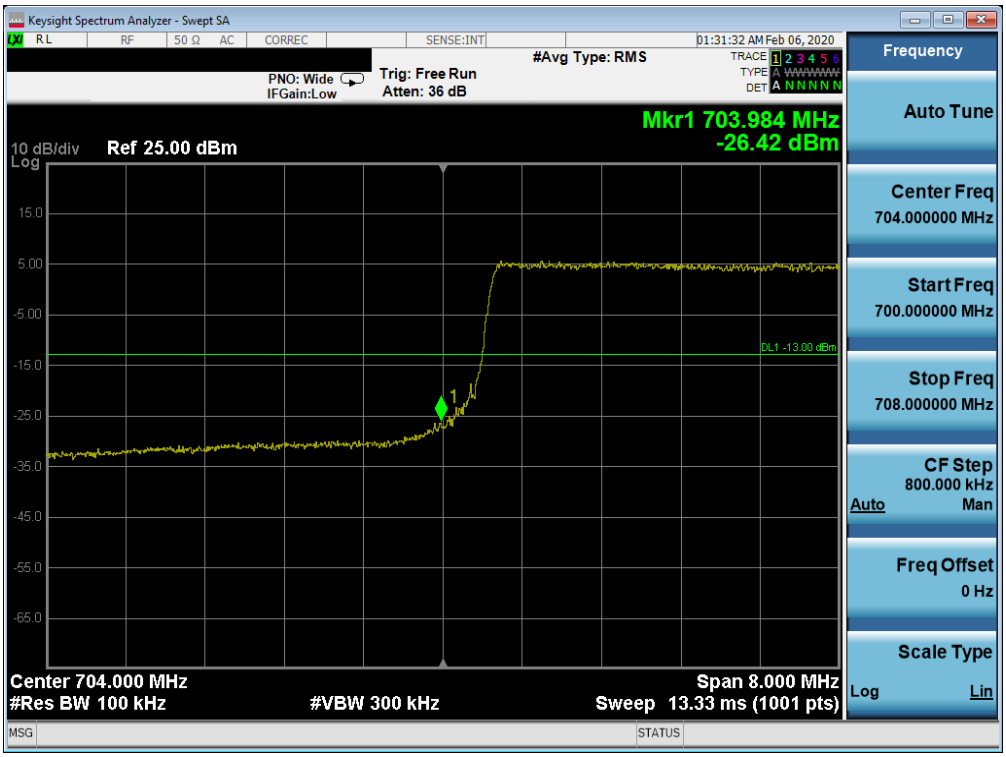
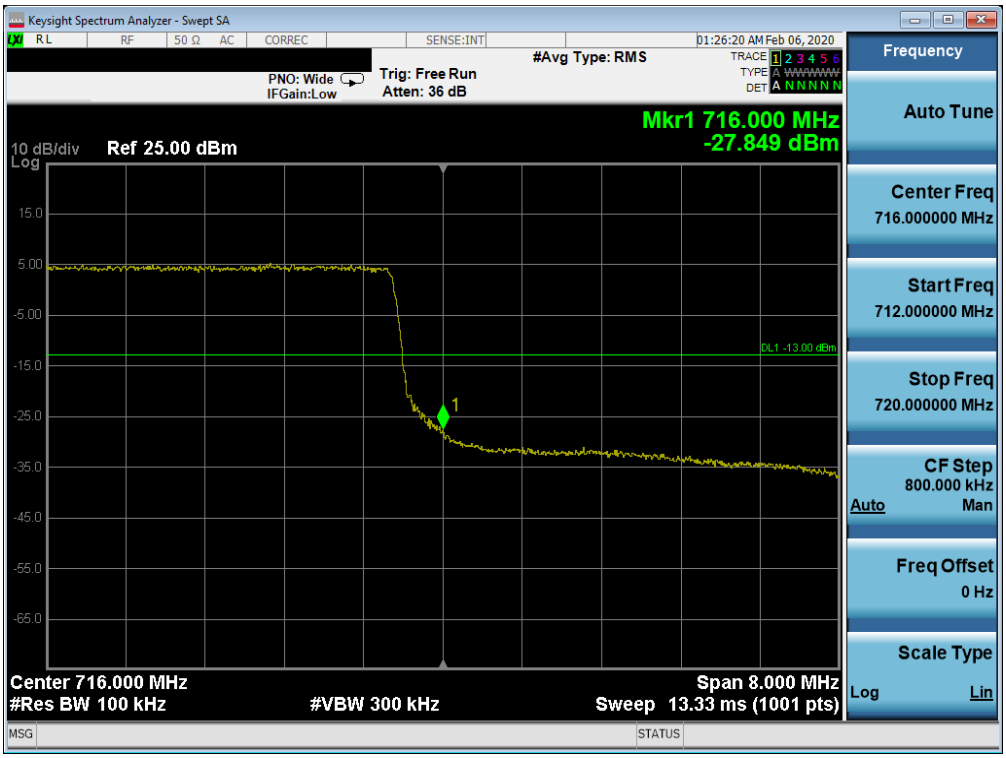


Plot 7-116. Lower Band Edge Plot (Band 17 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-117. Upper Band Edge Plot (Band 12/17 - 10.0MHz QPSK - Full RB Configuration)

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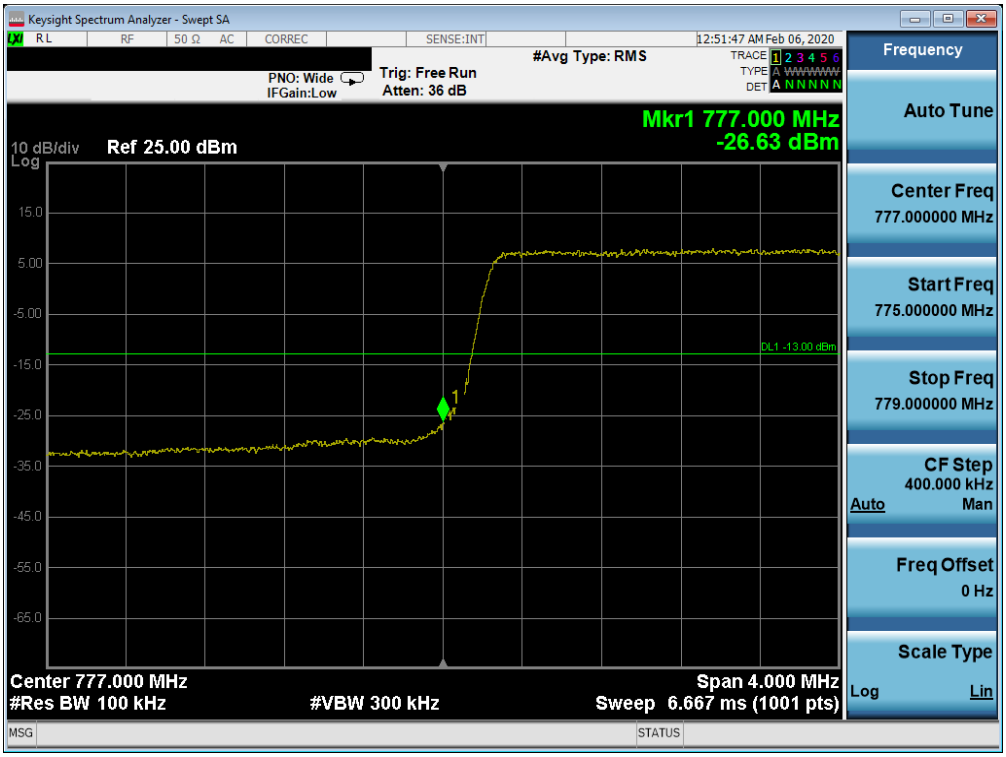
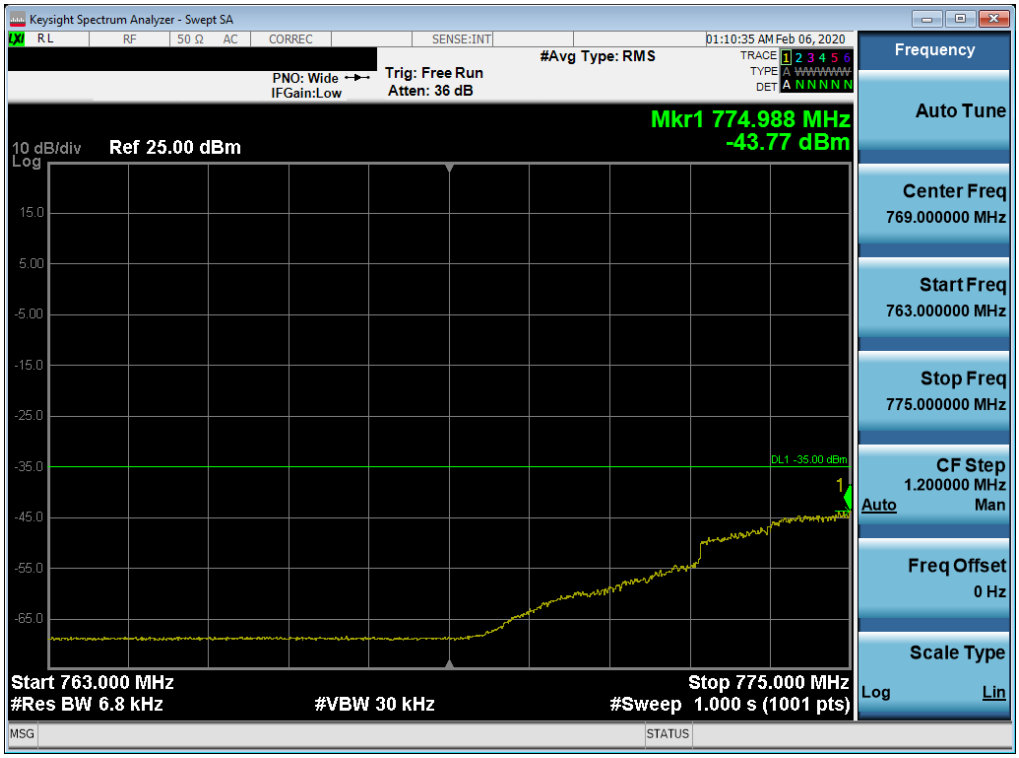
Band 13



Plot 7-118. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-119. Lower Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

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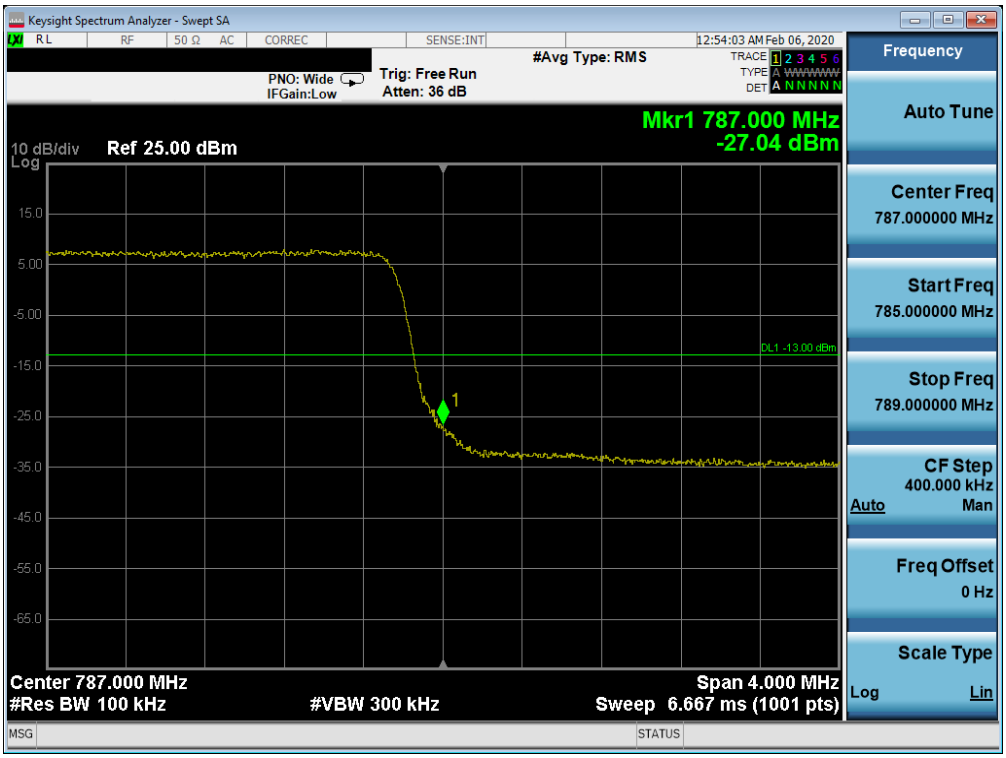

Plot 7-120. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-121. Upper Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

