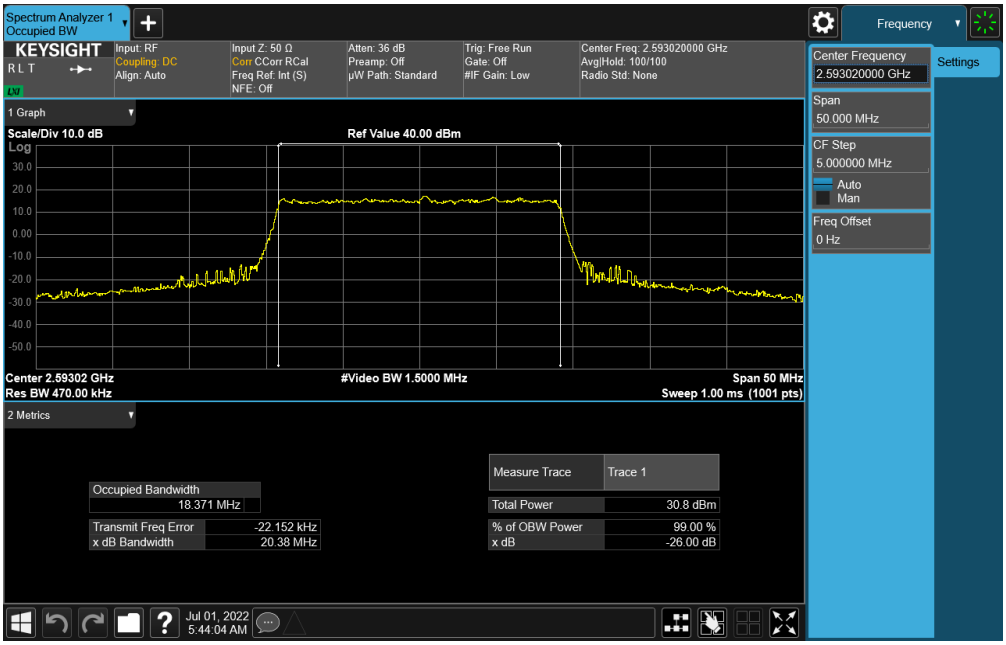
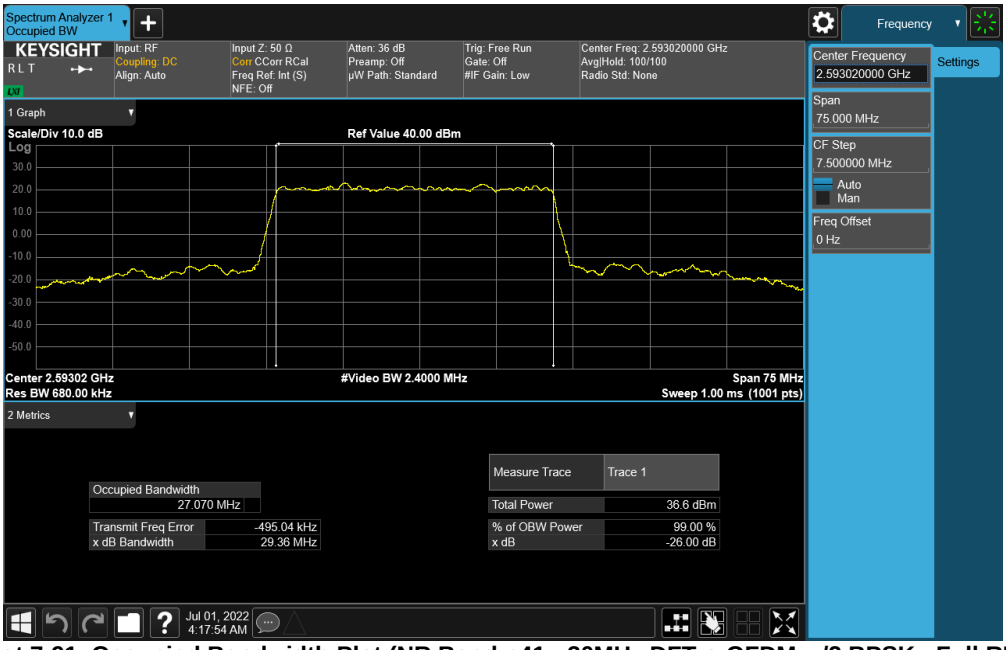
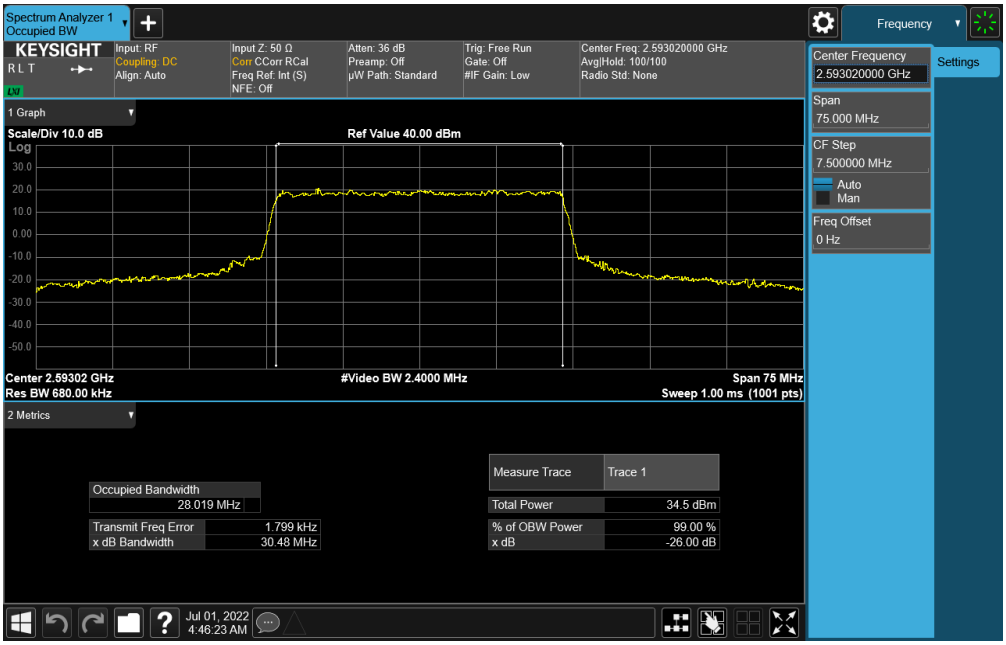


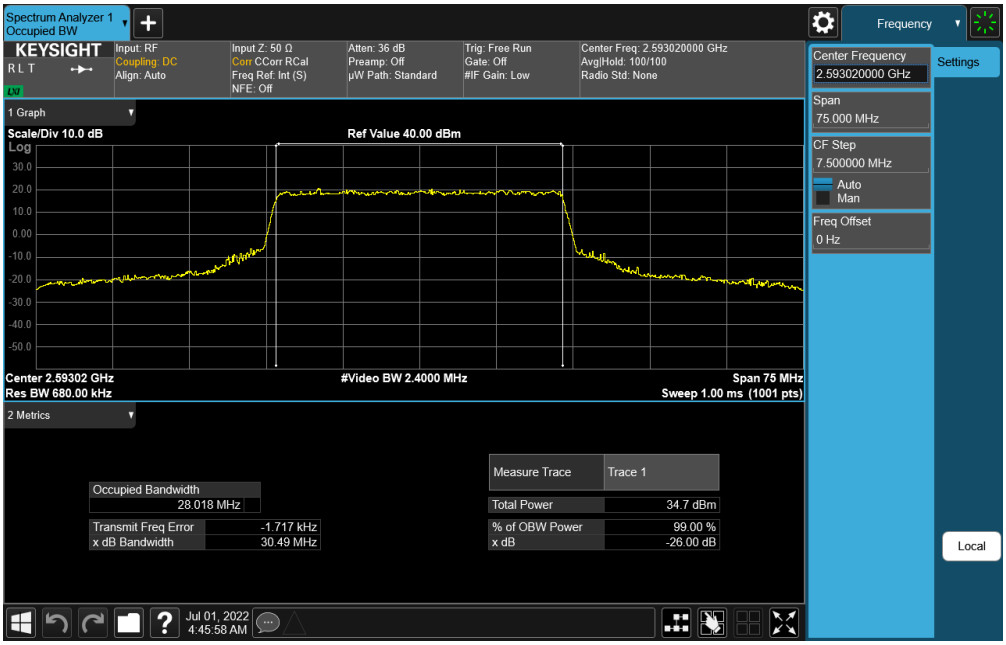
Plot 7-90. Occupied Bandwidth Plot (NR Band n41 - 20MHz CP-OFDM 256-QAM - Full RB)



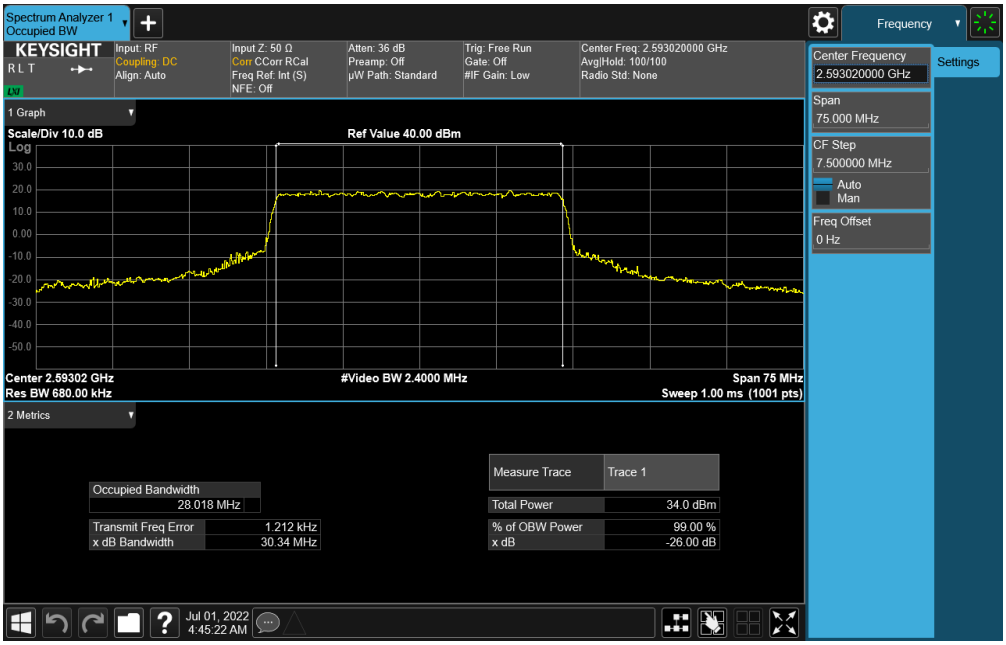
Plot 7-91. Occupied Bandwidth Plot (NR Band n41 - 30MHz DFT-s-OFDM π/2 BPSK - Full RB)



Plot 7-92. Occupied Bandwidth Plot (NR Band n41 - 30MHz CP-OFDM QPSK - Full RB)



Plot 7-93. Occupied Bandwidth Plot (NR Band n41 - 30MHz CP-OFDM 16-QAM - Full RB)

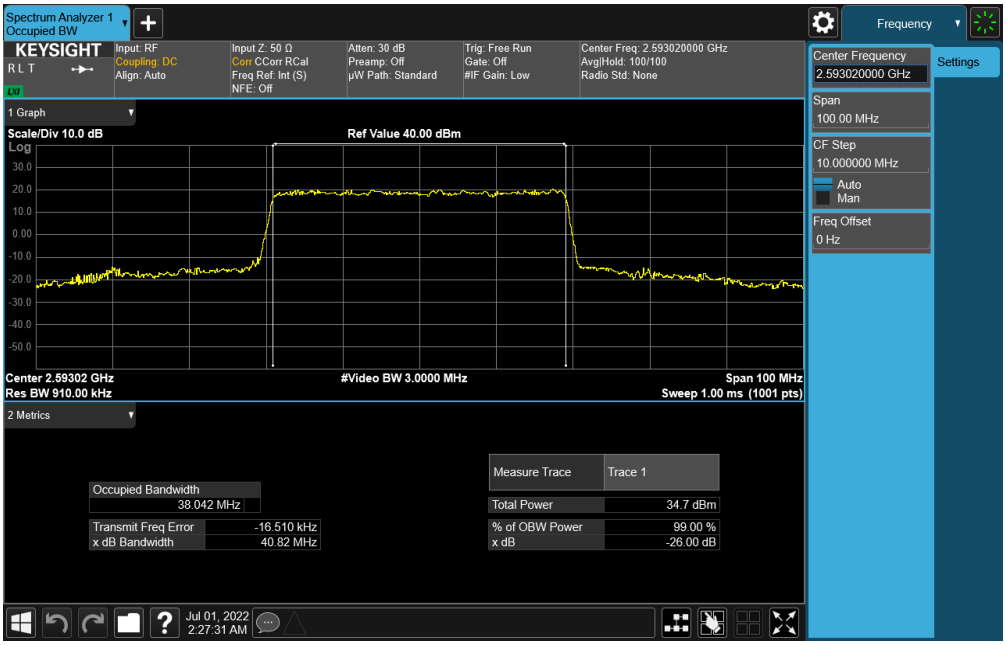


Plot 7-94. Occupied Bandwidth Plot (NR Band n41 - 30MHz CP-OFDM 64-QAM - Full RB)

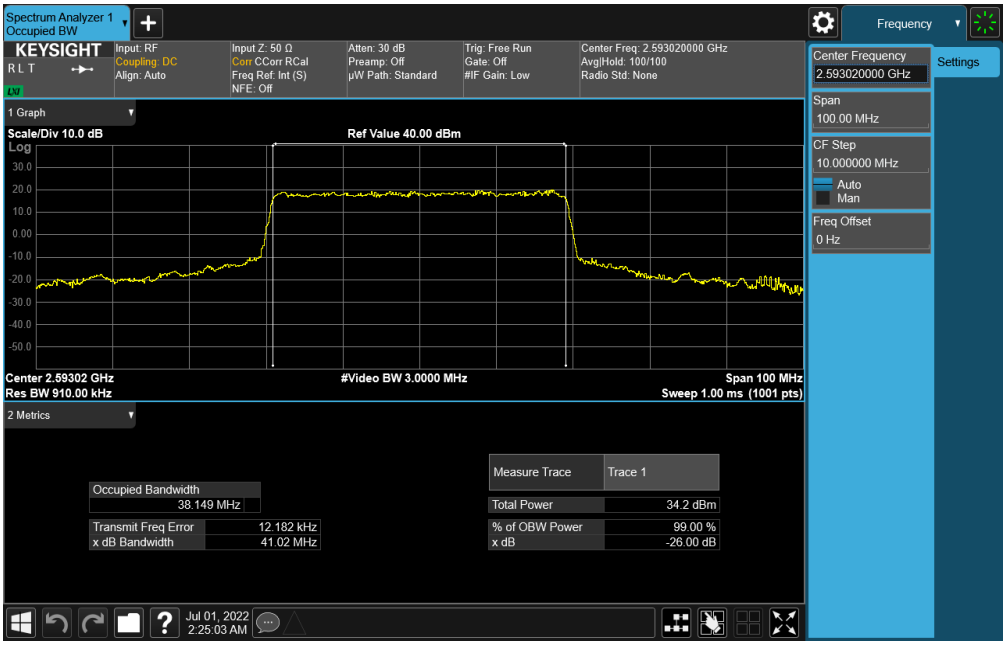
Plot 7-95. Occupied Bandwidth Plot (NR Band n41 - 30MHz CP-OFDM 256-QAM - Full RB)

Plot 7-96. Occupied Bandwidth Plot (NR Band n41 - 40MHz DFT-s-OFDM π/2 BPSK - Full RB)

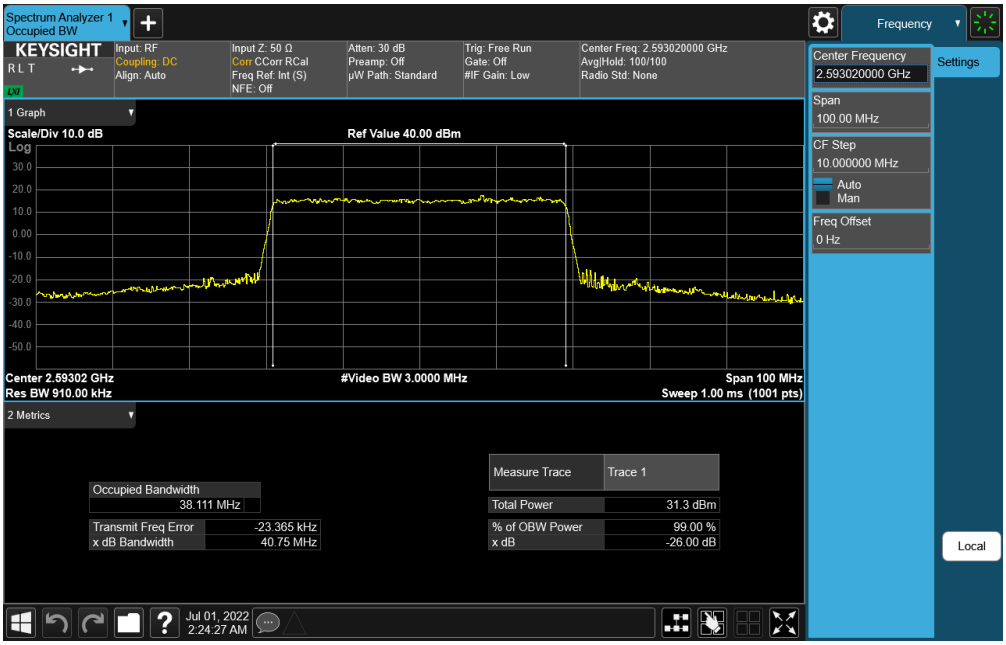
Plot 7-97. Occupied Bandwidth Plot (NR Band n41 - 40MHz CP-OFDM QPSK - Full RB)



Plot 7-98. Occupied Bandwidth Plot (NR Band n41 - 40MHz CP-OFDM 16-QAM - Full RB)



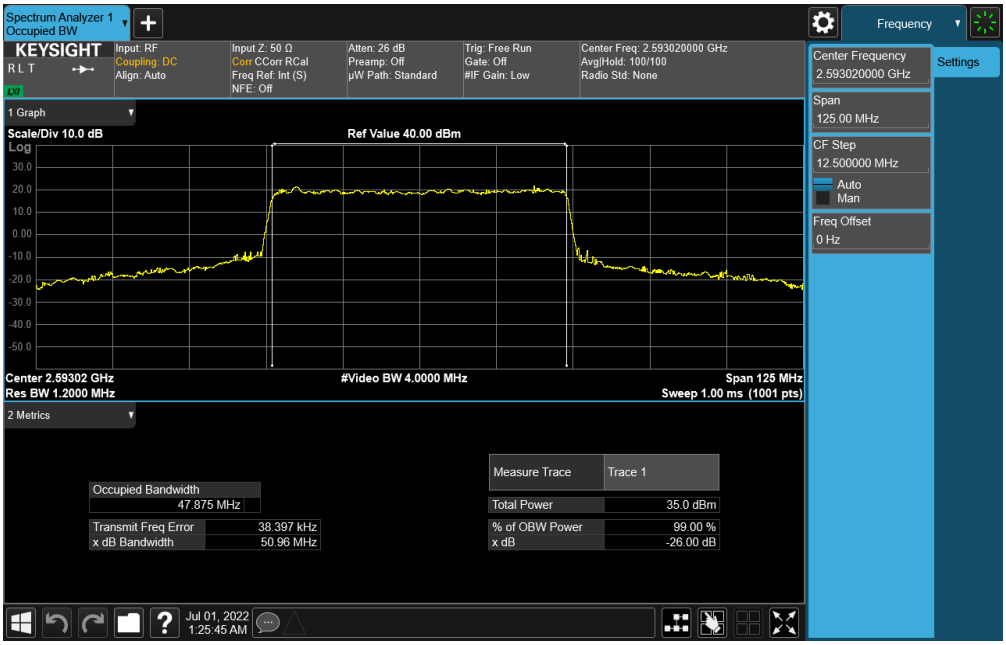
Plot 7-99. Occupied Bandwidth Plot (NR Band n41 - 40MHz CP-OFDM 64-QAM - Full RB)



