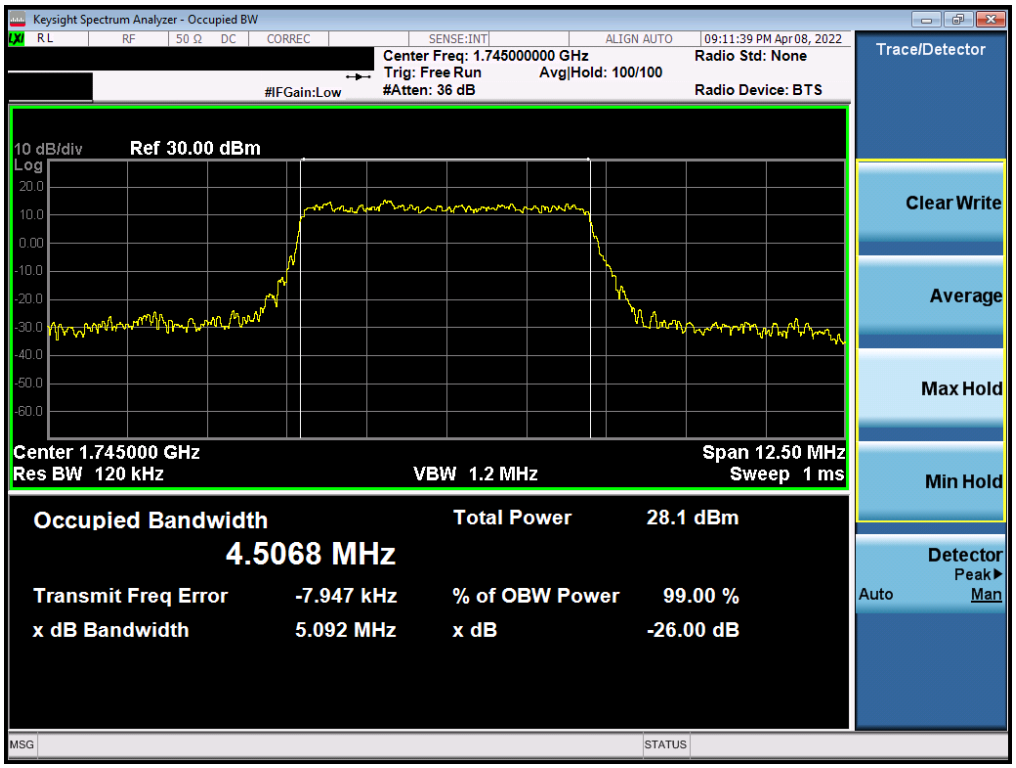


Plot 7-101. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB – Ant F)



Plot 7-102. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB – Ant F)

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7.4 Spurious and Harmonic Emissions at Antenna Terminal

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 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 + 10 $\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 18GHz (separated into at least two plots per channel)
2. RBW ≥ 100kHz
3. VBW ≥ 3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

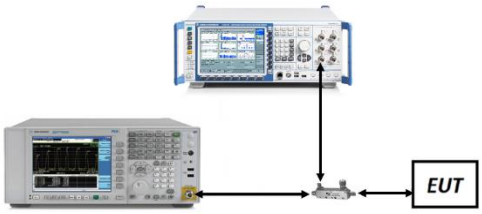

Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Per Part 27 and RSS-139, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz.

2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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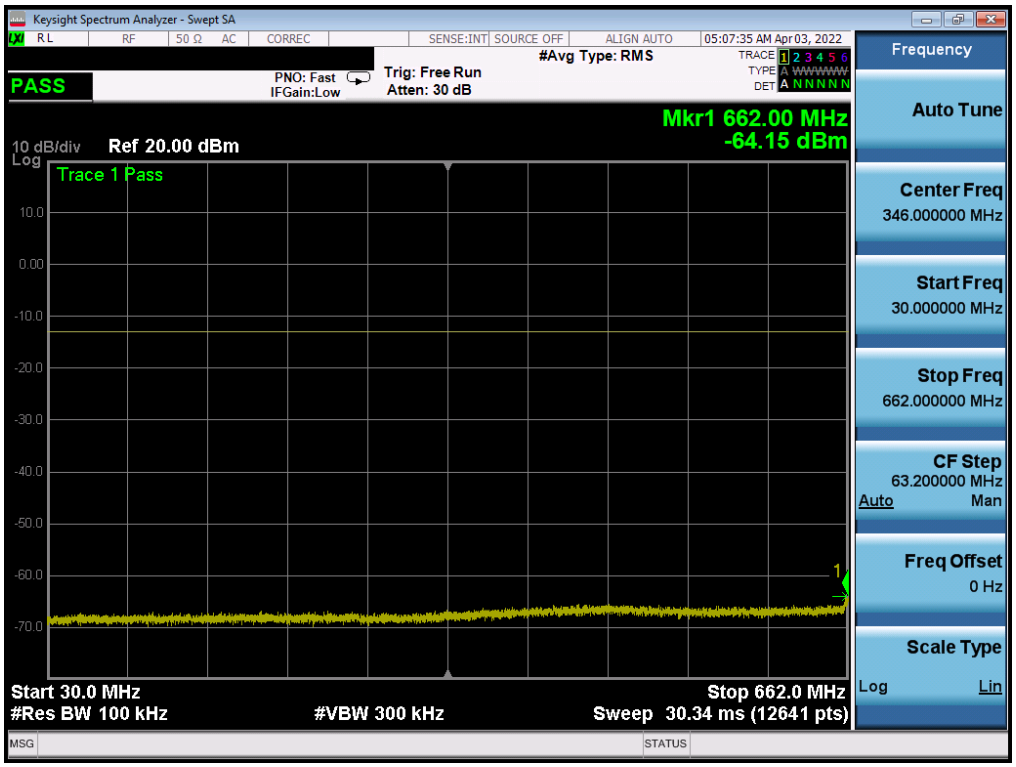
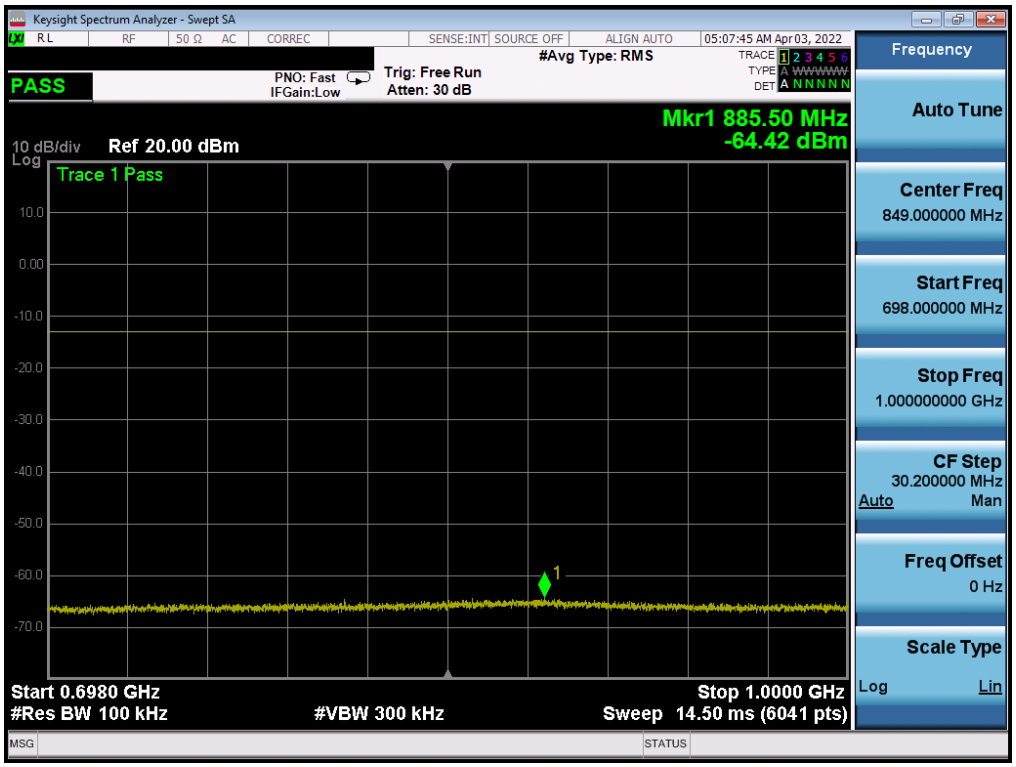
LTE Band 71 – Ant A



Plot 7-103. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - Low Channel - Ant A)



Plot 7-104. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - Low Channel - Ant A)

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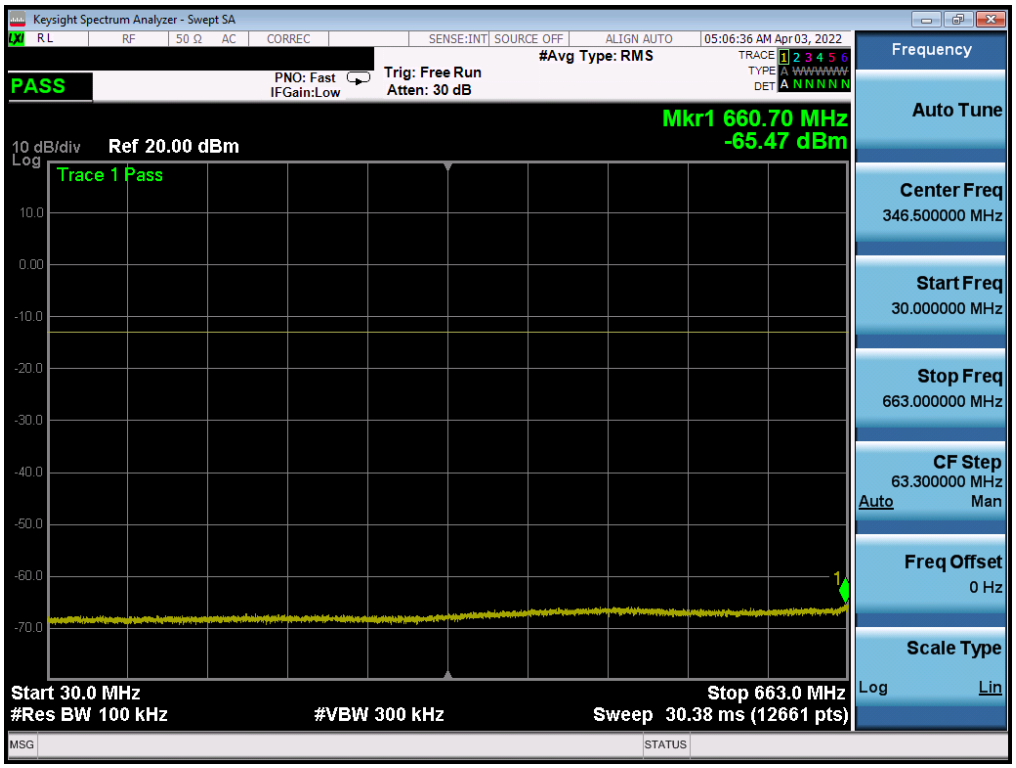
Plot 7-105. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - Low Channel - Ant A)



Plot 7-106. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - Mid Channel - Ant A)

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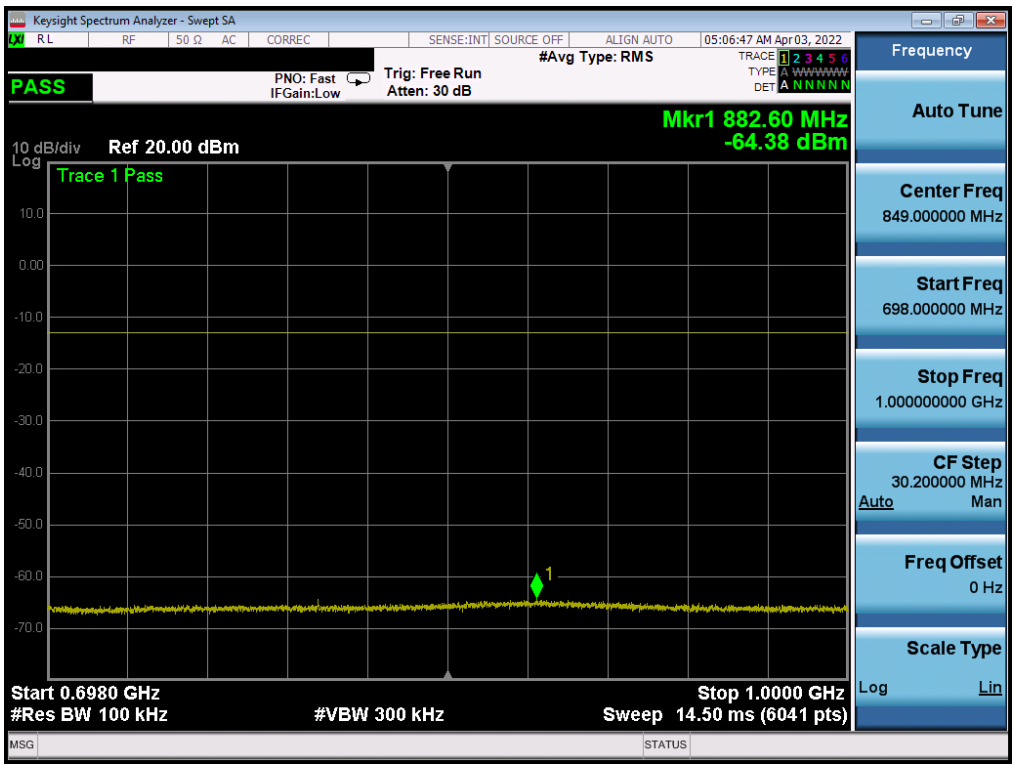

Plot 7-107. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - Mid Channel - Ant A)

Plot 7-108. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - Mid Channel - Ant A)

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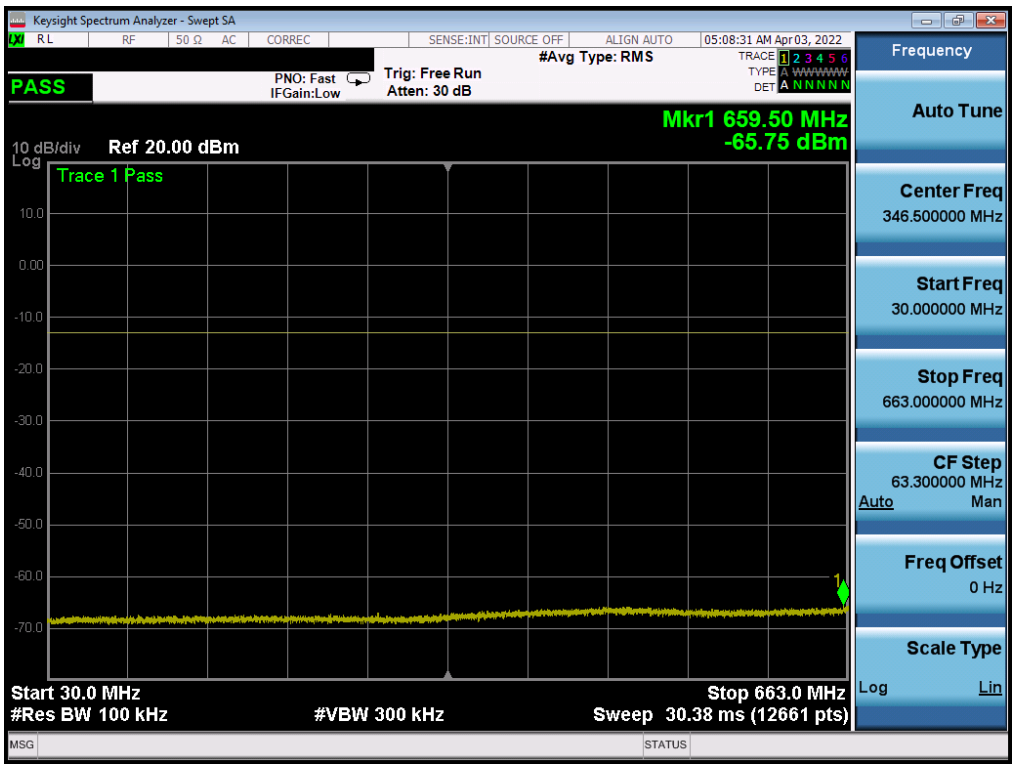
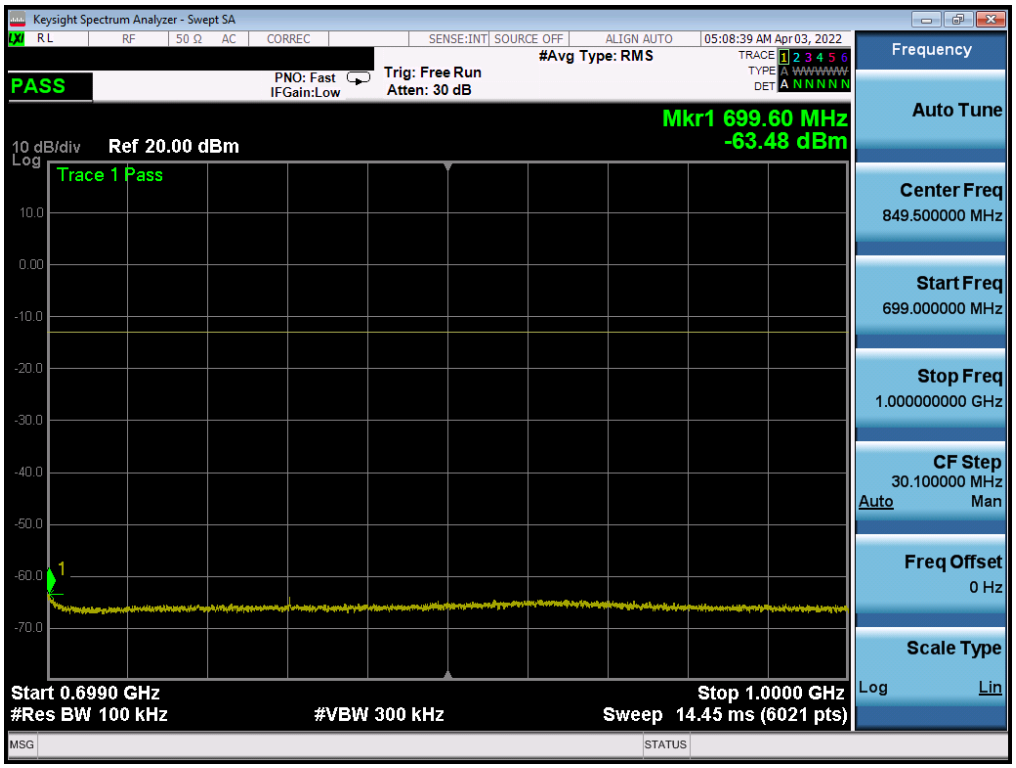


Plot 7-109. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - High Channel - Ant A)



Plot 7-110. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - High Channel - Ant A)

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Plot 7-111. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - 1 RB - High Channel - Ant A)

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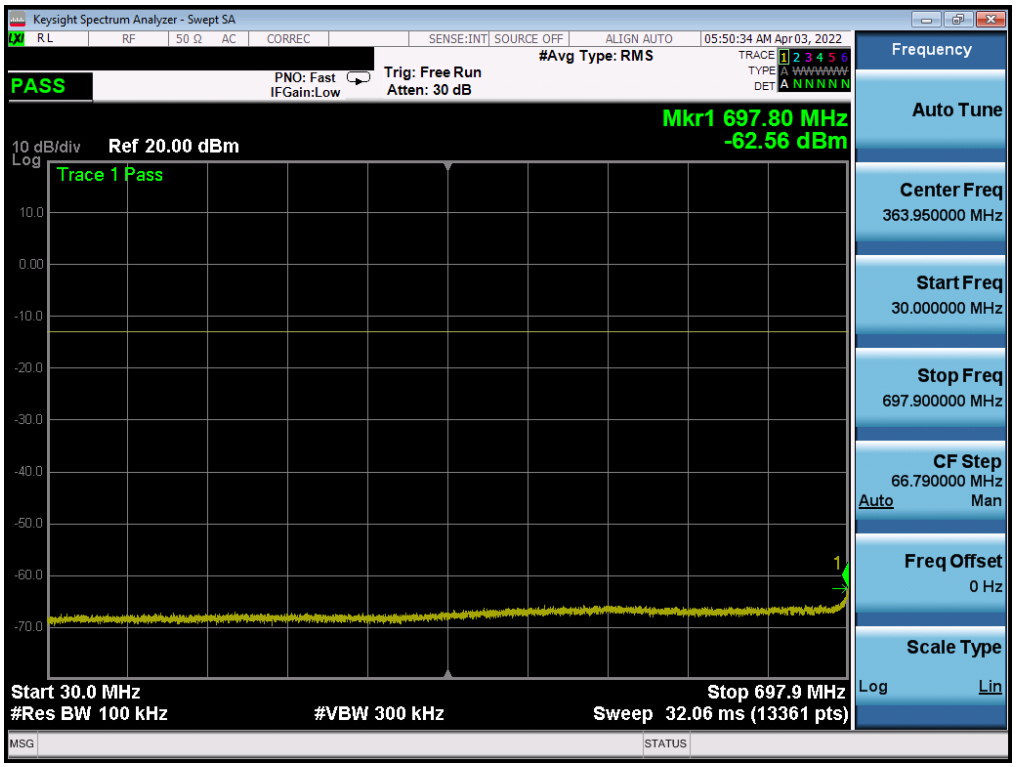
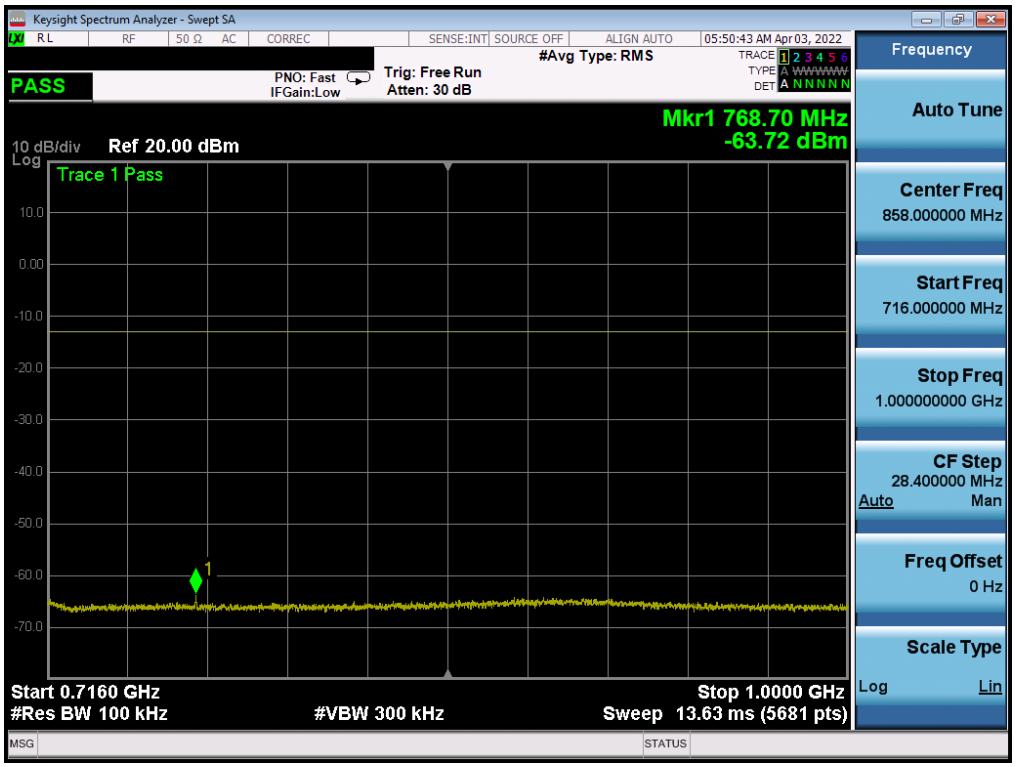
LTE Band 12 – Ant A



Plot 7-112. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Low Channel - Ant A)



Plot 7-113. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Low Channel - Ant A)