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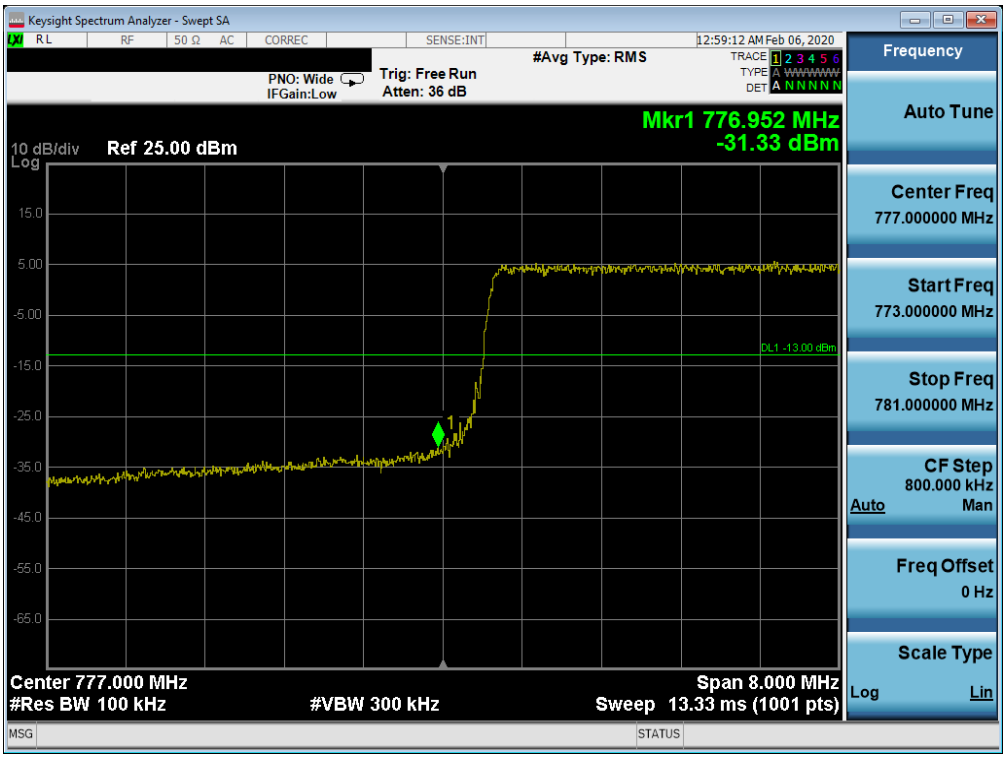

Plot 7-122. Lower Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-123. Lower Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

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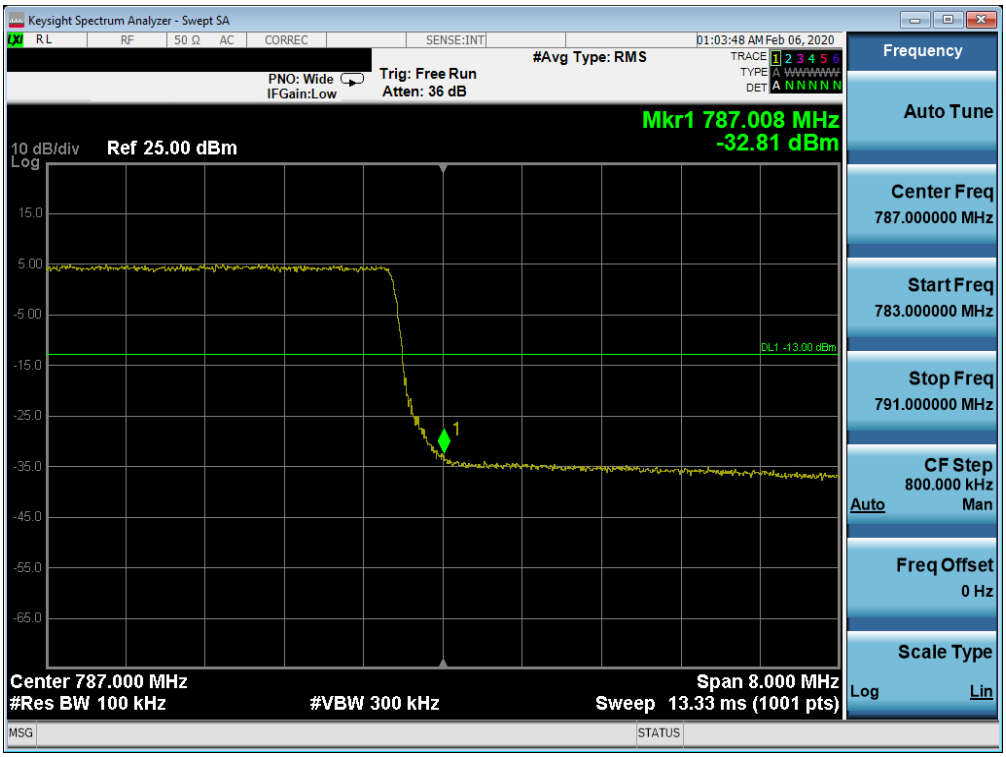

Plot 7-124. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-125. Upper Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Band 5

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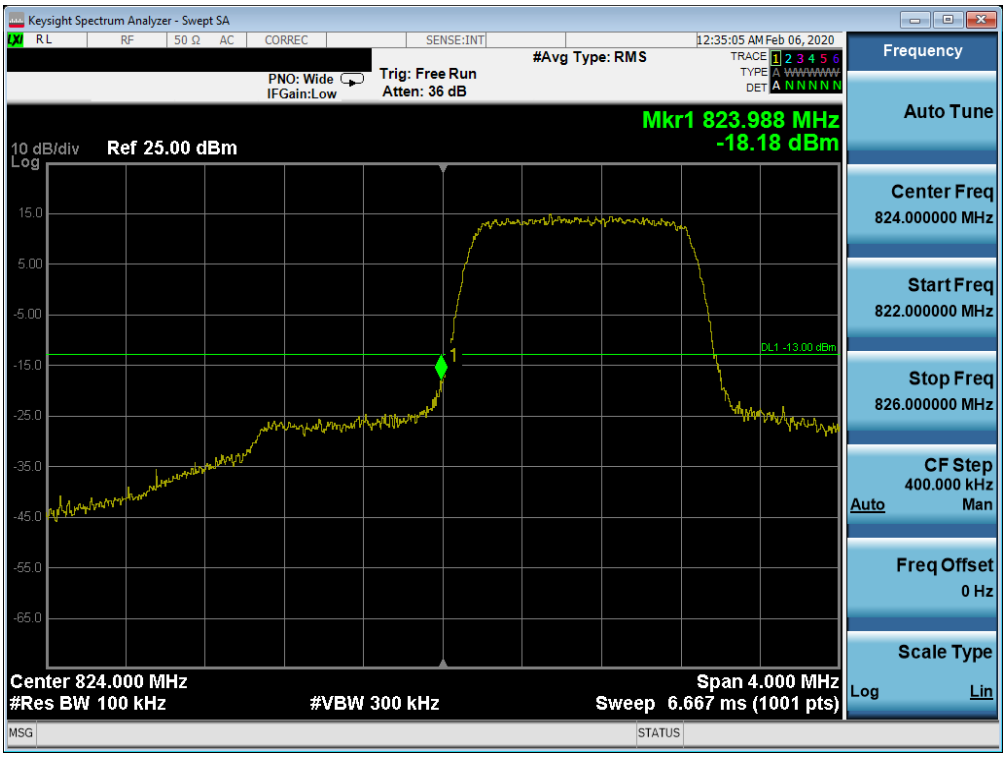
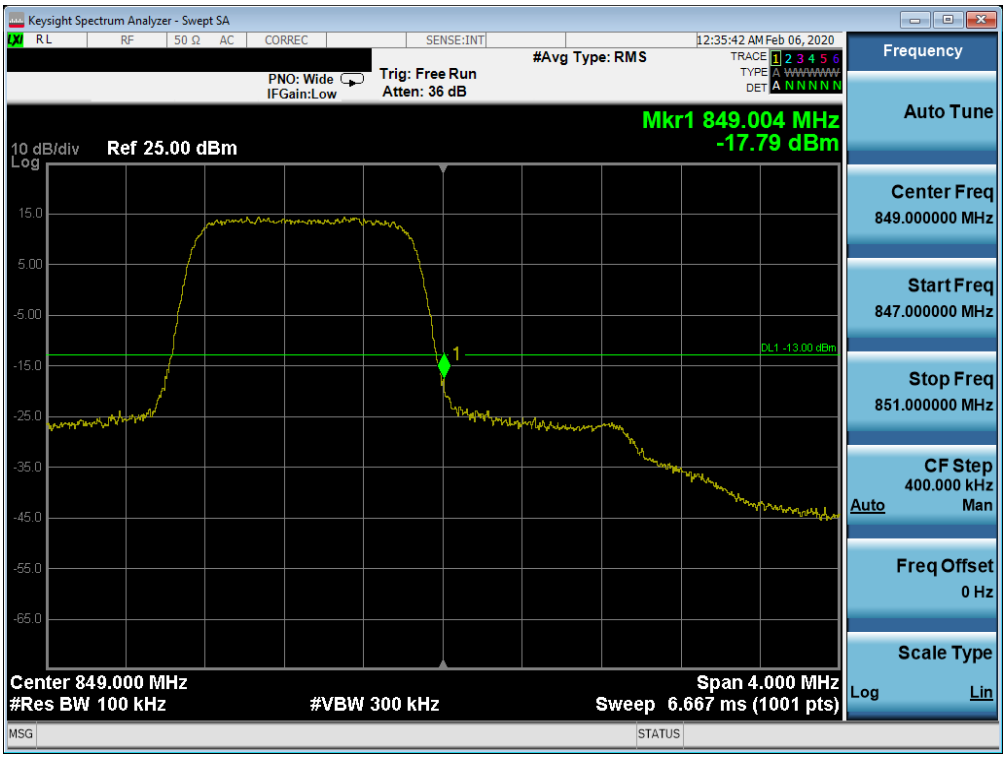


Plot 7-126. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-127. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

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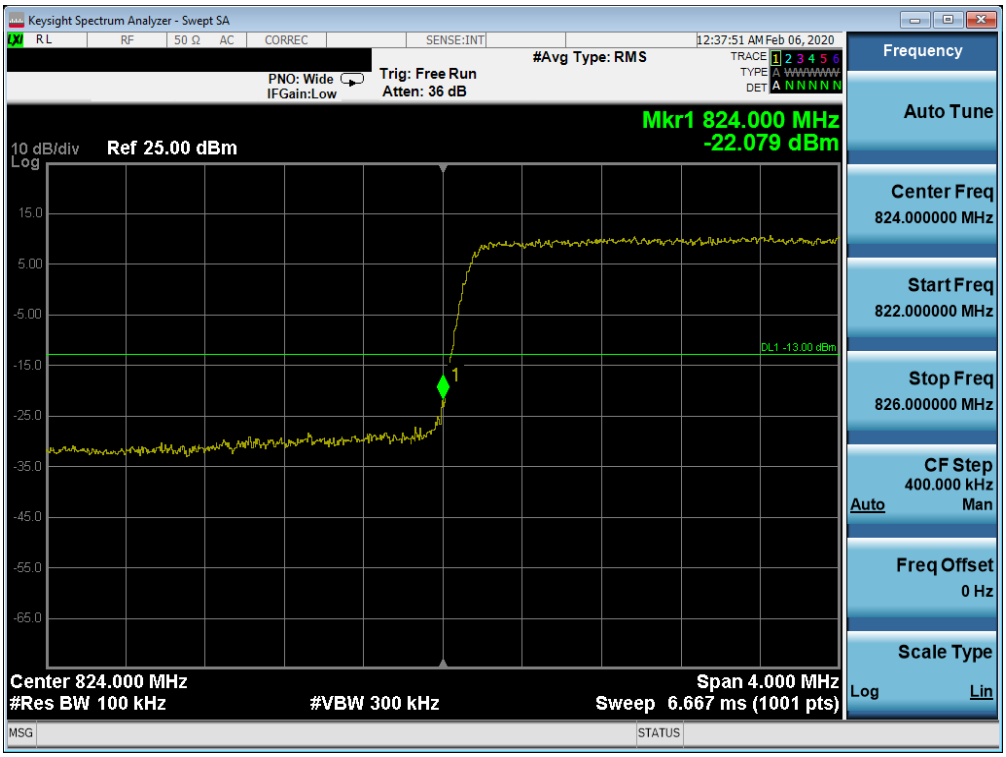
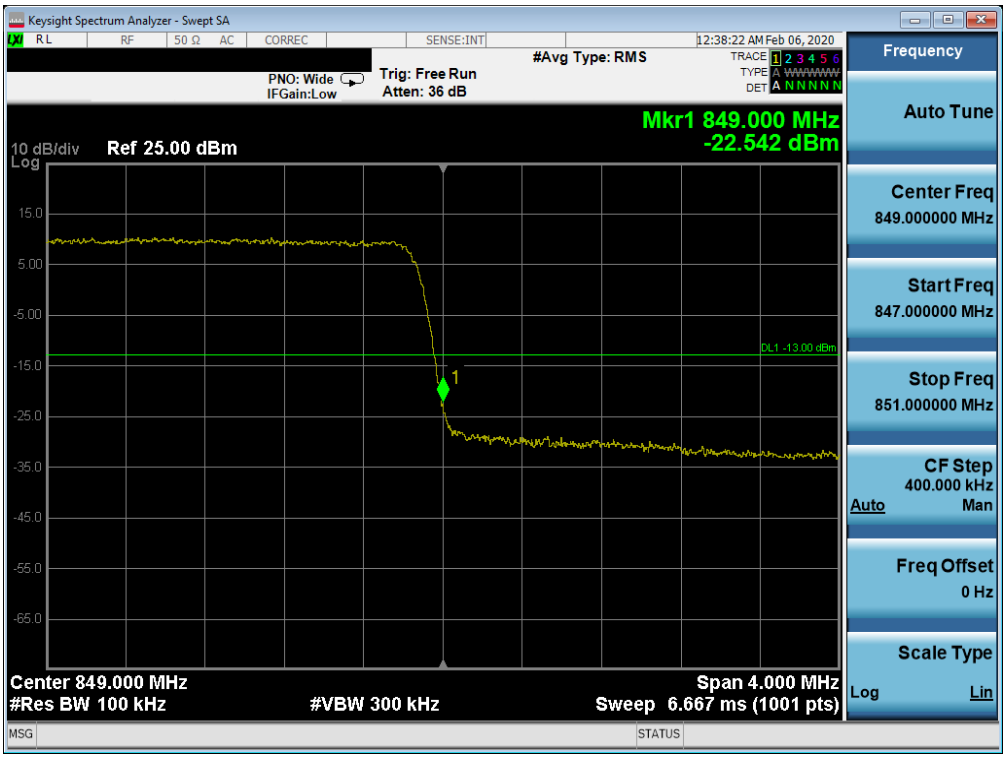