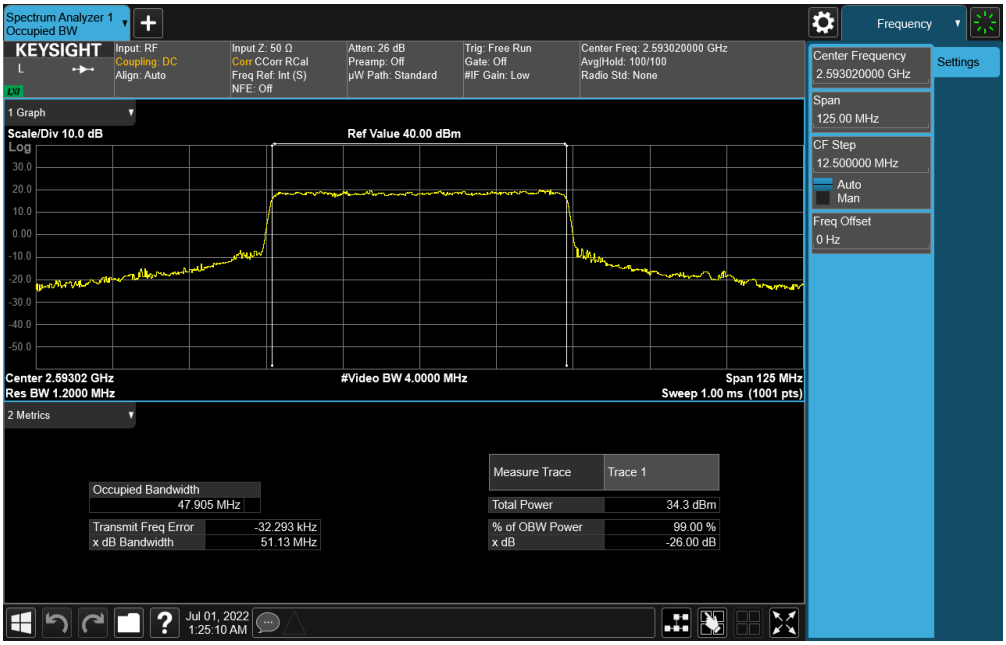
Plot 7-100. Occupied Bandwidth Plot (NR Band n41 - 40MHz CP-OFDM 256-QAM - Full RB)

Plot 7-101. Occupied Bandwidth Plot (NR Band n41 - 50MHz DFT-s-OFDM π/2 BPSK - Full RB)

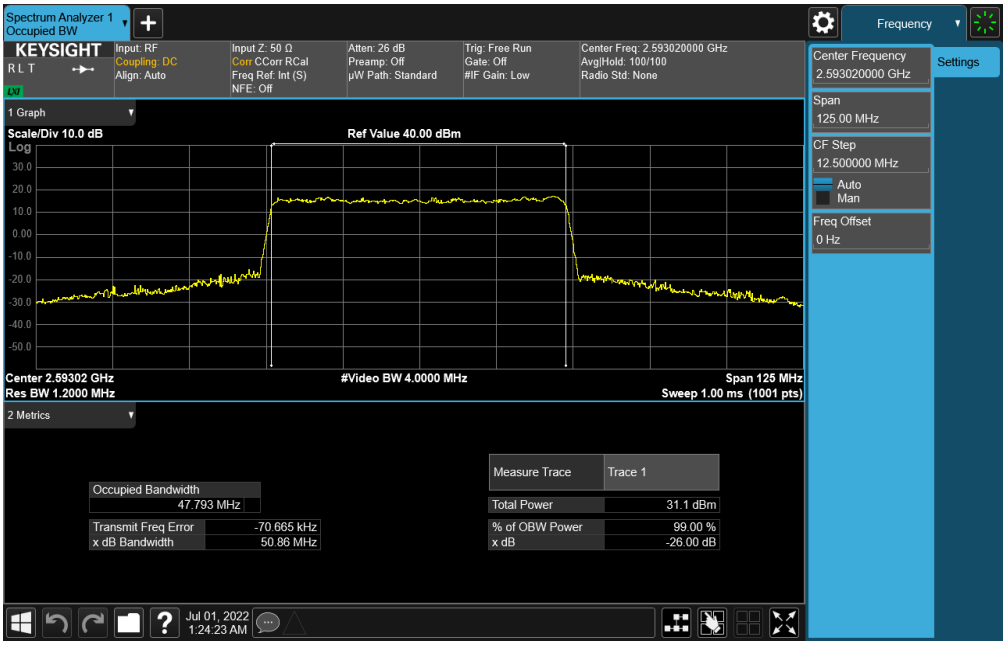
Plot 7-102. Occupied Bandwidth Plot (NR Band n41 - 50MHz CP-OFDM QPSK - Full RB)



Plot 7-103. Occupied Bandwidth Plot (NR Band n41 - 50MHz CP-OFDM 16-QAM - Full RB)



Plot 7-104. Occupied Bandwidth Plot (NR Band n41 - 50MHz CP-OFDM 64-QAM - Full RB)



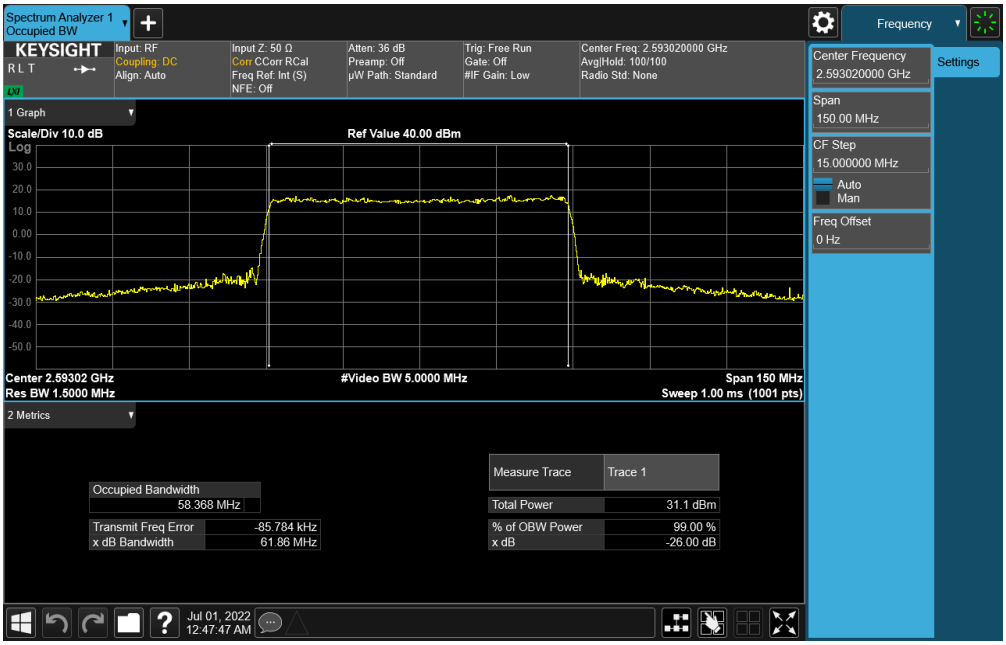
Plot 7-105. Occupied Bandwidth Plot (NR Band n41 - 50MHz CP-OFDM 256-QAM - Full RB)

Plot 7-106. Occupied Bandwidth Plot (NR Band n41 - 60MHz DFT-s-OFDM π/2 BPSK - Full RB)

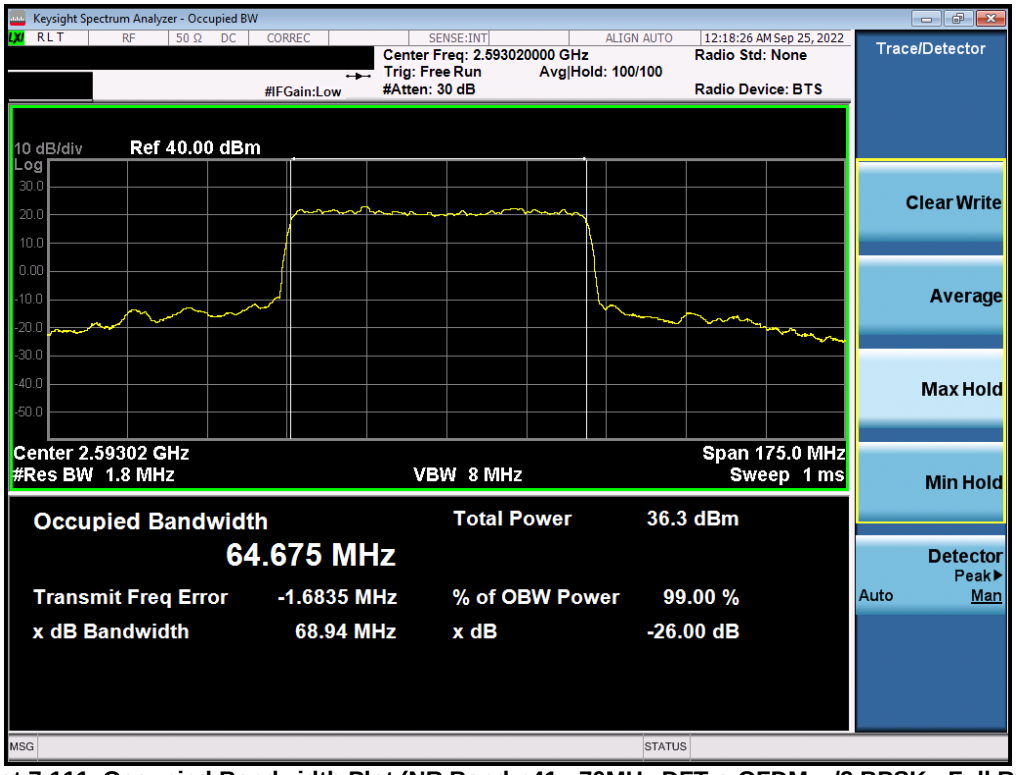
Plot 7-107. Occupied Bandwidth Plot (NR Band n41 - 60MHz DFT-s-OFDM QPSK - Full RB)

Plot 7-108. Occupied Bandwidth Plot (NR Band n41 - 60MHz DFT-s-OFDM 16-QAM - Full RB)

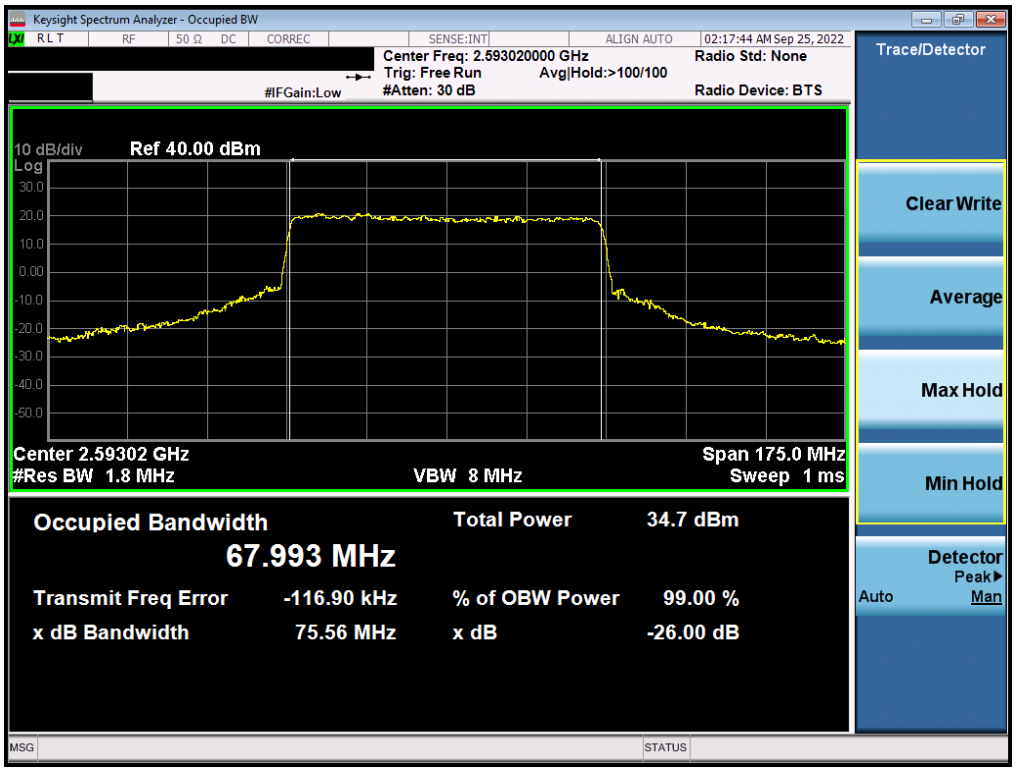
Plot 7-109. Occupied Bandwidth Plot (NR Band n41 - 60MHz DFT-s-OFDM 64-QAM - Full RB)



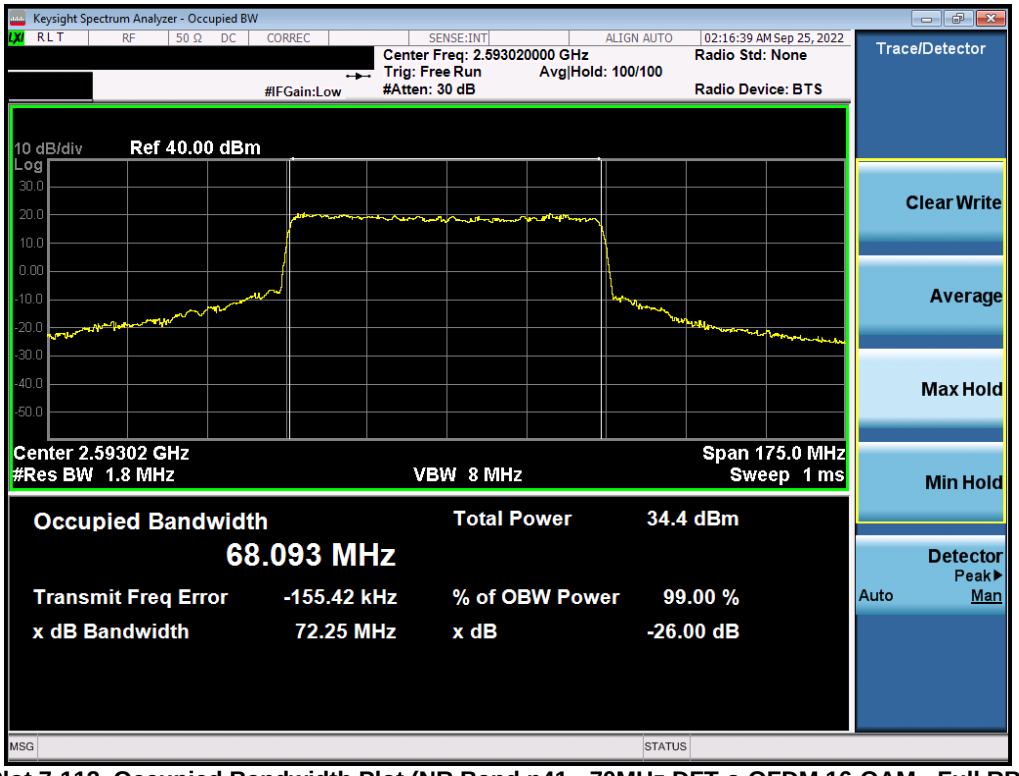
Plot 7-110. Occupied Bandwidth Plot (NR Band n41 - 60MHz DFT-s-OFDM 256-QAM - Full RB)



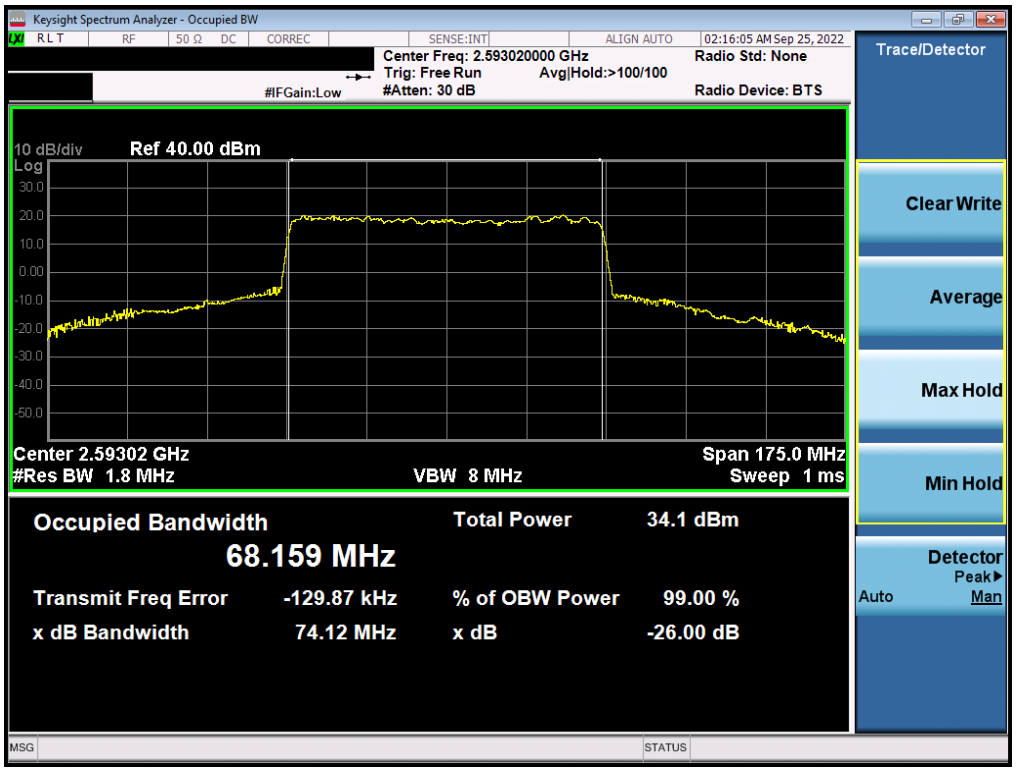
Plot 7-111. Occupied Bandwidth Plot (NR Band n41 - 70MHz DFT-s-OFDM π/2 BPSK - Full RB)



Plot 7-112. Occupied Bandwidth Plot (NR Band n41 - 70MHz DFT-s-OFDM QPSK - Full RB)



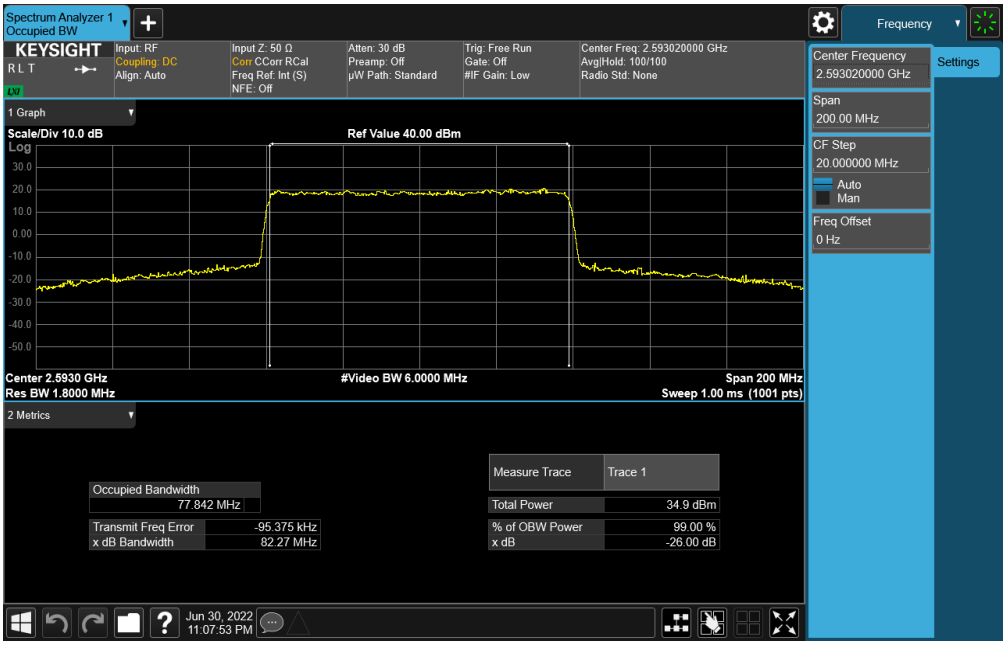
Plot 7-113. Occupied Bandwidth Plot (NR Band n41 - 70MHz DFT-s-OFDM 16-QAM - Full RB)



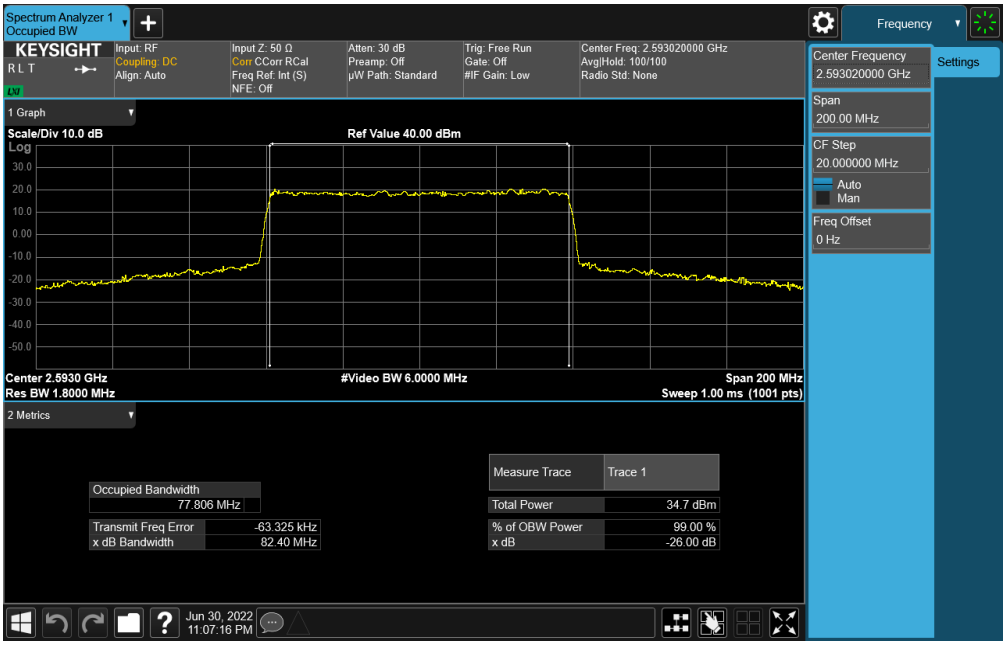
Plot 7-114. Occupied Bandwidth Plot (NR Band n41 - 70MHz DFT-s-OFDM 64-QAM - Full RB)