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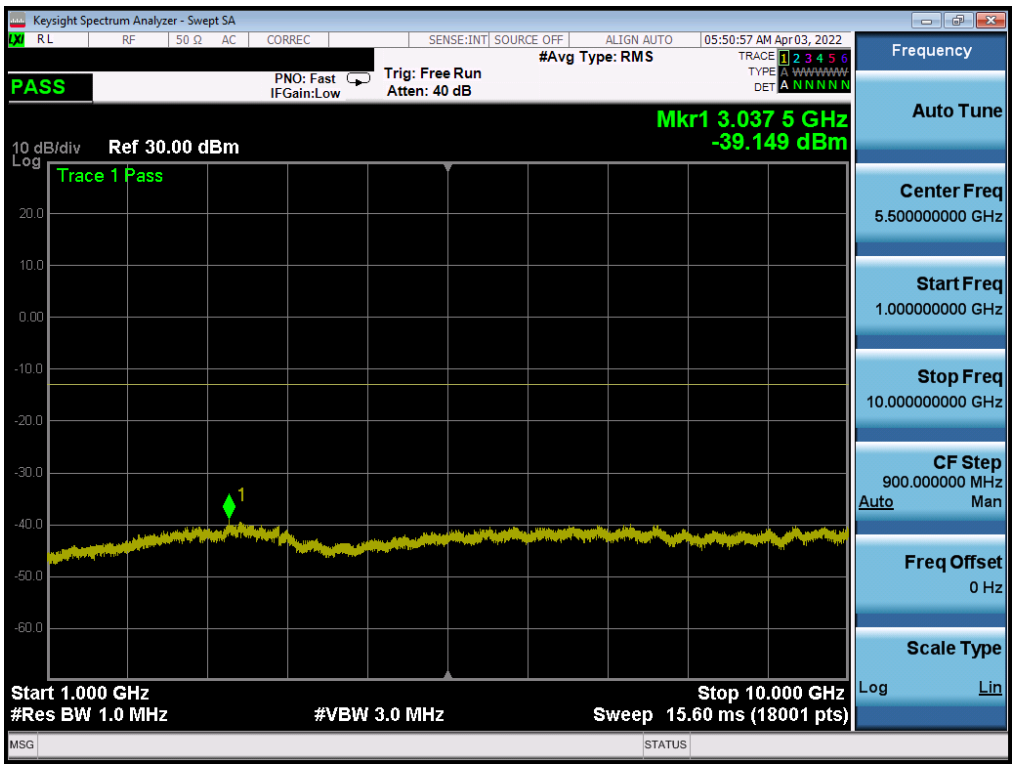
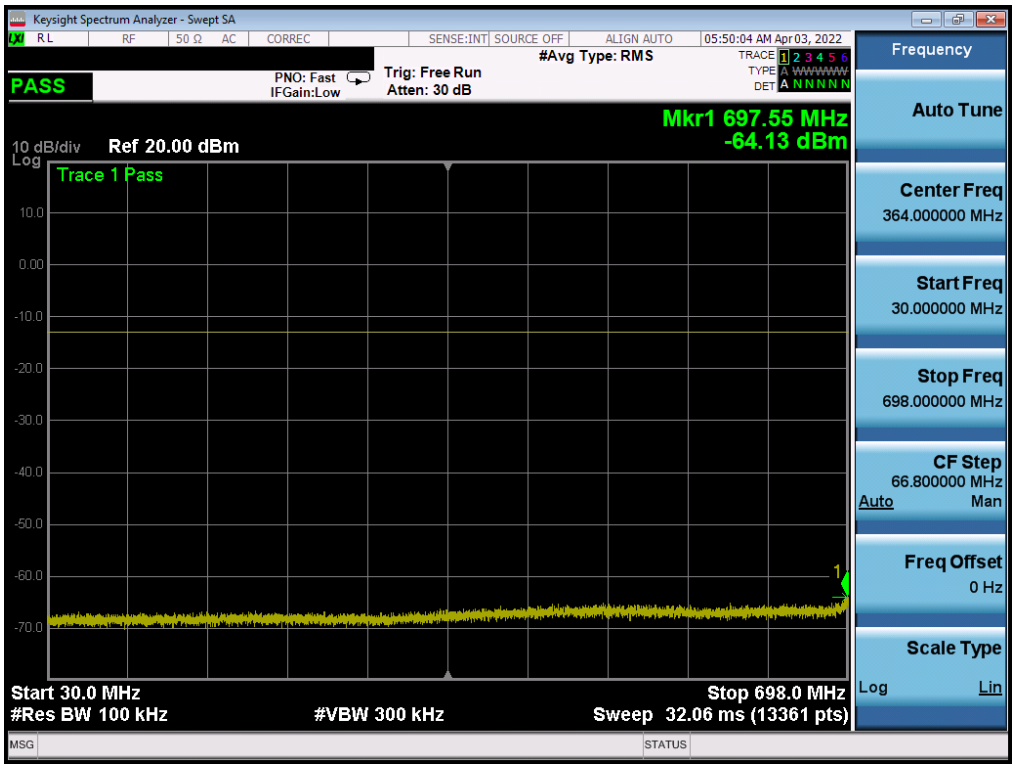


Plot 7-114. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Low Channel - Ant A)



Plot 7-115. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Mid Channel - Ant A)

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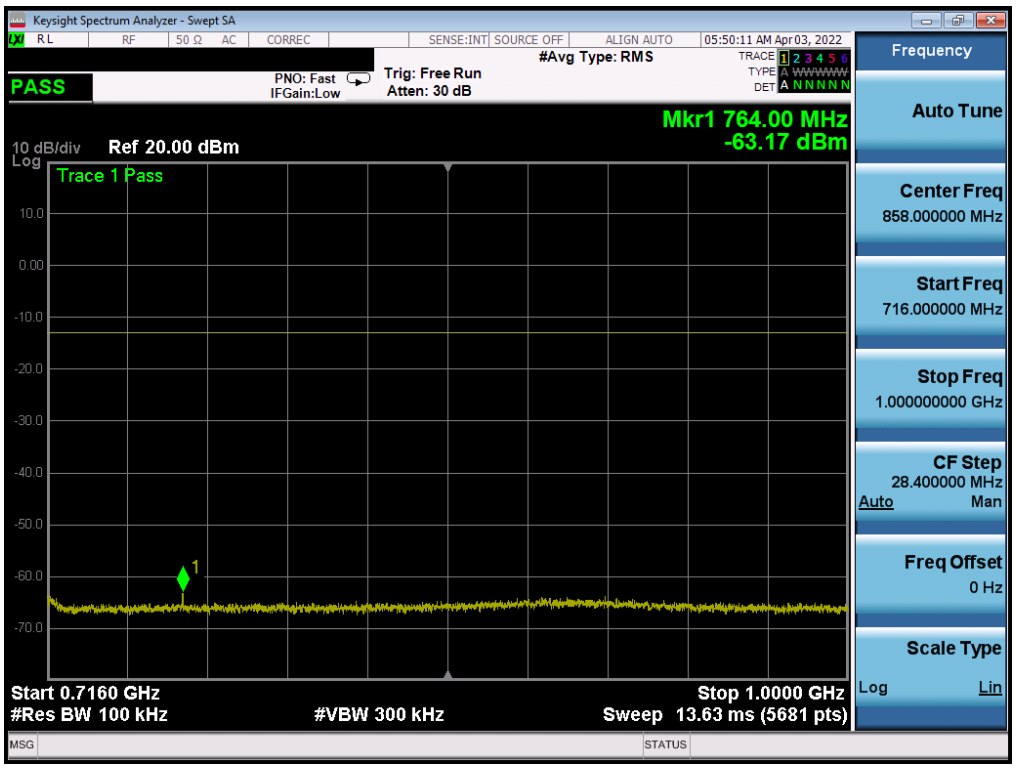

Plot 7-116. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Mid Channel - Ant A)

Plot 7-117. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Mid Channel - Ant A)

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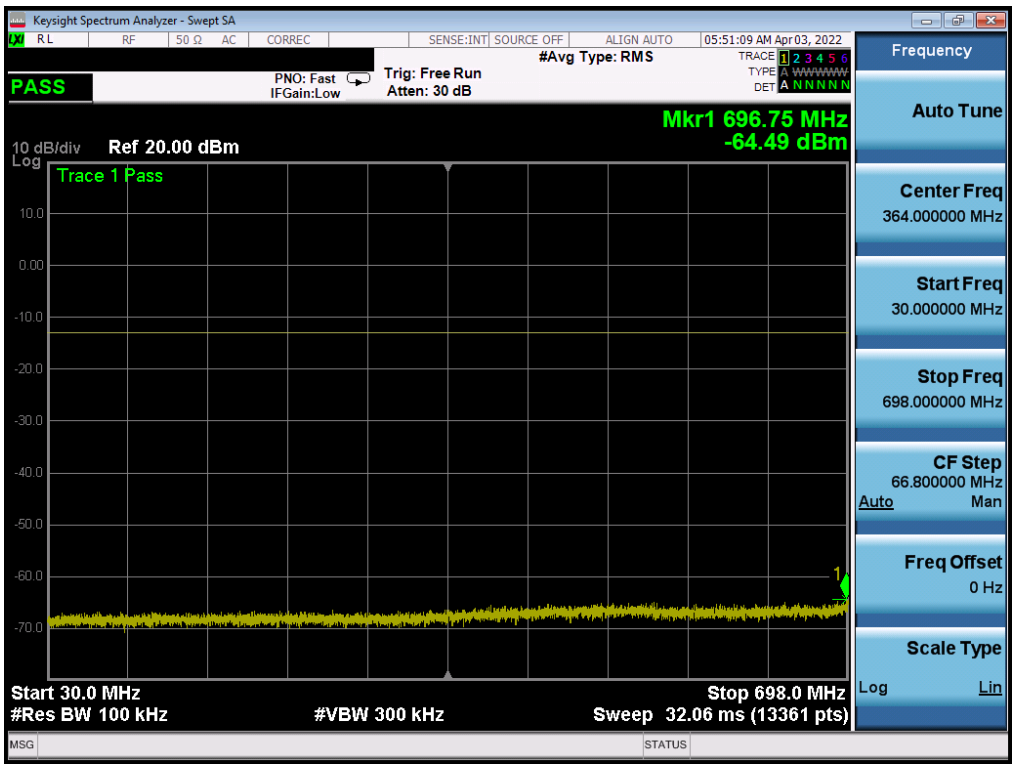
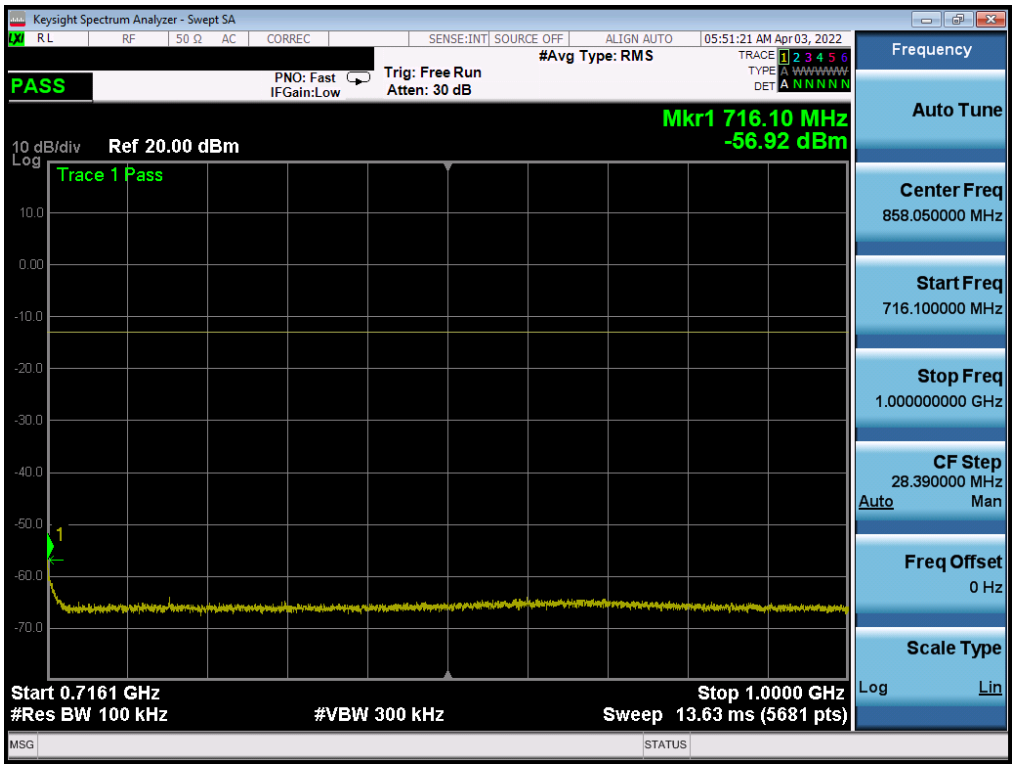


Plot 7-118. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - High Channel - Ant A)



Plot 7-119. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - High Channel - Ant A)

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Plot 7-120. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - High Channel - Ant A)

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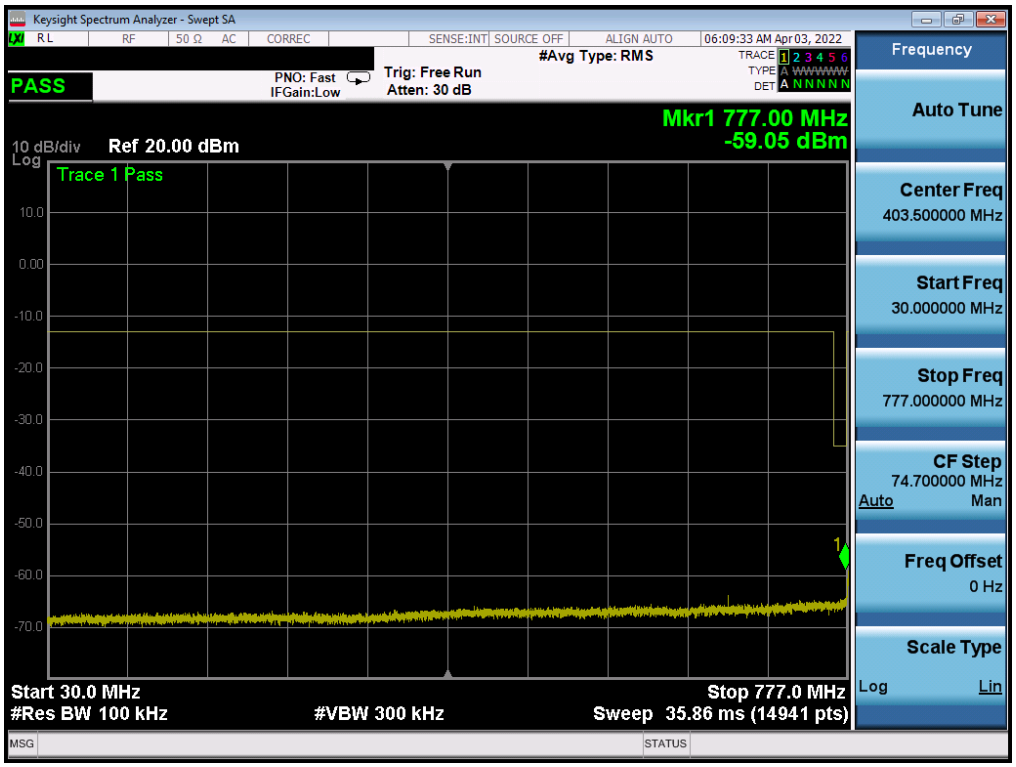
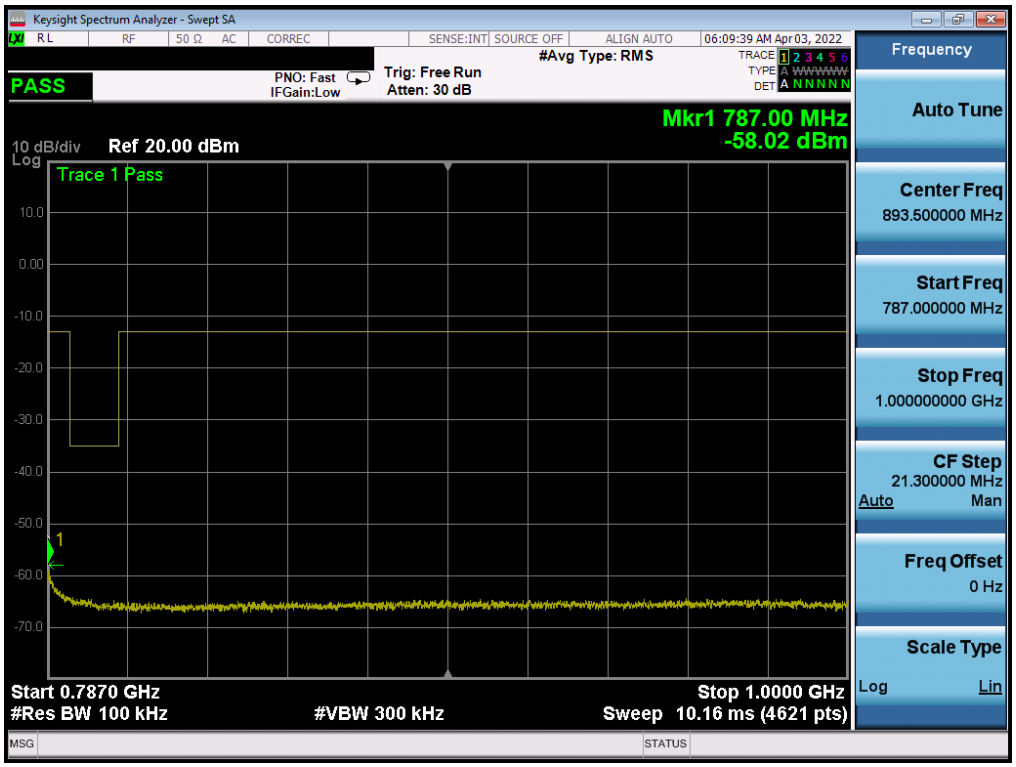
LTE Band 13 – Ant A



Plot 7-121. Conducted Spurious Plot (LTE Band 13 - 10MHz QPSK - 1 RB – Ant A)



Plot 7-122. Conducted Spurious Plot (LTE Band 13 - 10MHz QPSK - 1 RB – Ant A)

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Plot 7-123. Conducted Spurious Plot (LTE Band 13 - 10MHz QPSK - 1 RB – Ant A)

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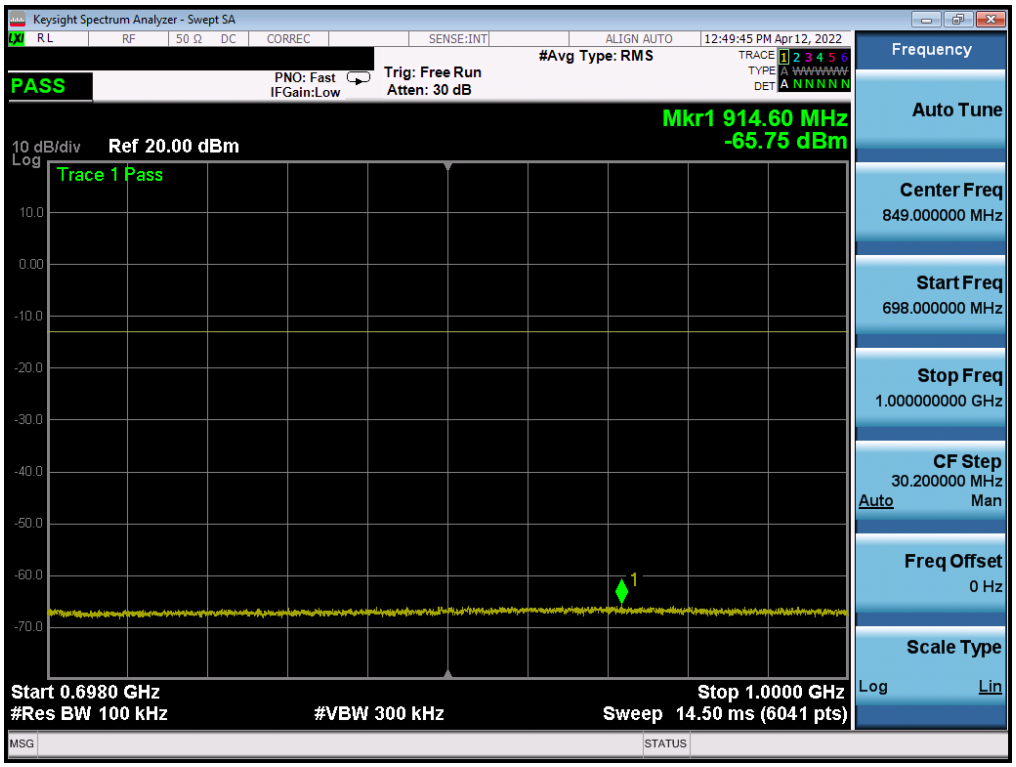
NR Band n71 – Ant A

Plot 7-124. Conducted Spurious Plot (NR Band n71 -20.0MHz - 1 RB - Low Channel - Ant A)



Plot 7-125. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - Low Channel - Ant A)

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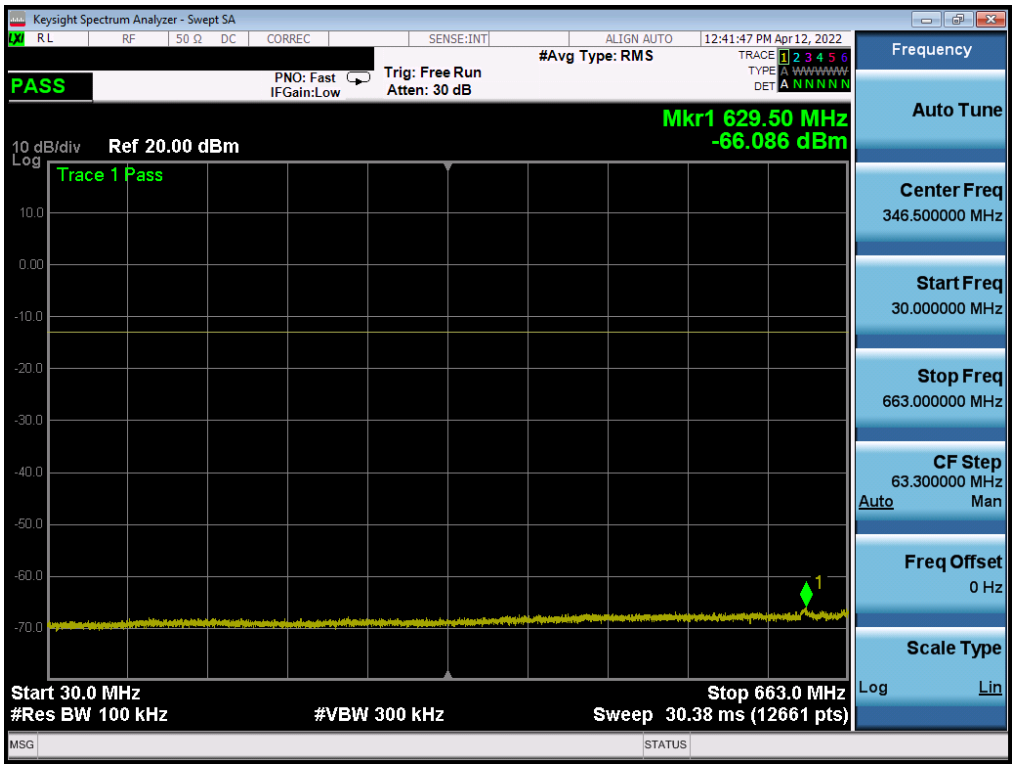
Plot 7-126. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - Low Channel - Ant A)



Plot 7-127. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - Mid Channel - Ant A)

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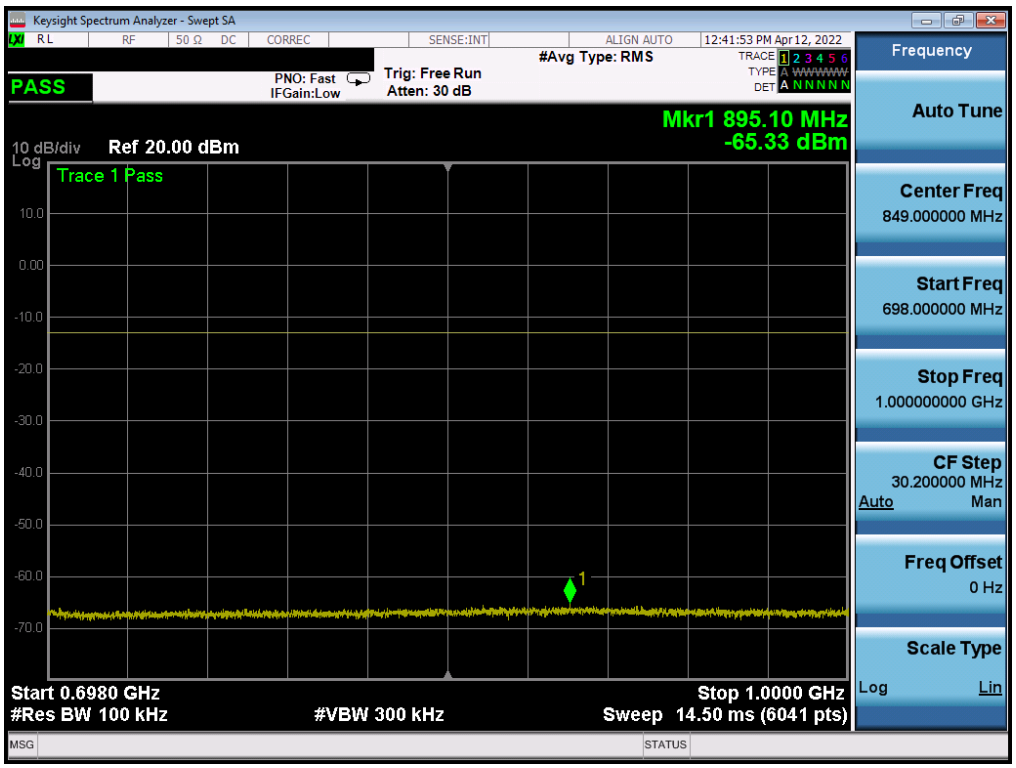