Plot 7-128. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-129. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

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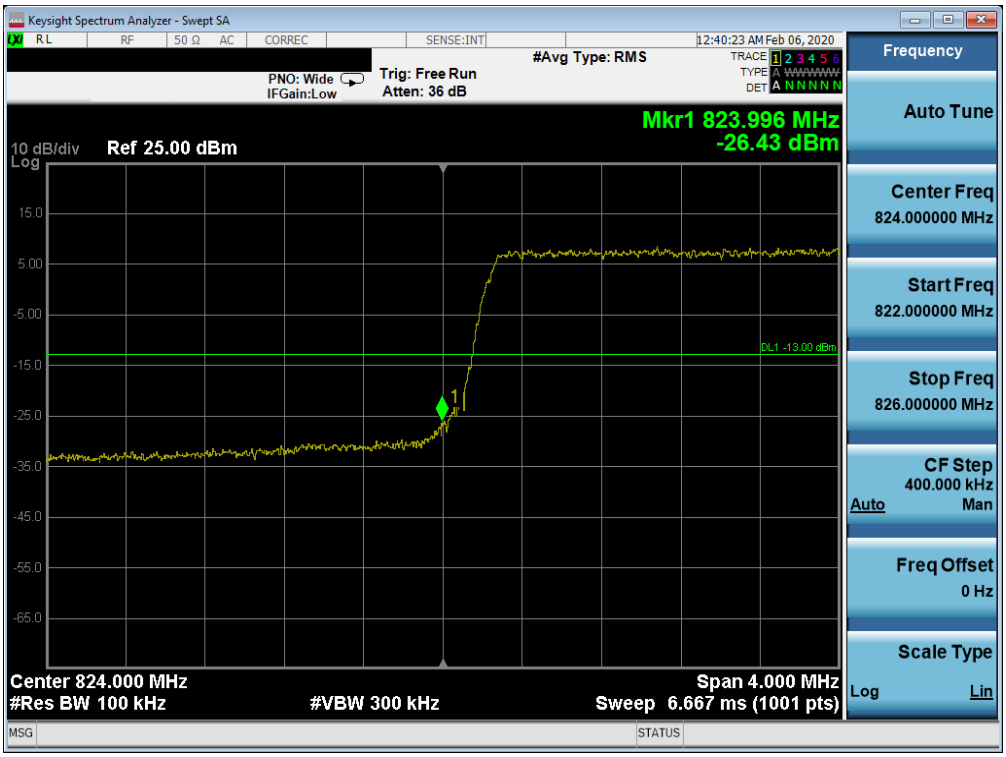
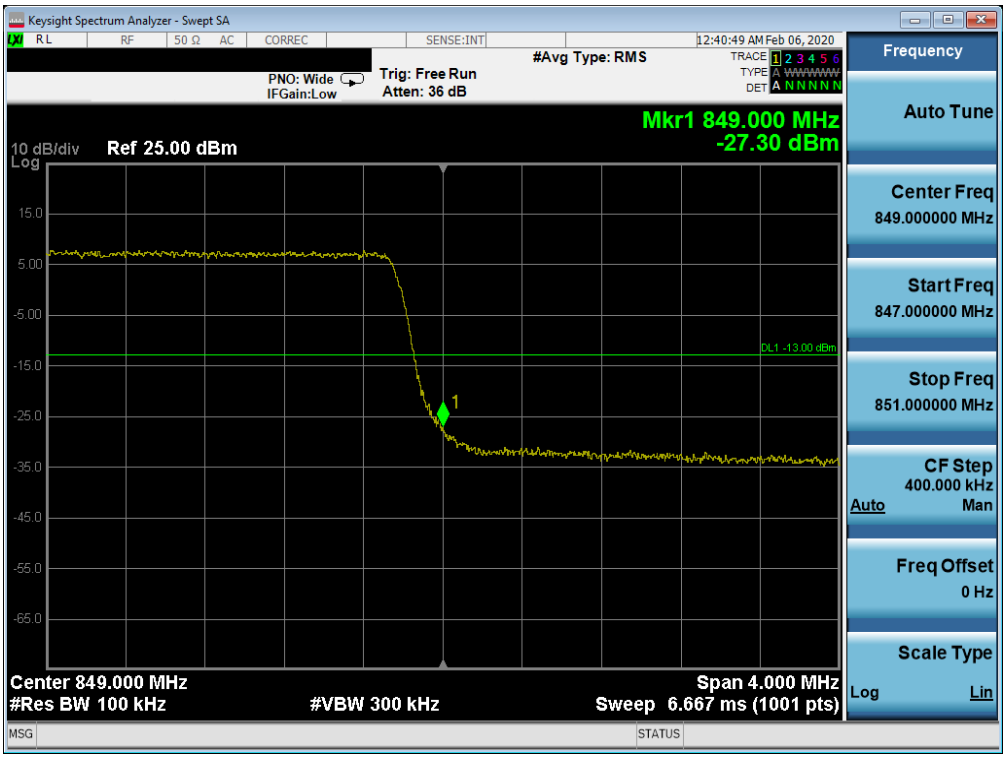


Plot 7-130. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-131. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

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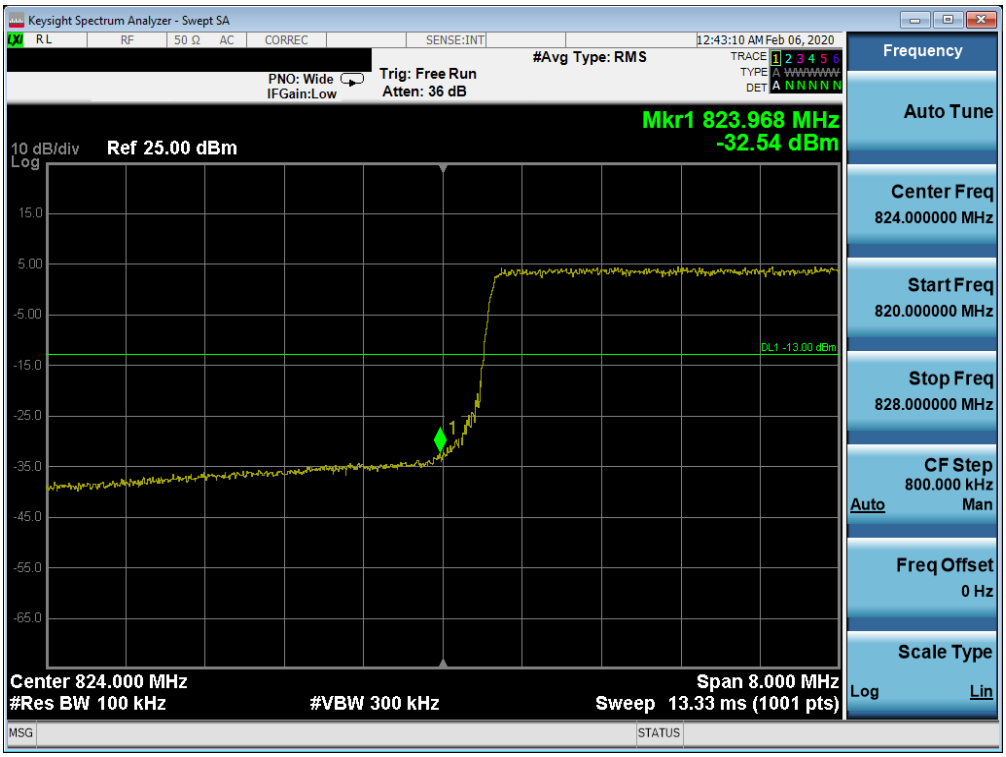
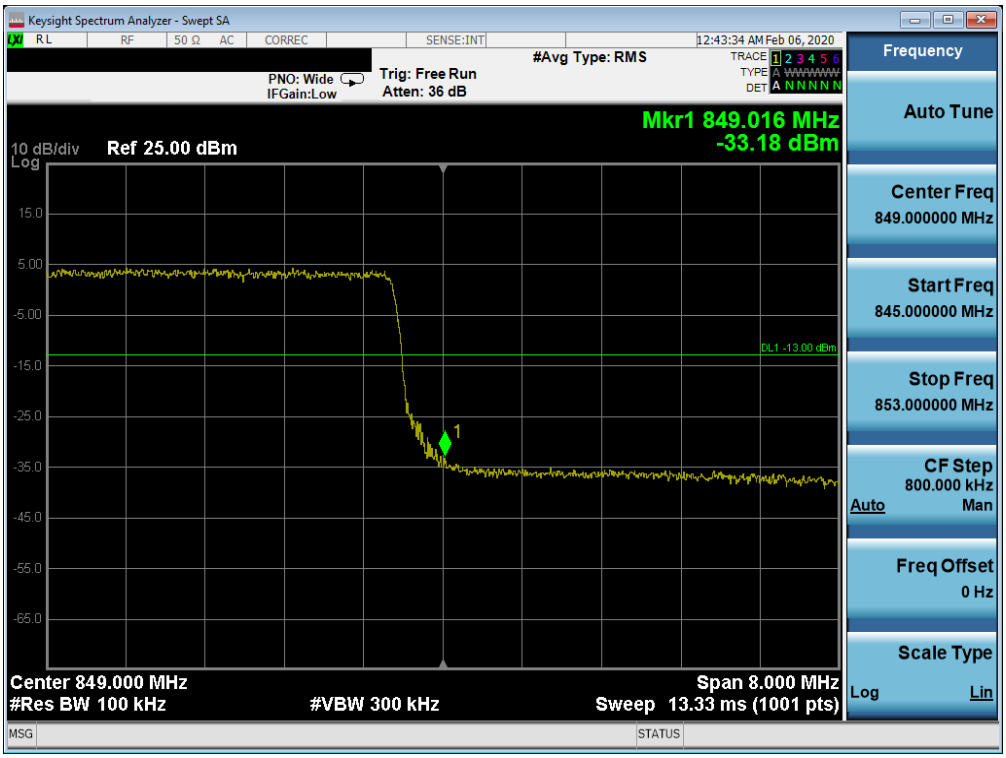


Plot 7-132. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-133. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

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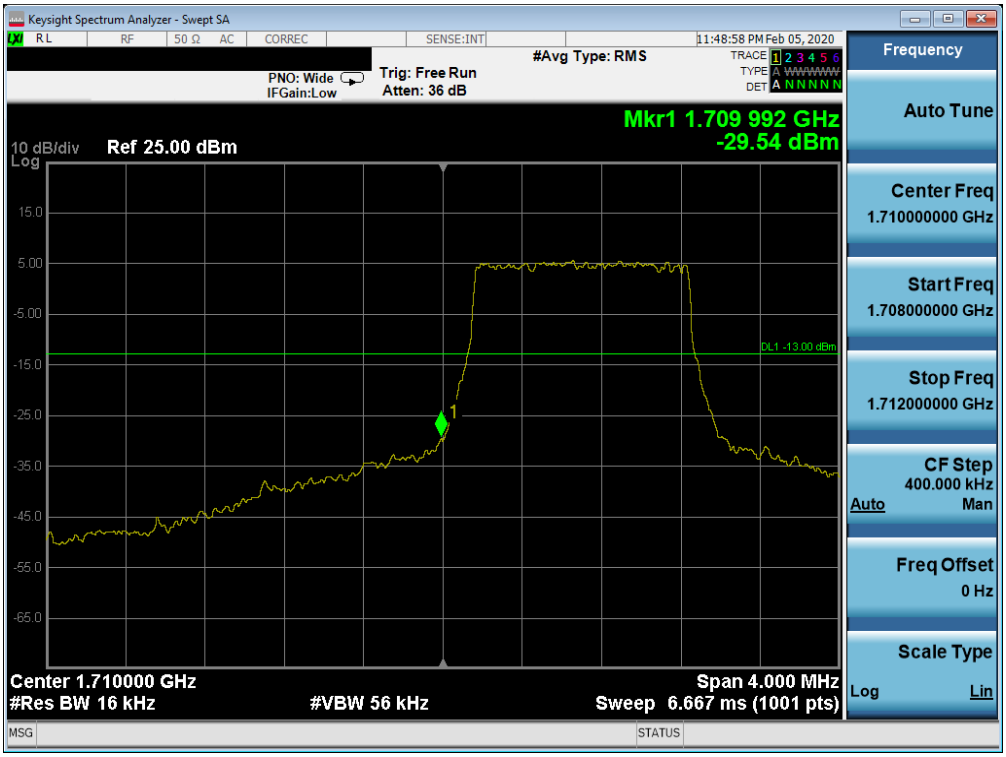
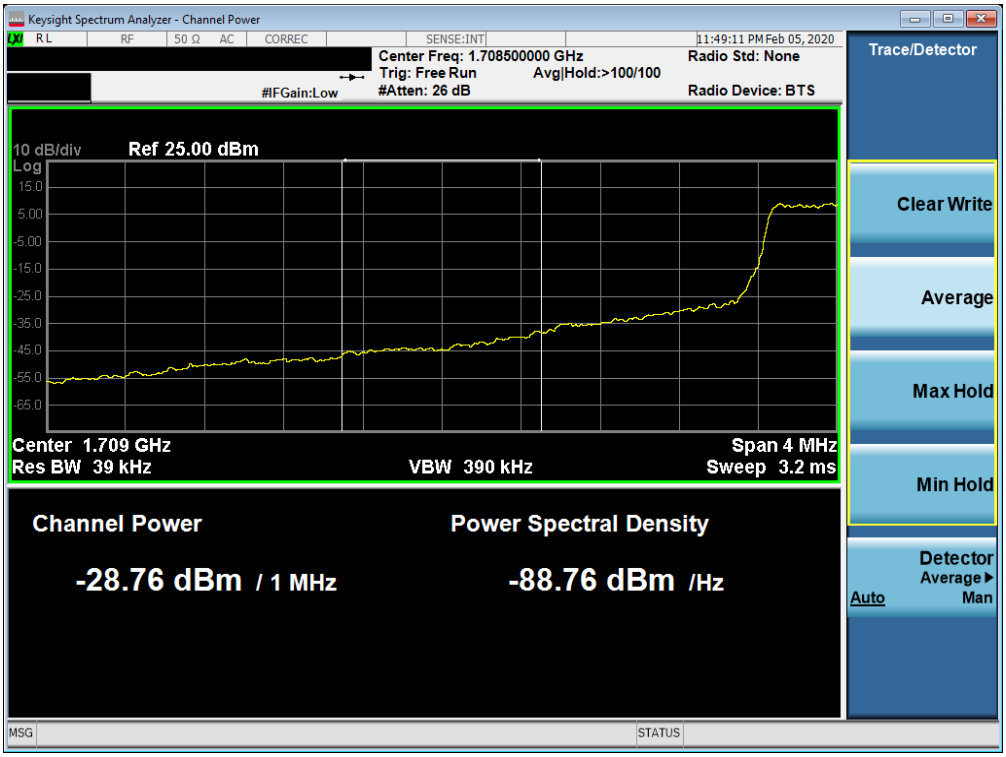
Band 66/4