Plot 7-115. Occupied Bandwidth Plot (NR Band n41 - 70MHz DFT-s-OFDM 256-QAM - Full RB)

Plot 7-116. Occupied Bandwidth Plot (NR Band n41 - 80MHz DFT-s-OFDM π/2 BPSK - Full RB)



Plot 7-117. Occupied Bandwidth Plot (NR Band n41 - 80MHz CP-OFDM QPSK - Full RB)



Plot 7-118. Occupied Bandwidth Plot (NR Band n41 - 80MHz CP-OFDM 16-QAM - Full RB)

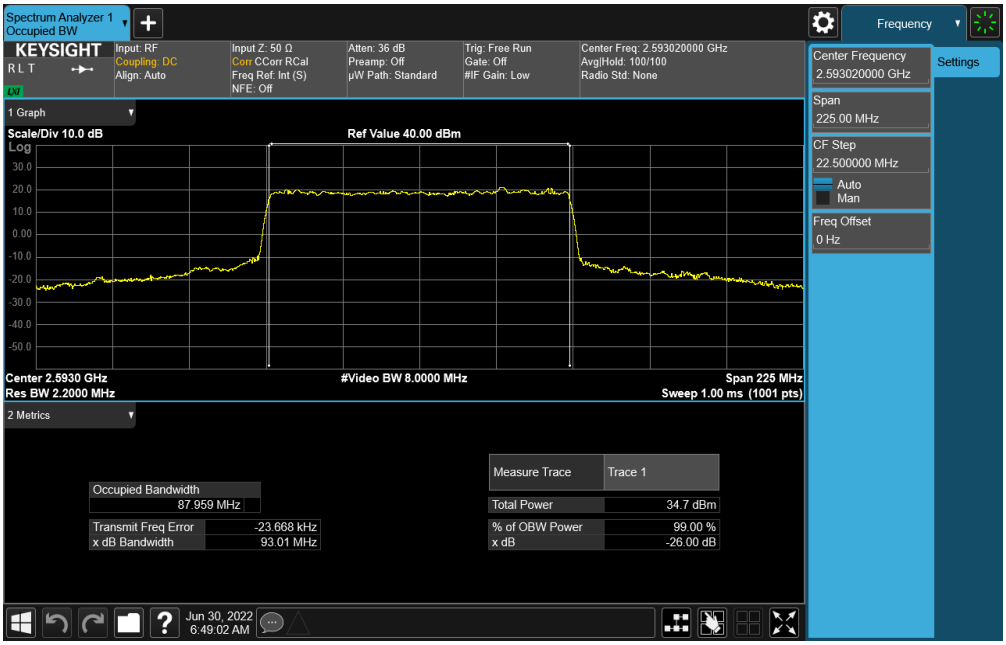
Plot 7-119. Occupied Bandwidth Plot (NR Band n41 - 80MHz CP-OFDM 64-QAM - Full RB)

Plot 7-120. Occupied Bandwidth Plot (NR Band n41 - 80MHz CP-OFDM 256-QAM - Full RB)

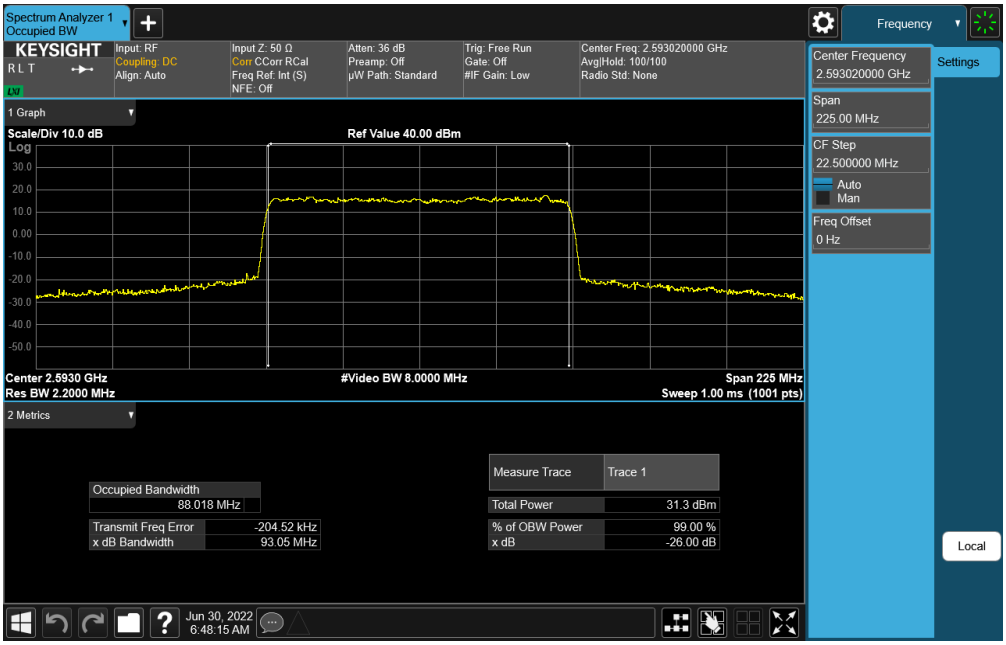
Plot 7-121. Occupied Bandwidth Plot (NR Band n41 - 90MHz DFT-s-OFDM π/2 BPSK - Full RB)

Plot 7-122. Occupied Bandwidth Plot (NR Band n41 - 90MHz CP-OFDM QPSK - Full RB)

Plot 7-123. Occupied Bandwidth Plot (NR Band n41 - 90MHz CP-OFDM 16-QAM - Full RB)



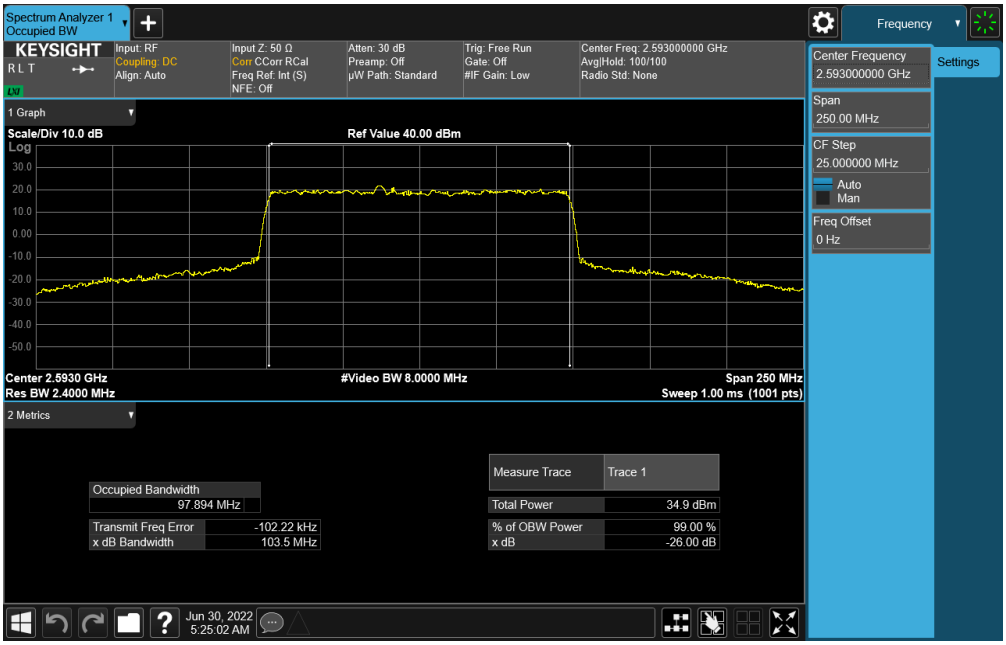
Plot 7-124. Occupied Bandwidth Plot (NR Band n41 - 90MHz CP-OFDM 64-QAM - Full RB)



Plot 7-125. Occupied Bandwidth Plot (NR Band n41 - 90MHz CP-OFDM 256-QAM - Full RB)

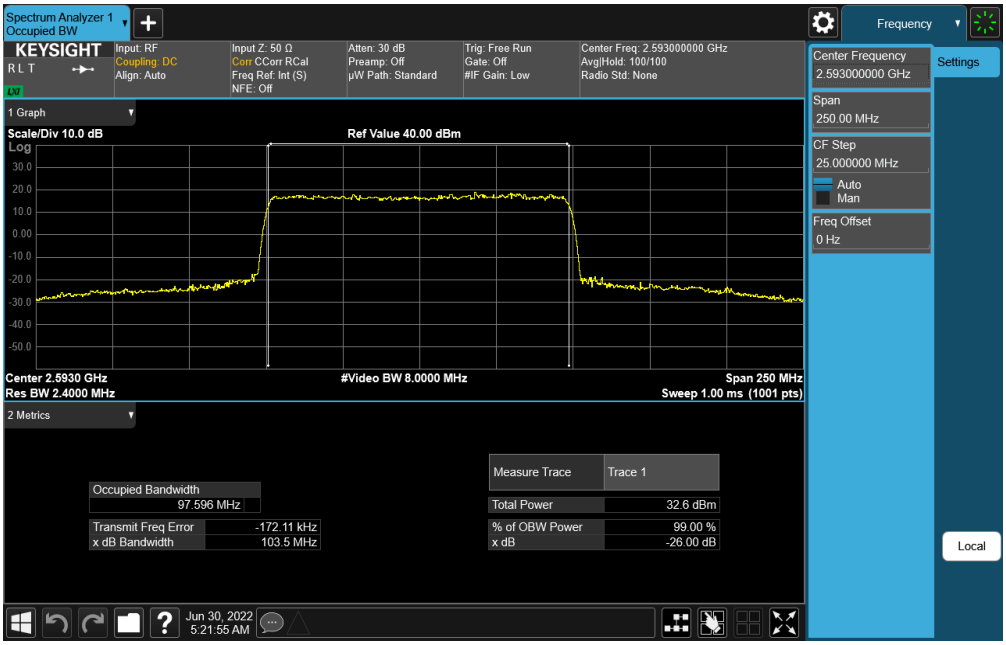
Plot 7-126. Occupied Bandwidth Plot (NR Band n41 - 100MHz DFT-s-OFDM π/2 BPSK - Full RB)

Plot 7-127. Occupied Bandwidth Plot (NR Band n41 - 100MHz CP-OFDM QPSK - Full RB)



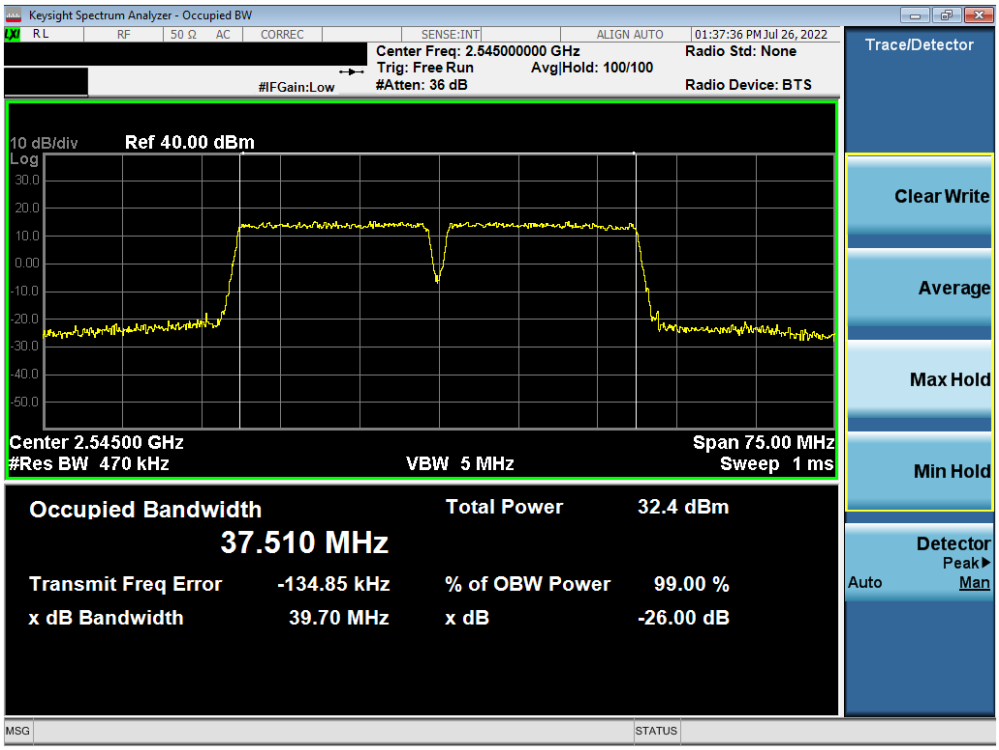
Plot 7-128. Occupied Bandwidth Plot (NR Band n41 - 100MHz CP-OFDM 16-QAM - Full RB)

Plot 7-129. Occupied Bandwidth Plot (NR Band n41 - 100MHz CP-OFDM 64-QAM - Full RB)

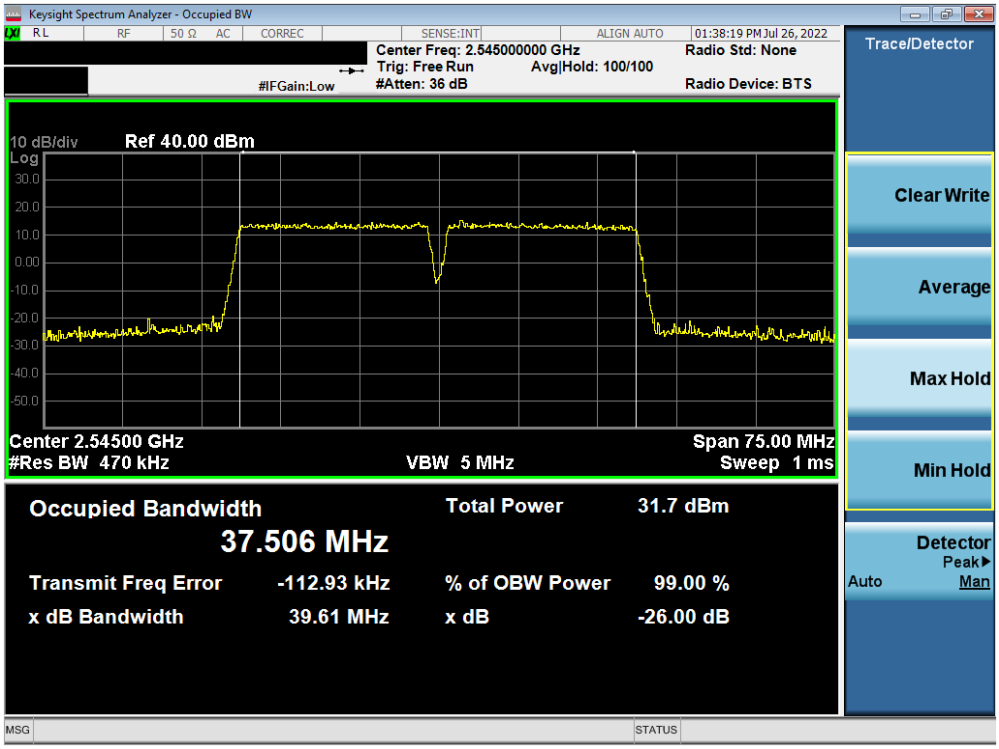


Plot 7-130. Occupied Bandwidth Plot (NR Band n41 - 100MHz CP-OFDM 256-QAM - Full RB)

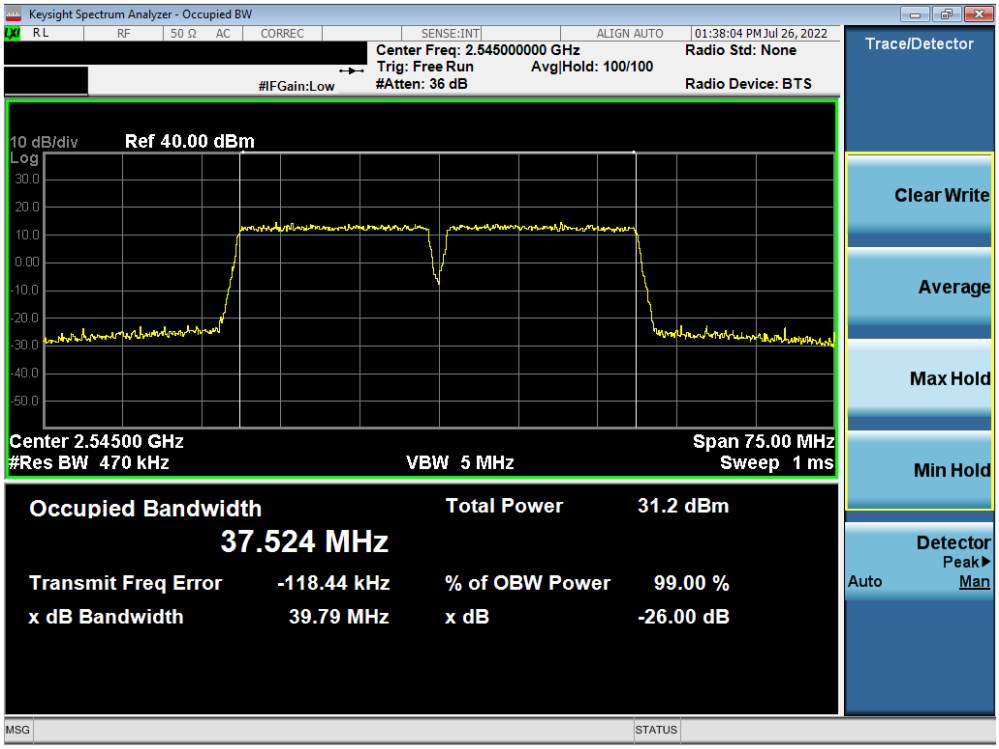
ULCA - LTE Band 7



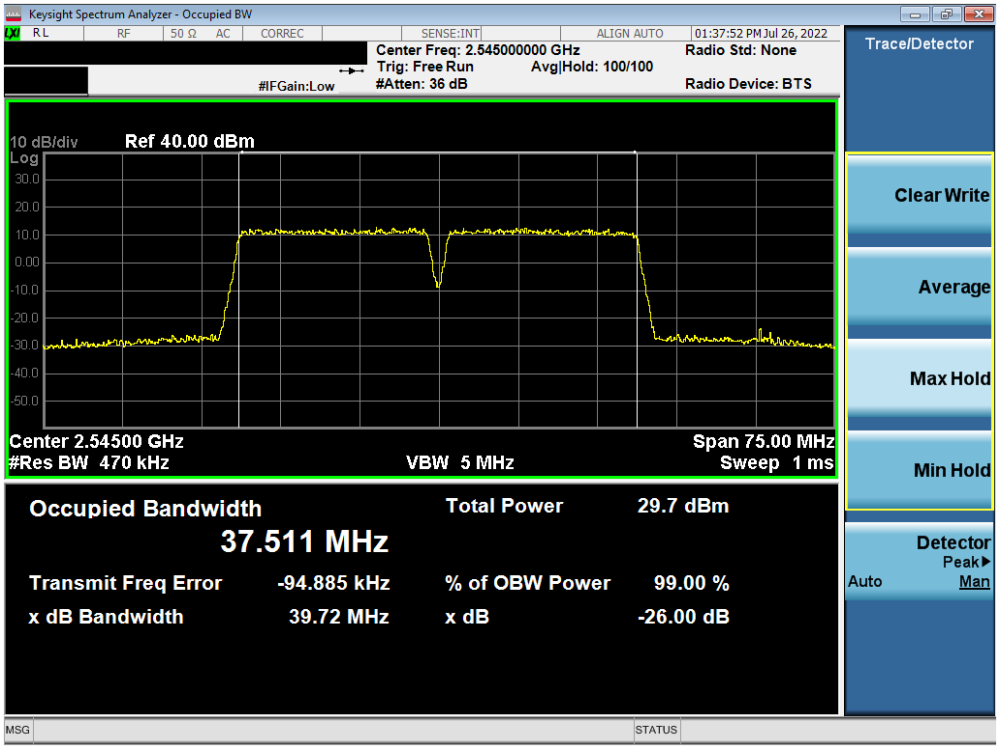
Plot 7-131. Occupied Bandwidth Plot (LTE Band 7 – (20+20)MHz QPSK - Full RB)



Plot 7-132. Occupied Bandwidth Plot (LTE Band 7 - (20+20)MHz 16-QAM - Full RB)