Plot 7-128. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - Mid Channel - Ant A)

Plot 7-129. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - Mid Channel - Ant A)

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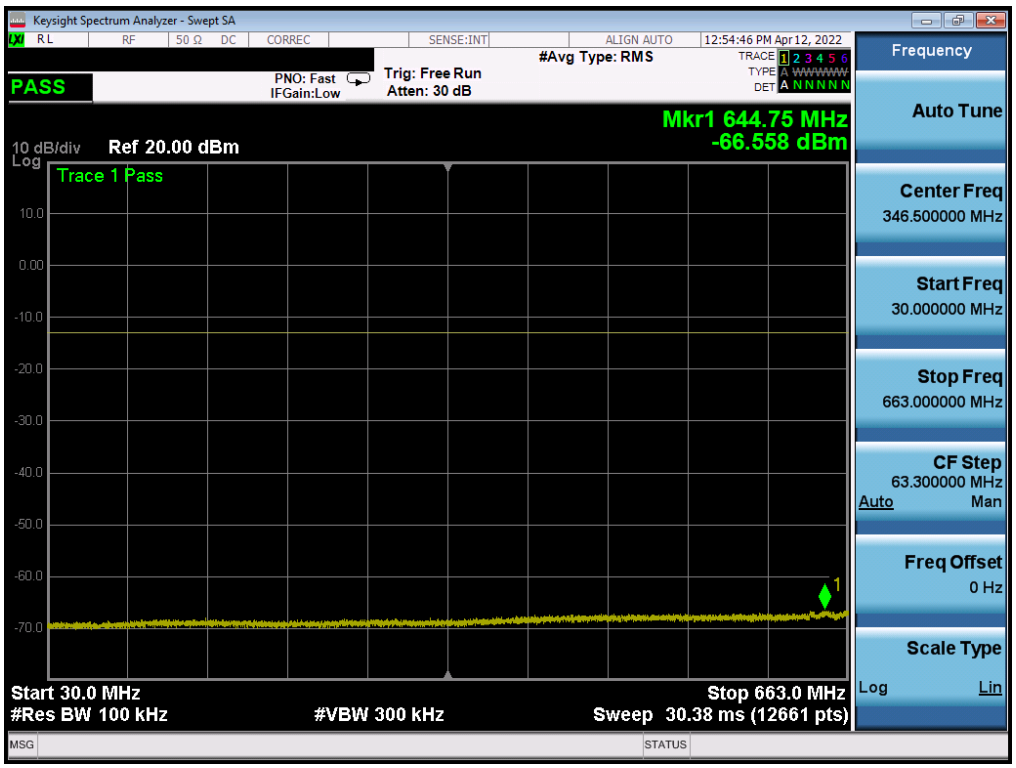
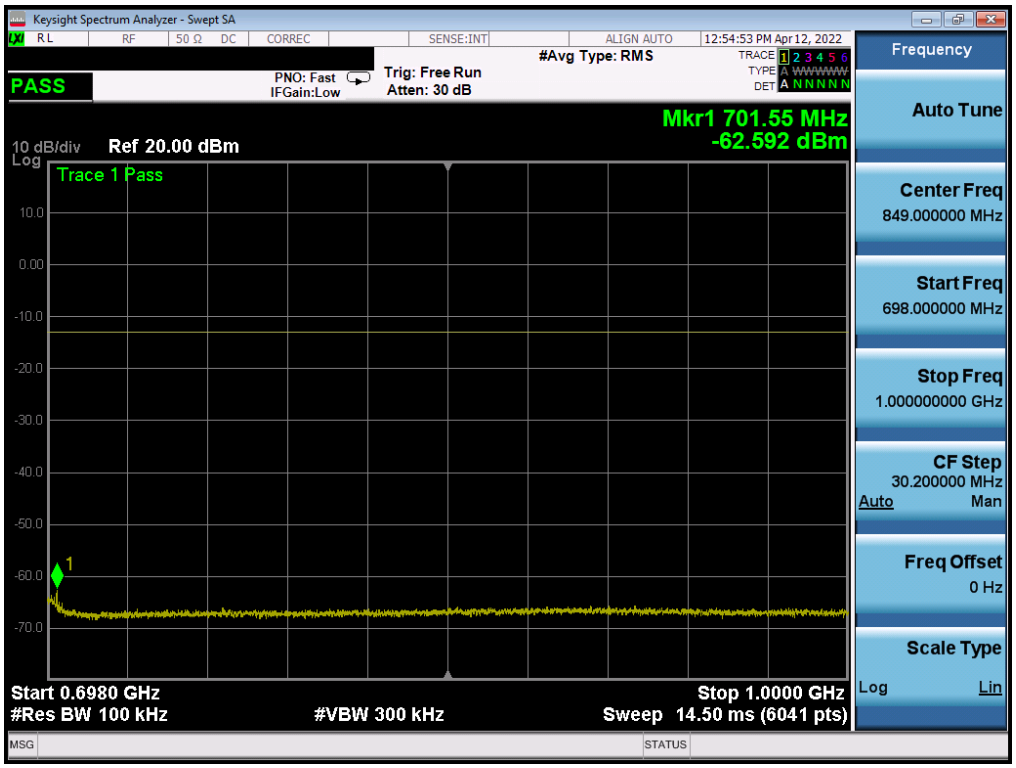


Plot 7-130. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - High Channel - Ant A)



Plot 7-131. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - High Channel - Ant A)

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Plot 7-132. Conducted Spurious Plot (NR Band n71 - 20.0MHz - 1 RB - High Channel - Ant A)

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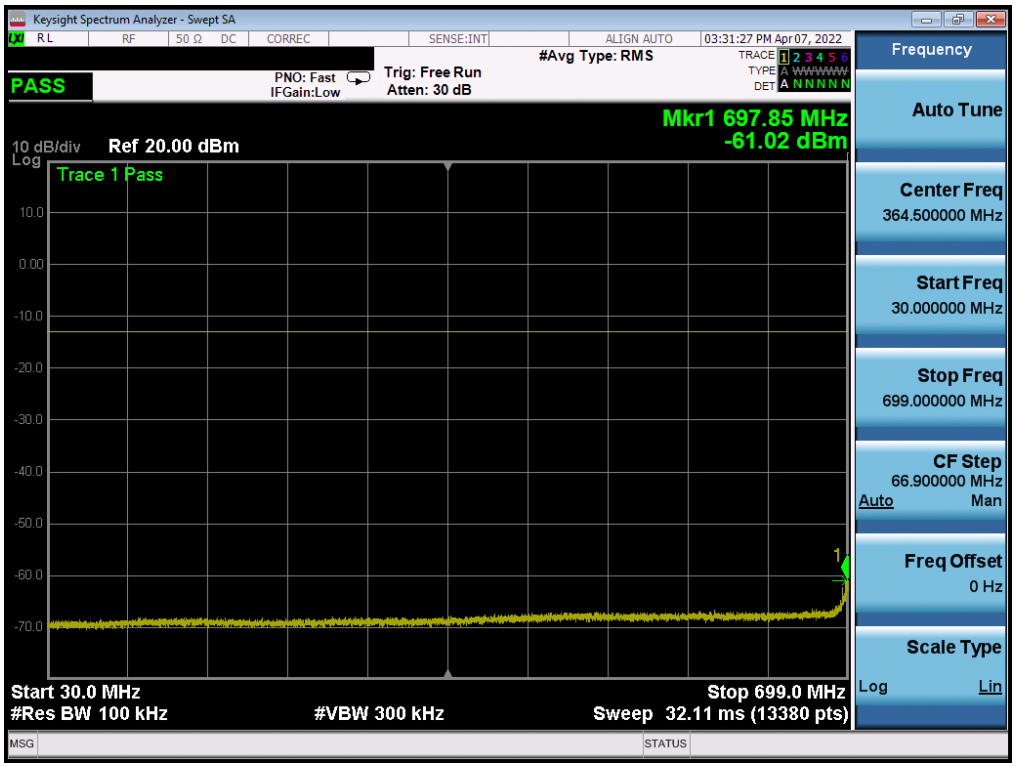
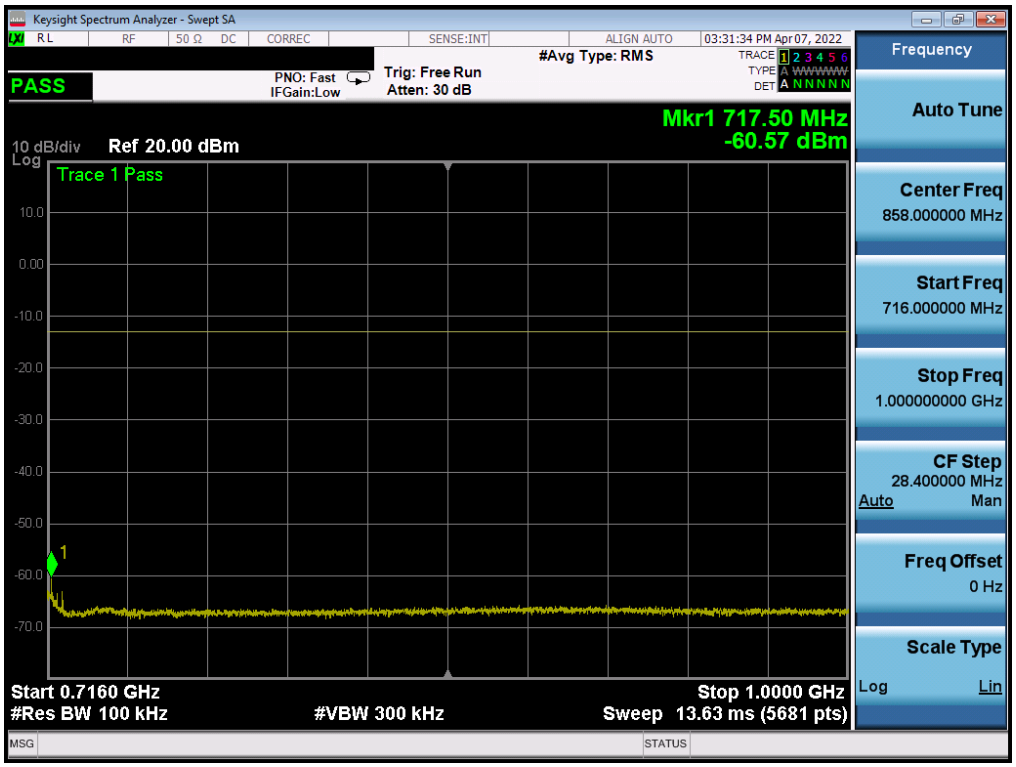
NR Band n12 – Ant A



Plot 7-133. Conducted Spurious Plot (NR Band n12 -15.0MHz - 1 RB - Low Channel - Ant A)



Plot 7-134. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - Low Channel - Ant A)

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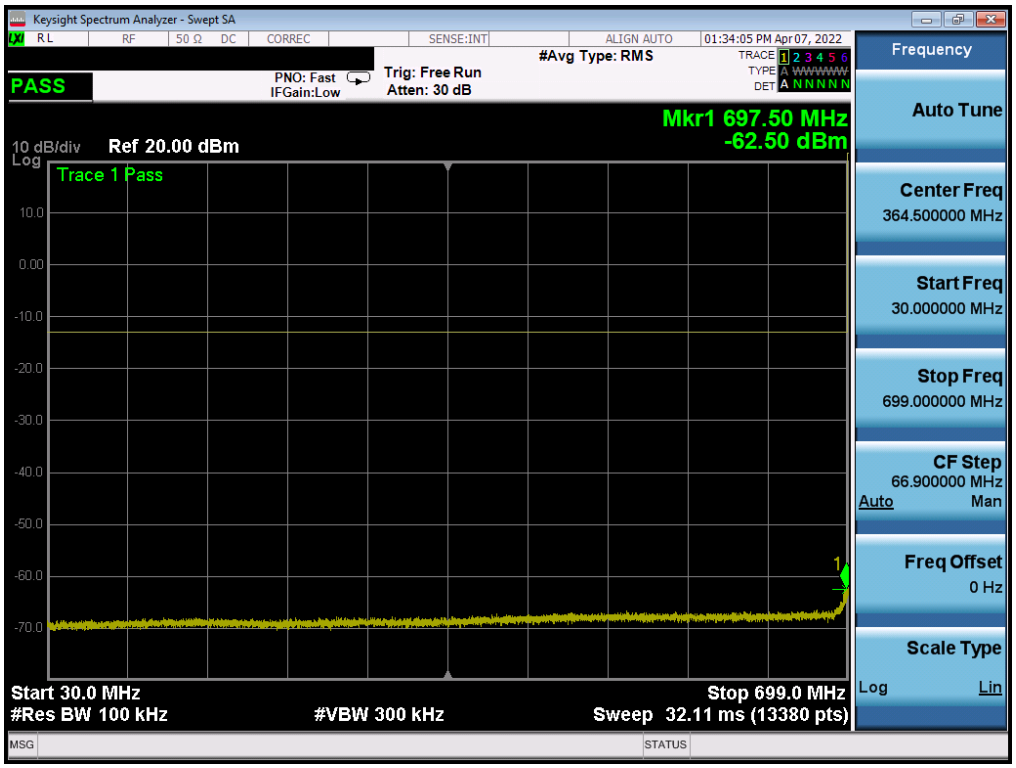
Plot 7-135. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - Low Channel - Ant A)



Plot 7-136. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - Mid Channel - Ant A)

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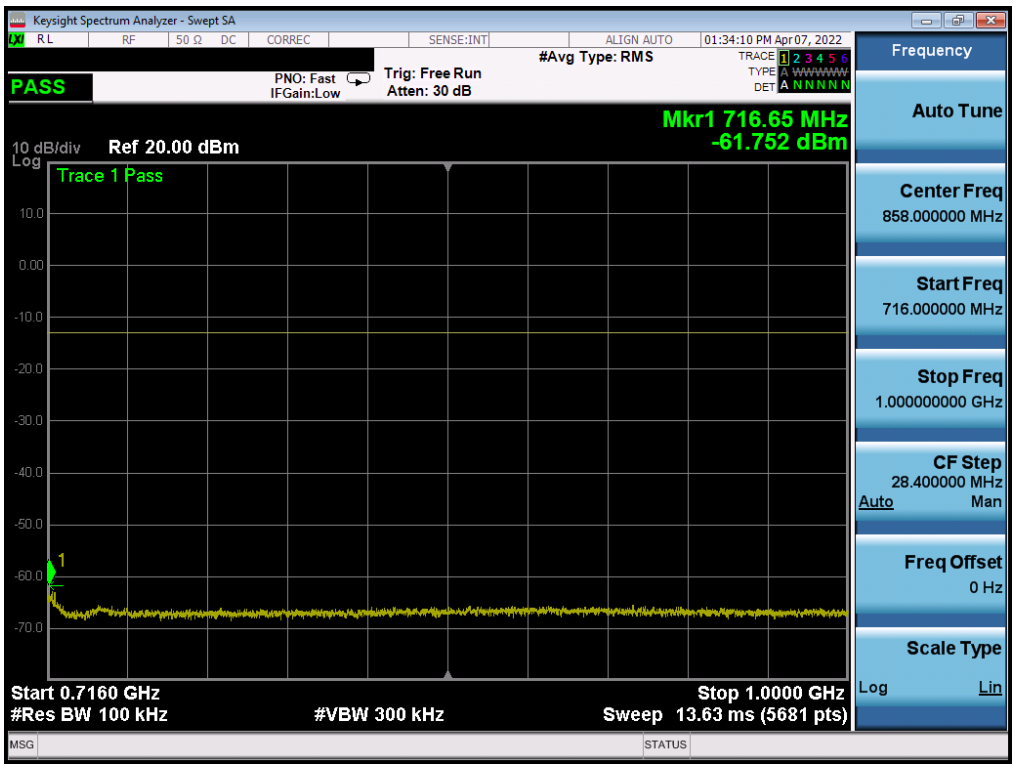

Plot 7-137. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - Mid Channel - Ant A)

Plot 7-138. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - Mid Channel - Ant A)

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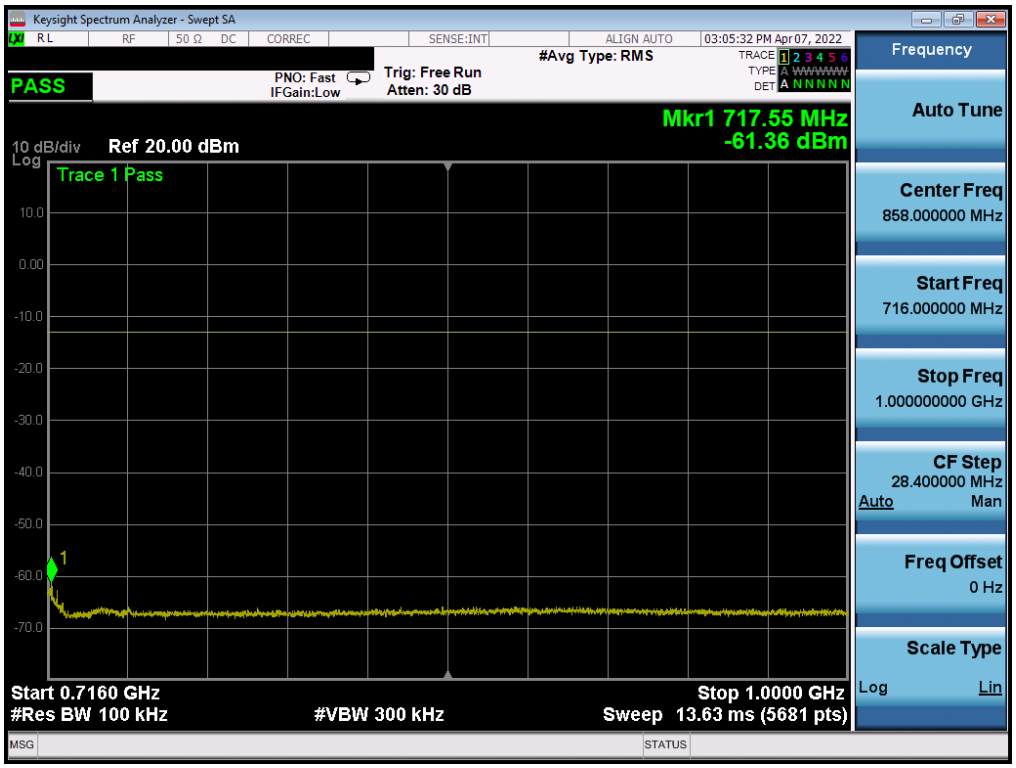
Plot 7-139. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - High Channel - Ant A)



Plot 7-140. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - High Channel - Ant A)

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Plot 7-141. Conducted Spurious Plot (NR Band n12 - 15.0MHz - 1 RB - High Channel - Ant A)

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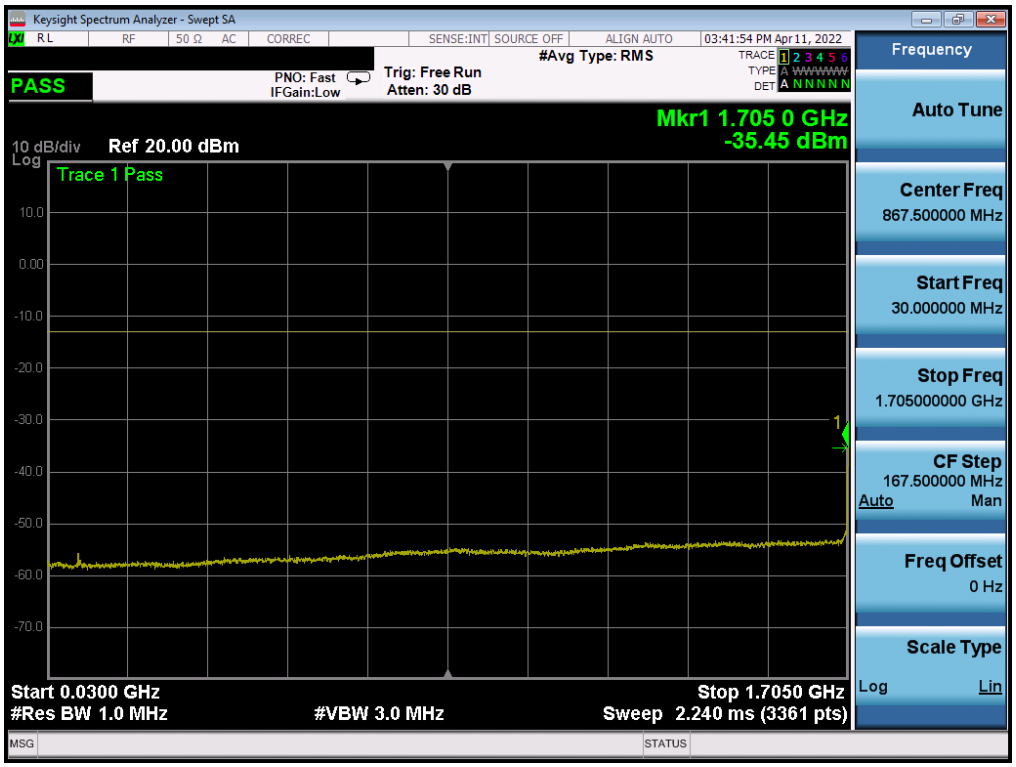
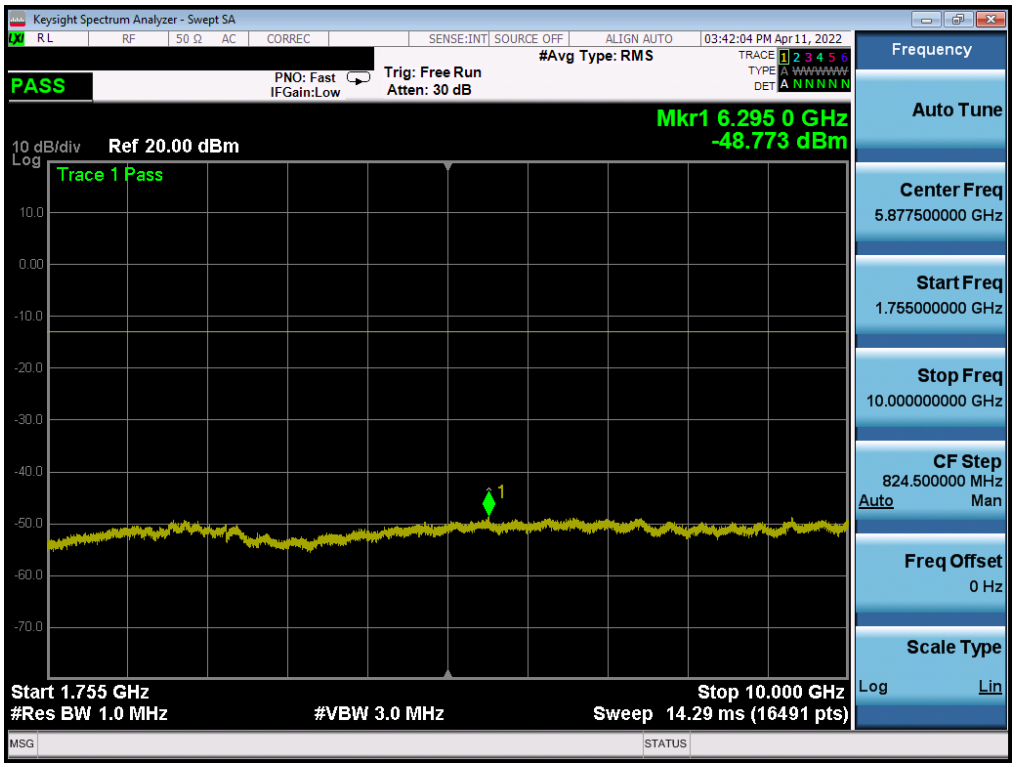
WCDMA AWS – Ant A



Plot 7-142. Conducted Spurious Plot (WCDMA Ch. 1312- Low Channel - Ant A)



Plot 7-143. Conducted Spurious Plot (WCDMA Ch. 1312- Low Channel - Ant A)