Plot 7-134. Lower Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-135. Lower Extended Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

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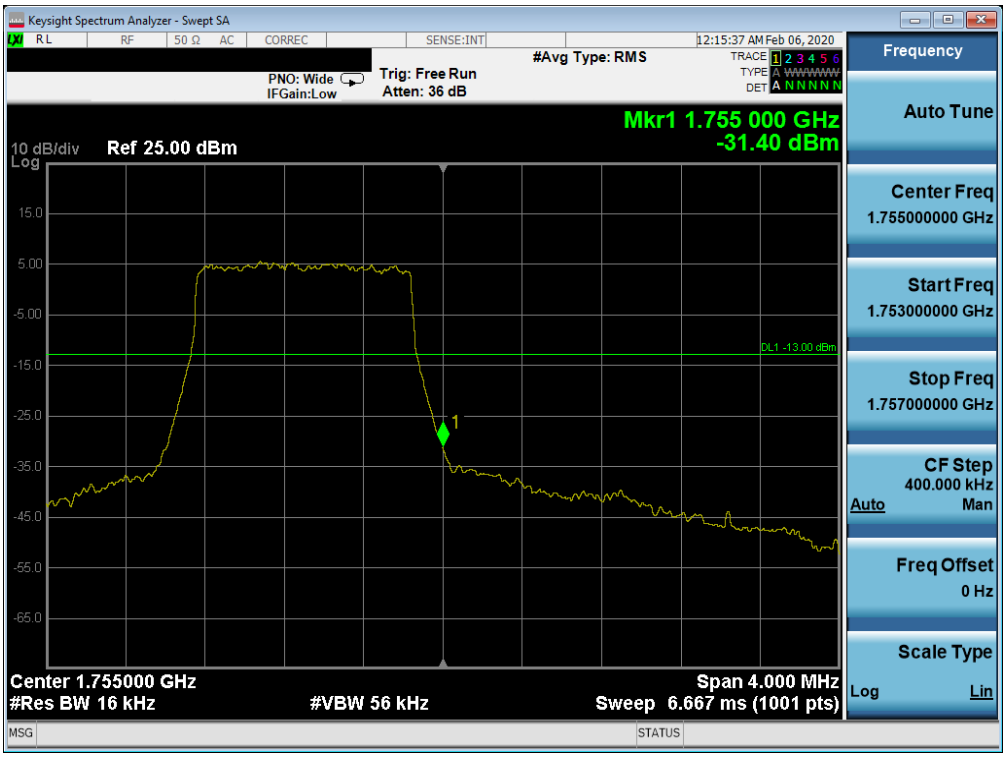
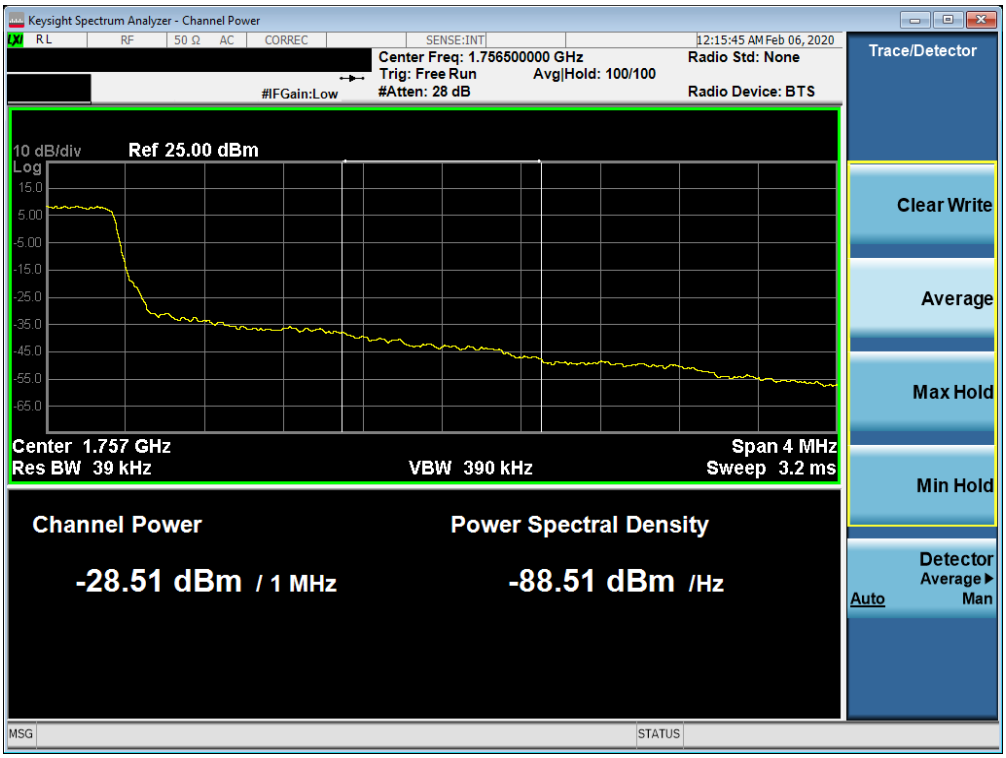


Plot 7-136. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-137. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

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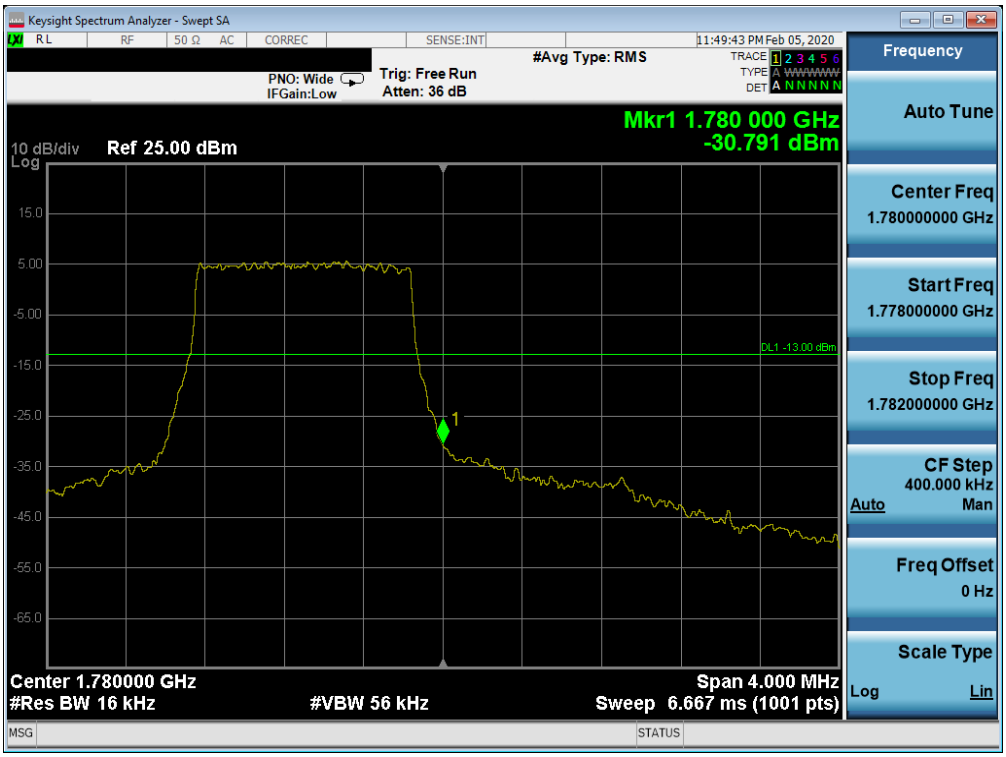
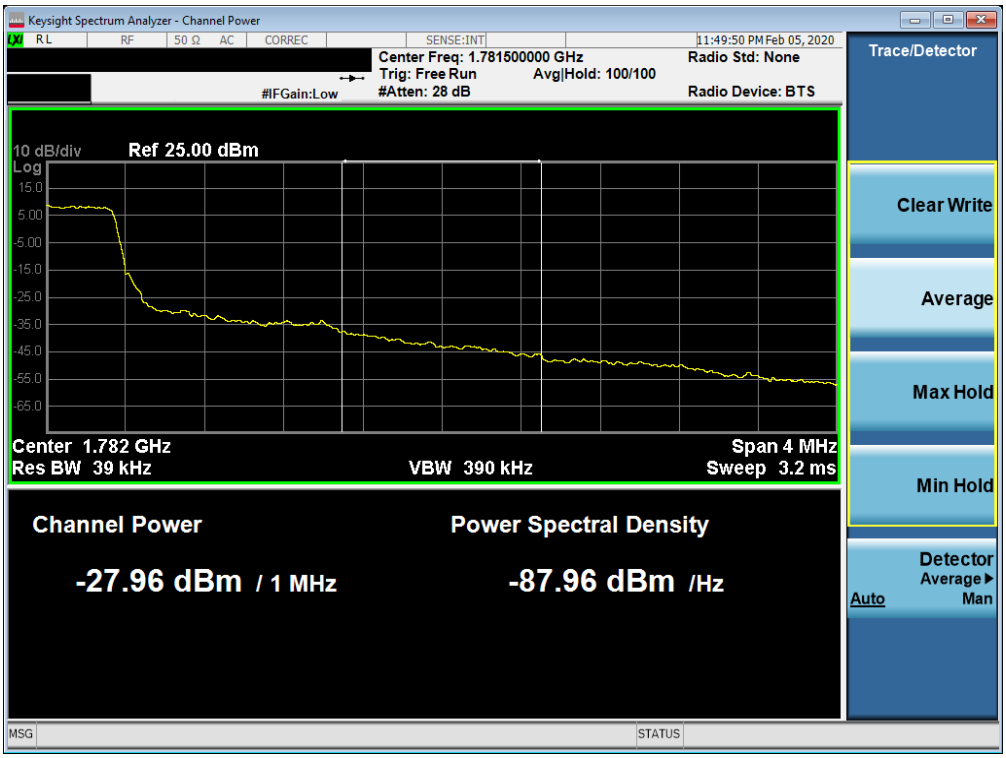


Plot 7-138. Upper Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-139. Upper Extended Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)