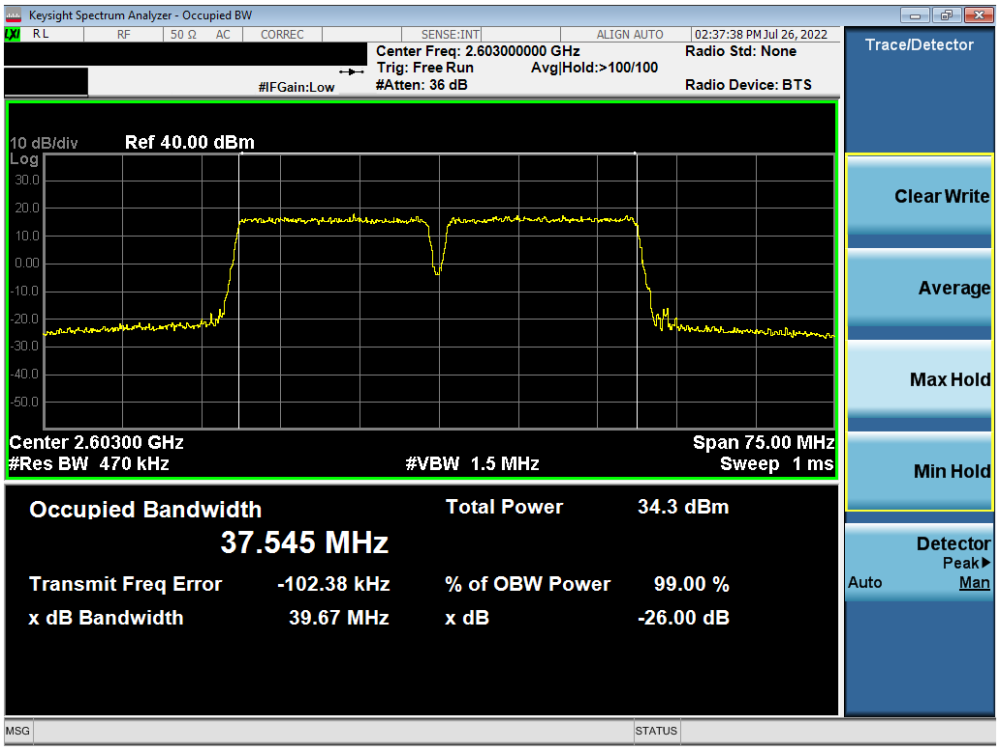


Plot 7-133. Occupied Bandwidth Plot (LTE Band 7 - (20+20)MHz 64-QAM - Full RB)

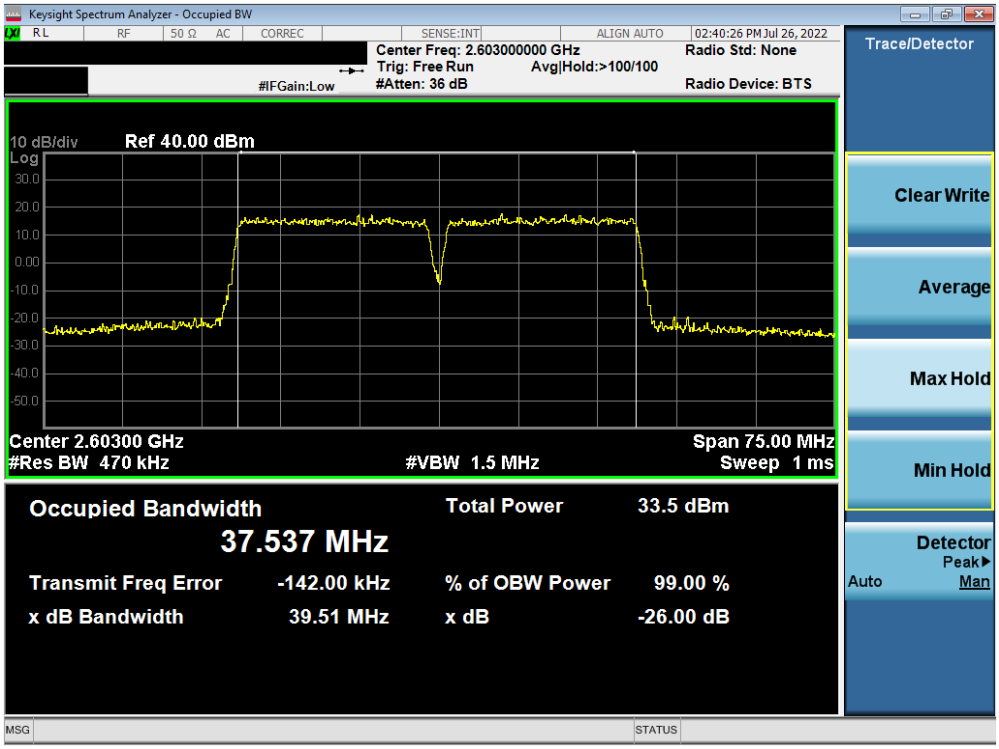


Plot 7-134. Occupied Bandwidth Plot (LTE Band 7 - (20+20)MHz 256-QAM - Full RB)

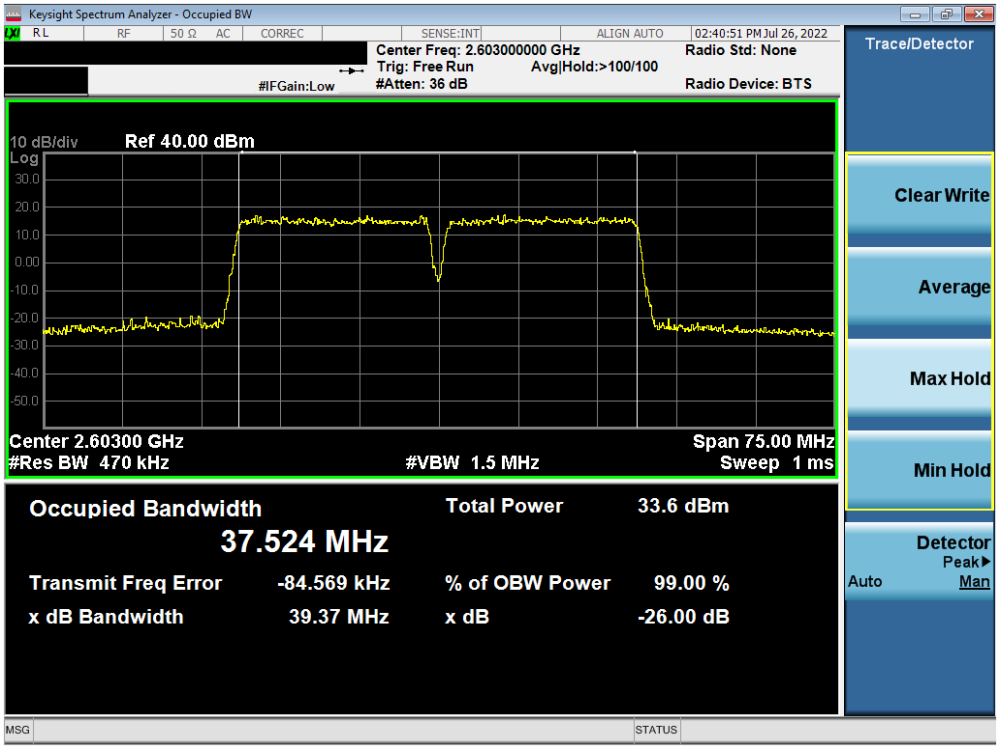
ULCA - LTE Band 41



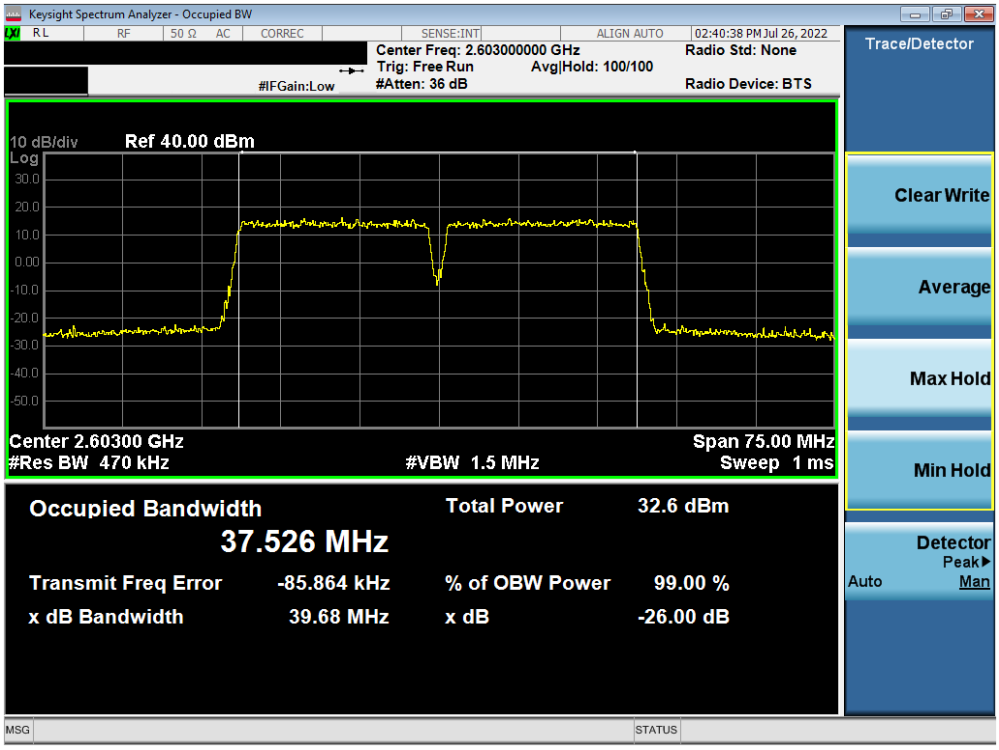
Plot 7-135. Occupied Bandwidth Plot (LTE Band 41 - (20+20)MHz QPSK - Full RB)



Plot 7-136. Occupied Bandwidth Plot (LTE Band 41 - (20+20)MHz 16-QAM - Full RB)



Plot 7-137. Occupied Bandwidth Plot (LTE Band 41 - (20+20)MHz 64-QAM - Full RB)



Plot 7-138. Occupied Bandwidth Plot (LTE Band 41 - (20+20)MHz 256-QAM - Full RB)

7.3 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051, §27.53(a), §27.53(m)

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. All ports were tested and only the worst case data were reported.

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

For LTE Bands 7, 41, NR FR1 Band n41 and NR FR1 Band n7 the minimum permissible attenuation level of any spurious emission is 55 + 10$log_{10}(P_{[Watts]})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (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.

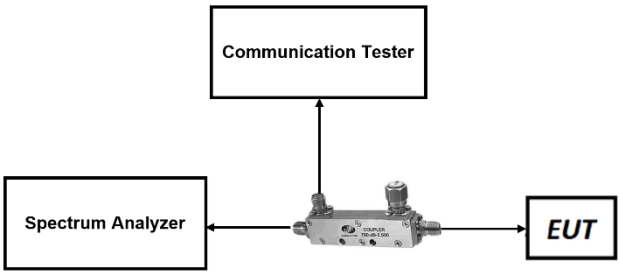


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

1. 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. 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.

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.

3. Uplink carrier aggregation for LTE Band 7 is only supported in this EUT while operating in Power Class 3.

4. Uplink carrier aggregation for LTE Band 41 is supported in this EUT while operating in Power Class 2 and Power Class 3.

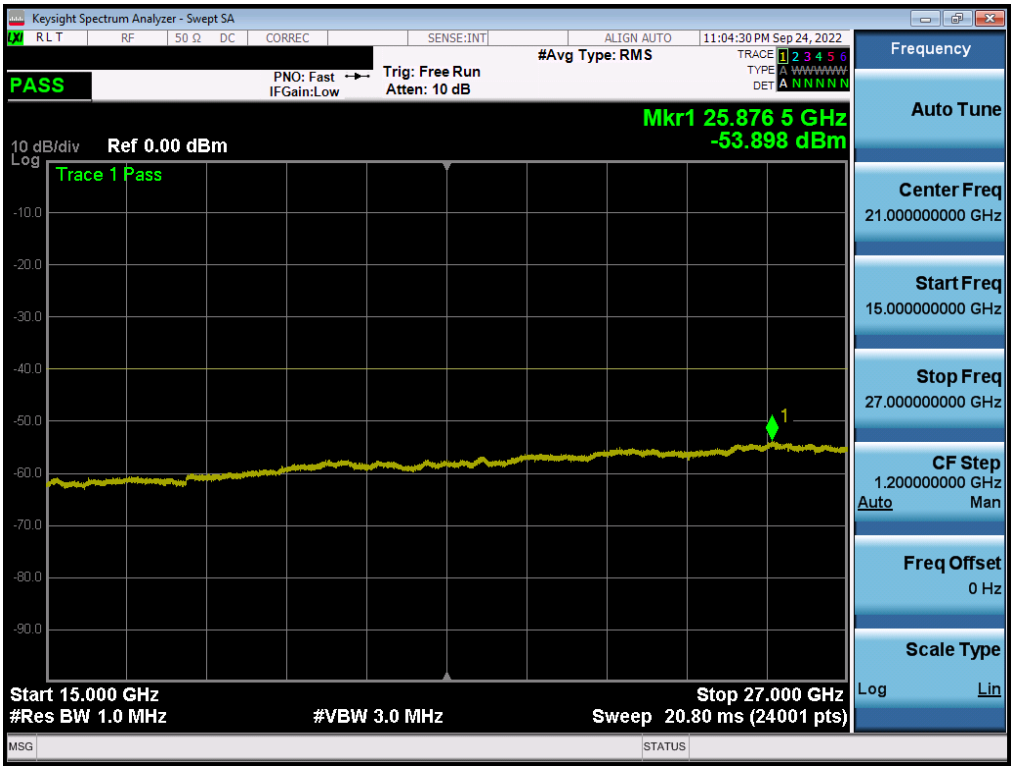
5. Uplink carrier aggregation intra-band conducted spurious emissions were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in the tables below, with both carriers set to transmit using 1RB.

6. Uplink carrier aggregation inter-band emission was investigated and found to not be the worst case.

LTE Band 30

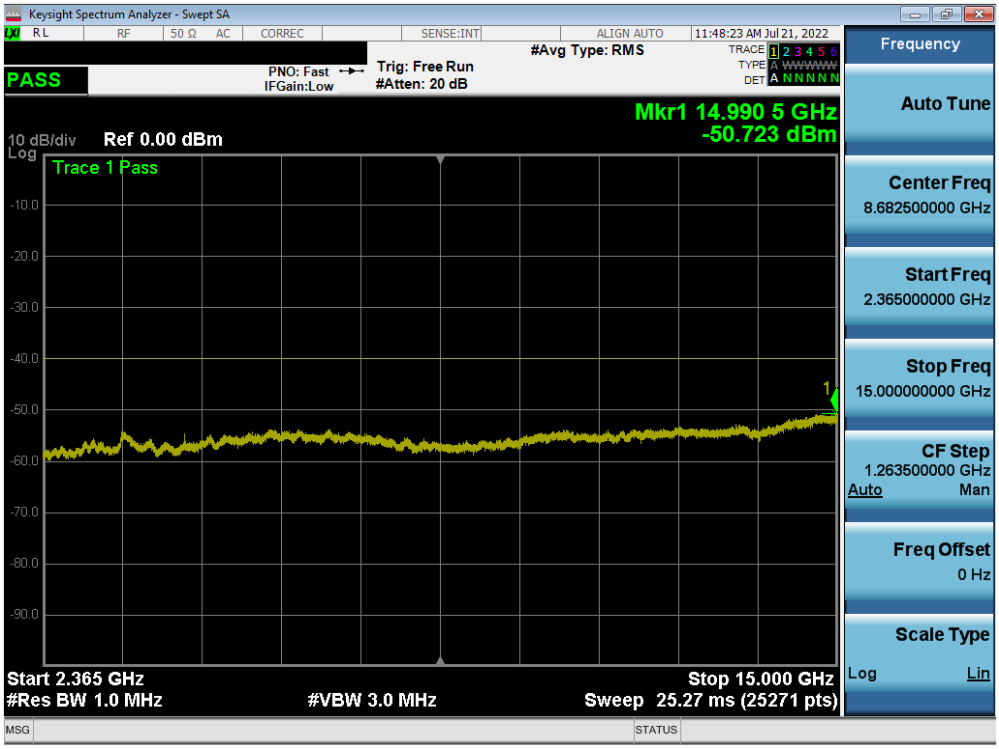
Plot 7-139. Conducted Spurious Plot (LTE Band 30 - 5MHz QPSK - RB Size 1, RB Offset 0 – Low Channel)

Plot 7-140. Conducted Spurious Plot (LTE Band 30 - 5MHz QPSK - RB Size 1, RB Offset 0 – Low Channel)

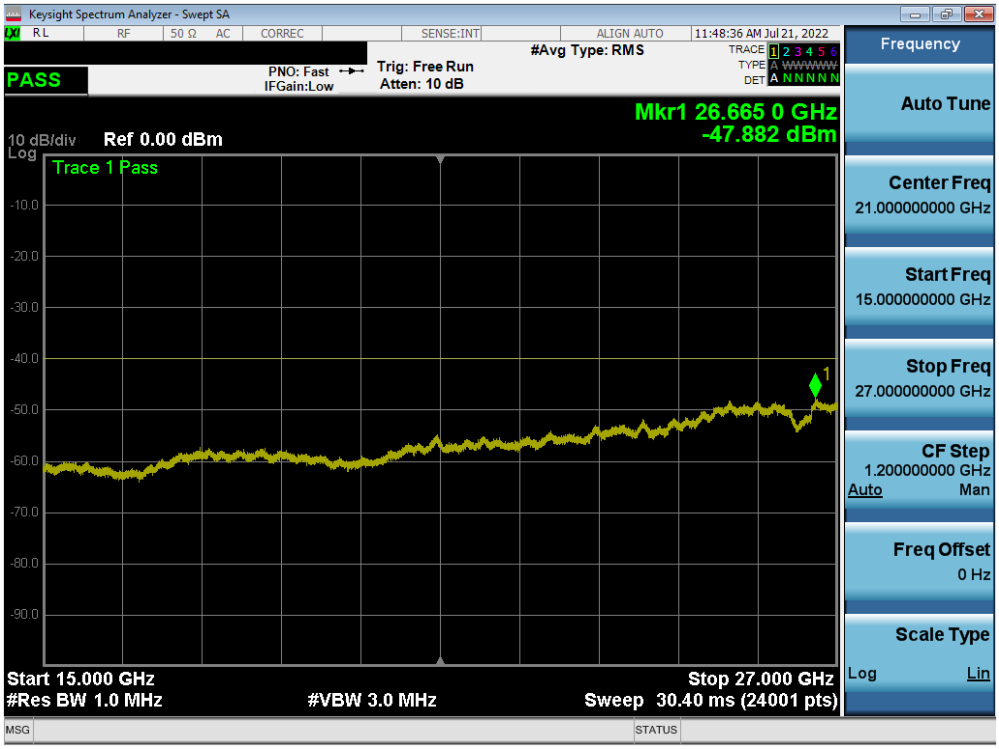


Plot 7-141. Conducted Spurious Plot (LTE Band 30 - 5MHz QPSK - RB Size 1, RB Offset 0 – Low Channel)

Plot 7-142. Conducted Spurious Plot (LTE Band 30 - 10MHz QPSK - RB Size 1, RB Offset 0 – Mid Channel)

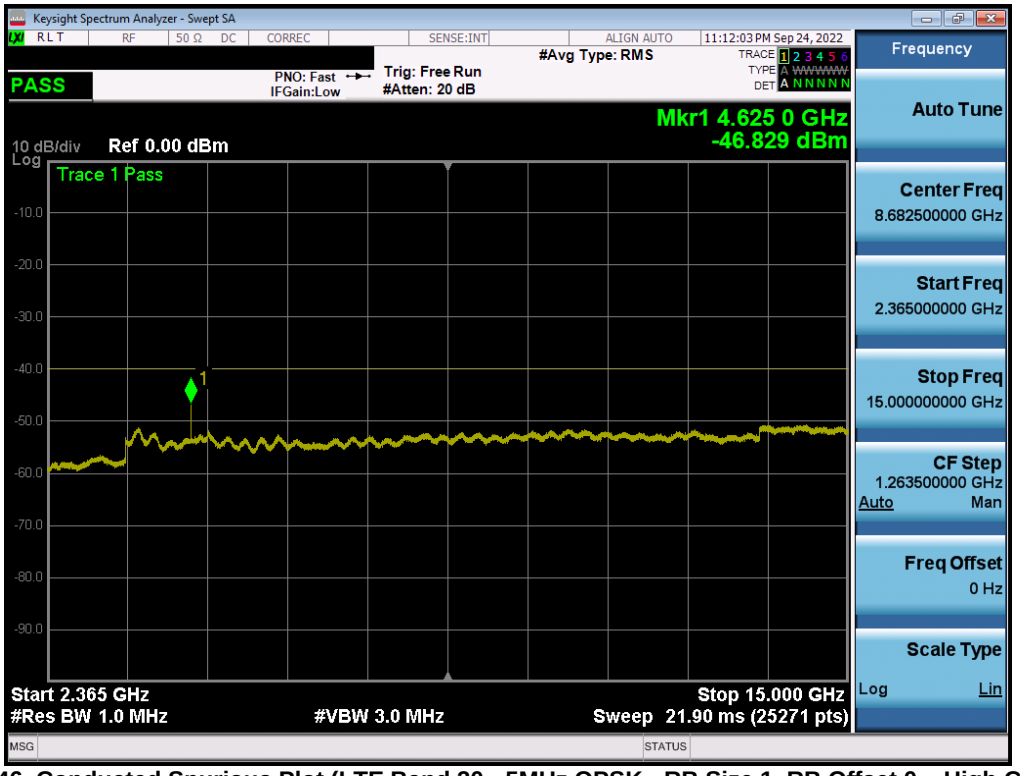


Plot 7-143. Conducted Spurious Plot (LTE Band 30 - 10MHz QPSK - RB Size 1, RB Offset 0 – Mid Channel)