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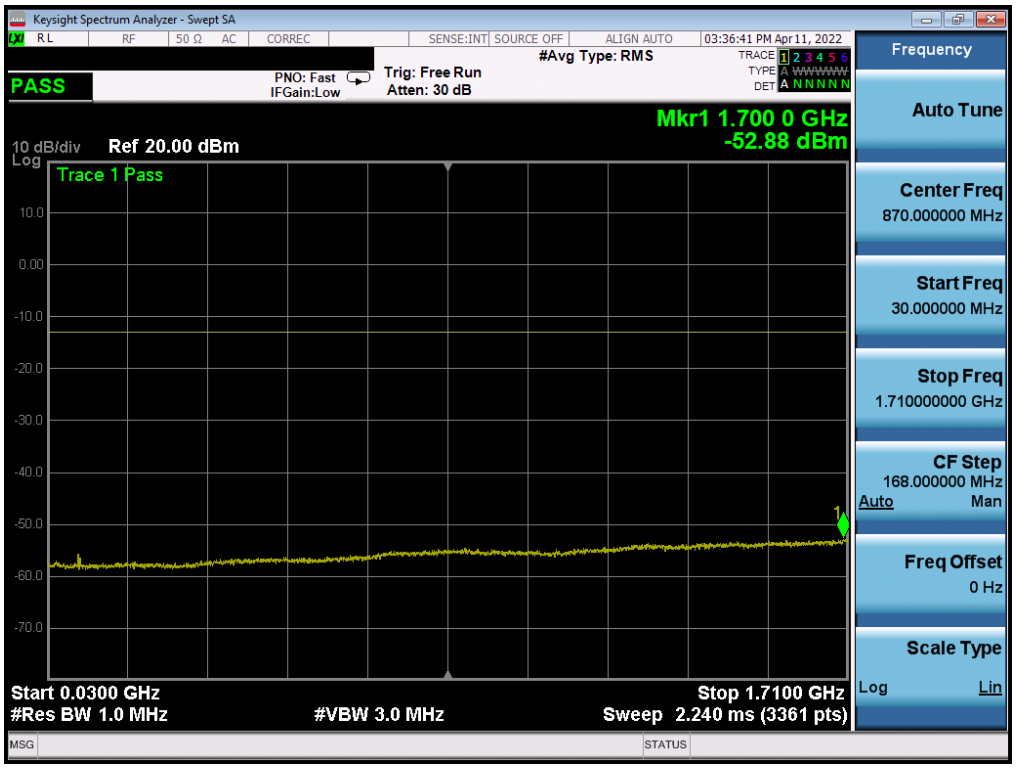
Plot 7-144. Conducted Spurious Plot (WCDMA Ch. 1312- Low Channel - Ant A)



Plot 7-145. Conducted Spurious Plot (WCDMA Ch. 1413- Mid Channel - Ant A)

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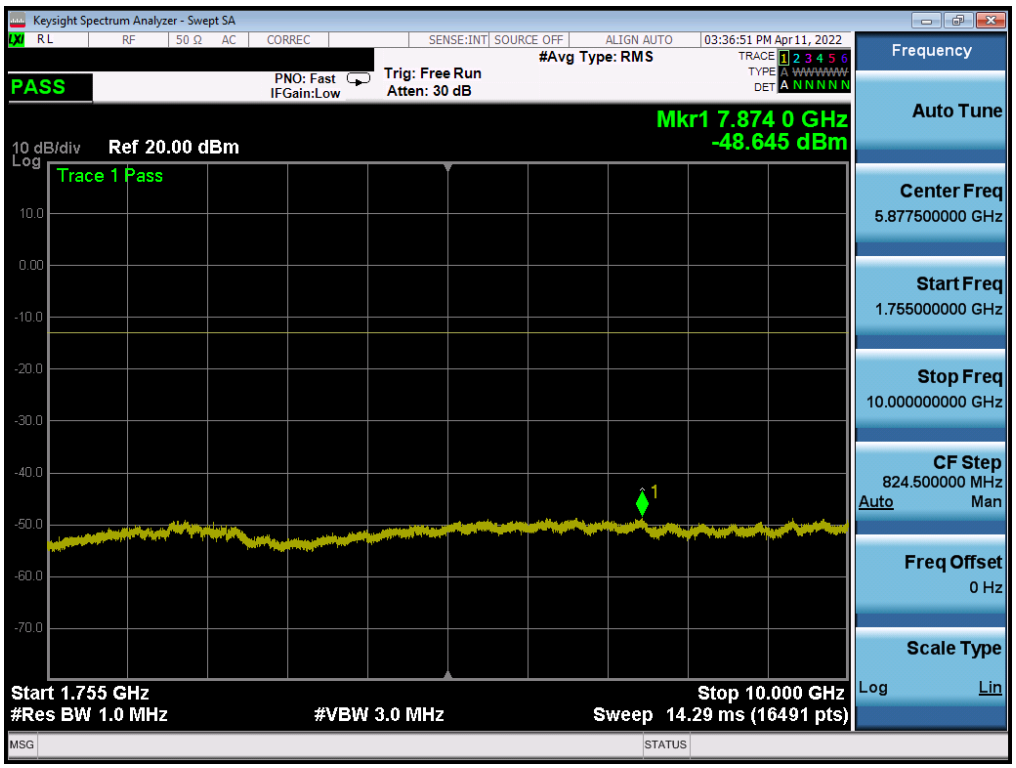

Plot 7-146. Conducted Spurious Plot (WCDMA Ch. 1413- Mid Channel - Ant A)

Plot 7-147. Conducted Spurious Plot (WCDMA Ch. 1413- Mid Channel - Ant A)

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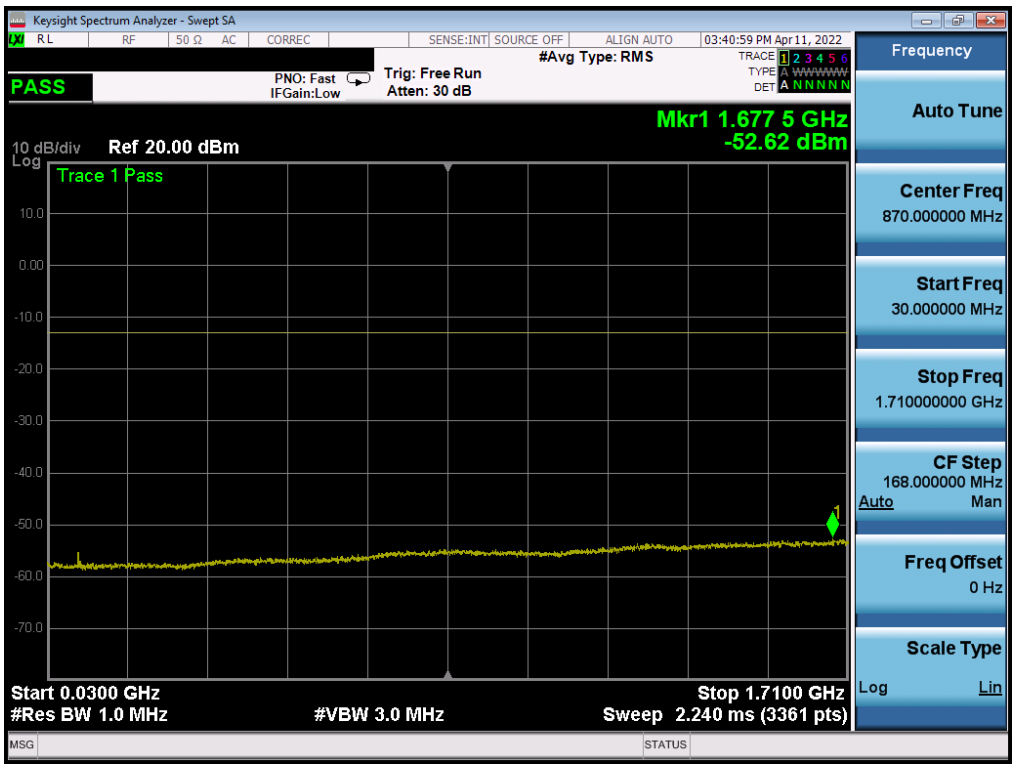
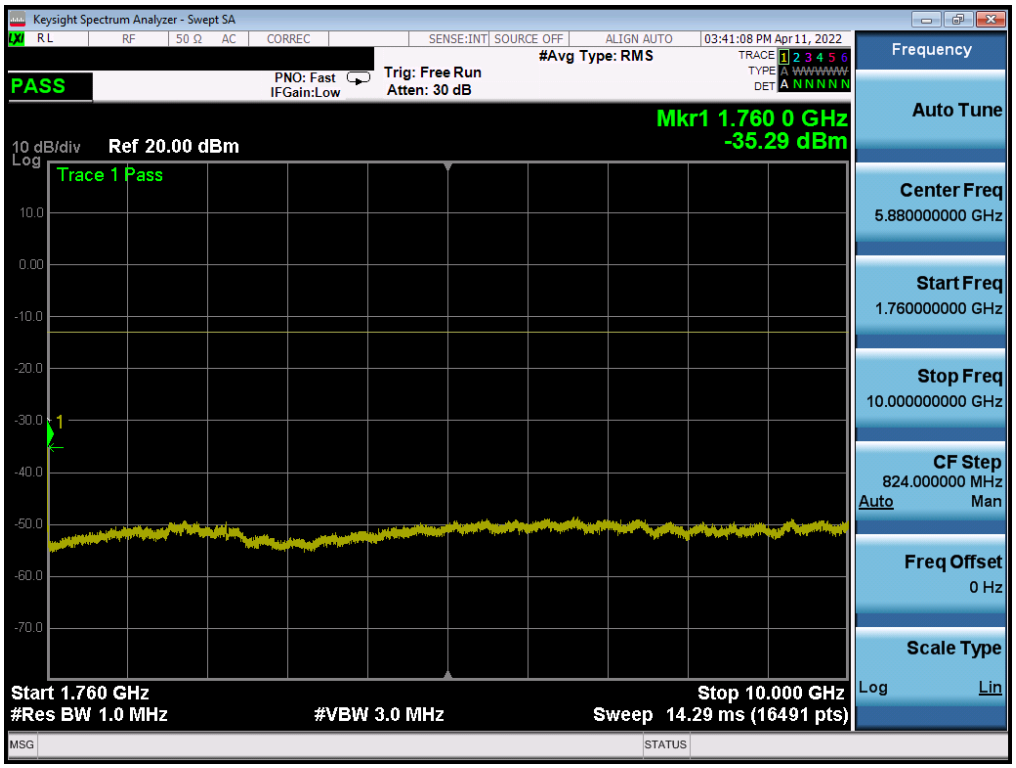


Plot 7-148. Conducted Spurious Plot (WCDMA Ch. 1513- High Channel - Ant A)



Plot 7-149. Conducted Spurious Plot (WCDMA Ch. 1513- High Channel - Ant A)

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Plot 7-150. Conducted Spurious Plot (WCDMA Ch. 1513- High Channel - Ant A)

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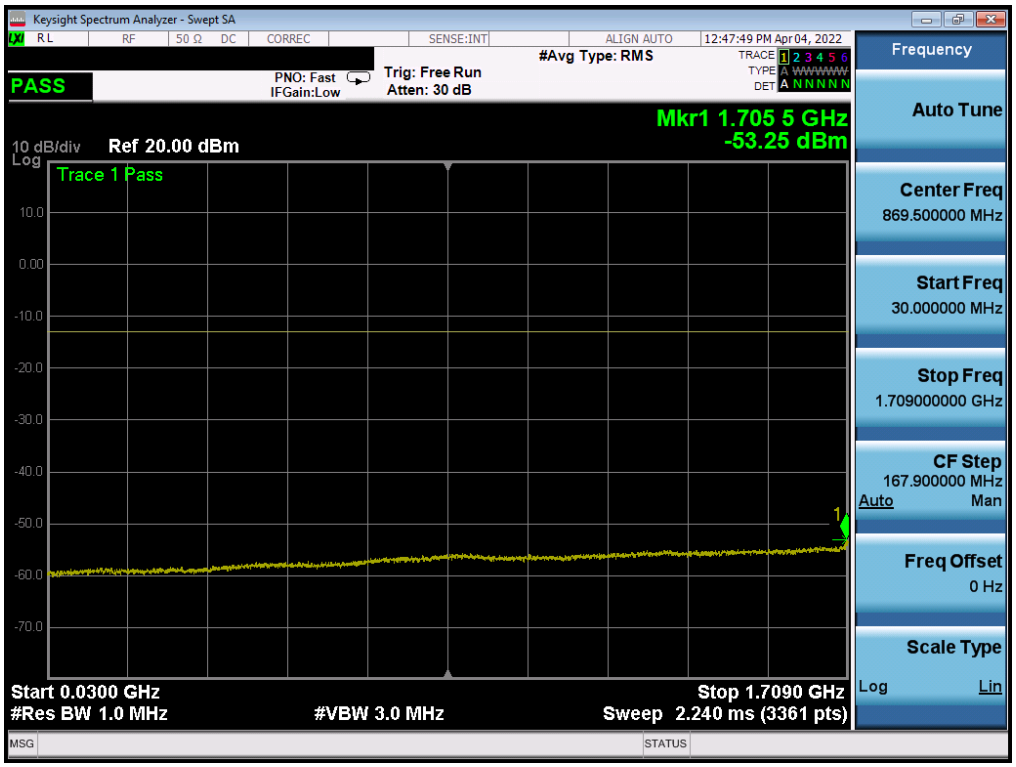
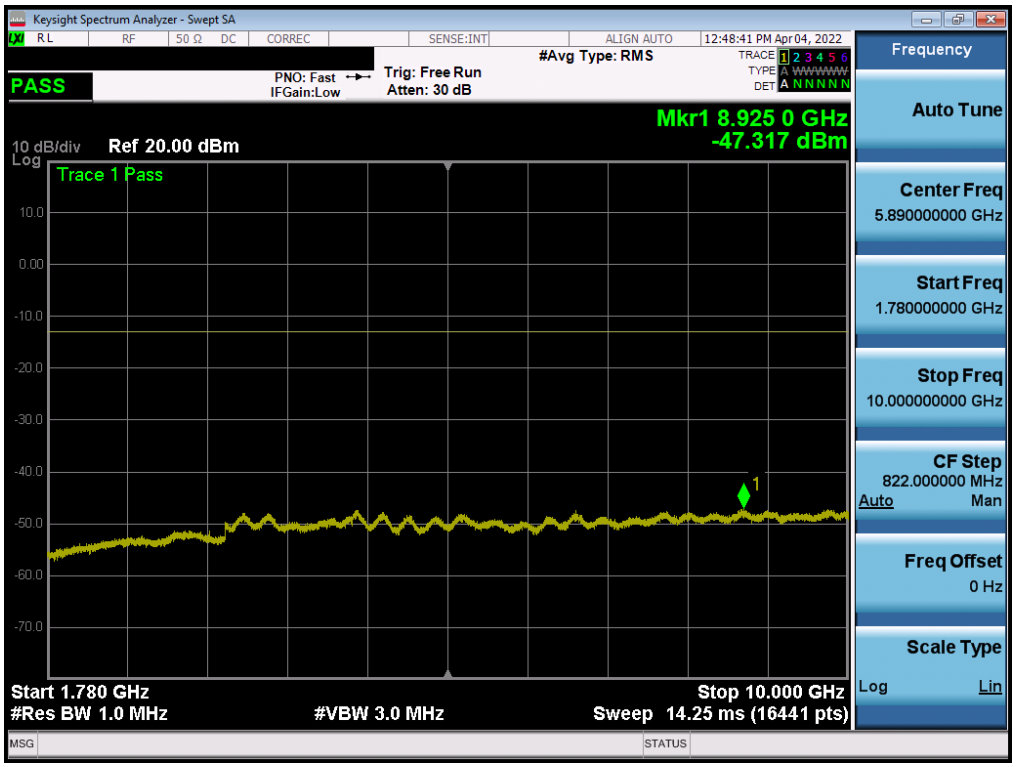
LTE Band 66/4 – Ant B



Plot 7-151. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Low Channel – Ant B)



Plot 7-152. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Low Channel – Ant B)

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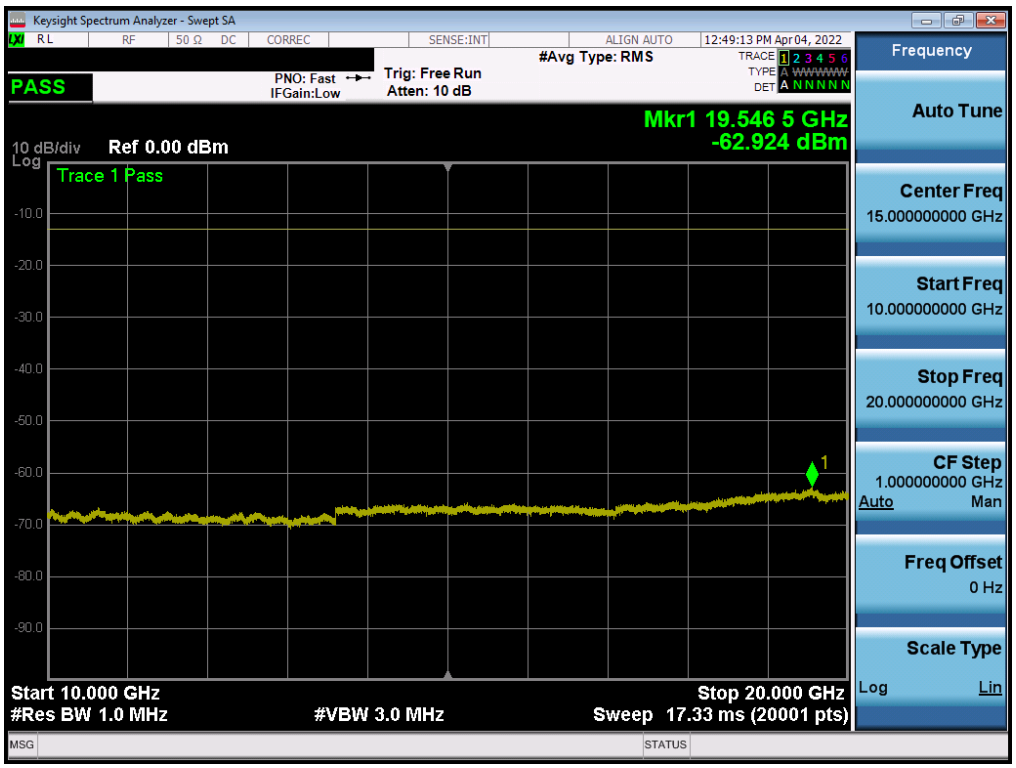
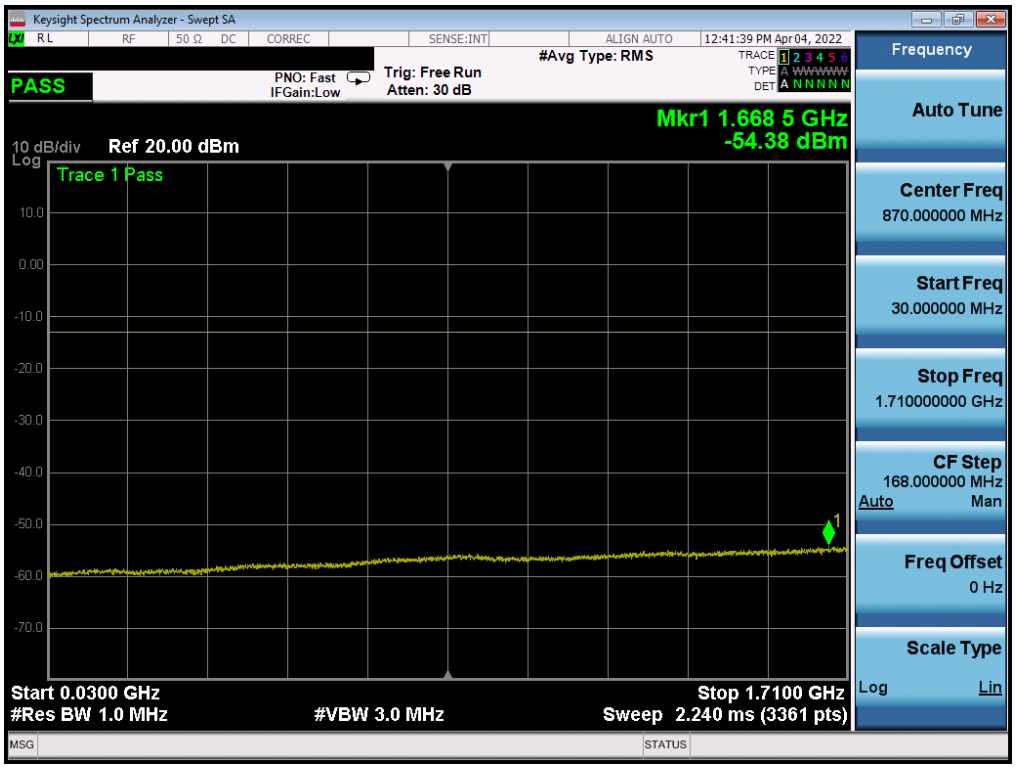


Plot 7-153. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Low Channel – Ant B)



Plot 7-154. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Mid Channel – Ant B)

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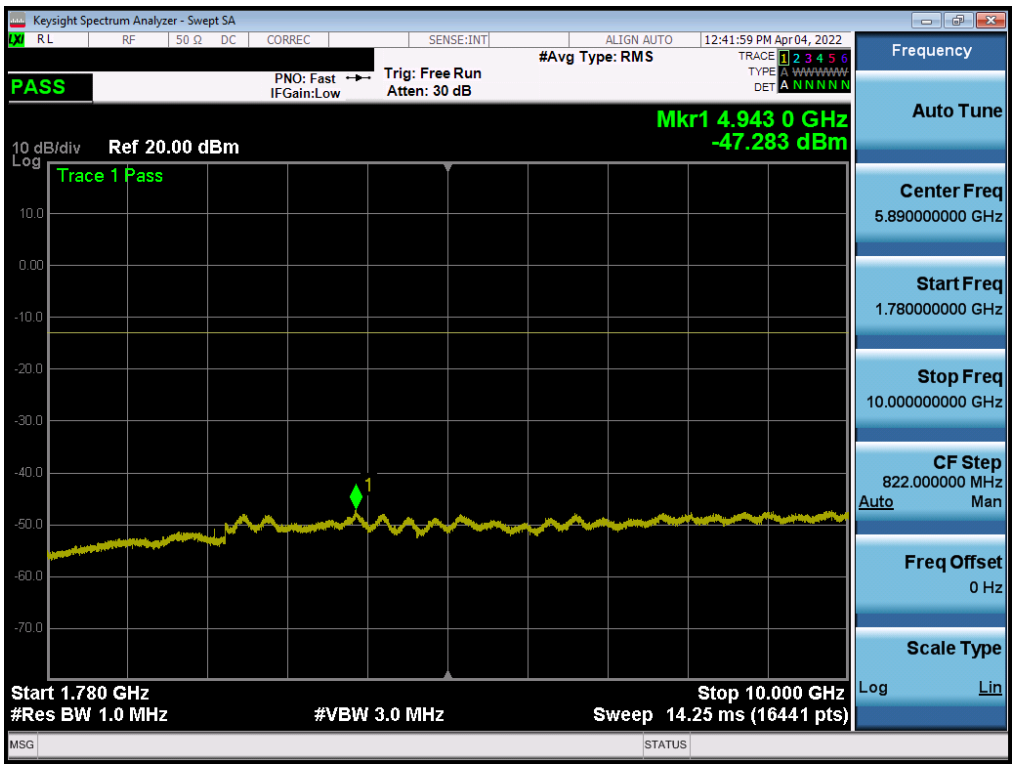

Plot 7-155. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Mid Channel – Ant B)

Plot 7-156. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Mid Channel – Ant B)