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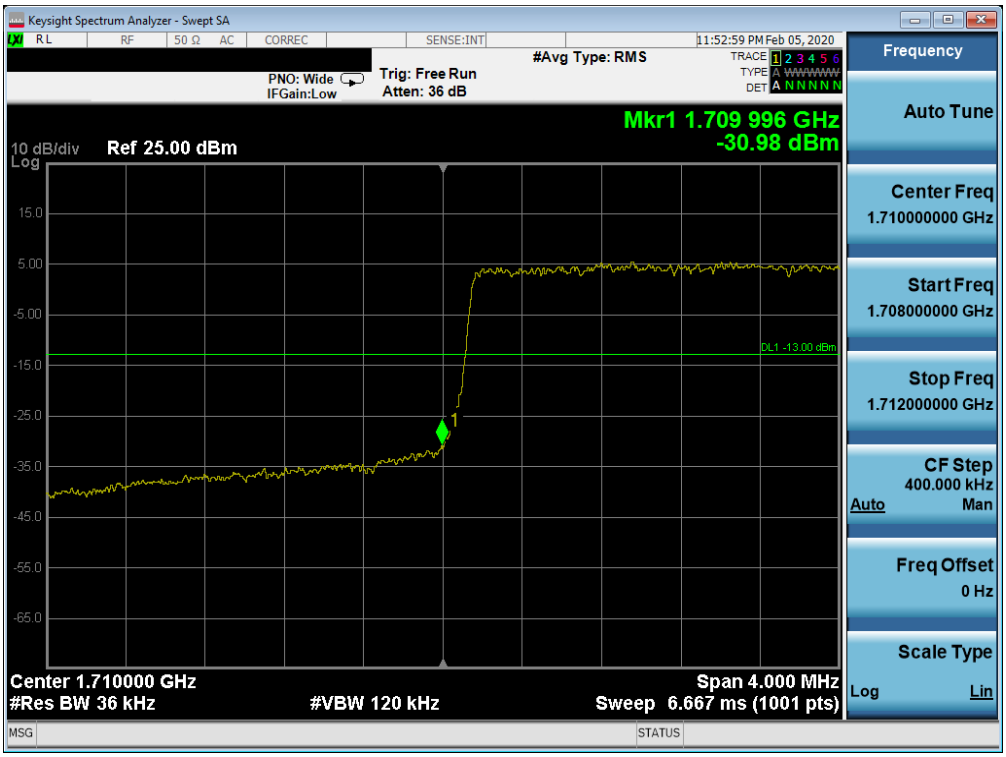
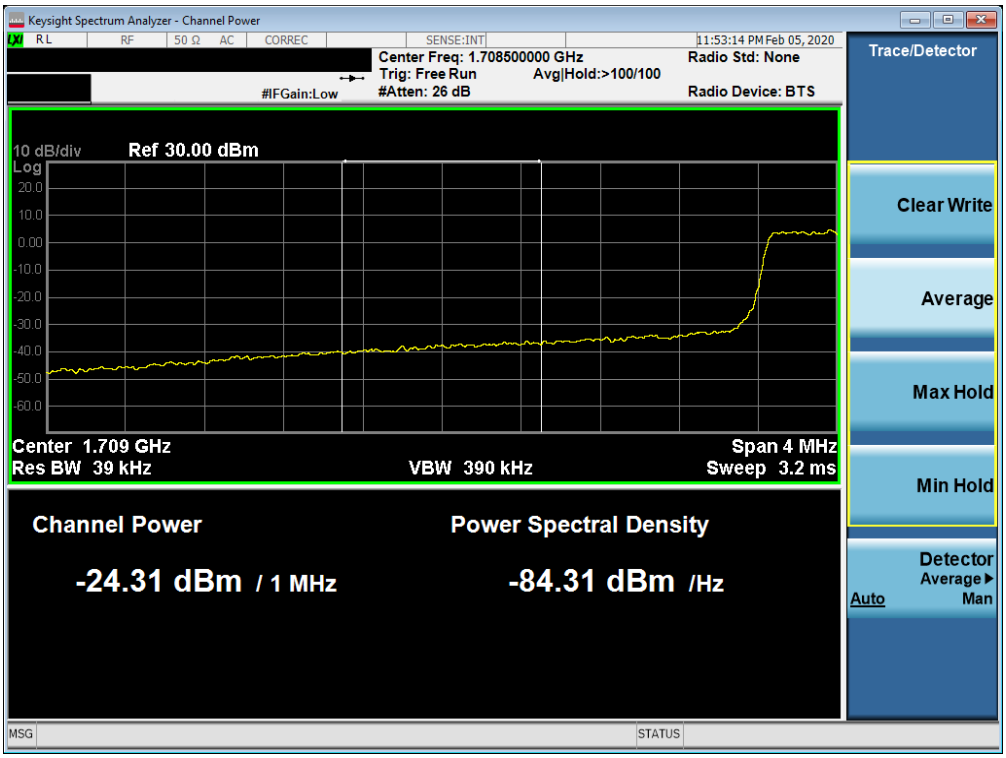


Plot 7-140. Lower Band Edge Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-141. Lower Extended Band Edge Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

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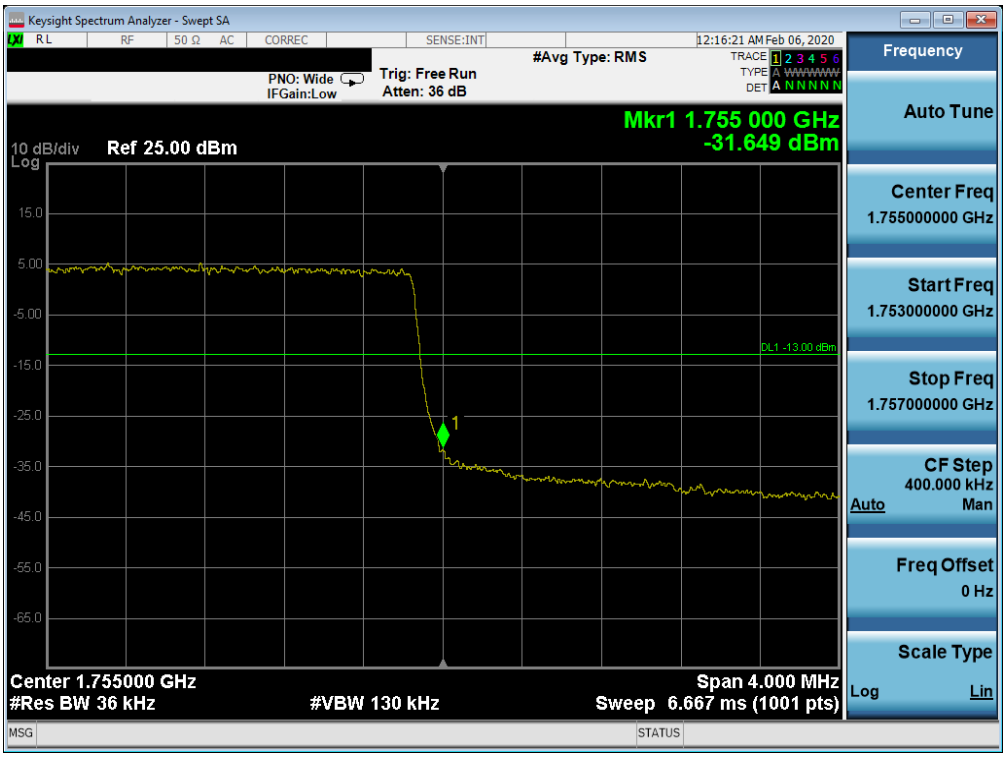
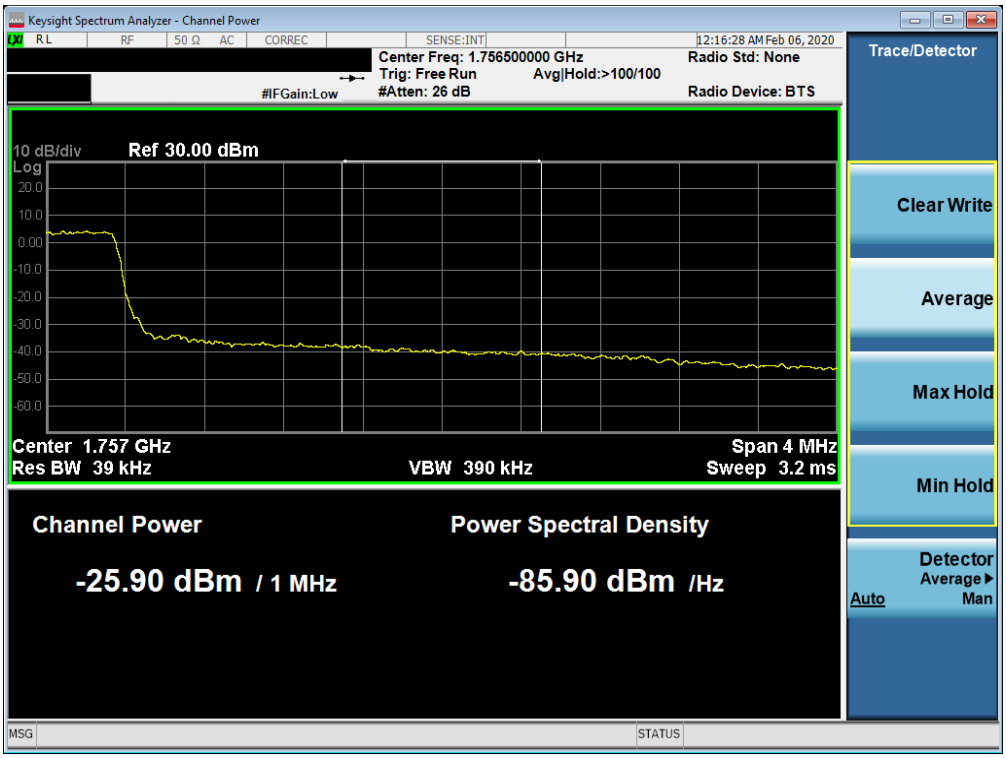


Plot 7-142. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-143. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

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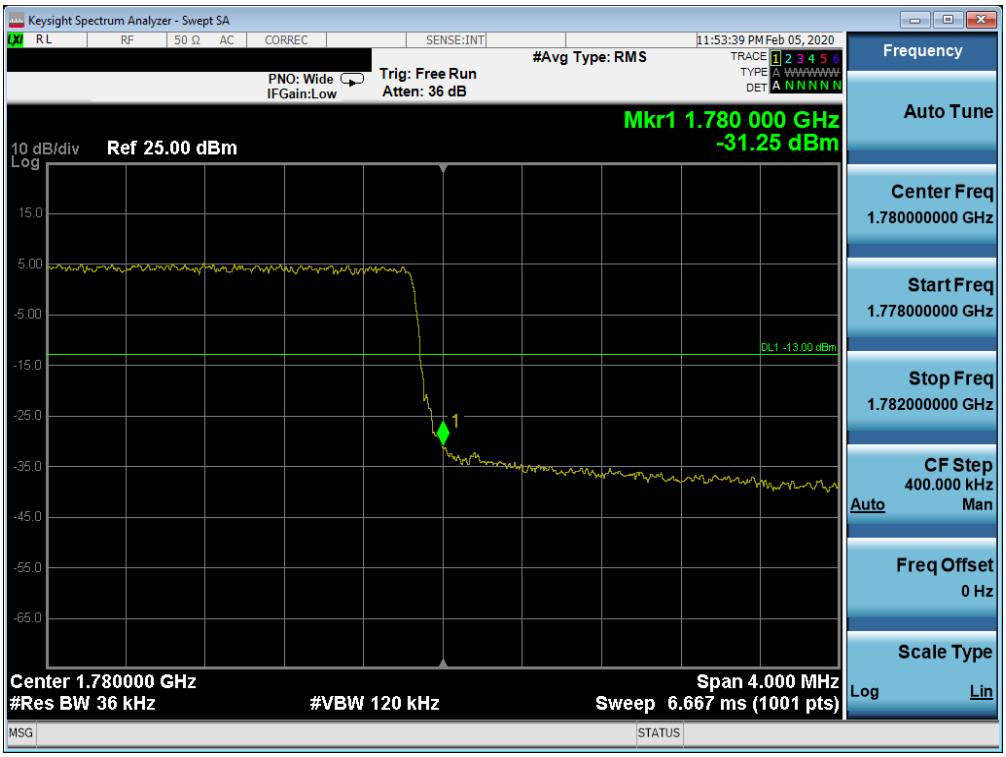
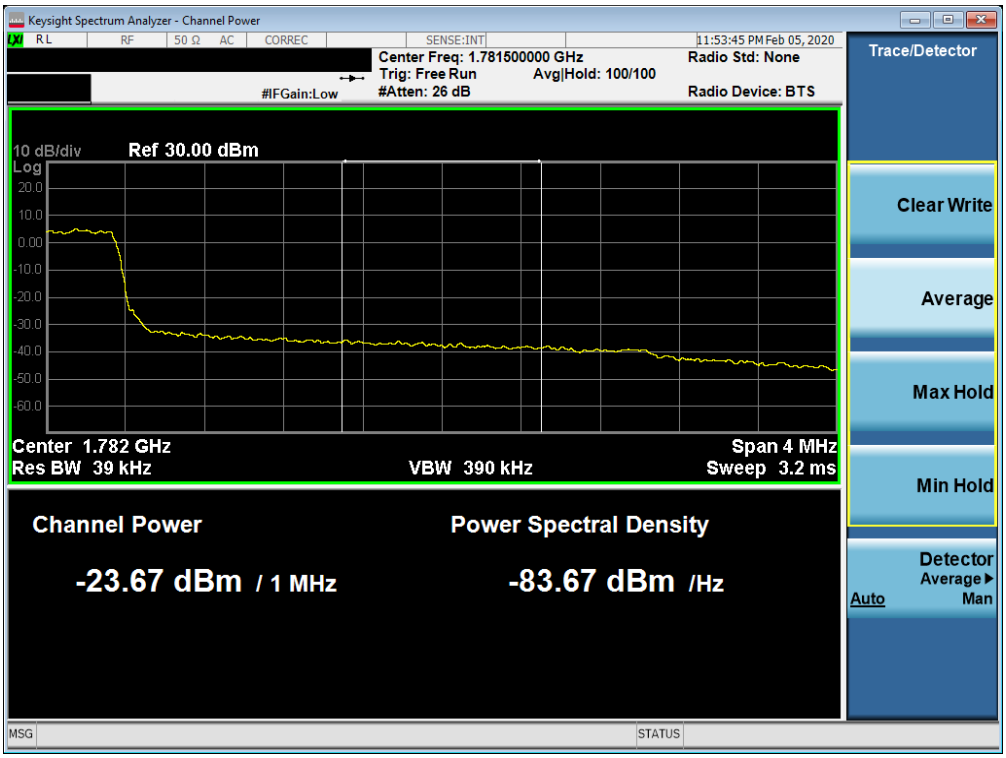


Plot 7-144. Upper Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-145. Upper Extended Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)