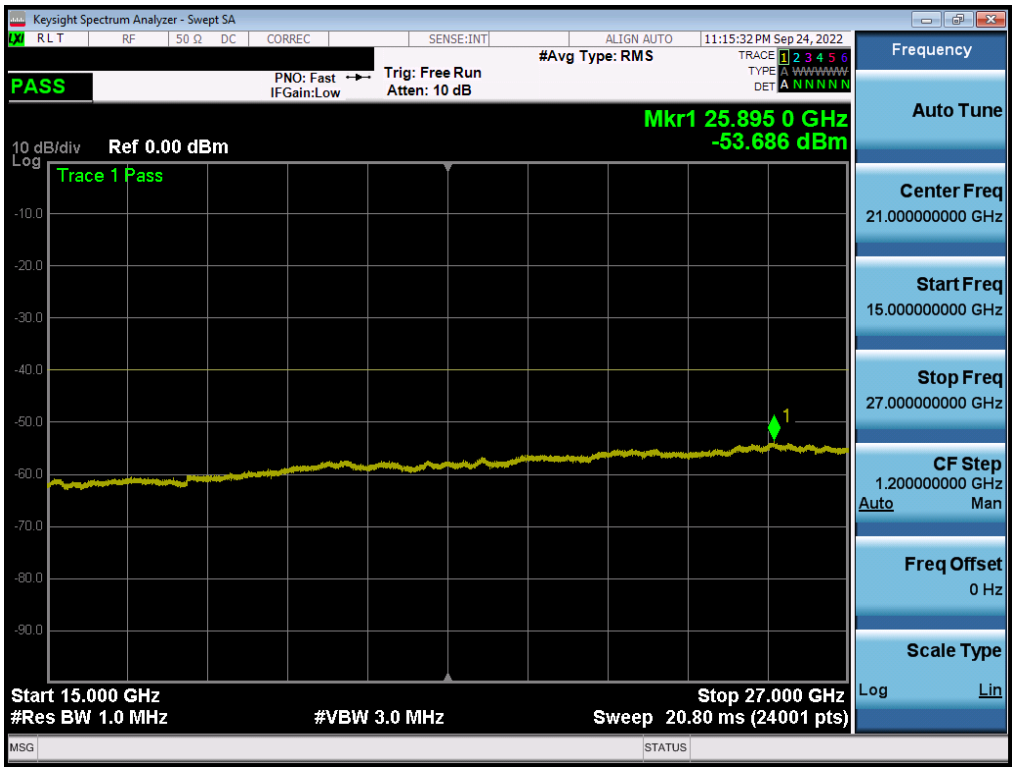


Plot 7-144. Conducted Spurious Plot (LTE Band 30 - 10MHz QPSK - RB Size 1, RB Offset 0 – Mid Channel)

Plot 7-145. Conducted Spurious Plot (LTE Band 30 - 5MHz QPSK - RB Size 1, RB Offset 0 – High Channel)

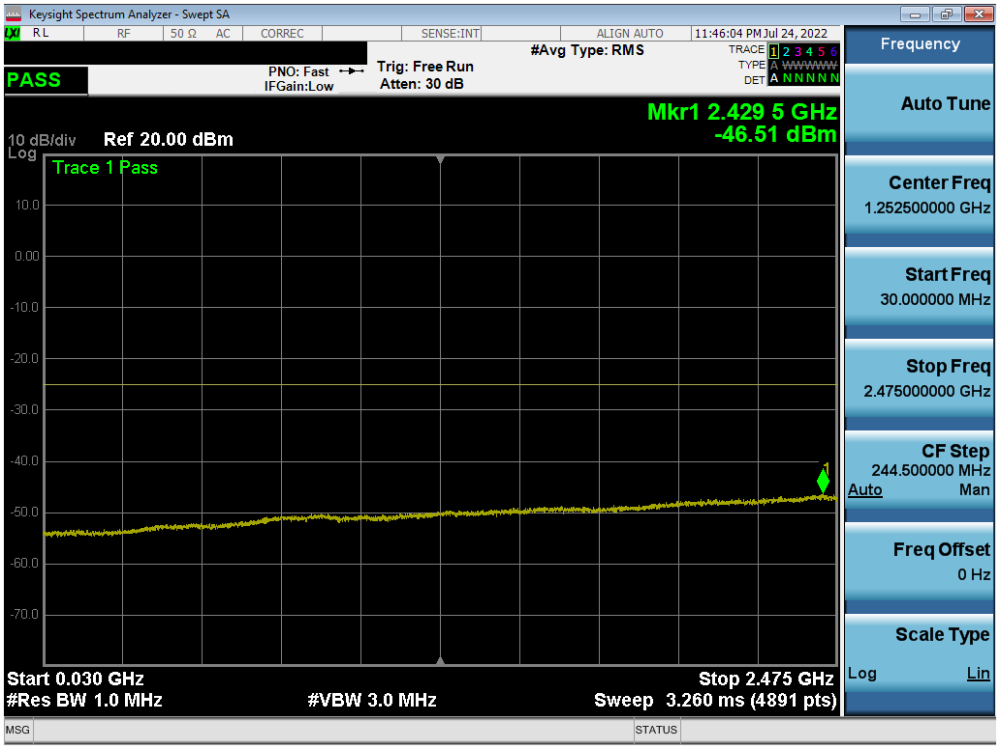


Plot 7-146. Conducted Spurious Plot (LTE Band 30 - 5MHz QPSK - RB Size 1, RB Offset 0 – High Channel)

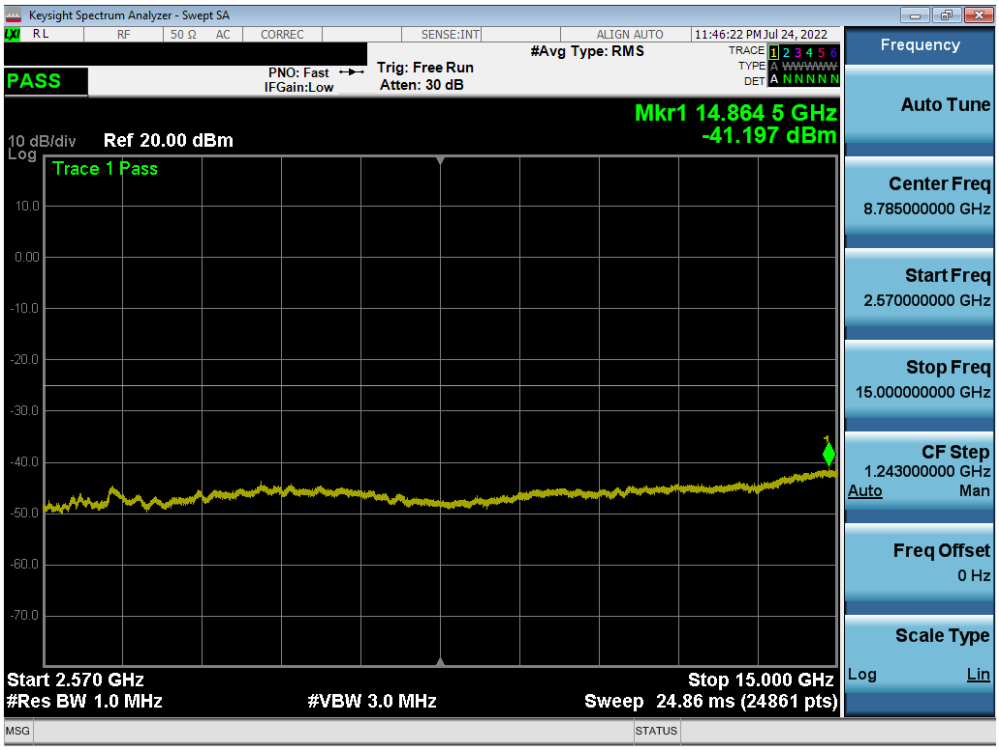


Plot 7-147. Conducted Spurious Plot (LTE Band 30 - 5MHz QPSK - RB Size 1, RB Offset 0 – High Channel)

LTE Band 7

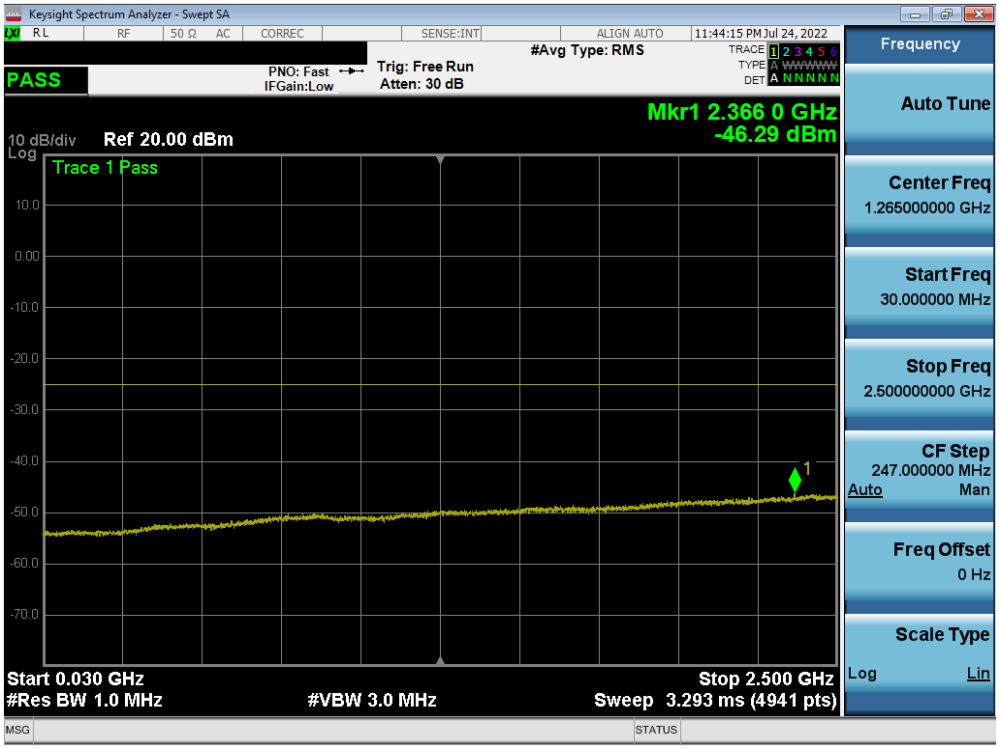


Plot 7-148. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

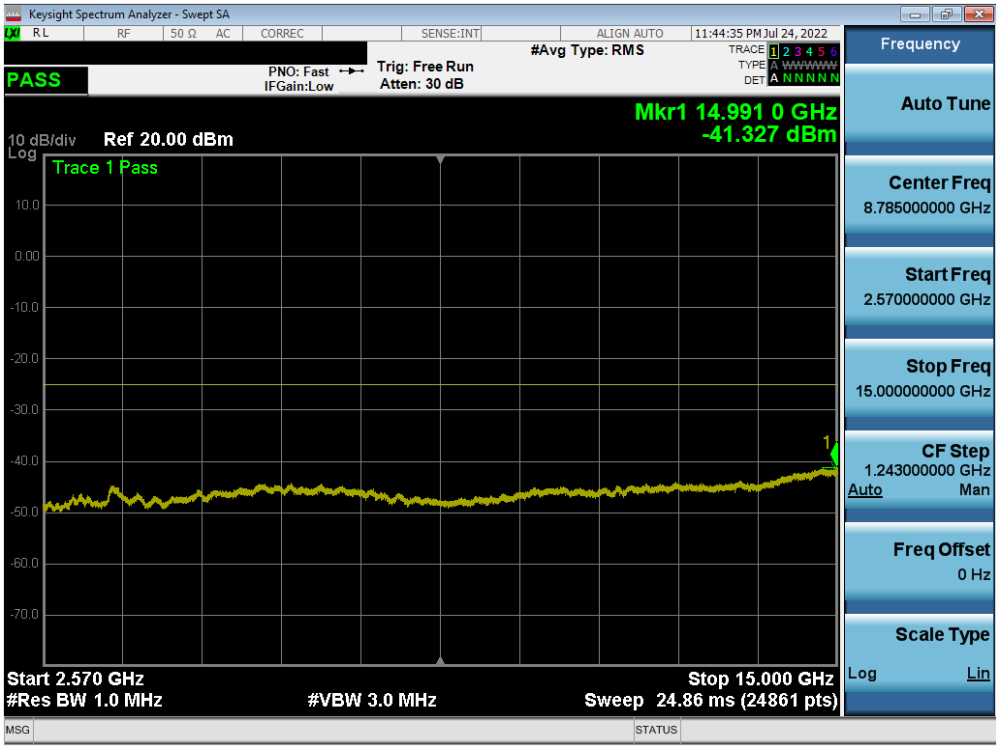


Plot 7-149. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

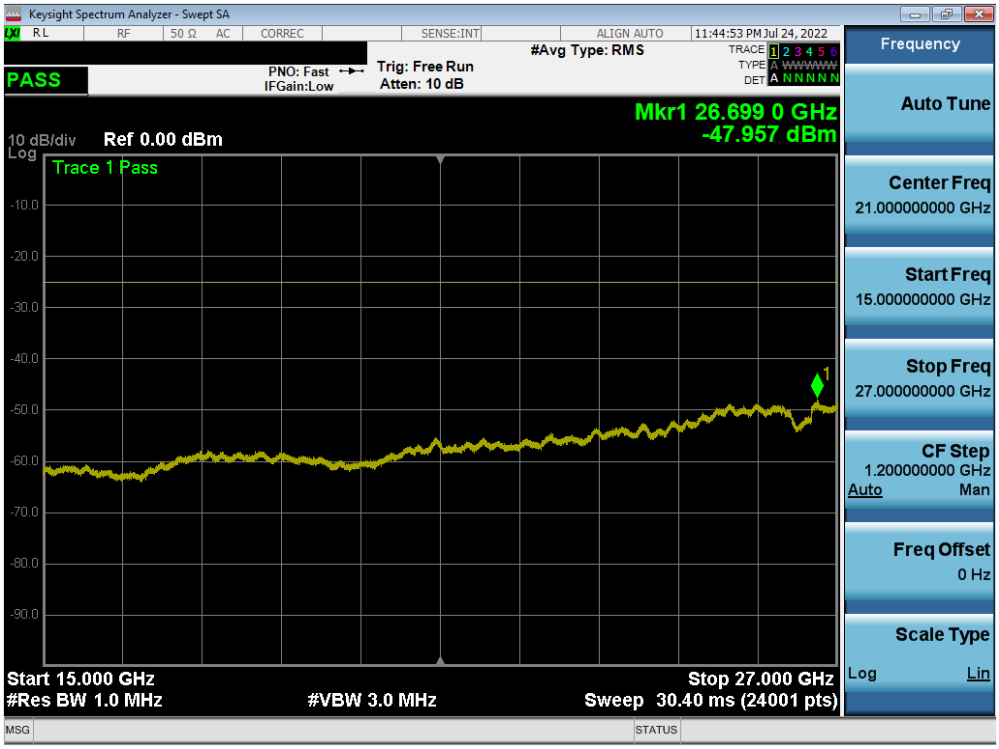
Plot 7-150. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



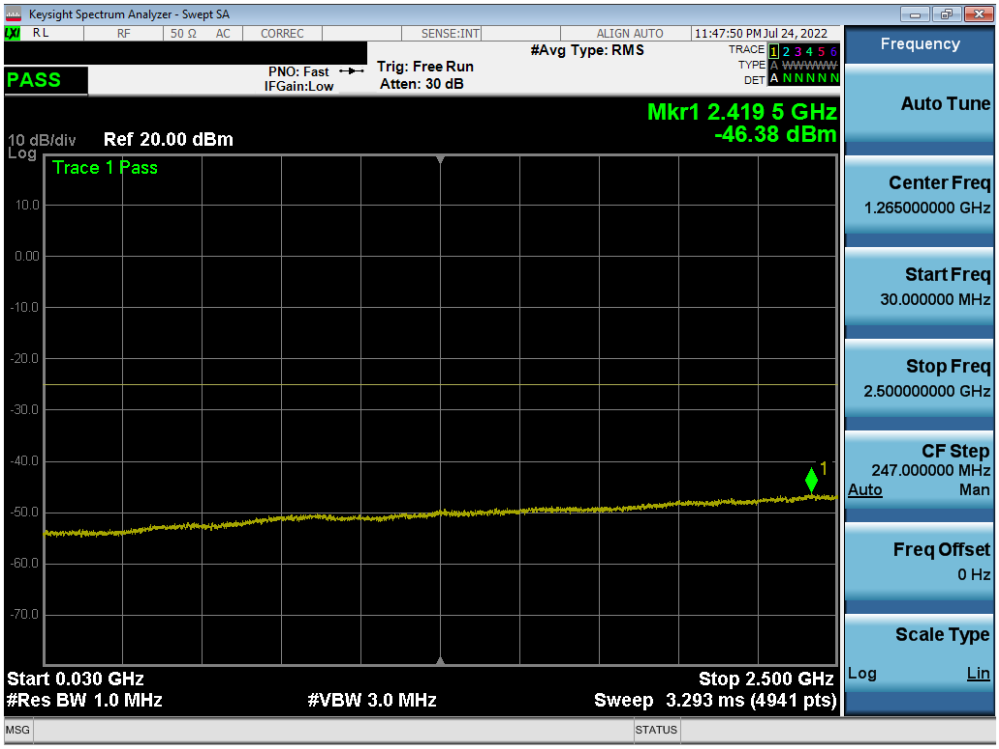
Plot 7-151. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



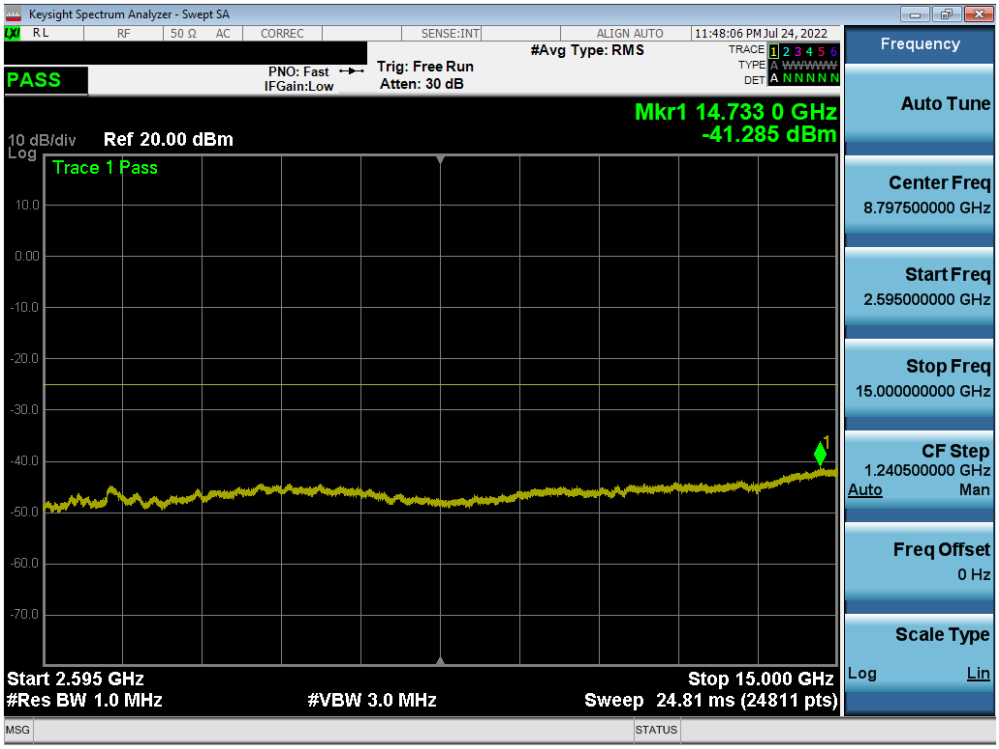
Plot 7-152. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-153. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