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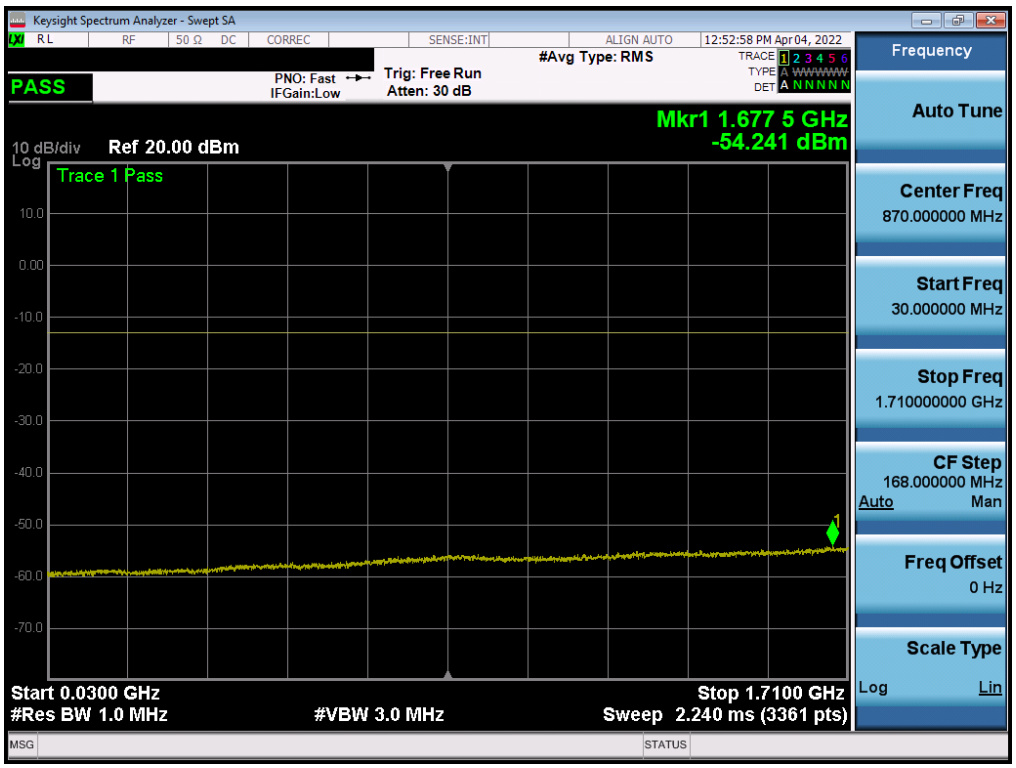
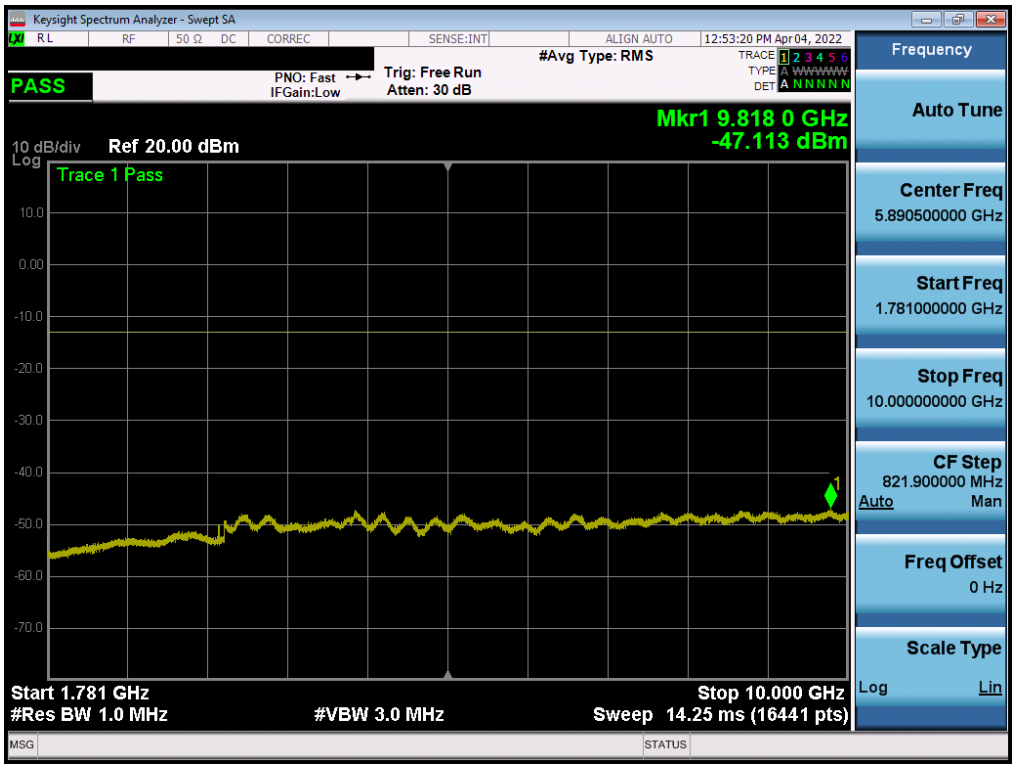


Plot 7-157. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - High Channel – Ant B)



Plot 7-158. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - High Channel – Ant B)

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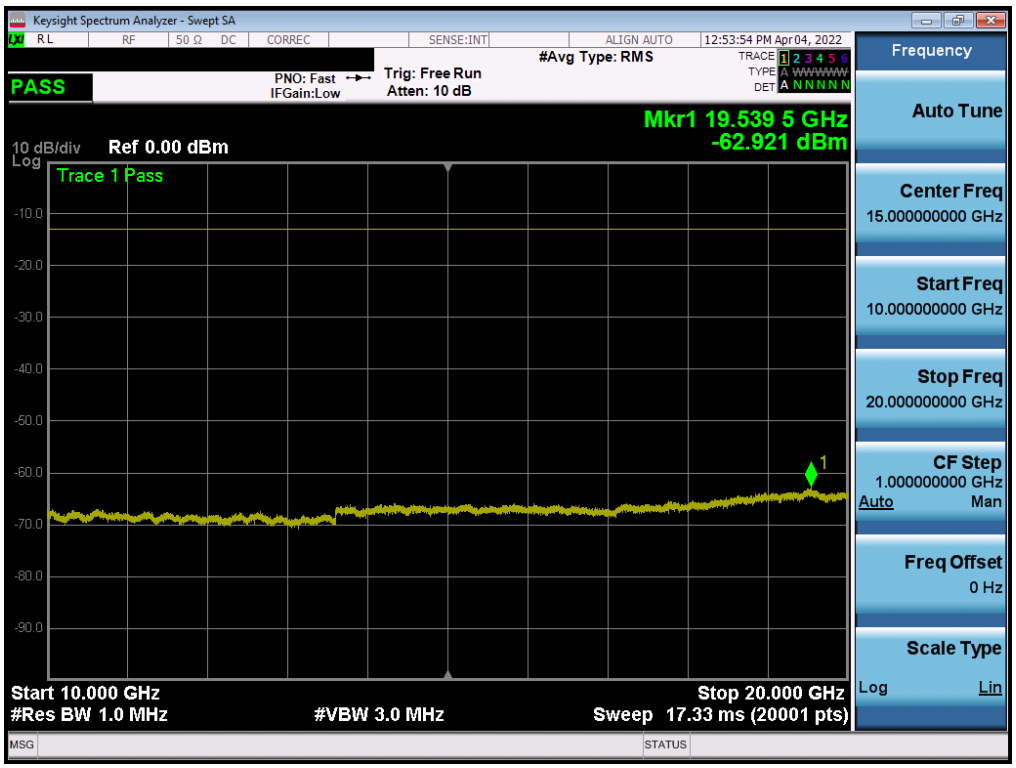

Plot 7-159. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - High Channel – Ant B)

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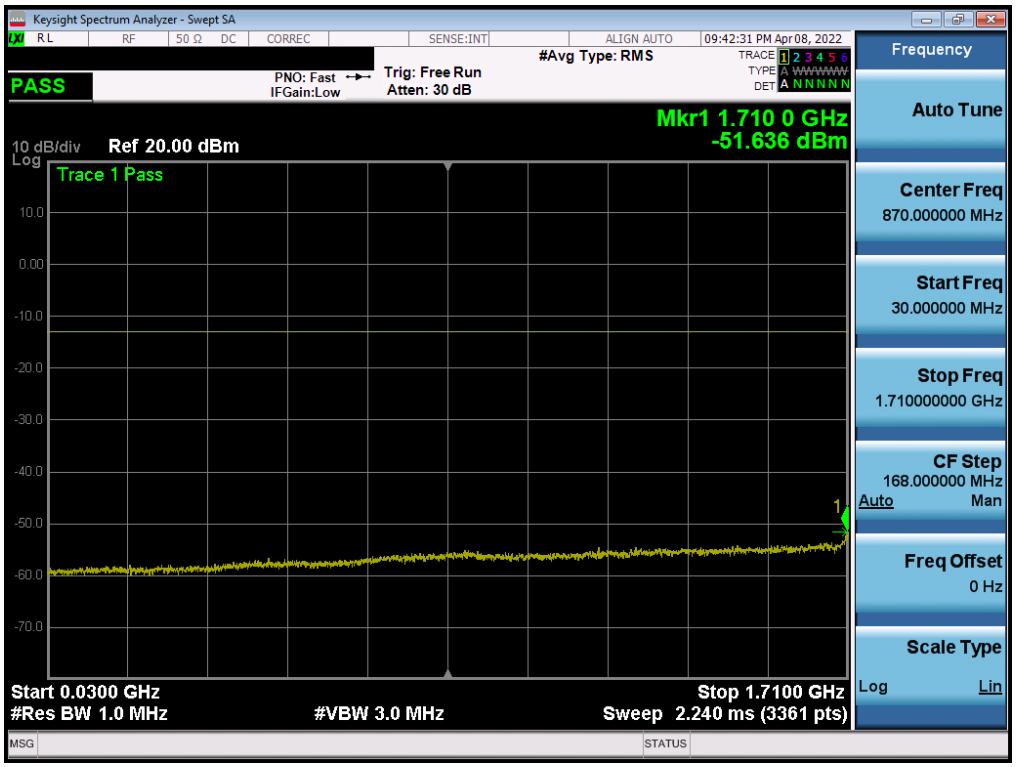
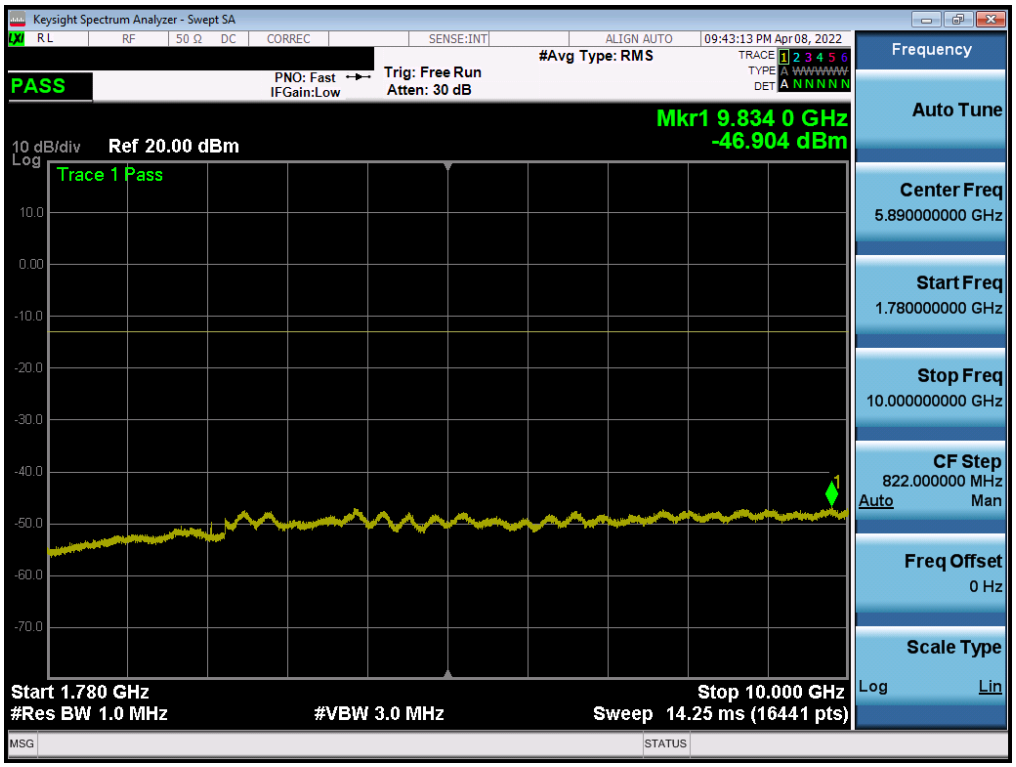
NR Band n66 – Ant B



Plot 7-160. Conducted Spurious Plot (NR Band n66 -40.0MHz - 1 RB - Low Channel - Ant B)



Plot 7-161. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Low Channel - Ant B)

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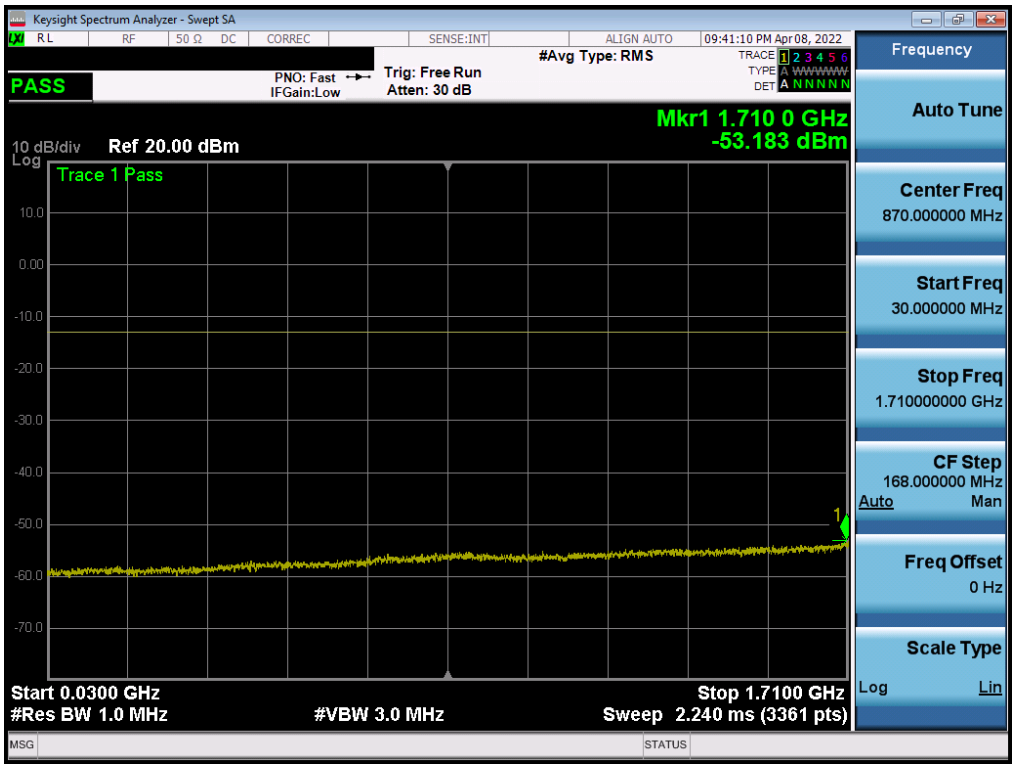
Plot 7-162. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Low Channel - Ant B)



Plot 7-163. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Mid Channel - Ant B)

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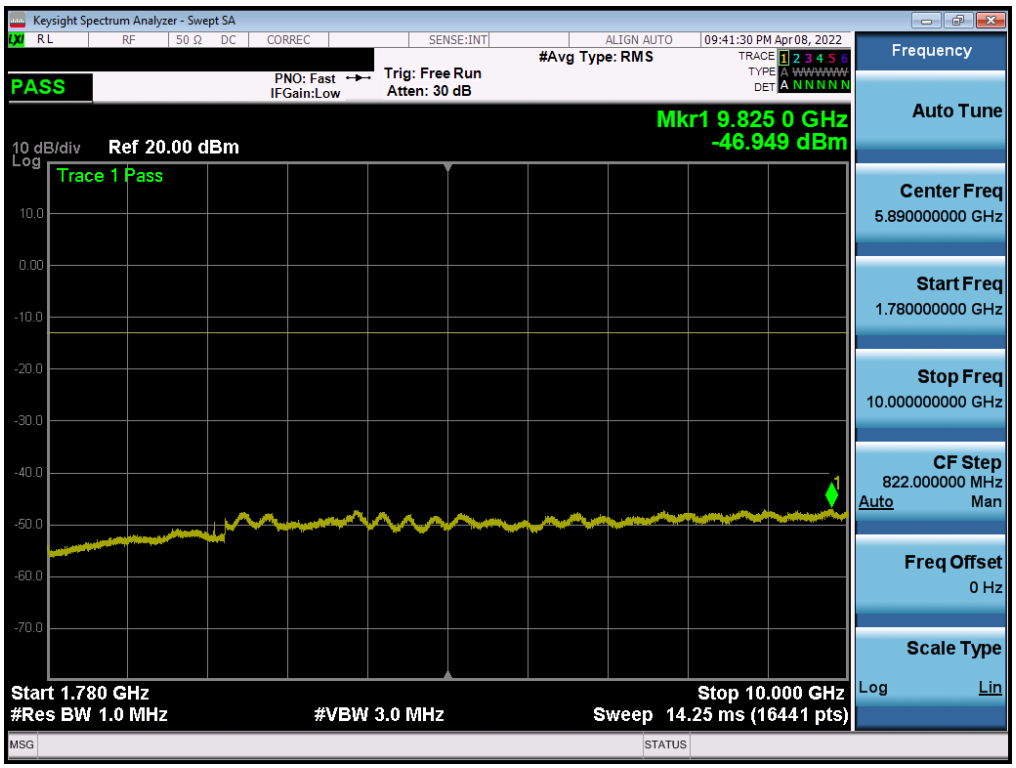

Plot 7-164. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Mid Channel - Ant B)

Plot 7-165. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Mid Channel - Ant B)

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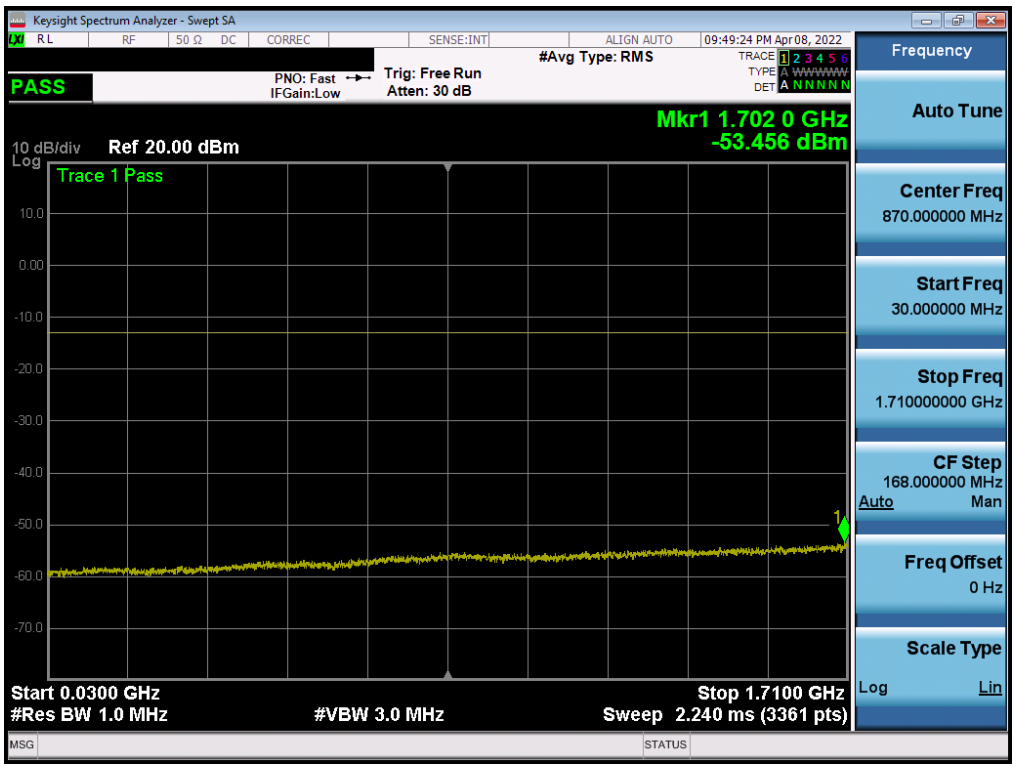
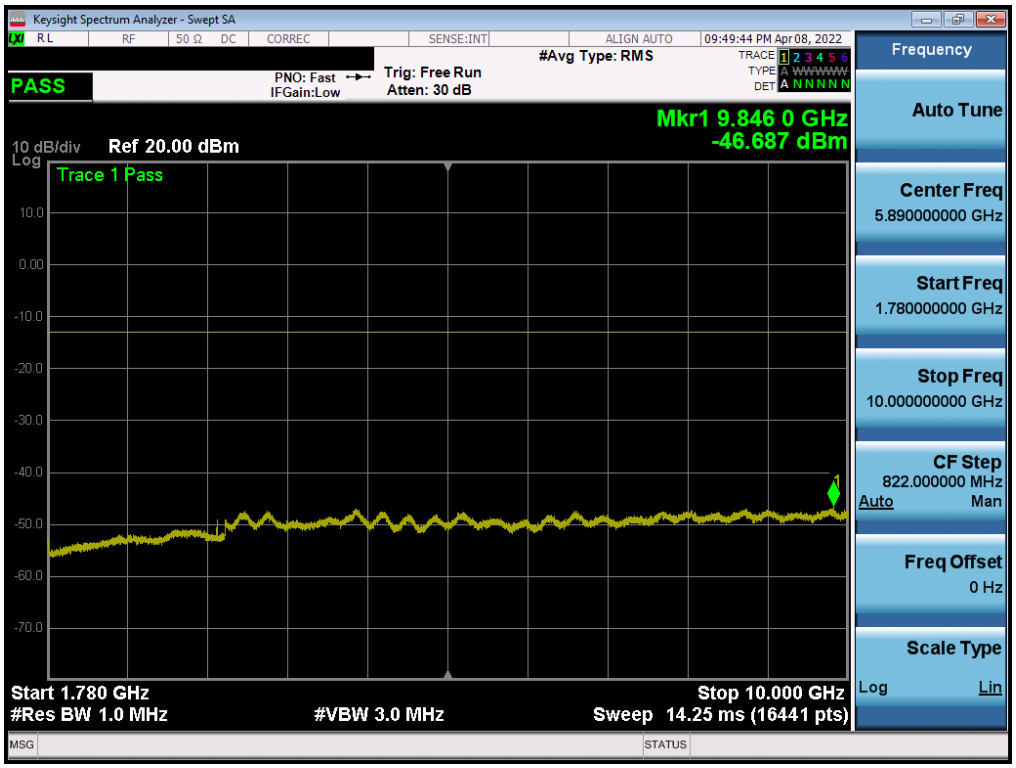


Plot 7-166. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - High Channel - Ant B)



Plot 7-167. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - High Channel - Ant B)

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Plot 7-168. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - High Channel - Ant B)

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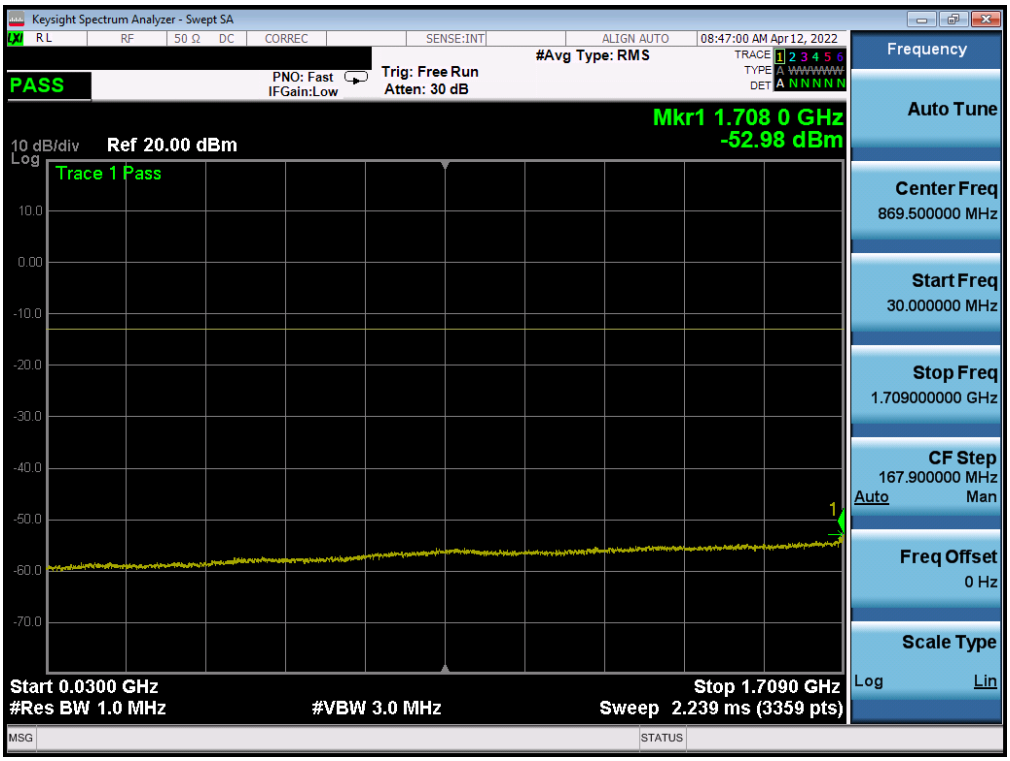
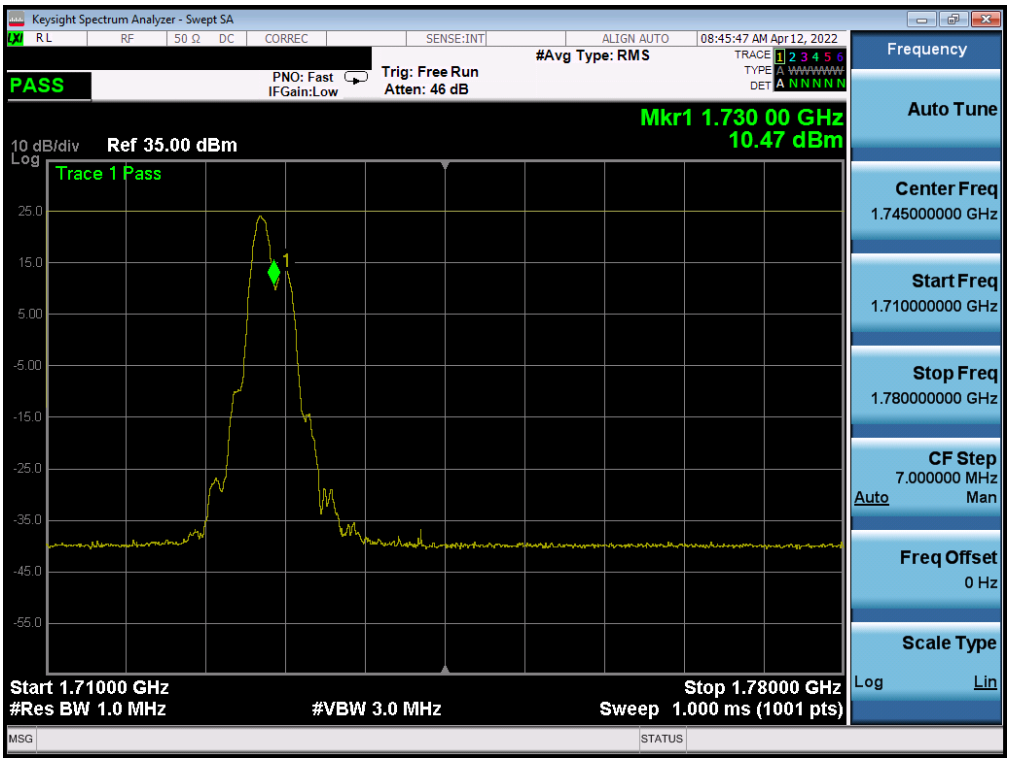
Uplink CA LTE Band 66B/C – Ant B