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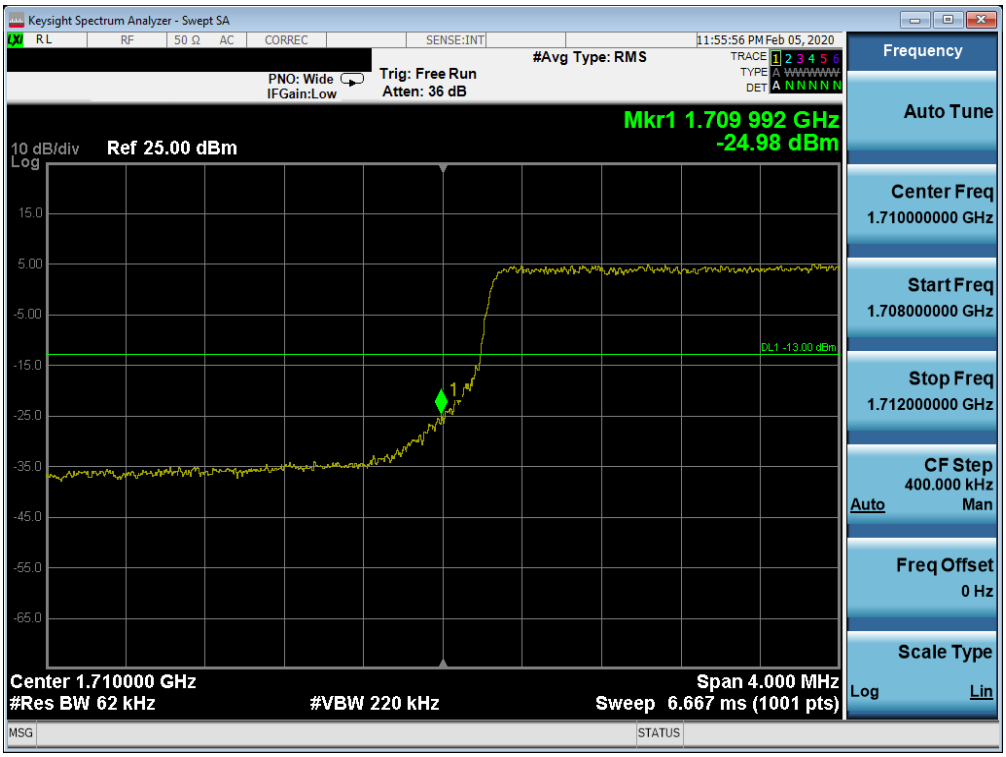
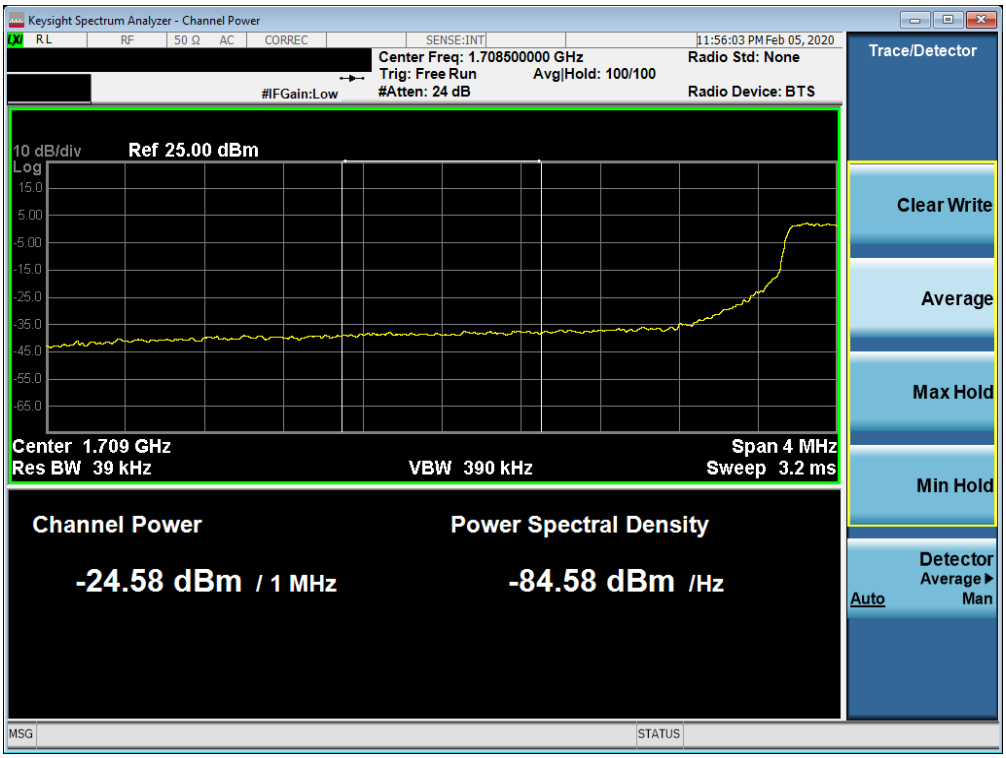


Plot 7-146. Lower Band Edge Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-147. Lower Extended Band Edge Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)

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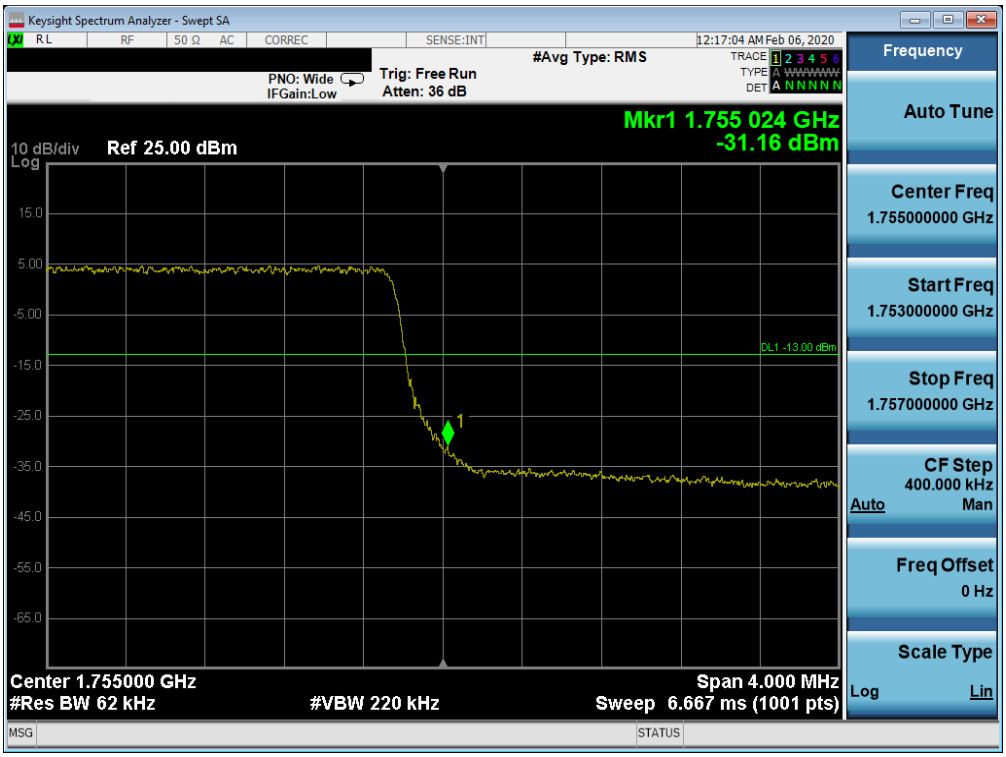
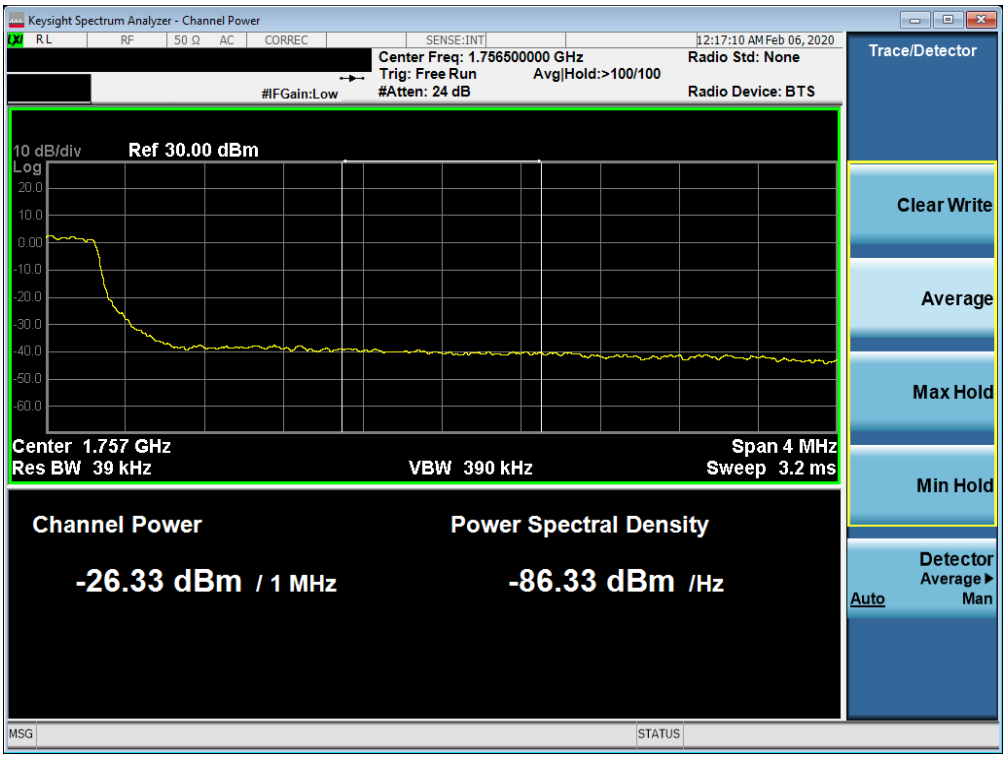


Plot 7-148. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-149. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

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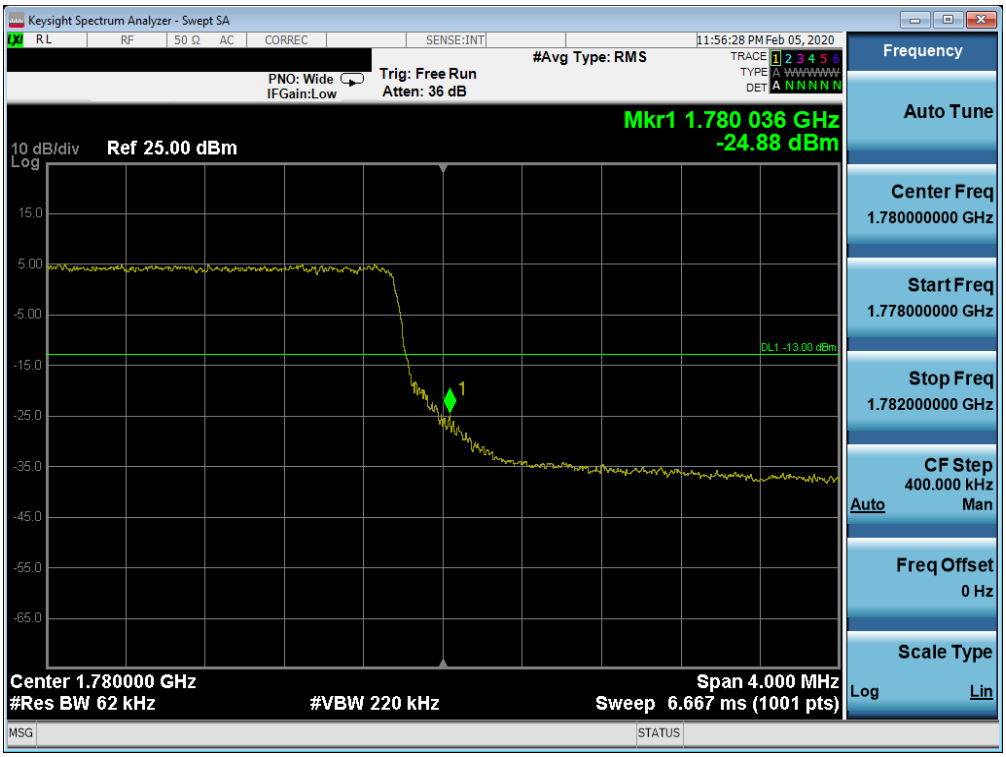
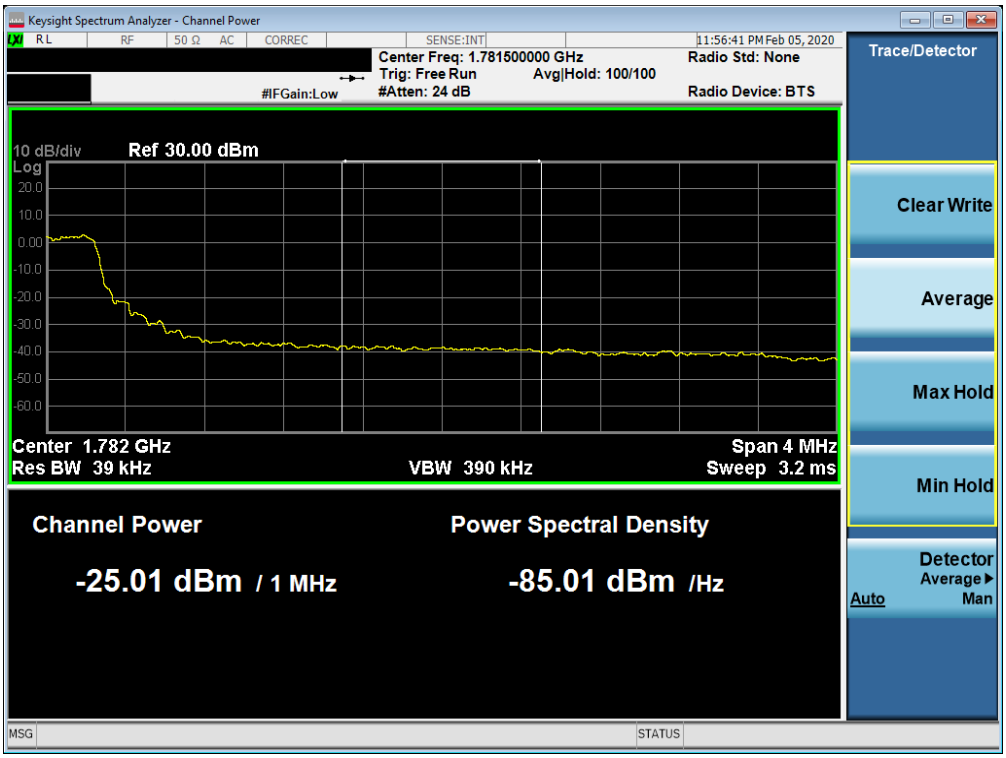