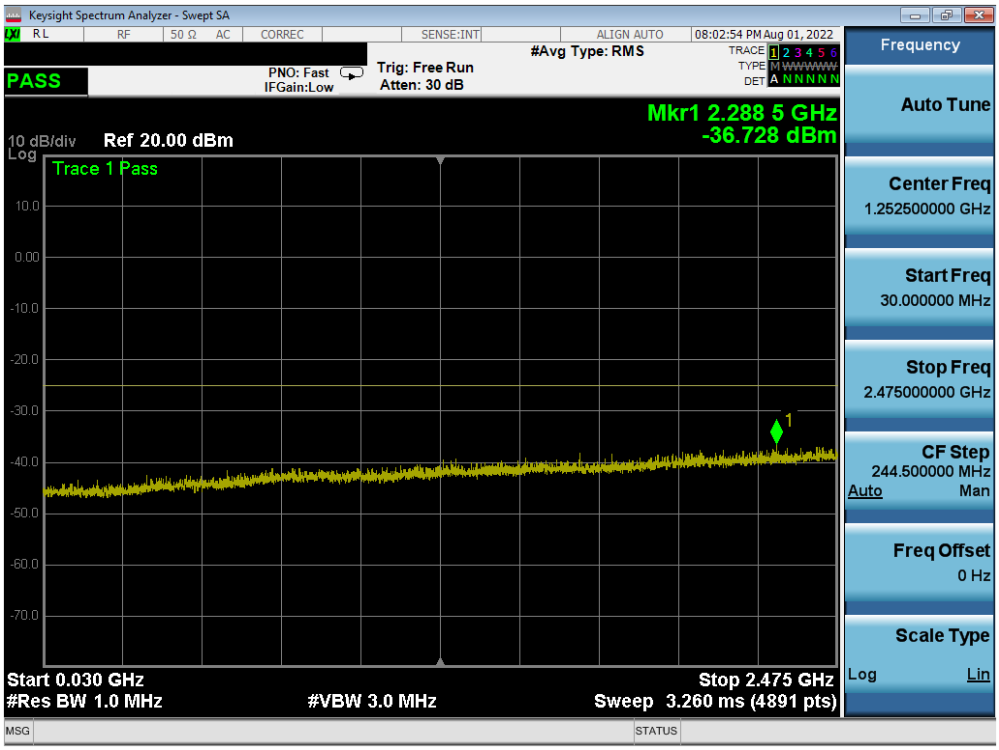
Plot 7-154. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



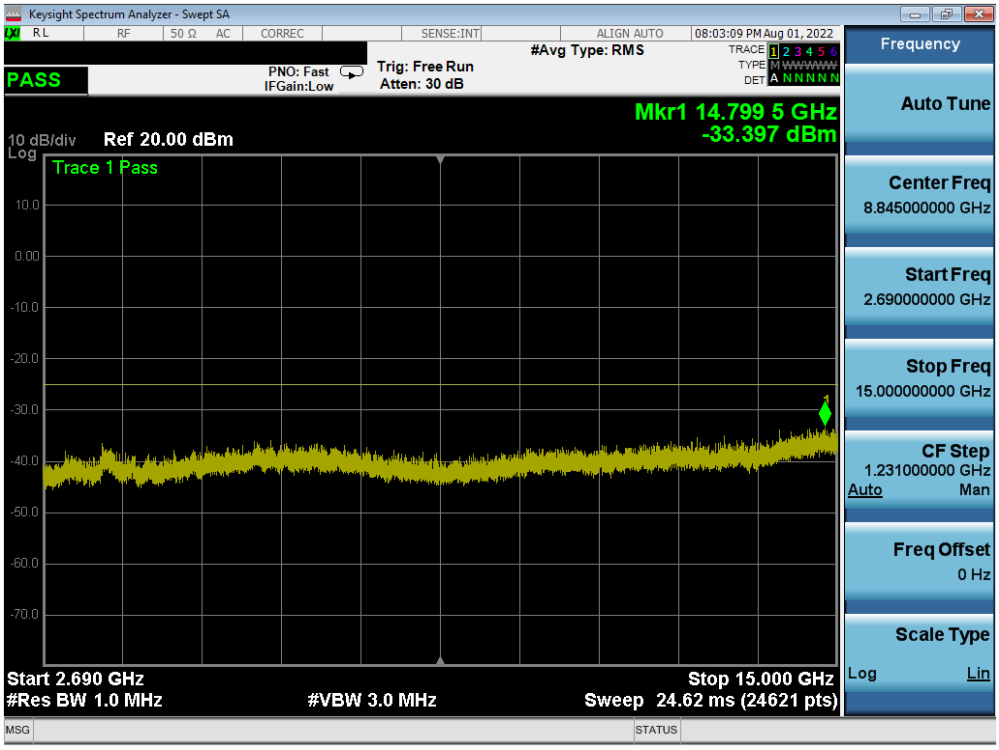
Plot 7-155. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Plot 7-156. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

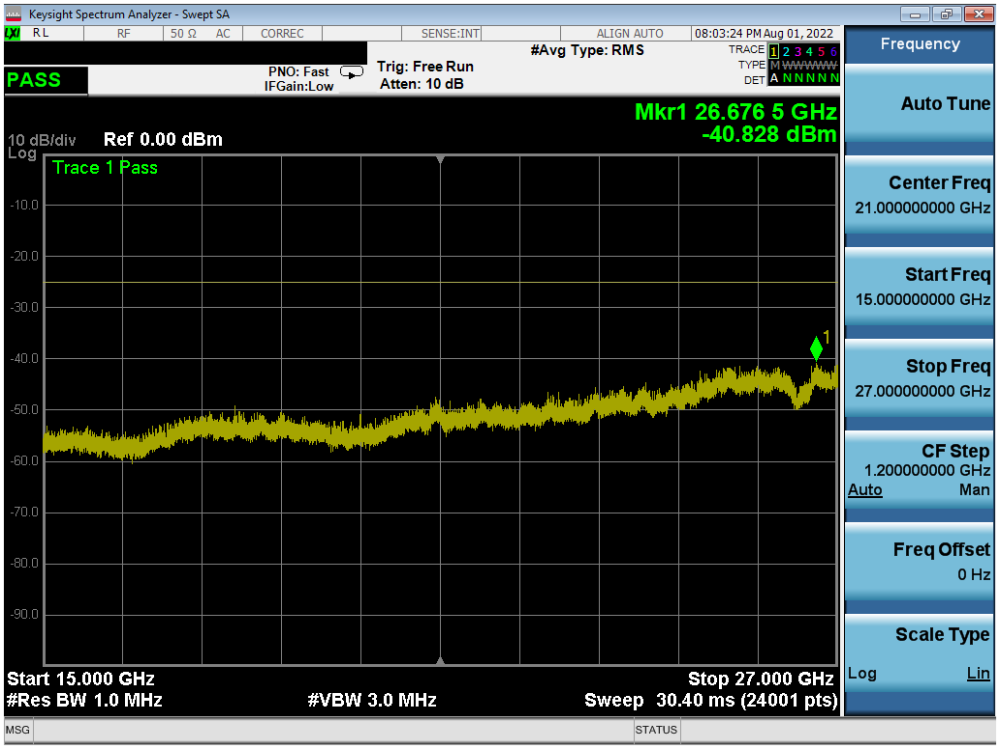
LTE Band 41



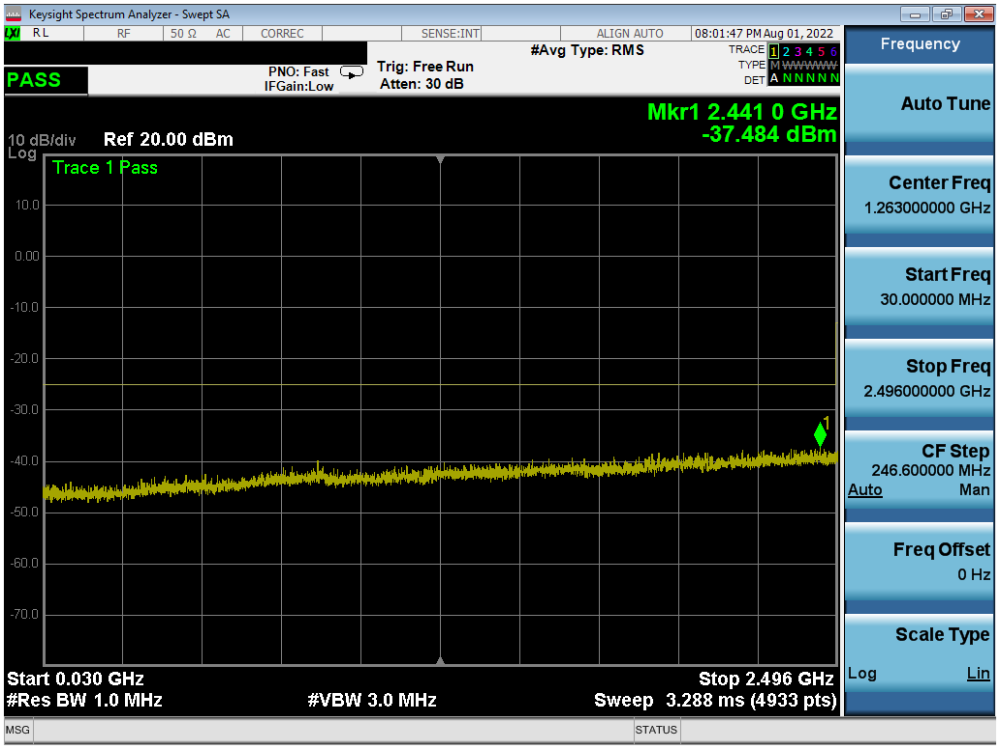
Plot 7-157. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



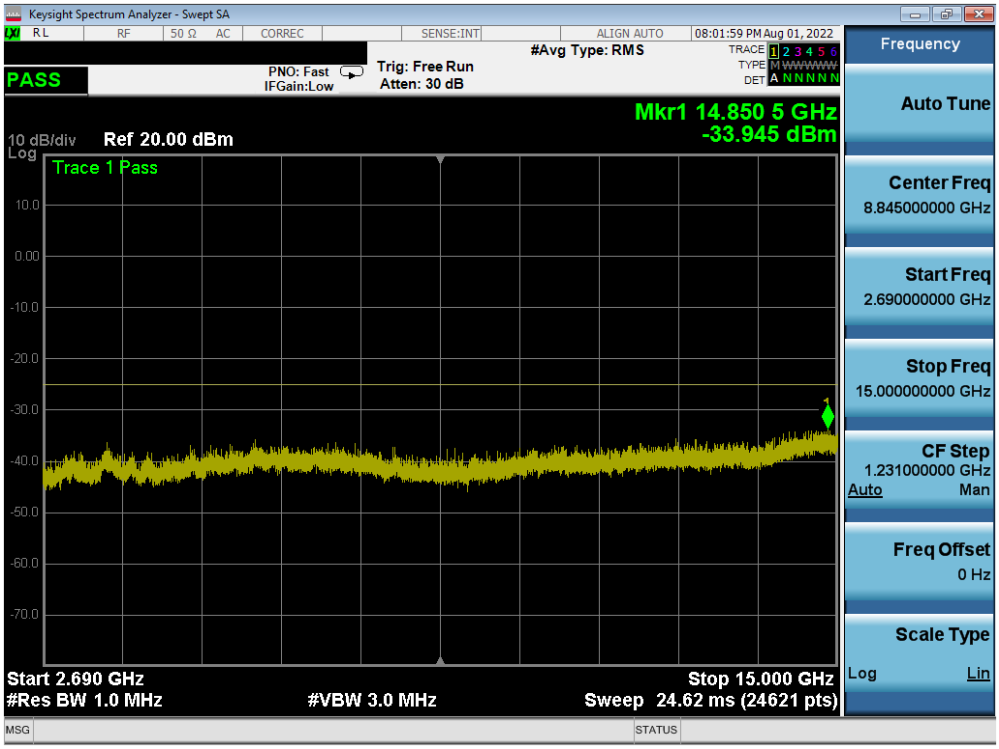
Plot 7-158. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



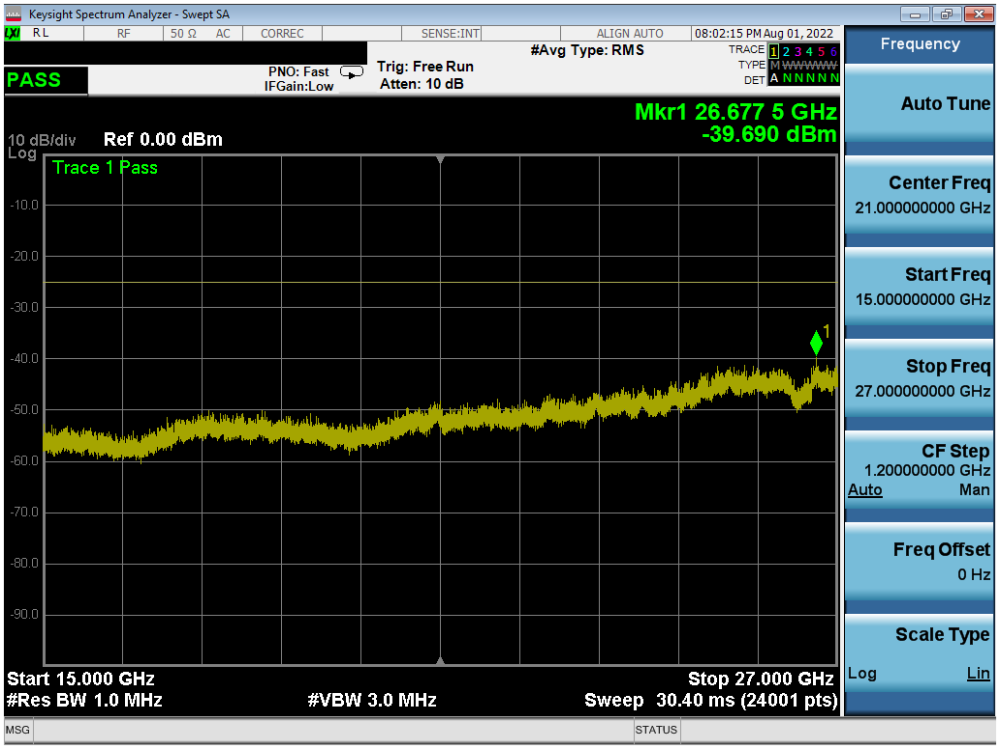
Plot 7-159. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



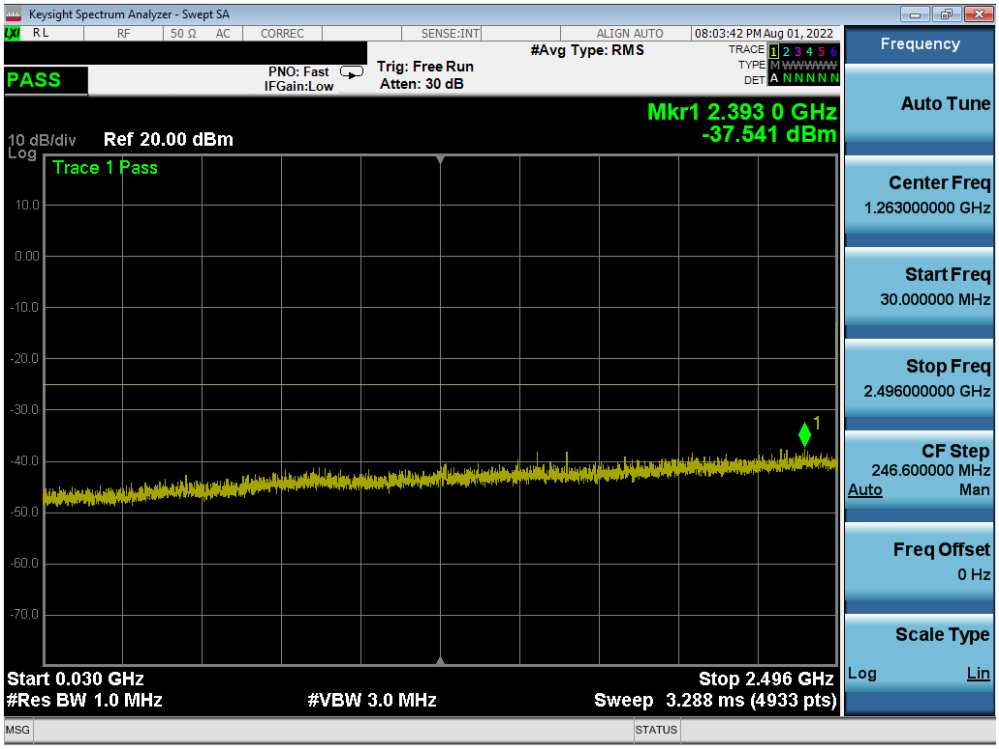
Plot 7-160. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



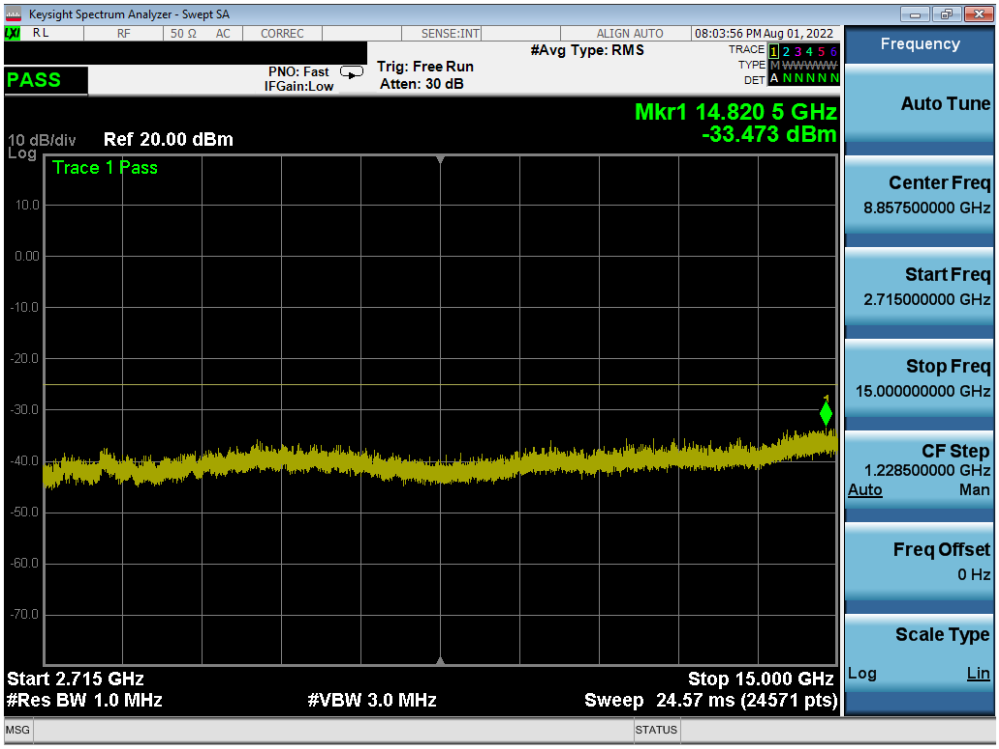
Plot 7-161. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



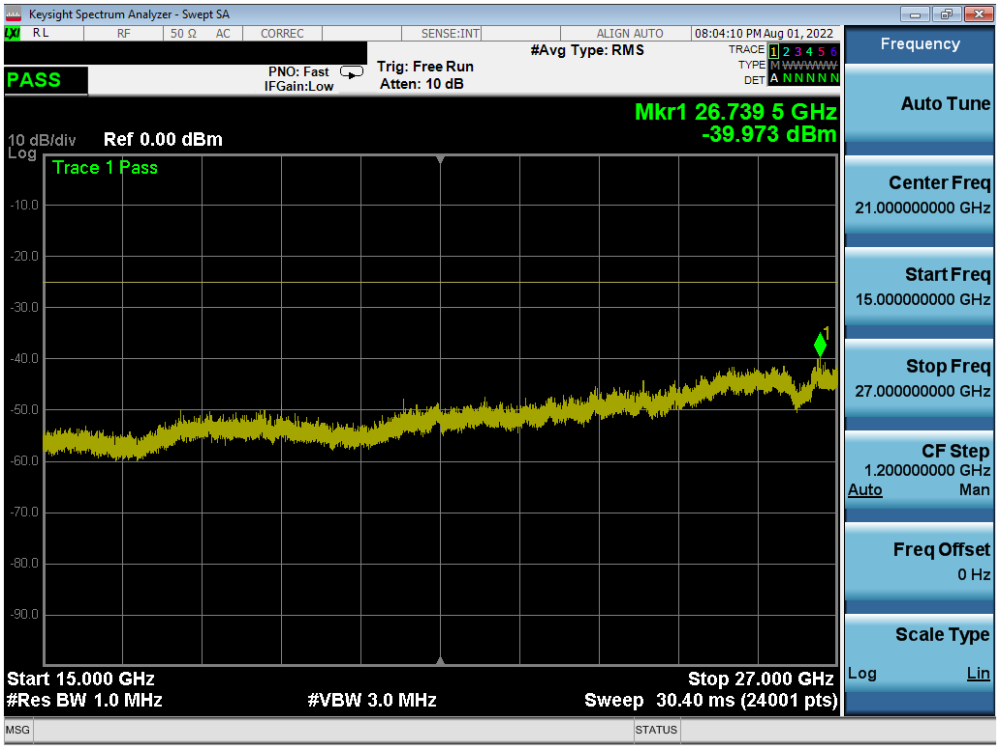
Plot 7-162. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-163. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