Plot 7-169. Conducted Spurious Plot (ULCA LTE Band 66 Low Channel - Ant B)



Plot 7-170. Conducted Spurious Plot (ULCA LTE Band 66 Low Channel - Ant B)

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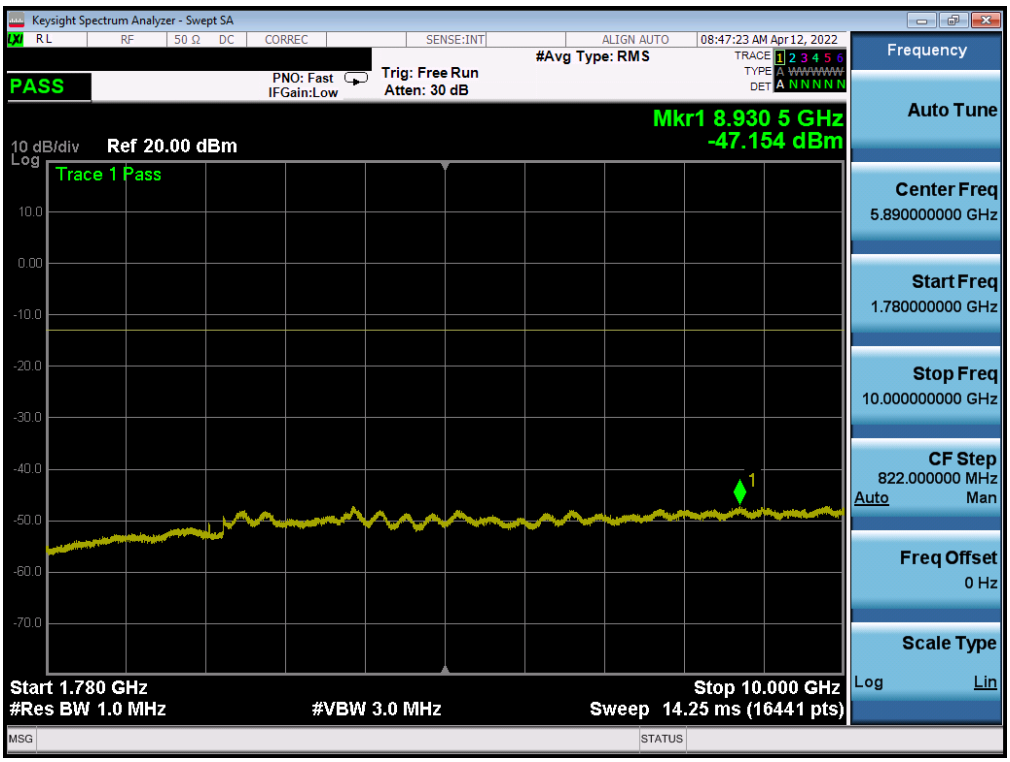
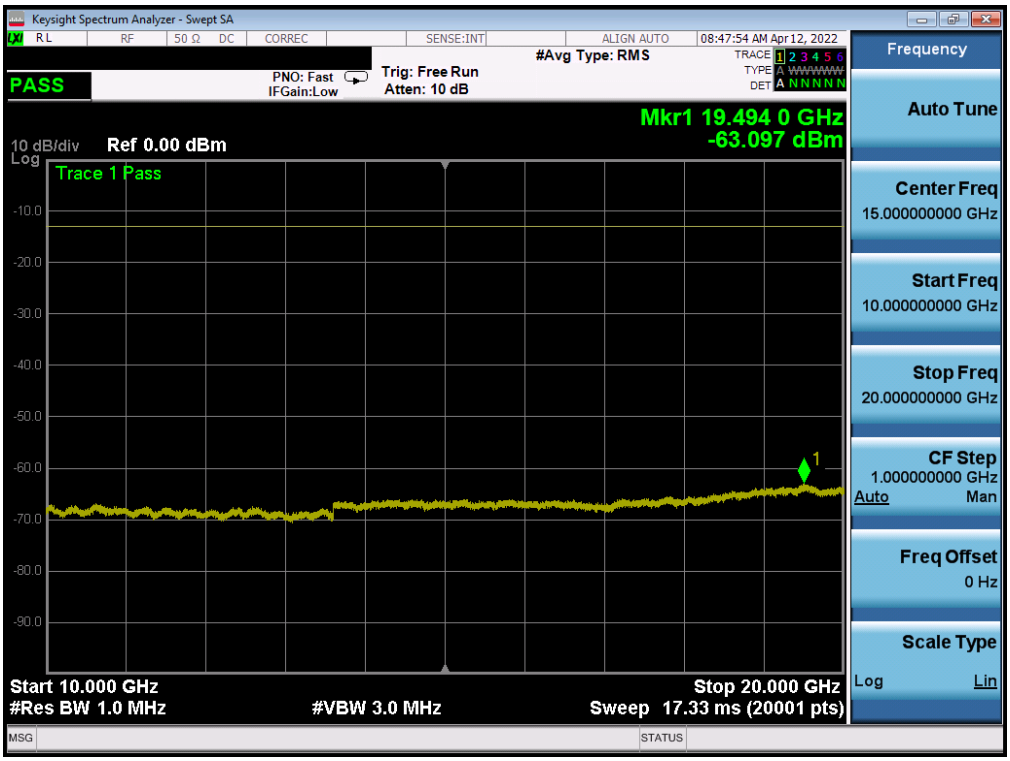


Plot 7-171. Conducted Spurious Plot (ULCA LTE Band 66 Low Channel - Ant B)



Plot 7-172. Conducted Spurious Plot (ULCA LTE Band 66 Low Channel - Ant B)

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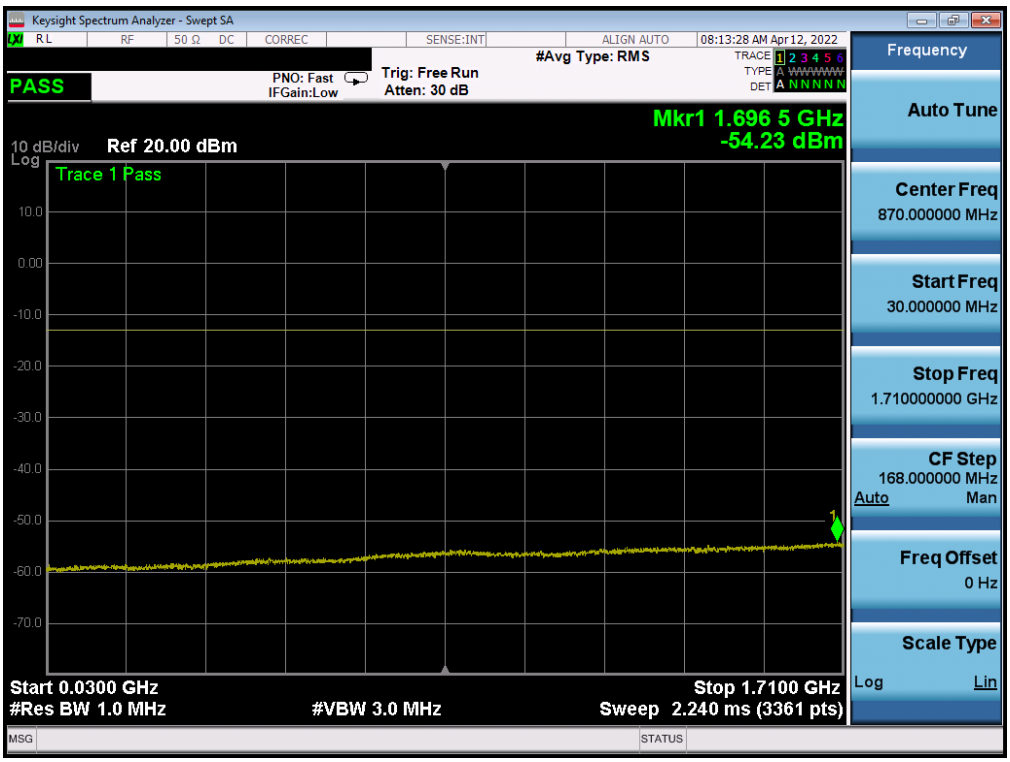
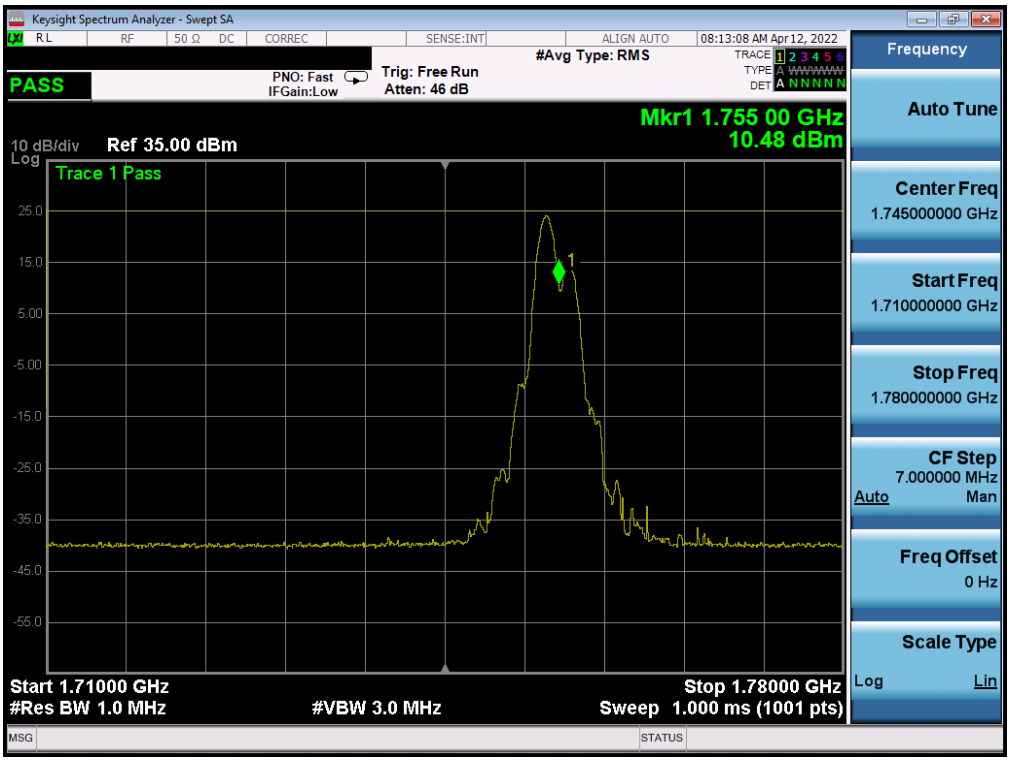


Plot 7-173. Conducted Spurious Plot (ULCA LTE Band 66 Mid Channel - Ant B)



Plot 7-174. Conducted Spurious Plot (ULCA LTE Band 66 Mid Channel - Ant B)

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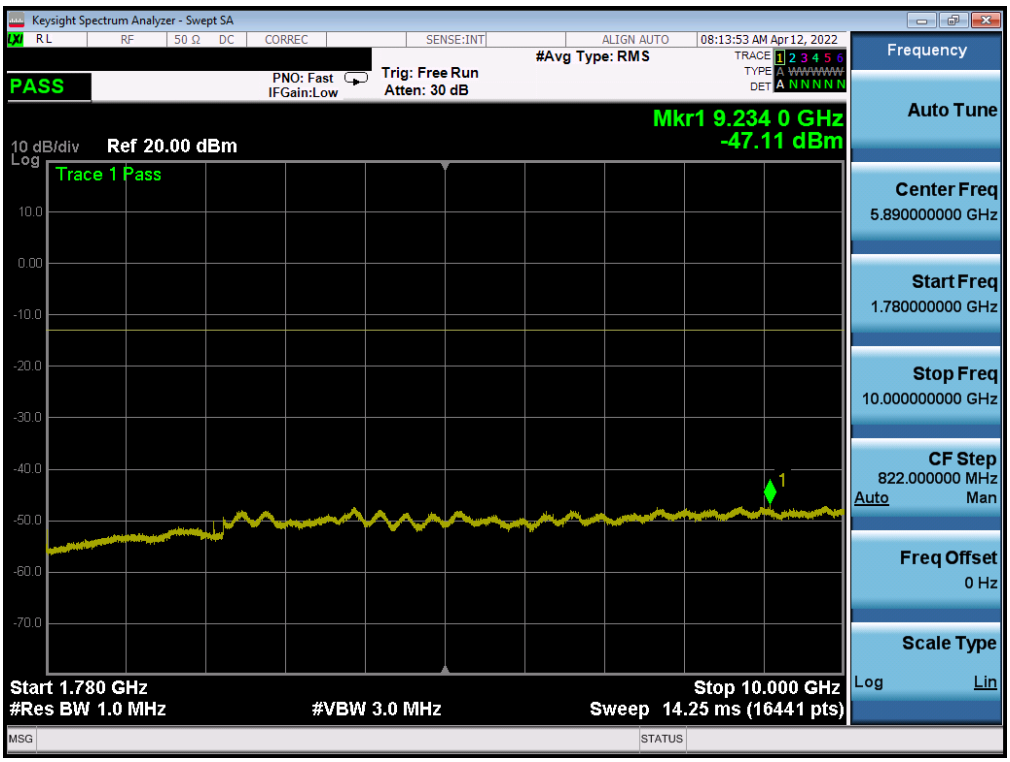
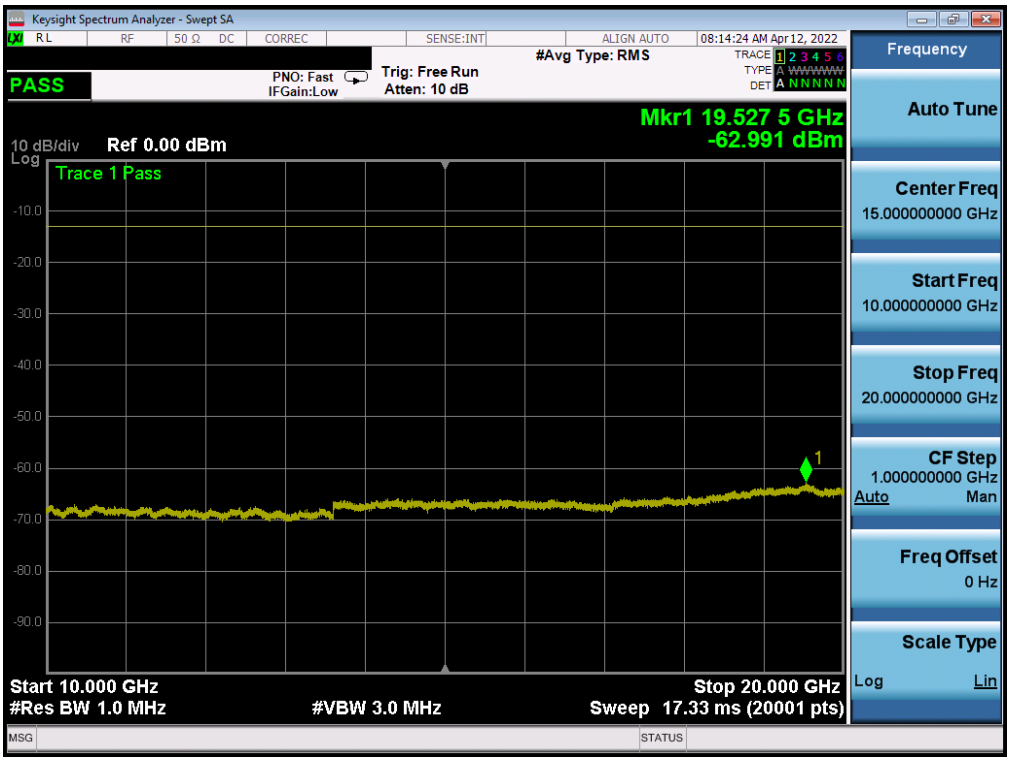


Plot 7-175. Conducted Spurious Plot (ULCA LTE Band 66 Mid Channel - Ant B)



Plot 7-176. Conducted Spurious Plot (ULCA LTE Band 66 Mid Channel - Ant B)

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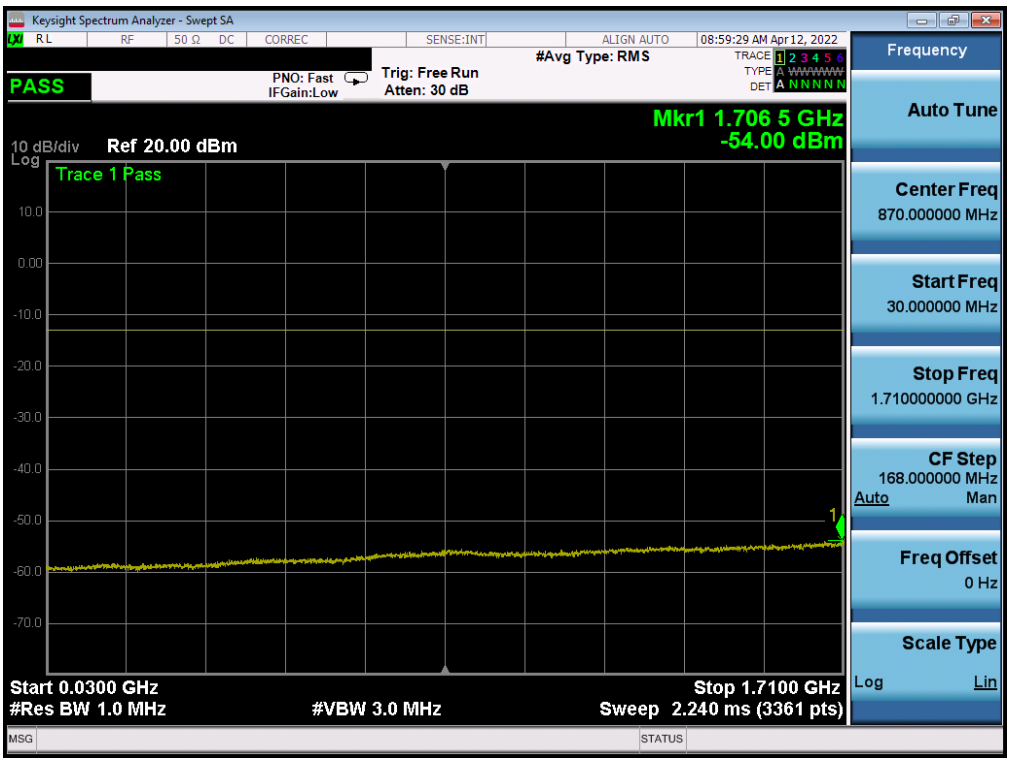
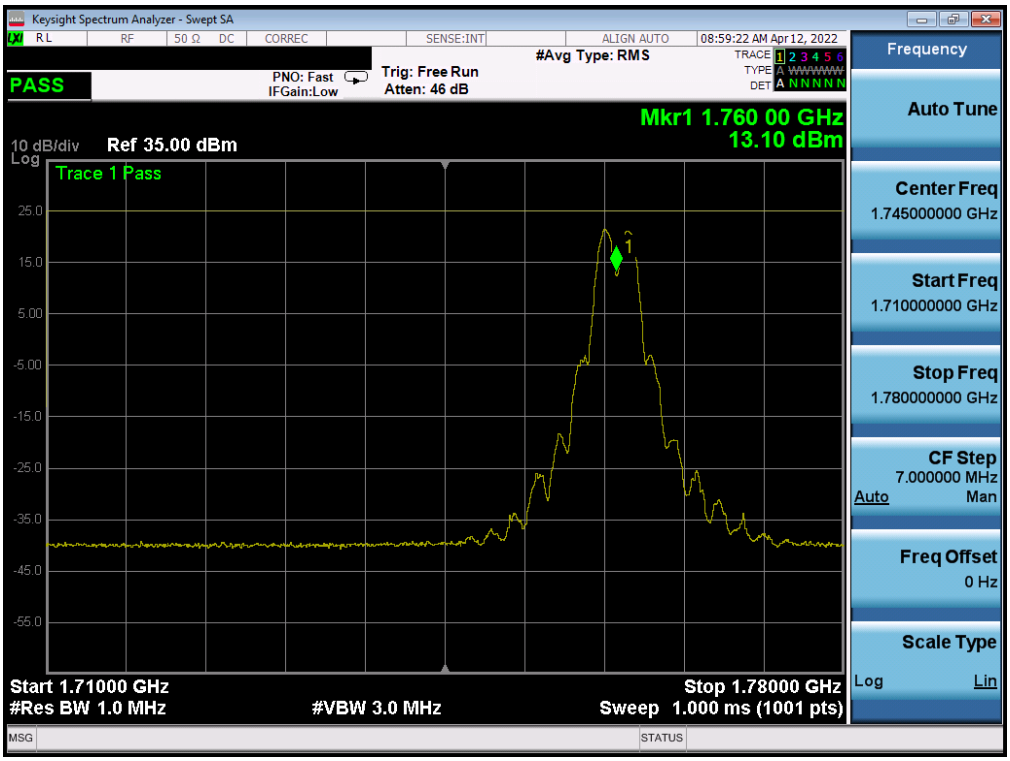


Plot 7-177. Conducted Spurious Plot (ULCA LTE Band 66 High Channel - Ant B)



Plot 7-178. Conducted Spurious Plot (ULCA LTE Band 66 High Channel - Ant B)