Plot 7-150. Upper Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-151. Upper Extended Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)

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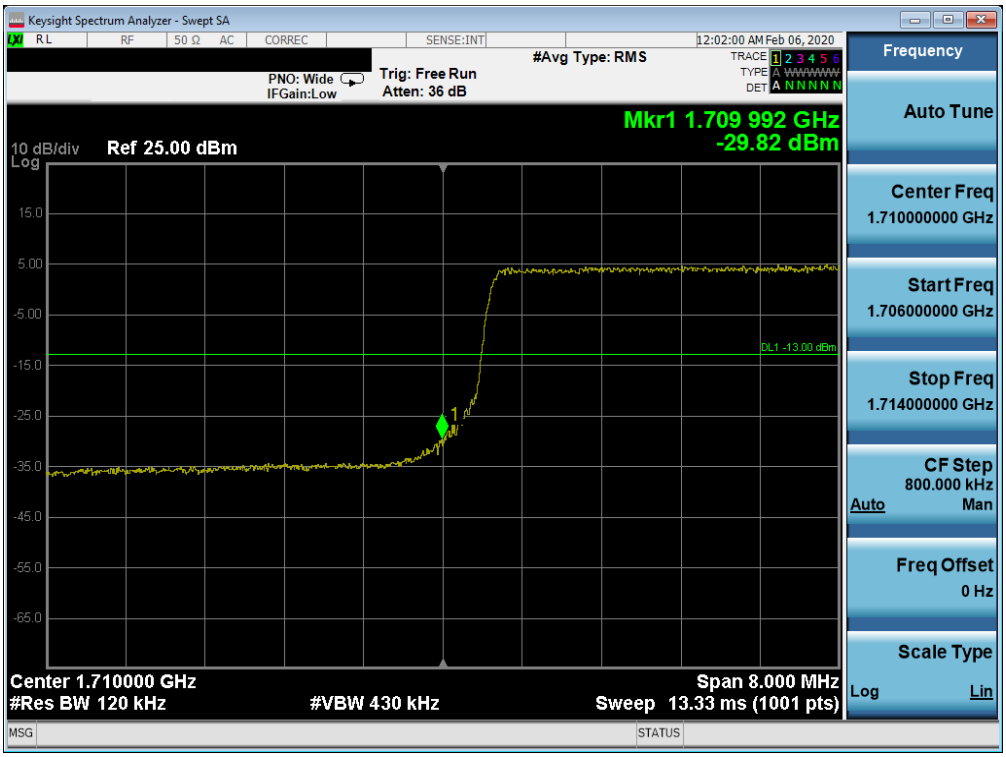
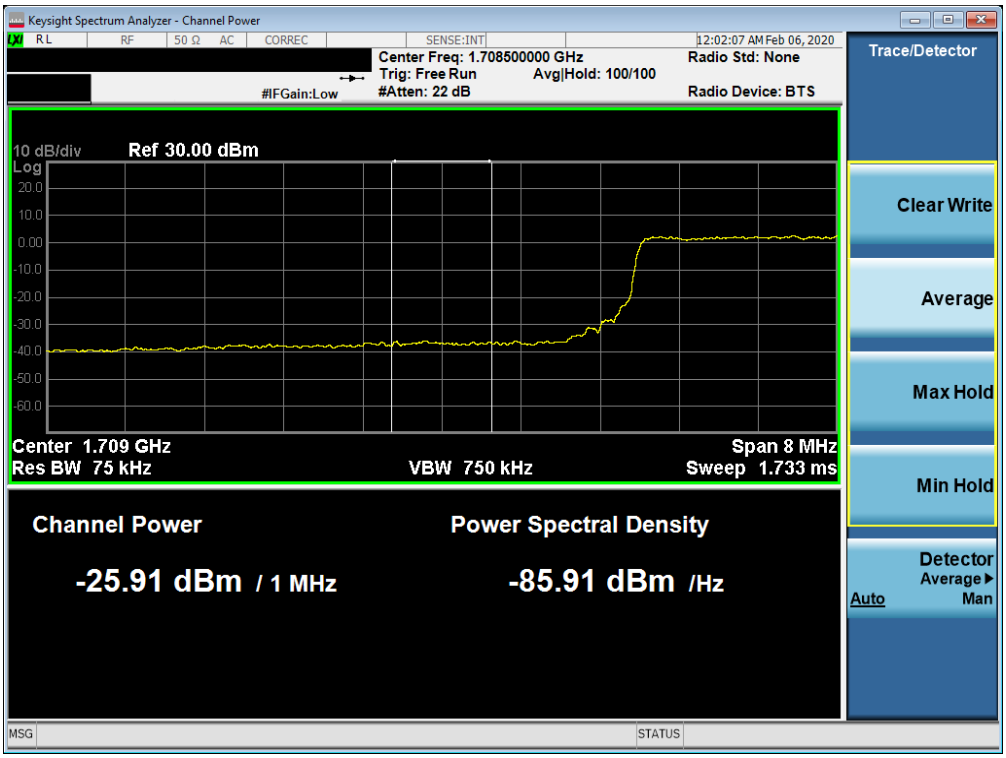


Plot 7-152. Lower Band Edge Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-153. Lower Extended Band Edge Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)

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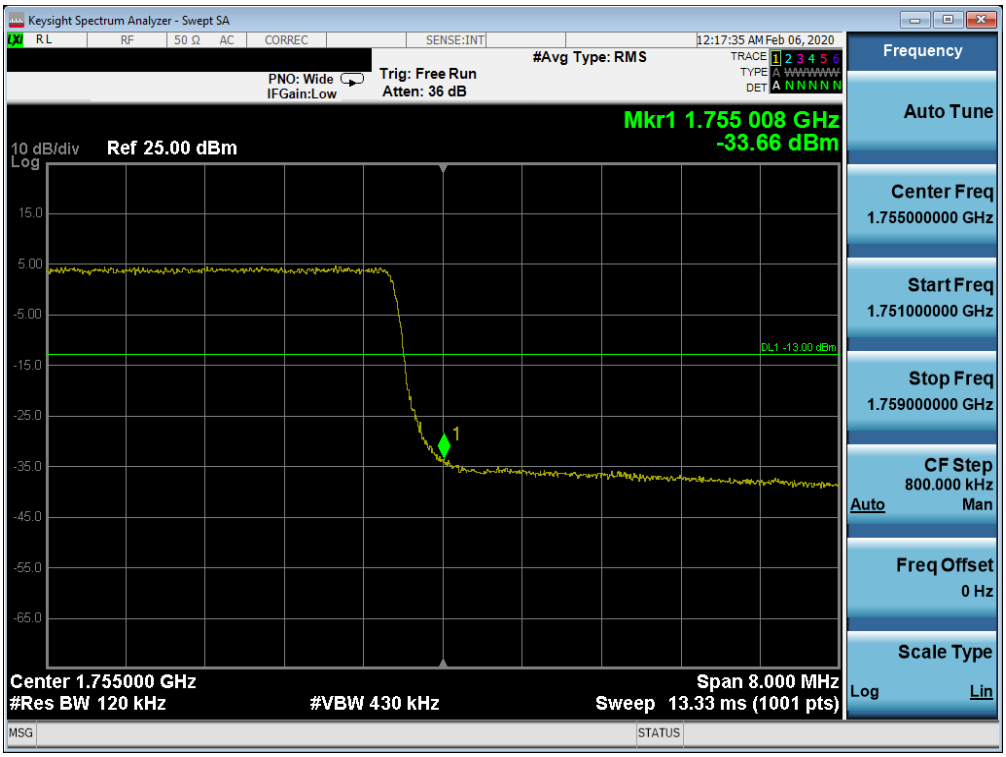
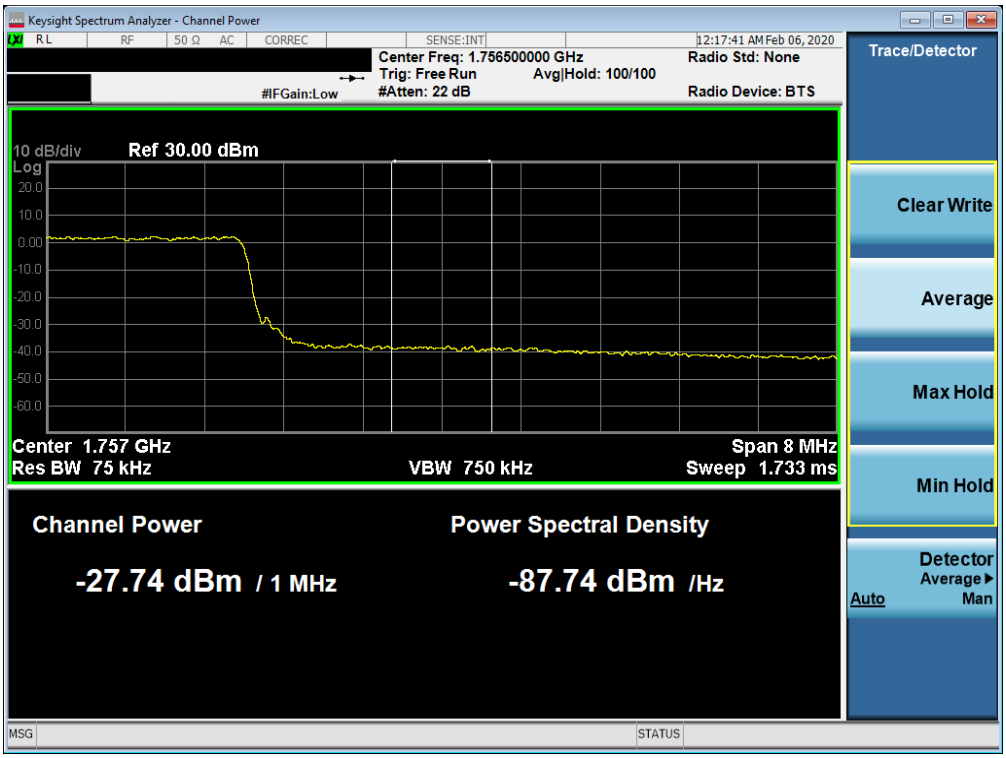


Plot 7-154. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-155. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

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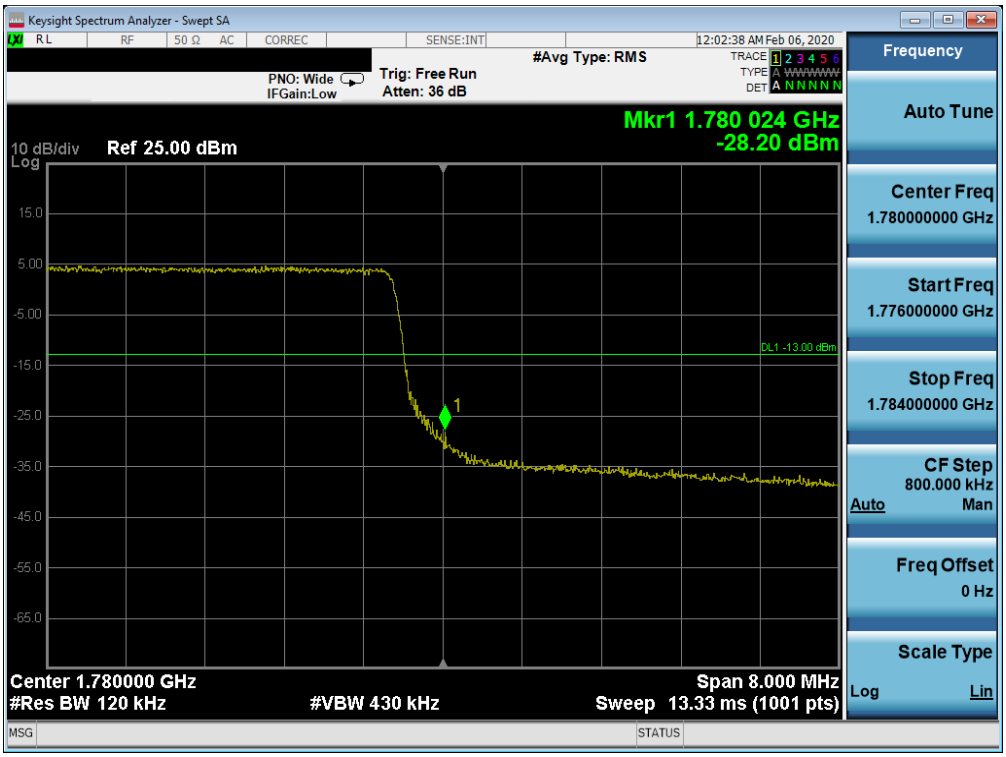
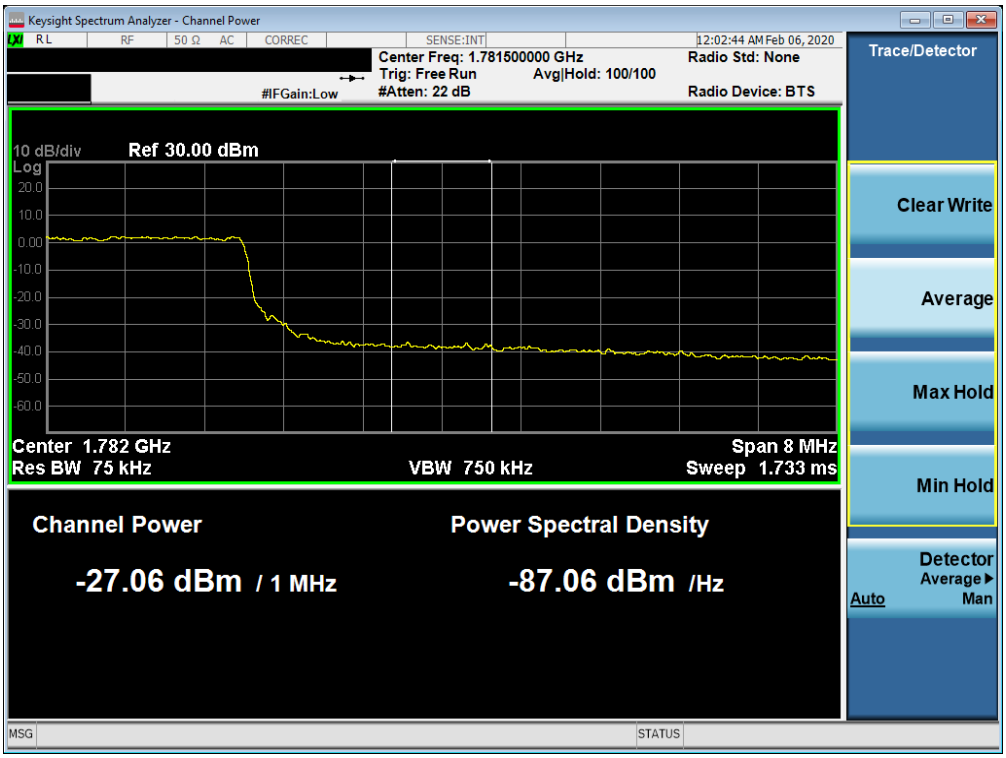