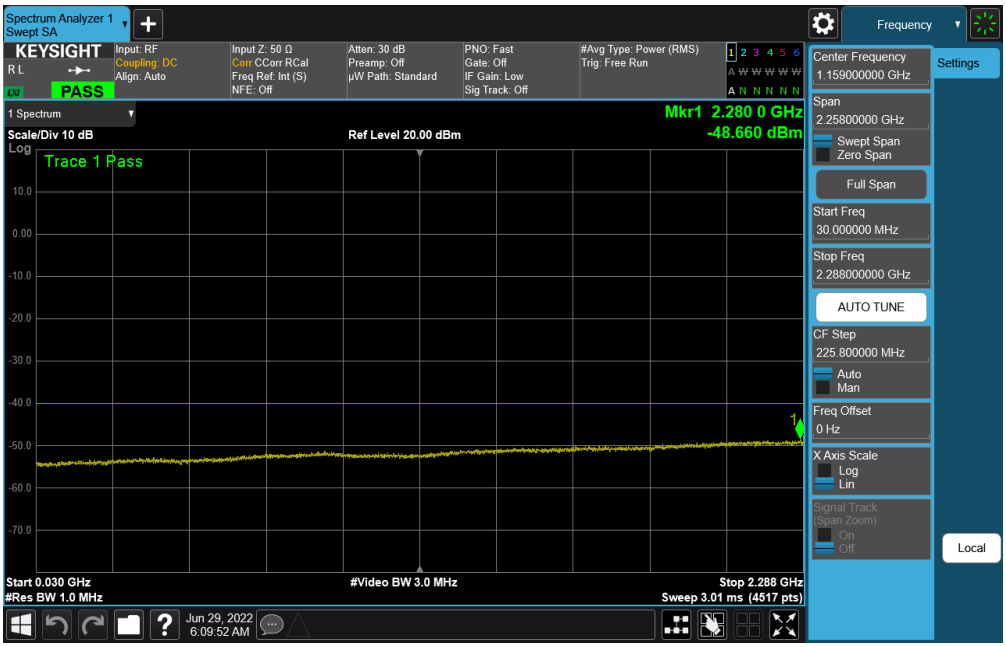


Plot 7-164. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

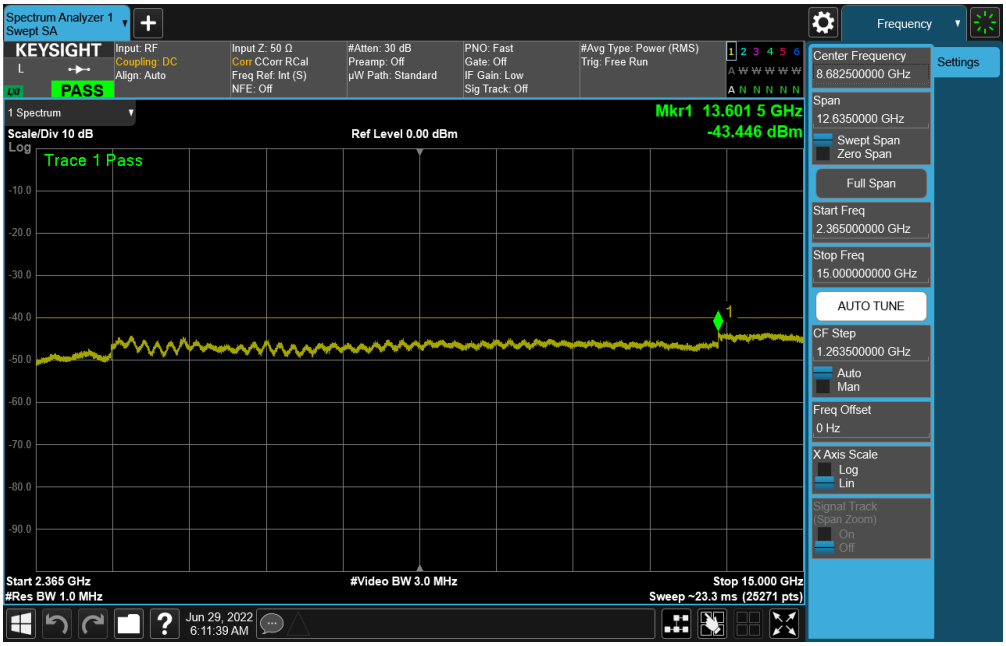


Plot 7-165. Conducted Spurious Plot (LTE Band 41 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

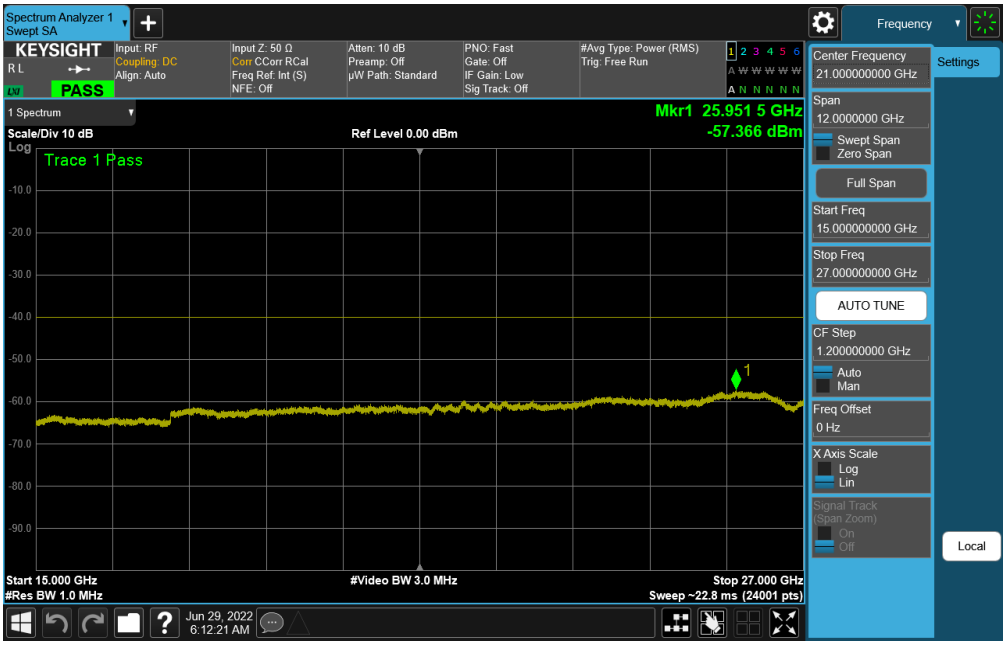
NR Band n30



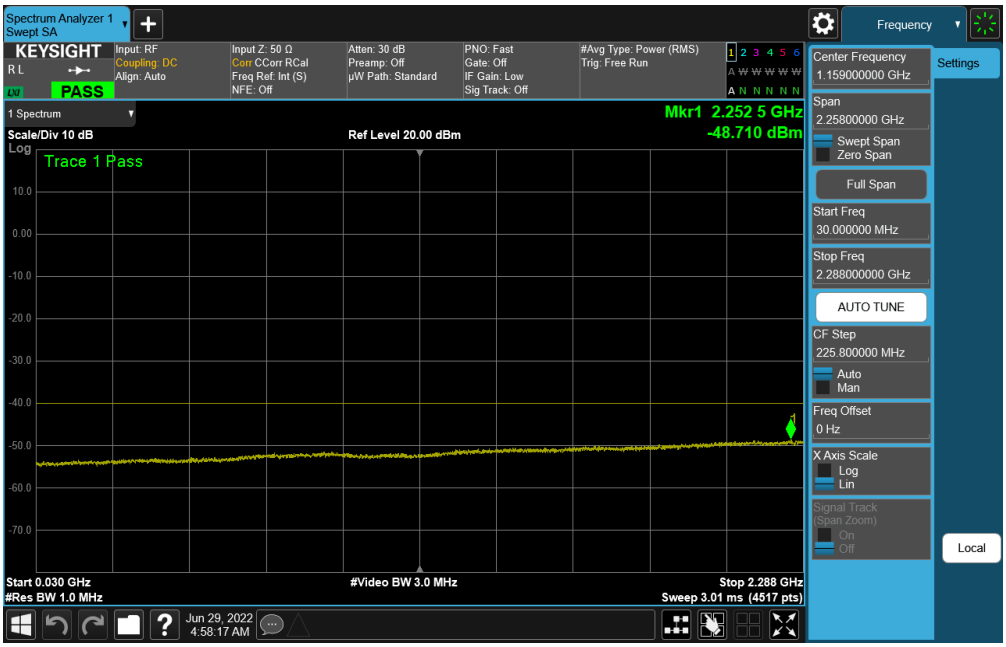
Plot 7-166. Conducted Spurious Plot (NR Band n30 - 5MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – Low Channel)



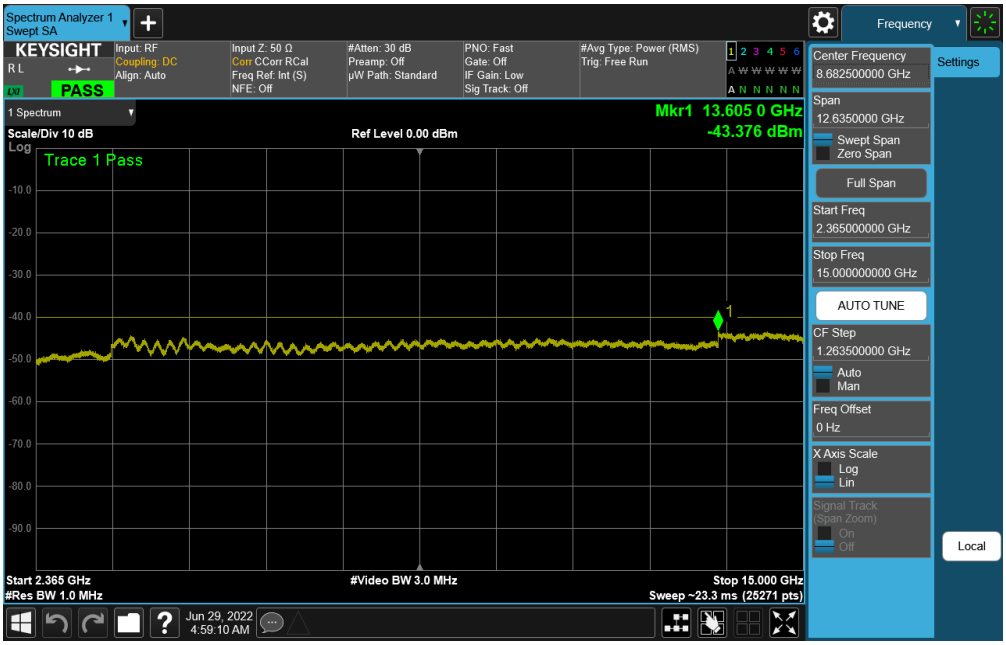
Plot 7-167. Conducted Spurious Plot (NR Band n30 - 5MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – Low Channel)



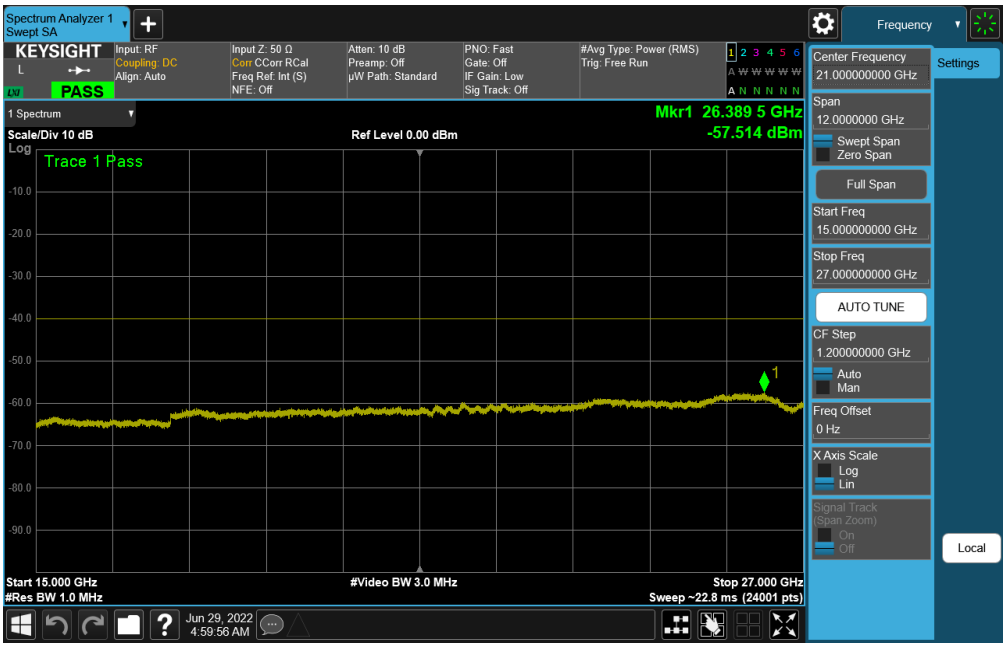
Plot 7-168. Conducted Spurious Plot (NR Band n30 - 5MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – Low Channel)



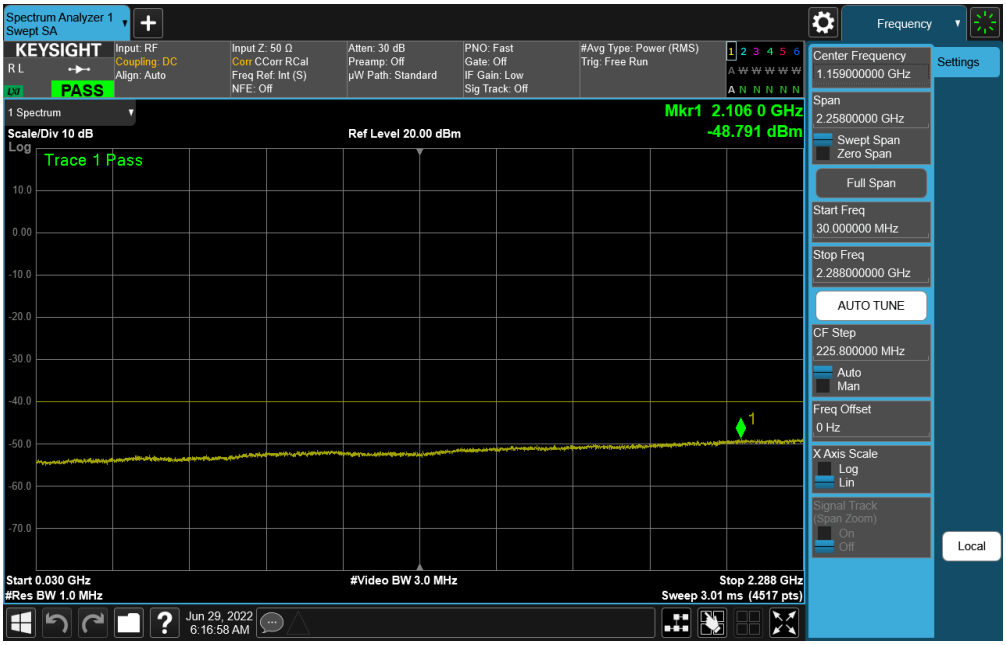
Plot 7-169. Conducted Spurious Plot (NR Band n30 - 10MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – Mid Channel)



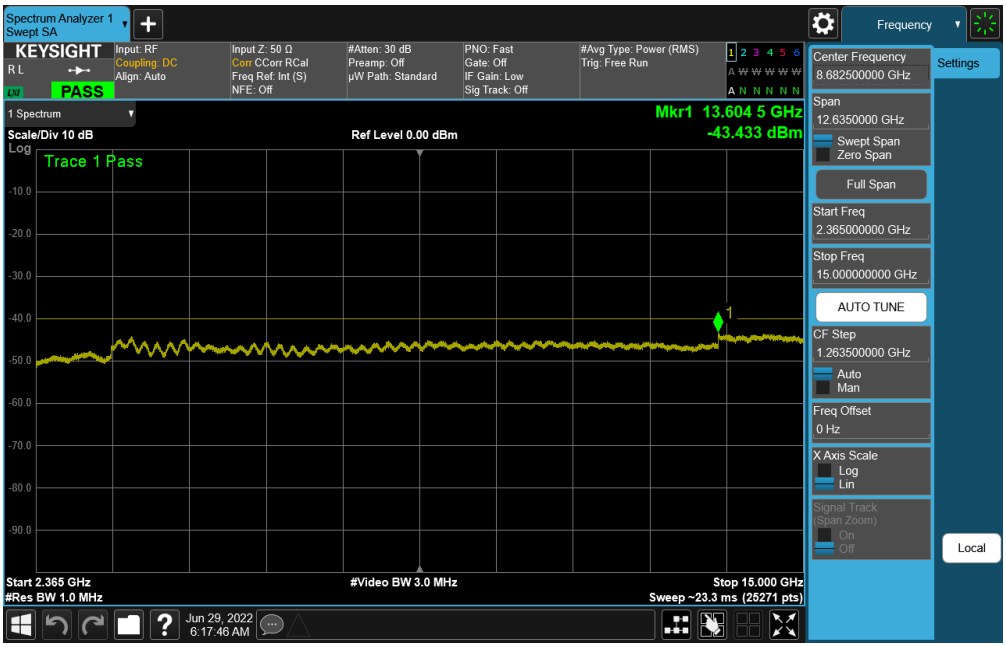
Plot 7-170. Conducted Spurious Plot (NR Band n30 - 10MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – Mid Channel)



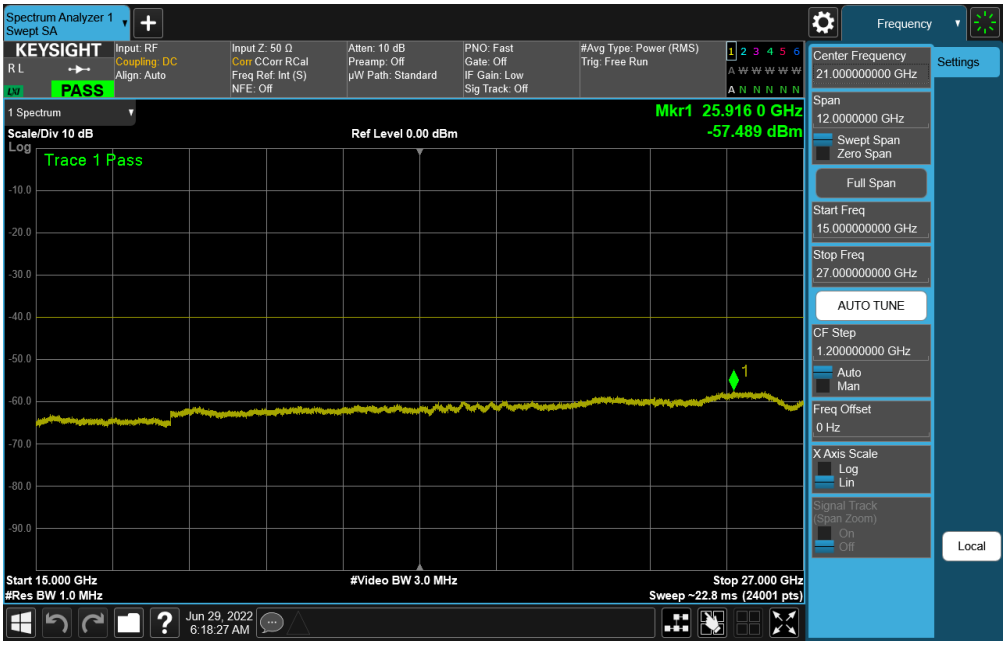
Plot 7-171. Conducted Spurious Plot (NR Band n30 - 10MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – Mid Channel)



Plot 7-172. Conducted Spurious Plot (NR Band n30 - 5MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – High Channel)

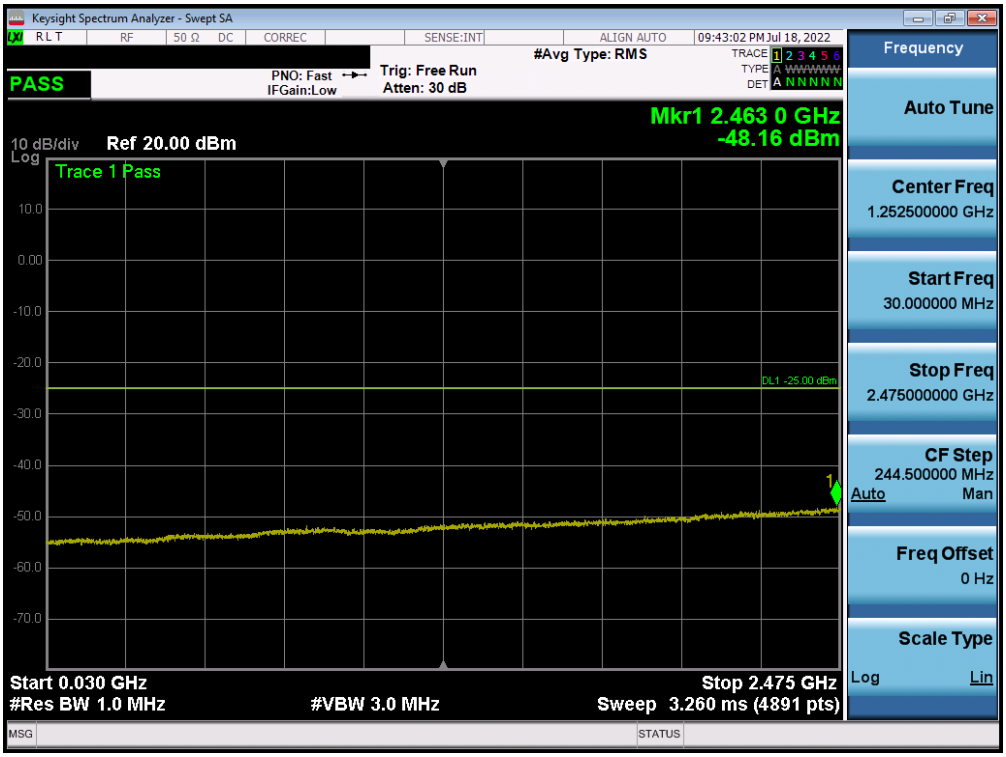


Plot 7-173. Conducted Spurious Plot (NR Band n30 - 5MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – High Channel)