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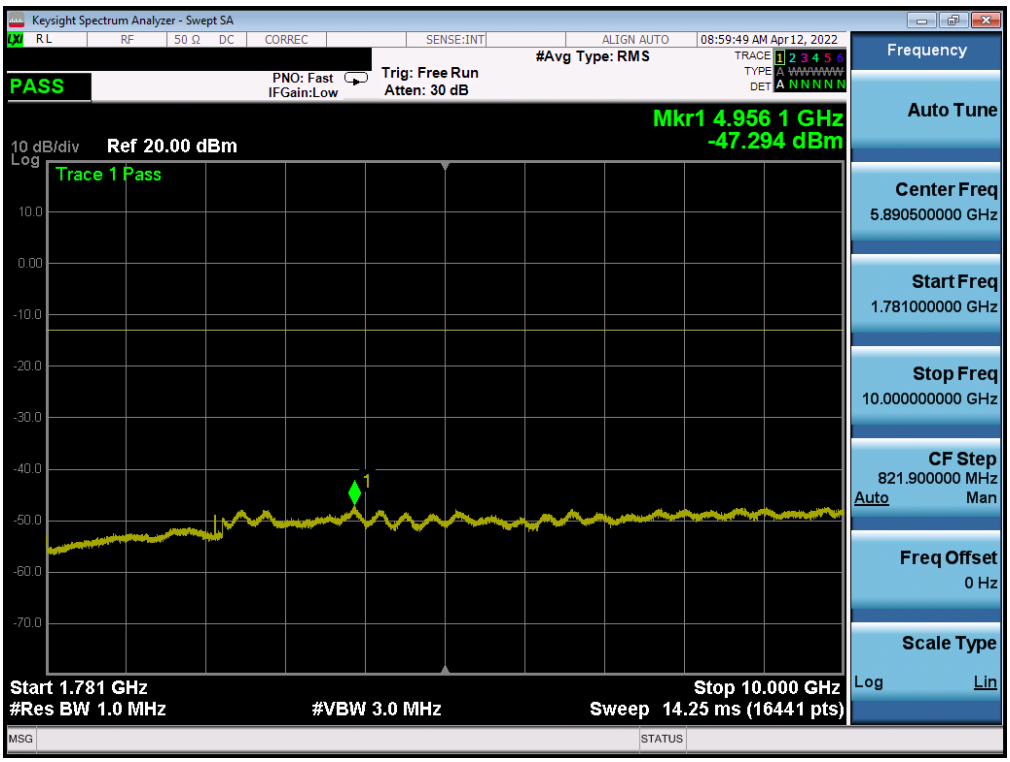
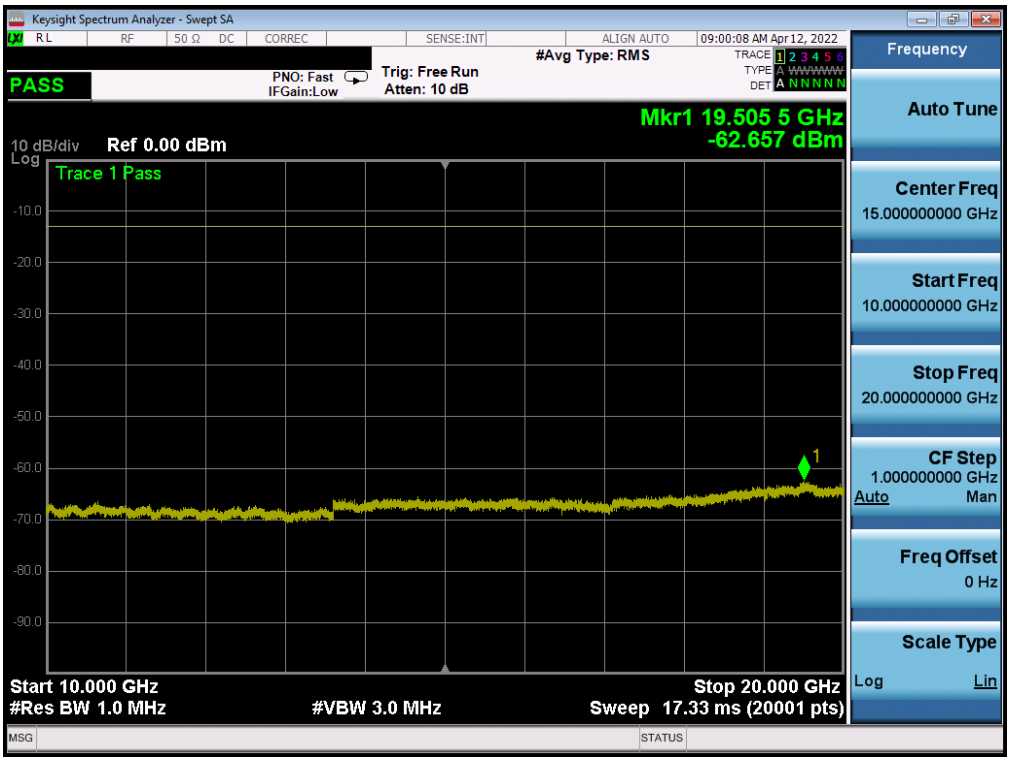


Plot 7-179. Conducted Spurious Plot (ULCA LTE Band 66 High Channel - Ant B)



Plot 7-180. Conducted Spurious Plot (ULCA LTE Band 66 High Channel - Ant B)

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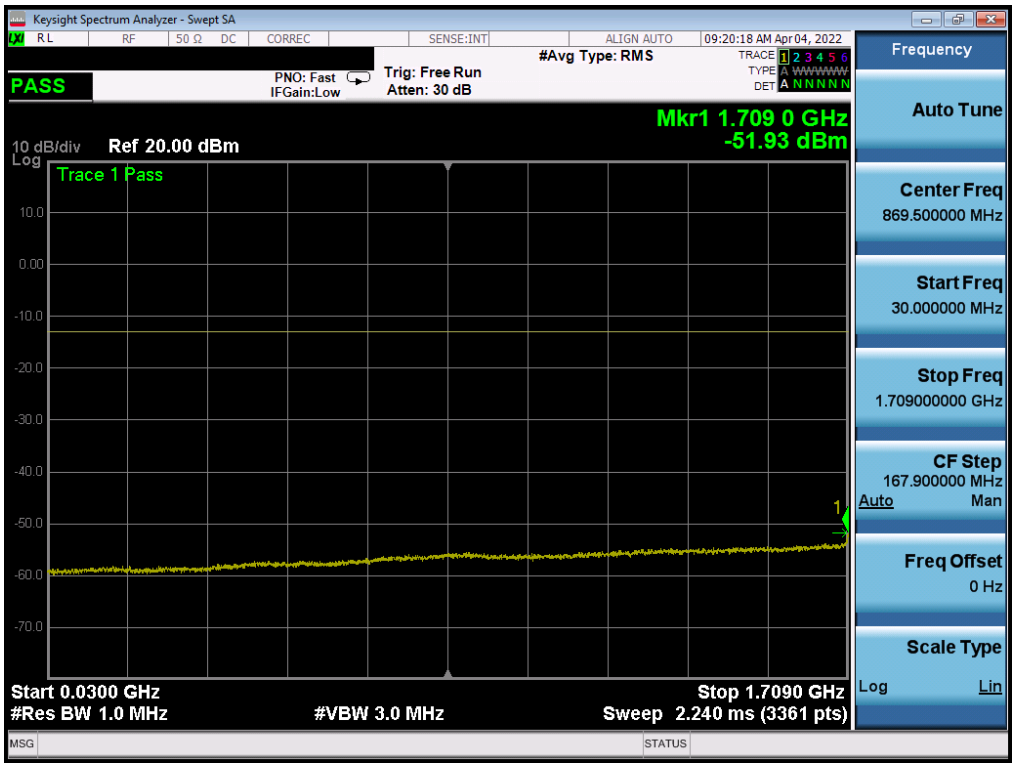
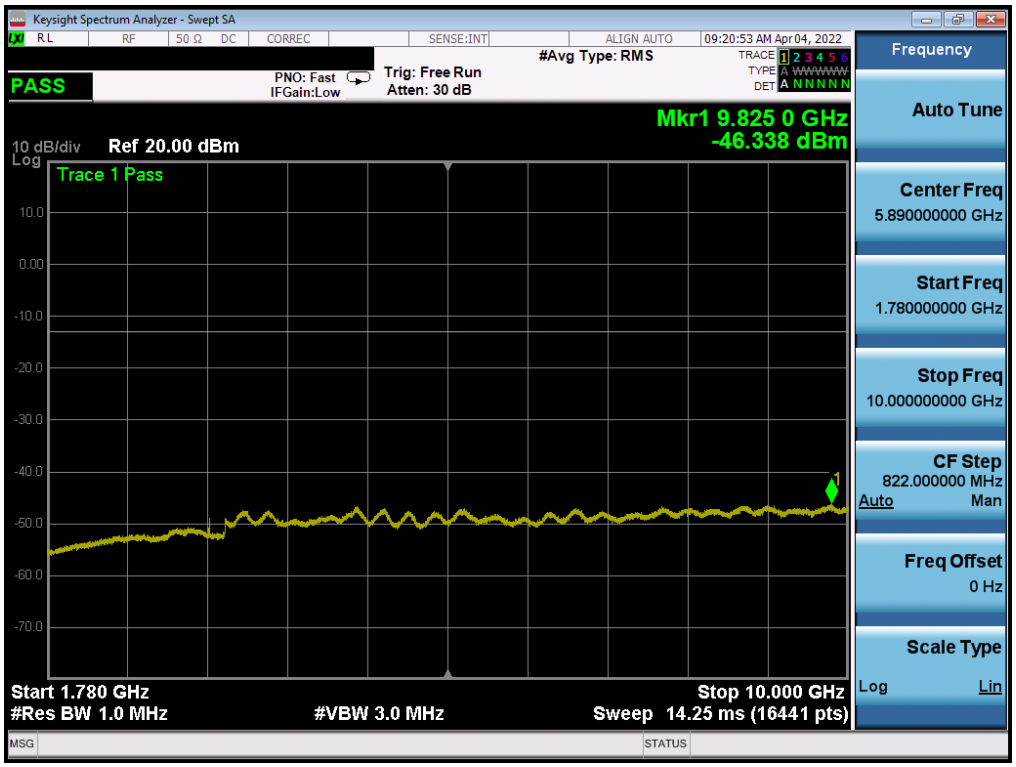
LTE Band 66/4 – Ant F



Plot 7-181. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Low Channel – Ant F)



Plot 7-182. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Low Channel – Ant F)

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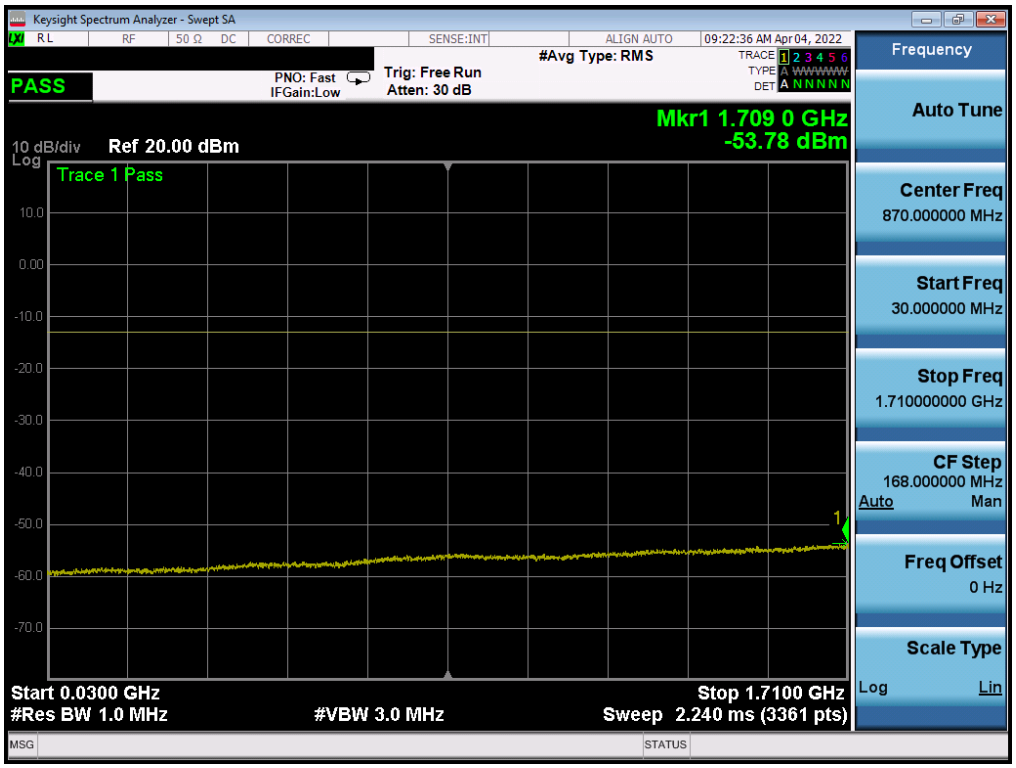
Plot 7-183. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Low Channel – Ant F)



Plot 7-184. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Mid Channel – Ant F)

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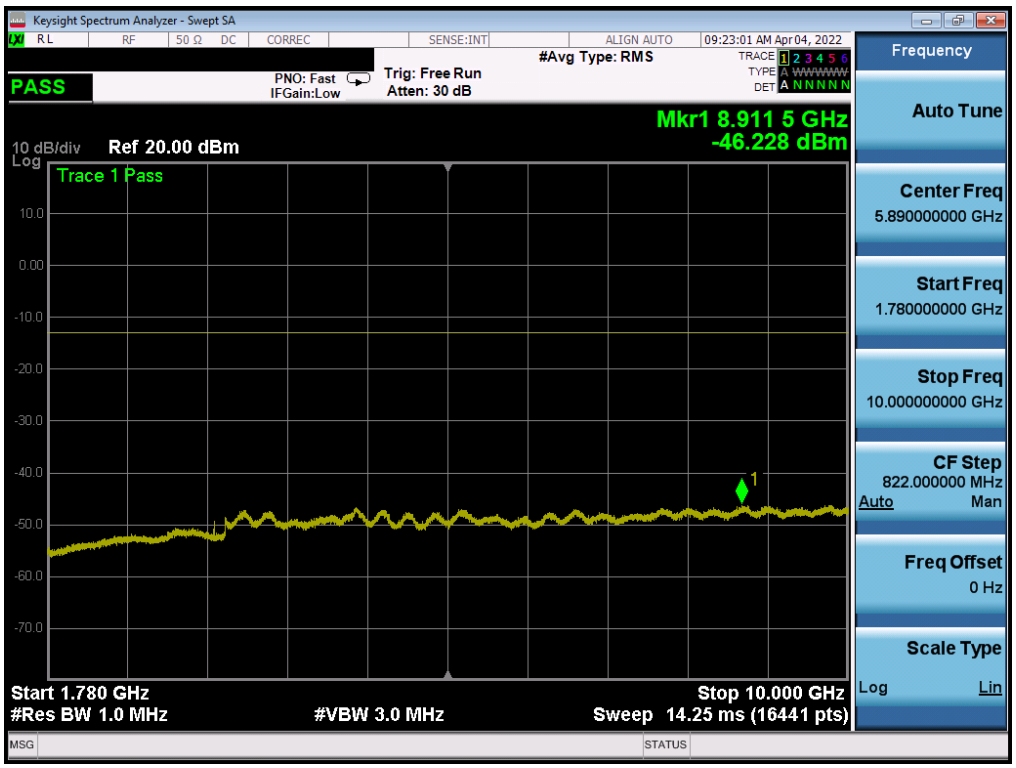

Plot 7-185. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Mid Channel – Ant F)

Plot 7-186. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - Mid Channel – Ant F)

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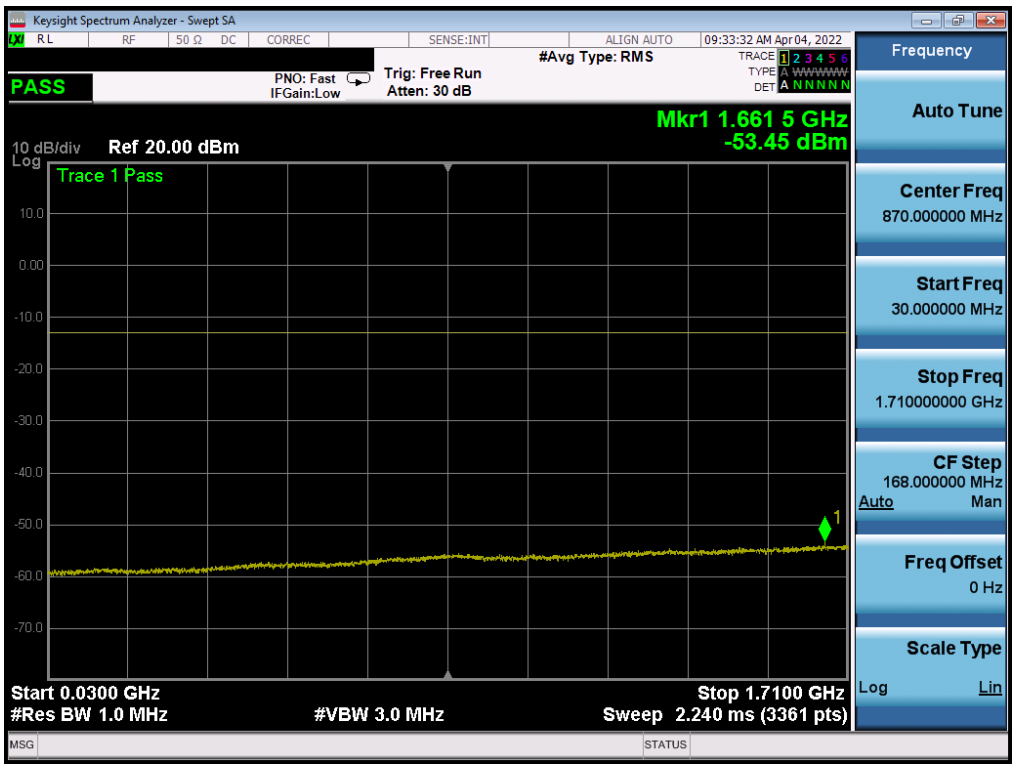
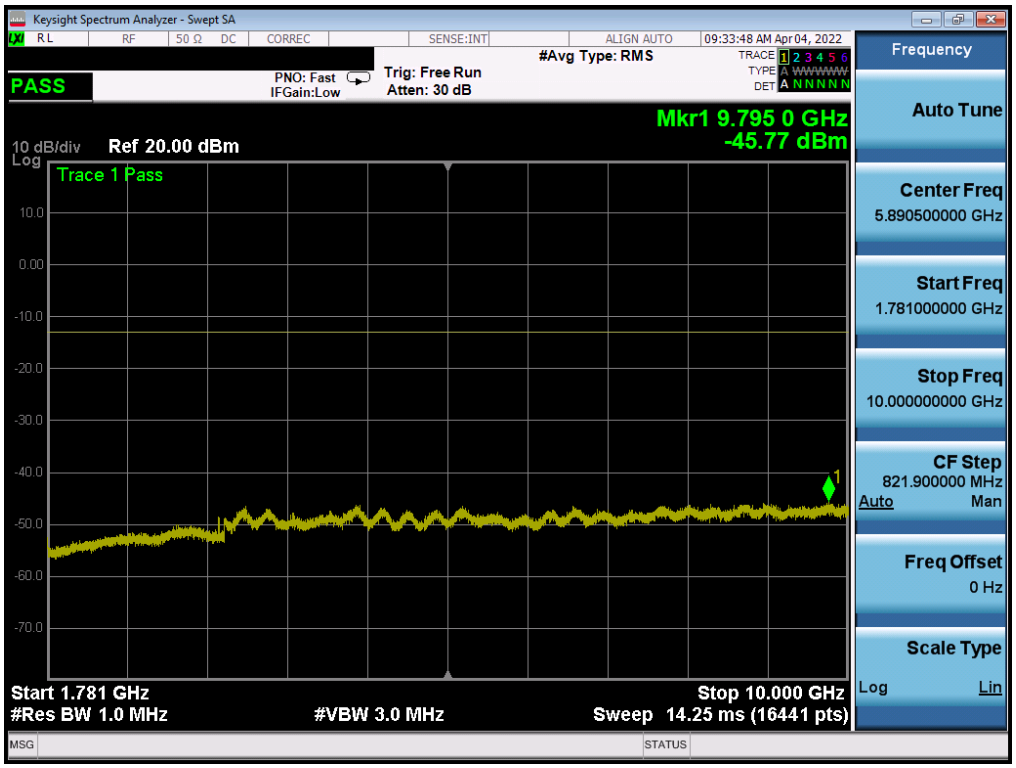


Plot 7-187. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - High Channel – Ant F)



Plot 7-188. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - High Channel – Ant F)

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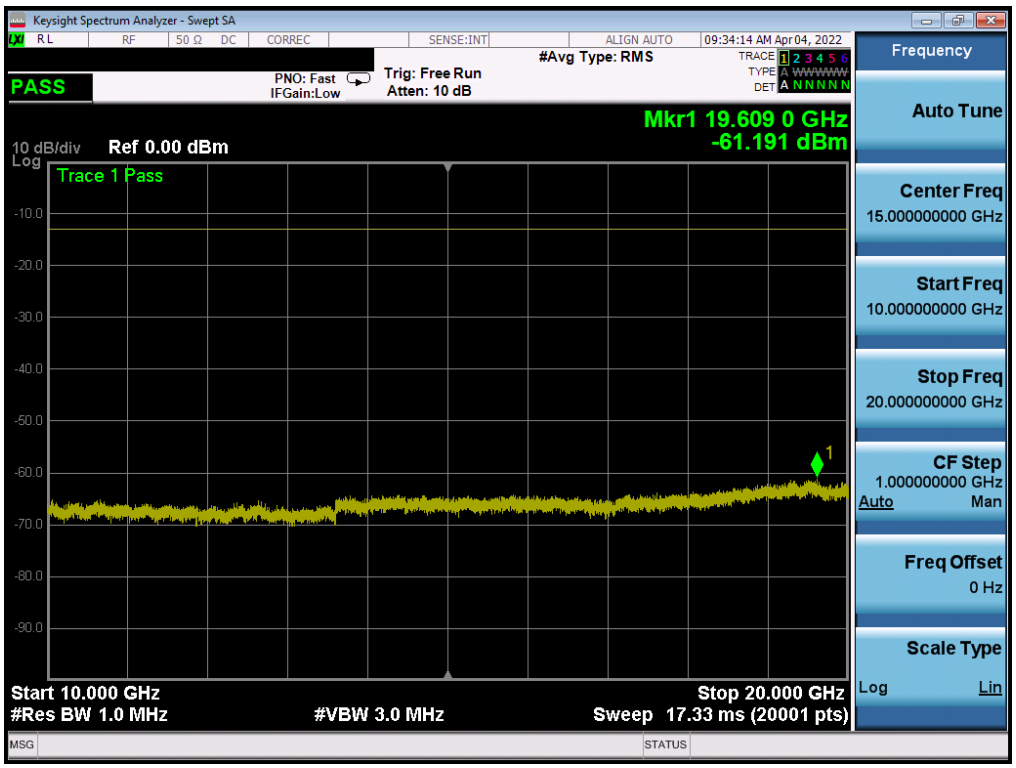

Plot 7-189. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - 1 RB - High Channel – Ant F)

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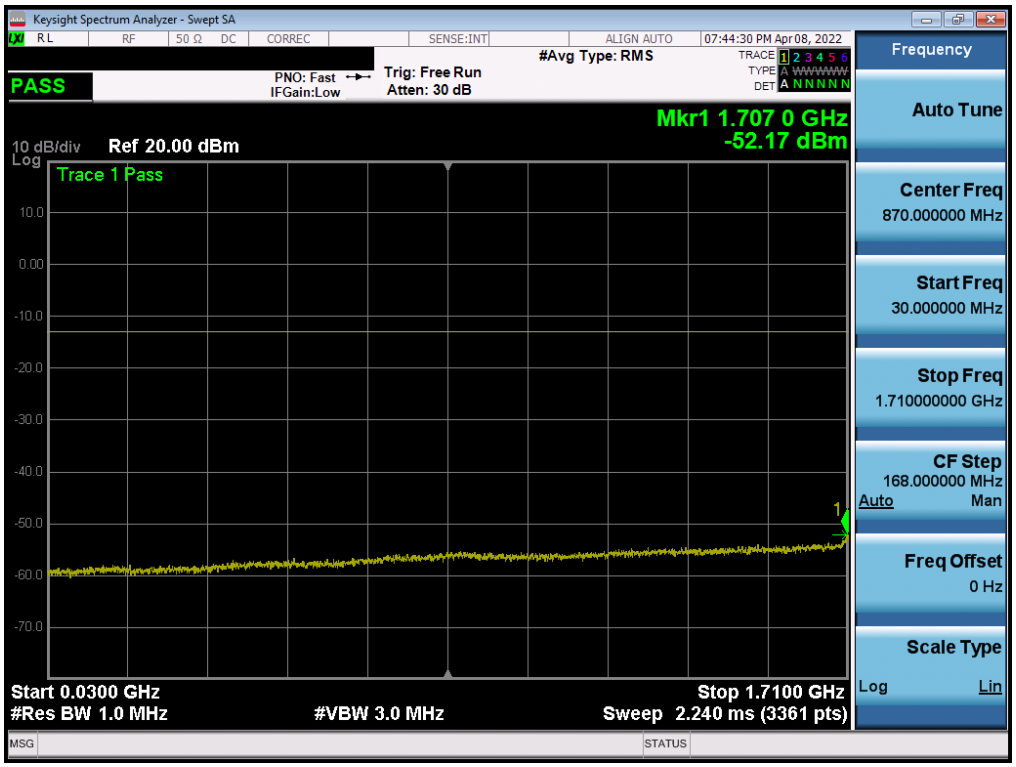
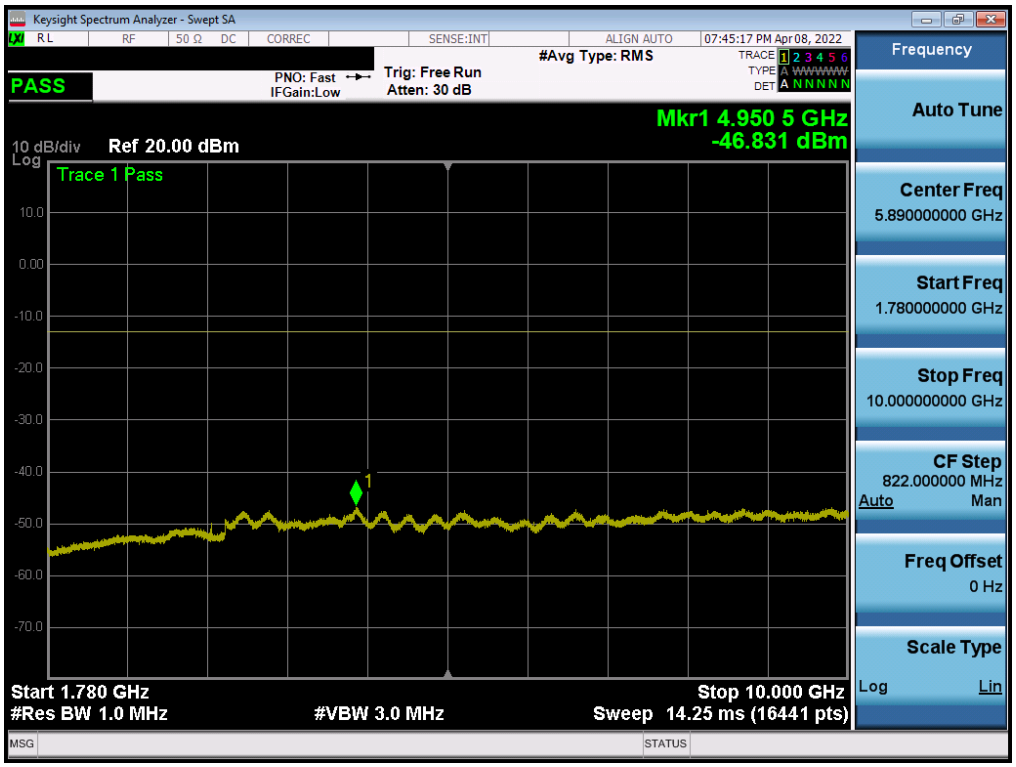
NR Band n66 – Ant F



Plot 7-190. Conducted Spurious Plot (NR Band n66 -40.0MHz - 1 RB - Low Channel - Ant F)



Plot 7-191. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Low Channel - Ant F)

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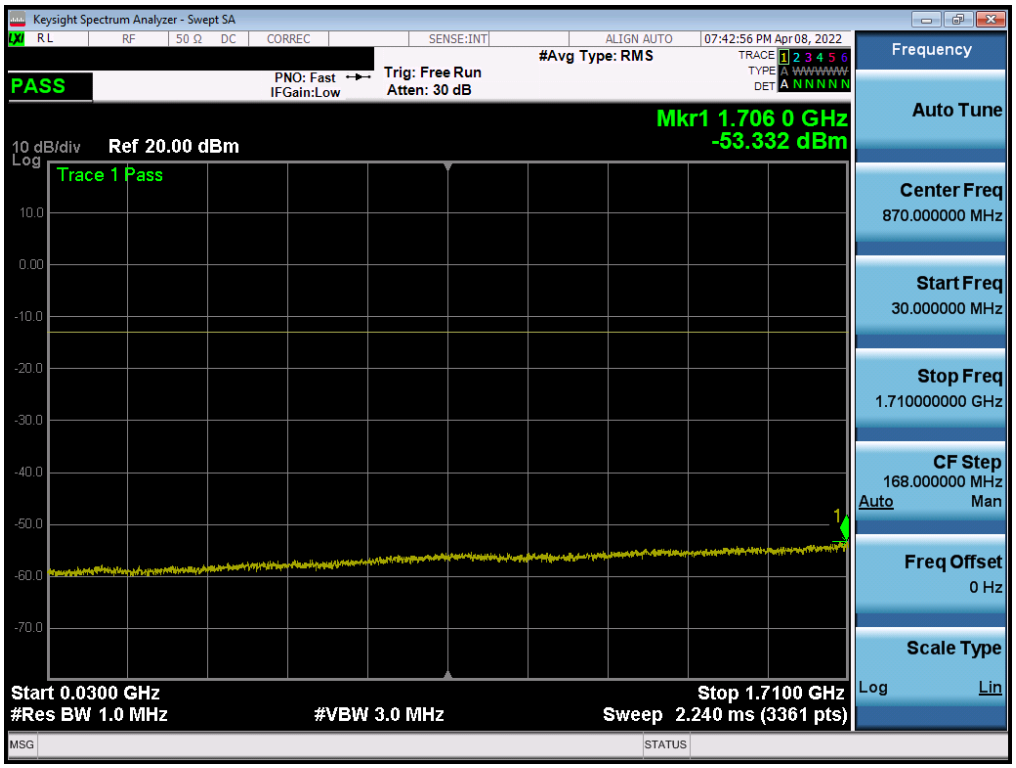
Plot 7-192. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Low Channel - Ant F)



Plot 7-193. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Mid Channel - Ant F)

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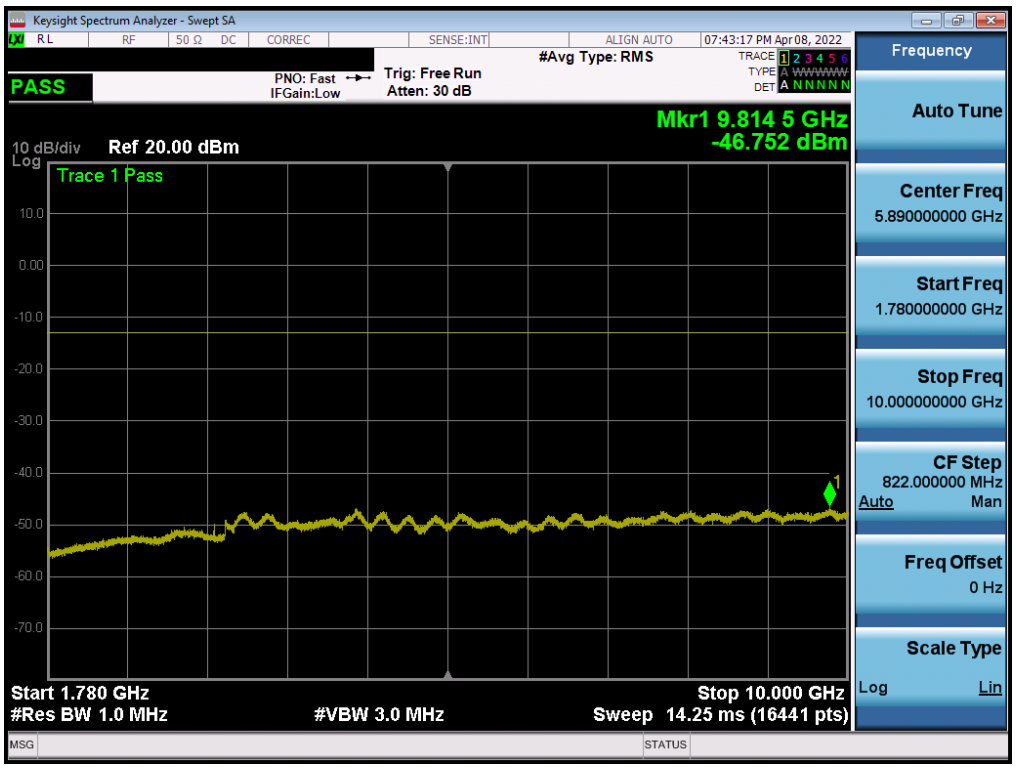

Plot 7-194. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Mid Channel - Ant F)

Plot 7-195. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - Mid Channel - Ant F)

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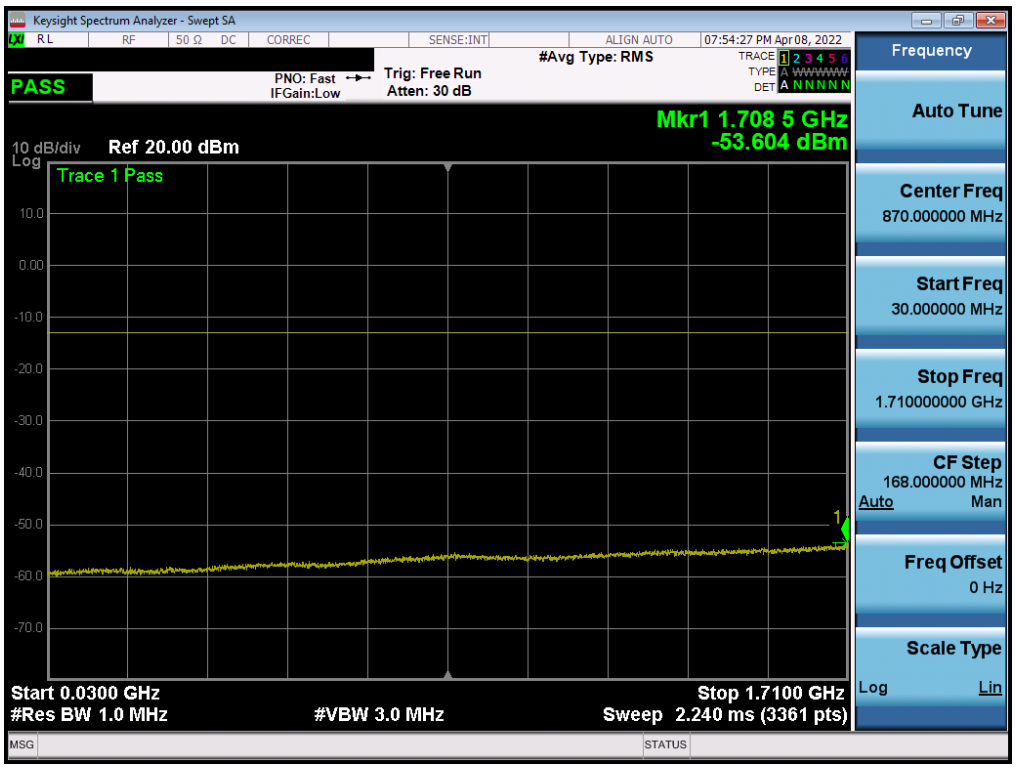
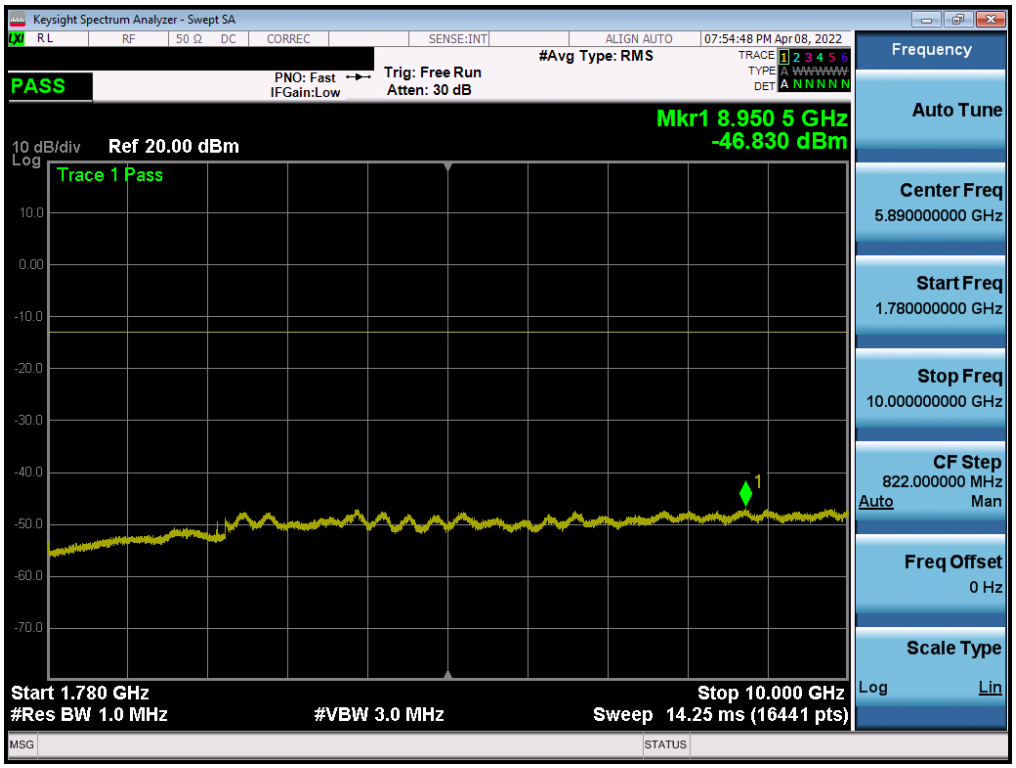


Plot 7-196. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - High Channel - Ant F)



Plot 7-197. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - High Channel - Ant F)

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Plot 7-198. Conducted Spurious Plot (NR Band n66 - 40.0MHz - 1 RB - High Channel - Ant F)

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7.5 Band Edge Emissions at Antenna Terminal

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 + 10 $\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.3

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 ≥ 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.

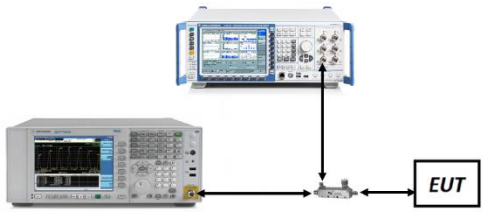

Figure 7-4. Test Instrument & Measurement Setup

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Test Notes

1. Per 27.53(h) for AWS band operation, 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.

2. Per 27.53(g) for operations in the 663 - 698 MHz and 698 – 746MHz bands, 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.

3. 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.

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

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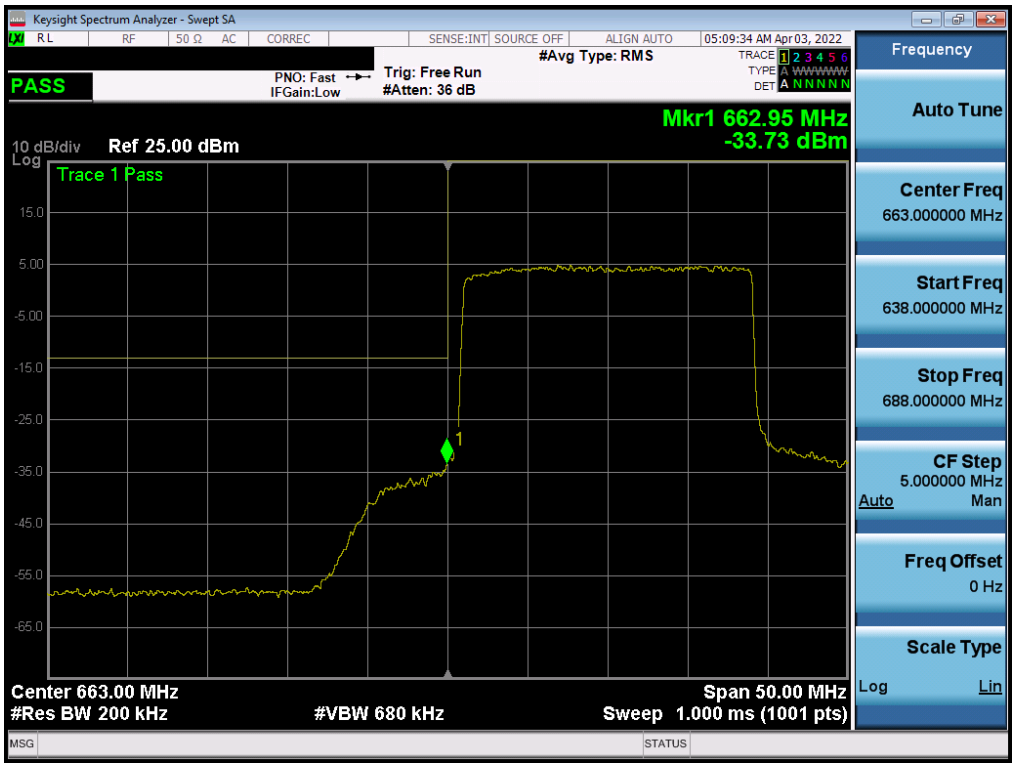
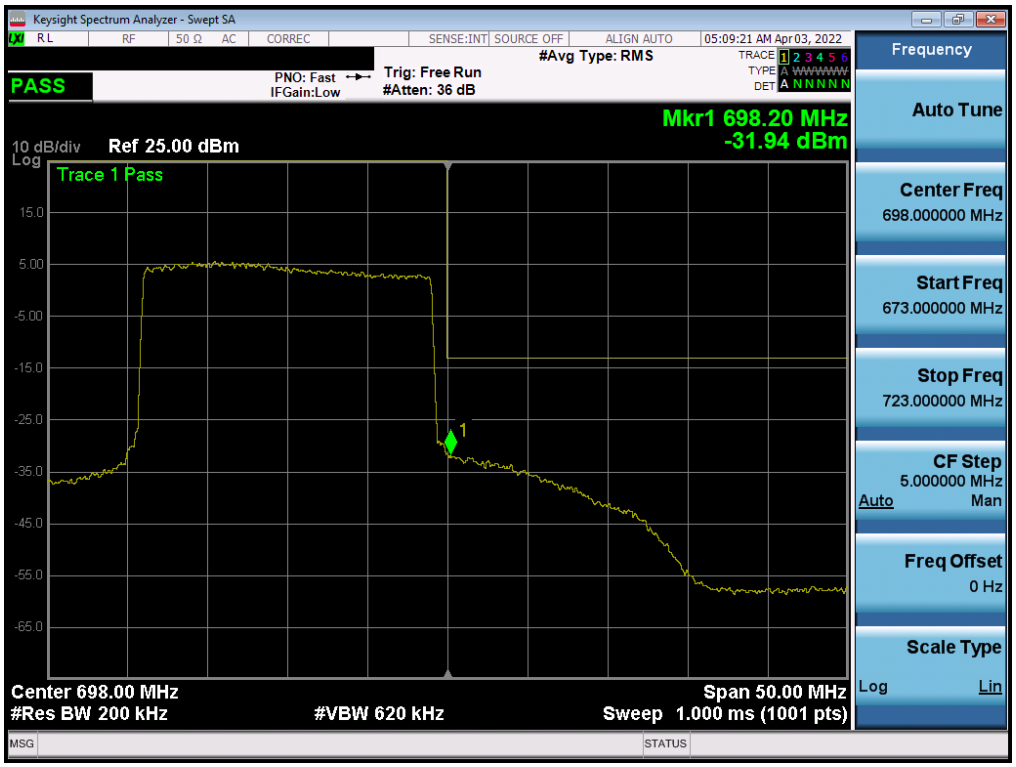
LTE Band 71 – Ant A



Plot 7-199. Lower Band Edge Plot (LTE Band 71 - 20MHz QPSK – Full RB - Ant A)



Plot 7-200. Upper Band Edge Plot (LTE Band 71 - 20MHz QPSK – Full RB - Ant A)

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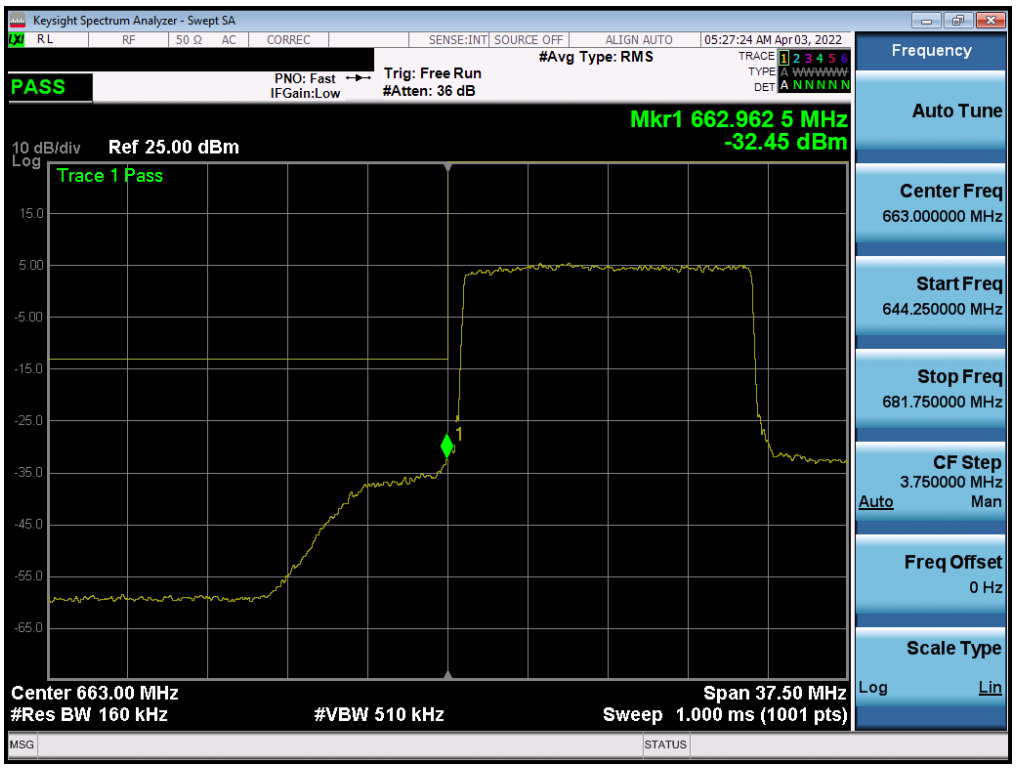

Plot 7-201. Lower Band Edge Plot (LTE Band 71 - 15MHz QPSK – Full RB - Ant A)

Plot 7-202. Upper Band Edge Plot (LTE Band 71 - 15MHz QPSK – Full RB - Ant A)

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Plot 7-203. Lower Band Edge Plot (LTE Band 71 - 10MHz QPSK – Full RB - Ant A)

Plot 7-204. Upper Band Edge Plot (LTE Band 71 - 10MHz QPSK – Full RB - Ant A)

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Plot 7-205. Lower Band Edge Plot (LTE Band 71 - 5MHz QPSK – Full RB - Ant A)

Plot 7-206. Upper Band Edge Plot (LTE Band 71 - 5MHz QPSK – Full RB - Ant A)

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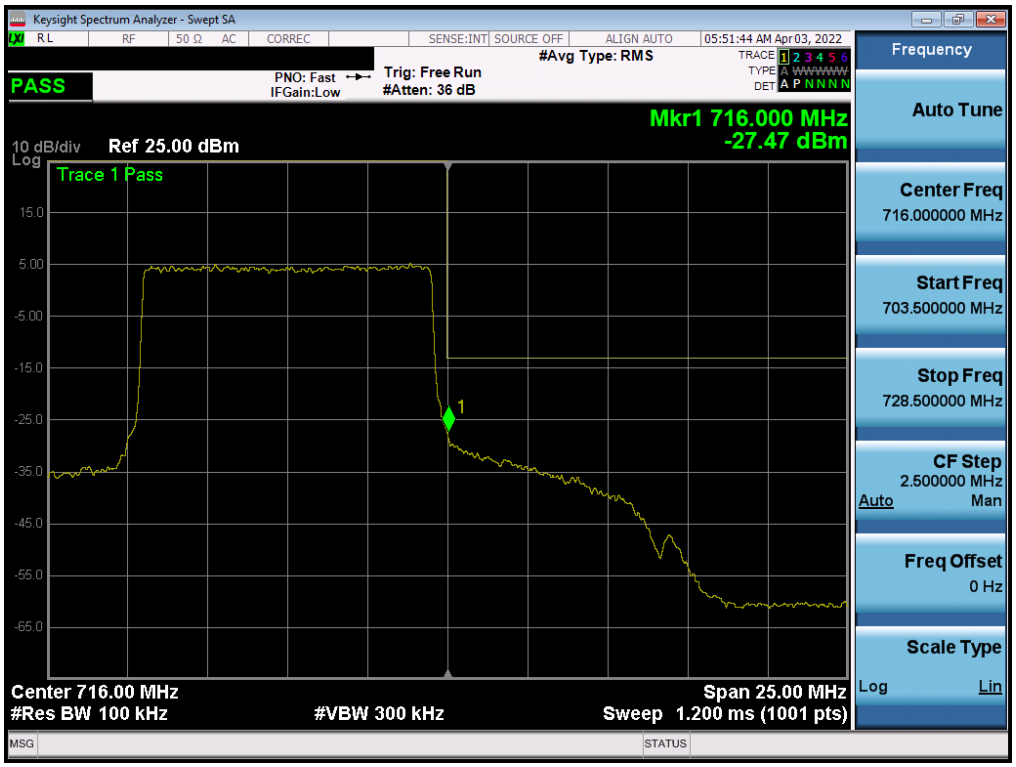
LTE Band 12 – Ant A

Plot 7-207. Lower Band Edge Plot (LTE Band 12 - 10MHz QPSK – Full RB - Ant A)



Plot 7-208. Upper Band Edge Plot (LTE Band 12 - 10MHz QPSK – Full RB - Ant A)

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