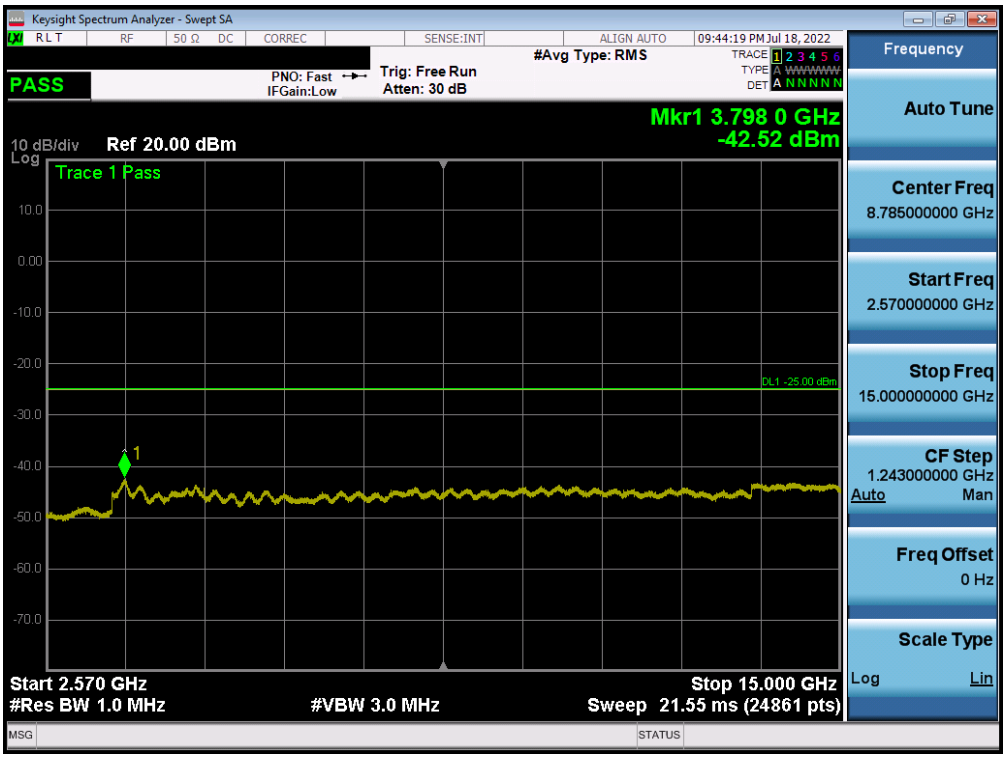


Plot 7-174. Conducted Spurious Plot (NR Band n30 - 5MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 – High Channel)

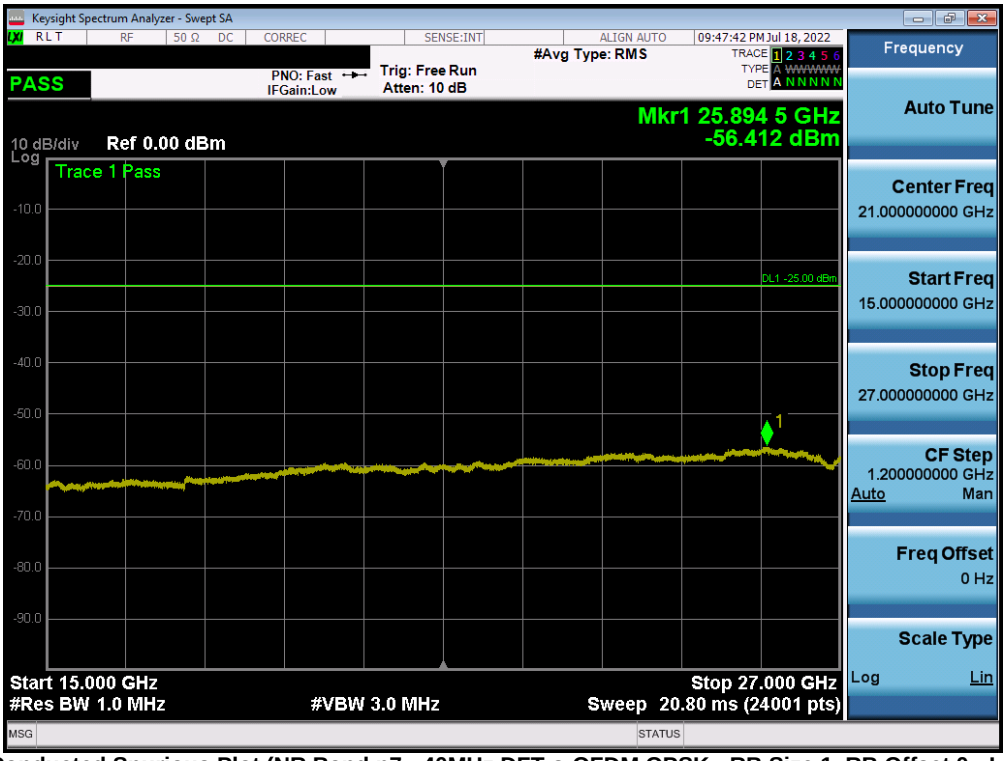
NR Band n7



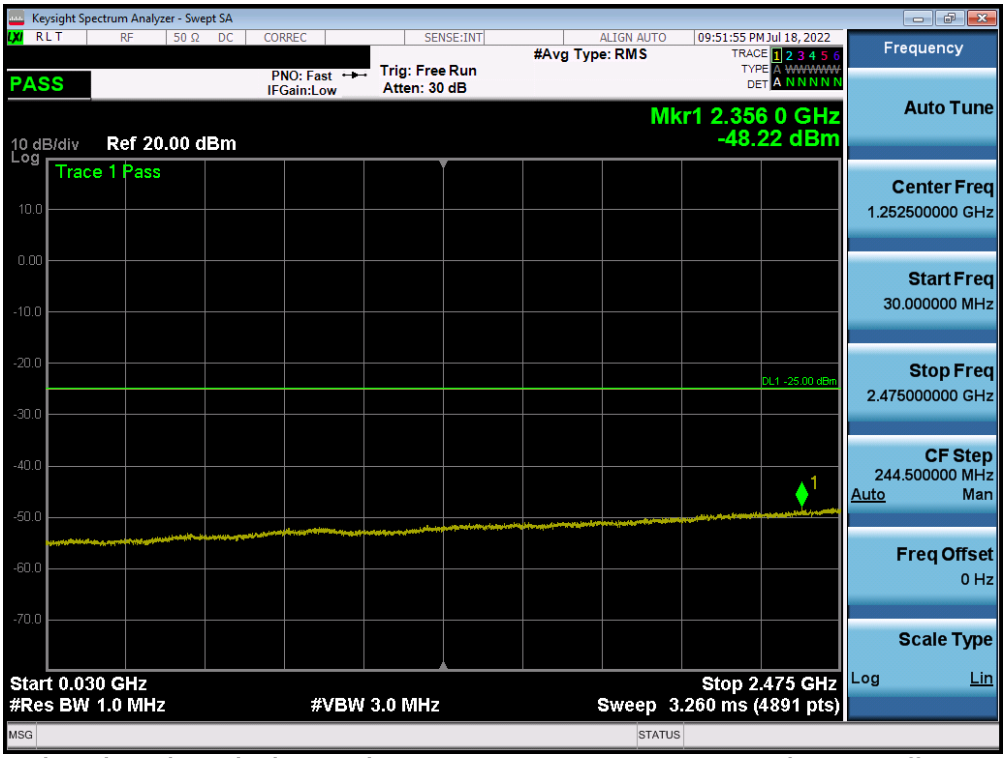
Plot 7-175. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - Low Channel)



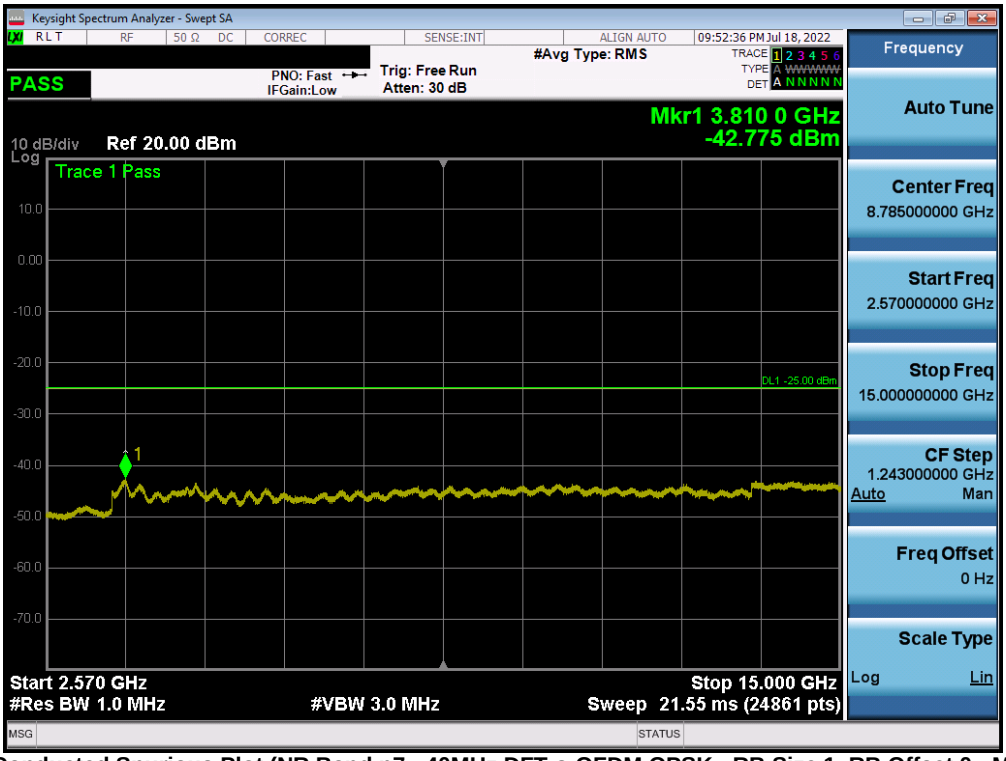
Plot 7-176. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - Low Channel)



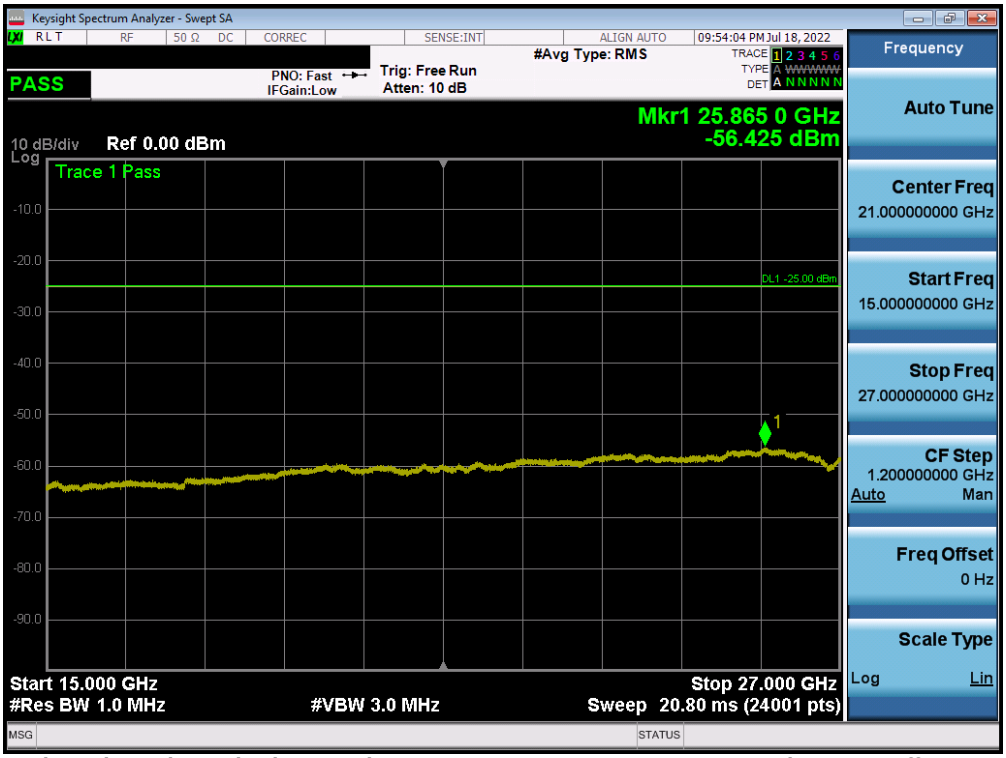
Plot 7-177. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - Low Channel)



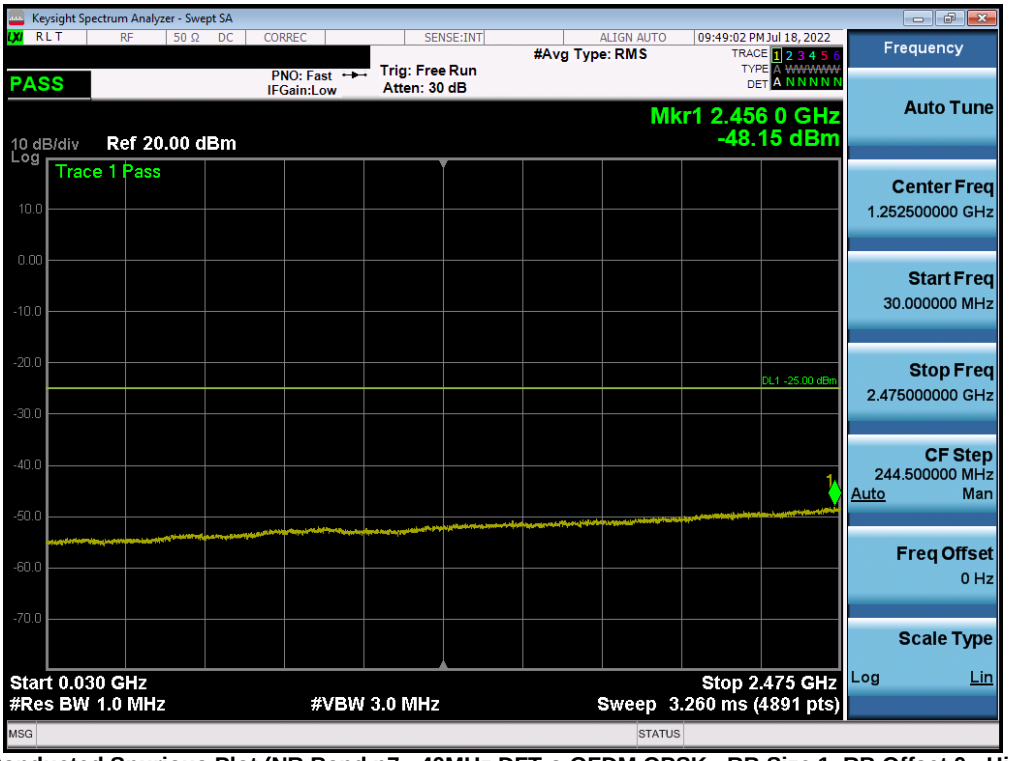
Plot 7-178. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - Mid Channel)



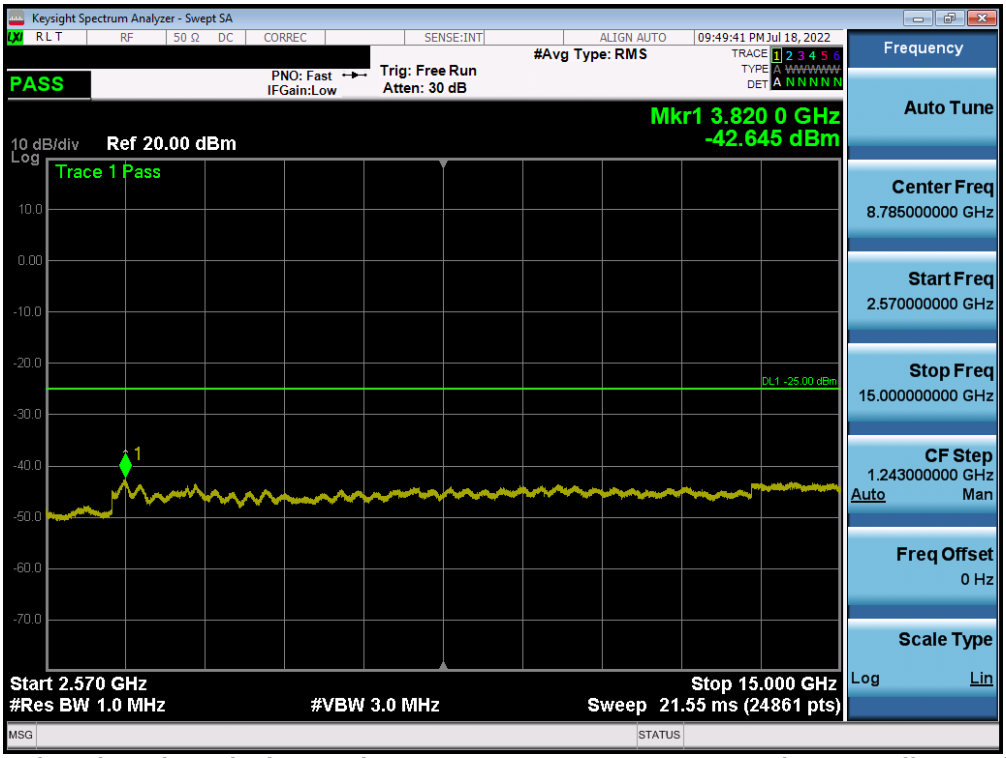
Plot 7-179. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - Mid Channel)



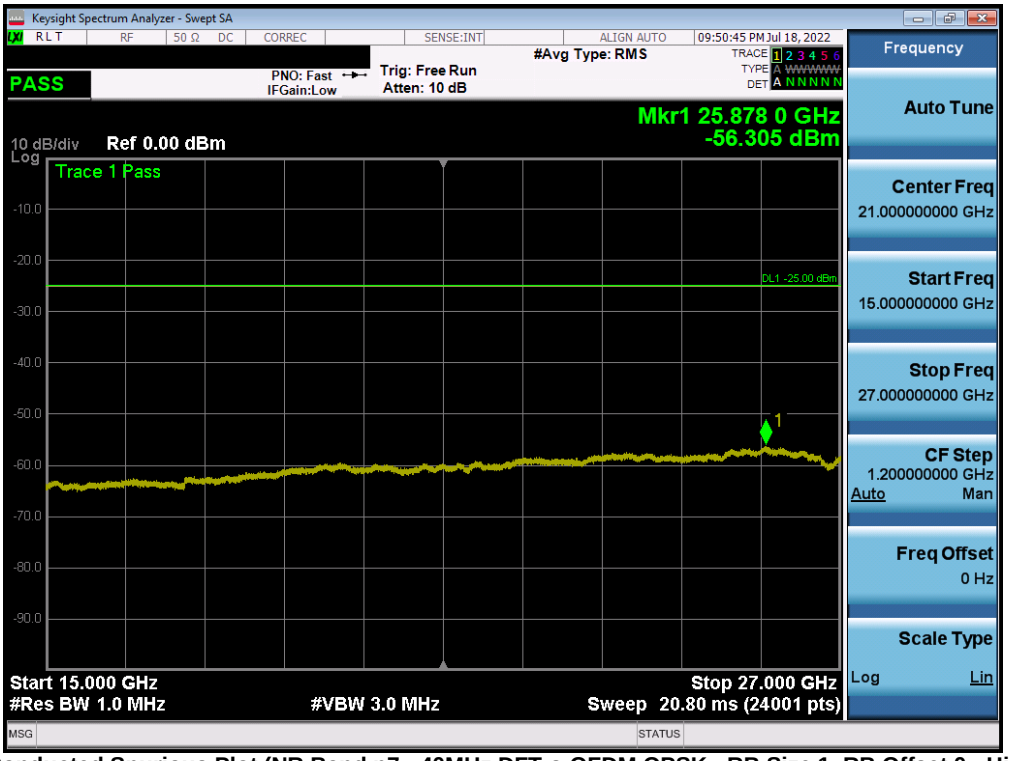
Plot 7-180. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-181. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-182. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-183. Conducted Spurious Plot (NR Band n7 - 40MHz DFT-s-OFDM QPSK - RB Size 1, RB Offset 0 - High Channel)