Plot 7-156. Upper Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-157. Upper Extended Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

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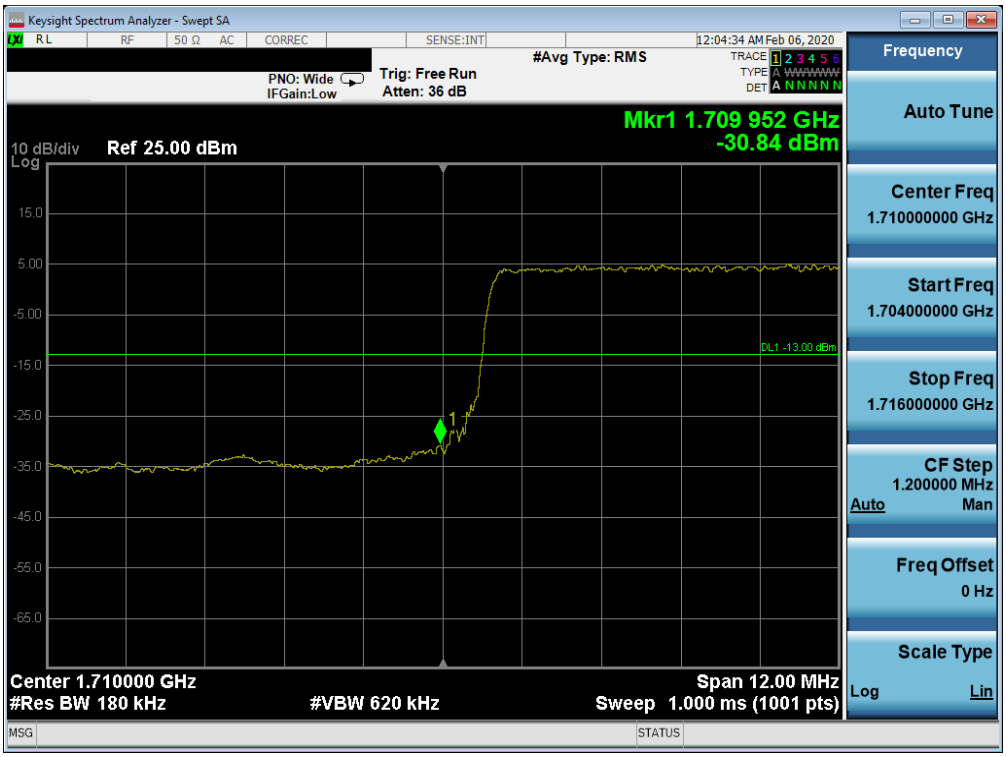
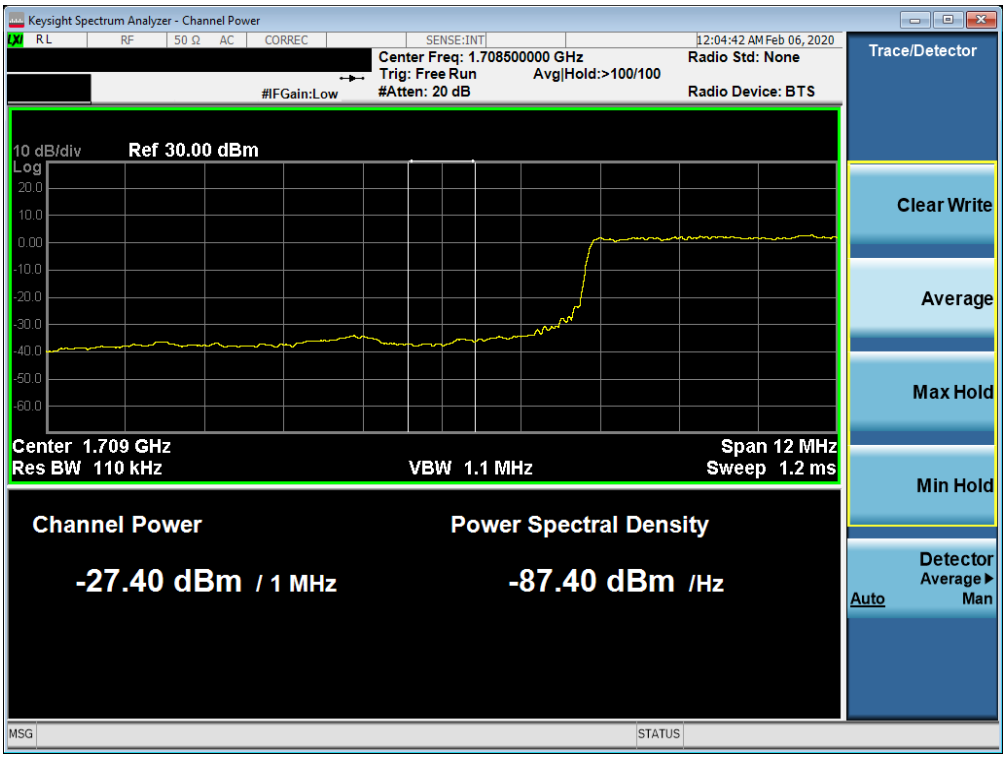


Plot 7-158. Lower Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-159. Lower Extended Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)

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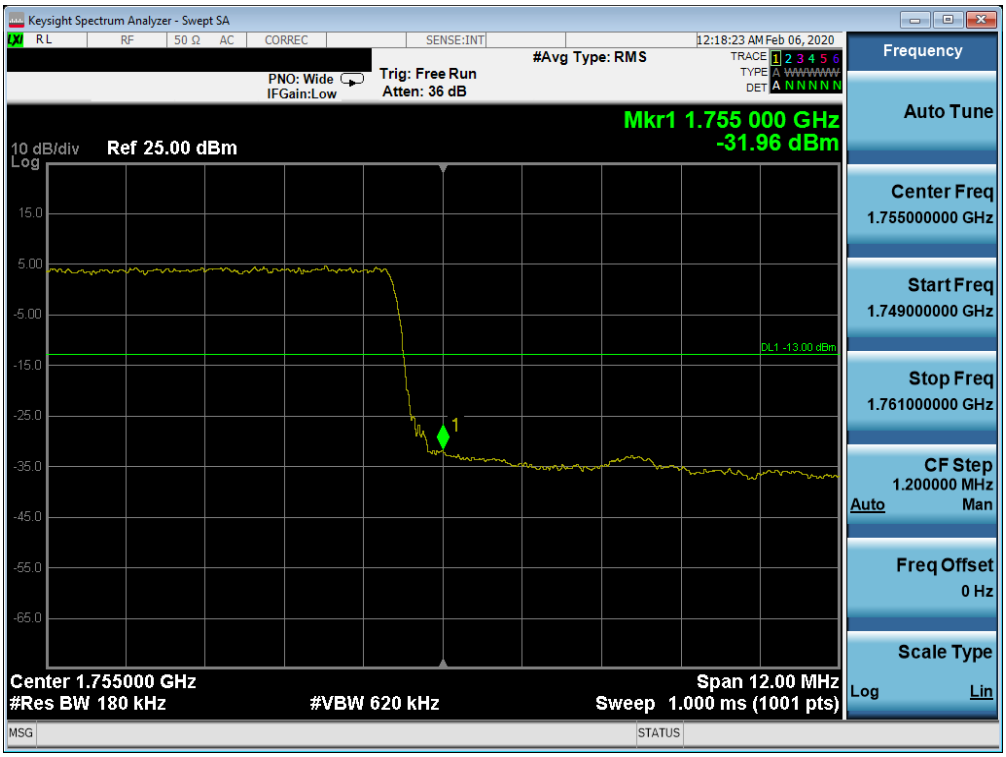
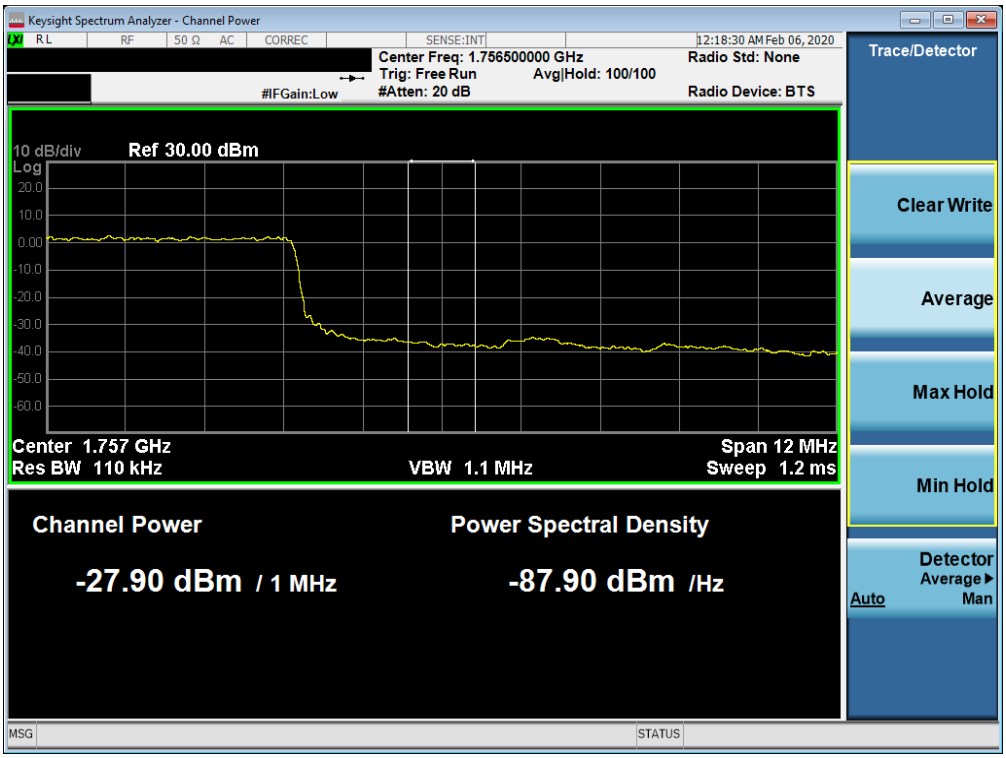


Plot 7-160. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-161. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

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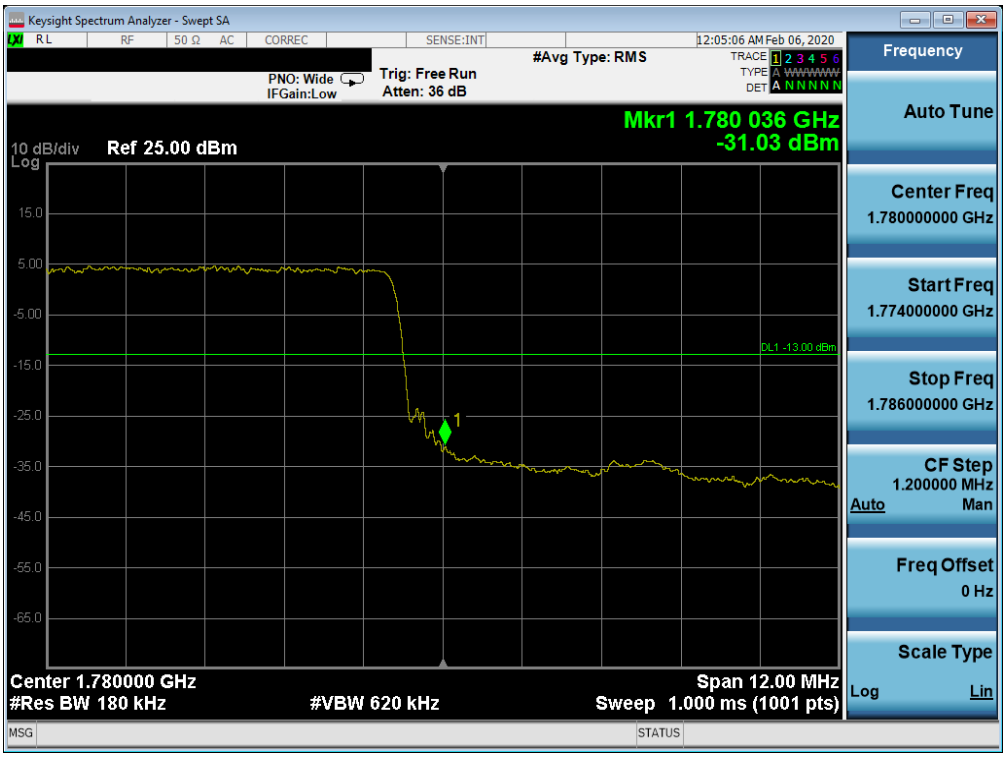
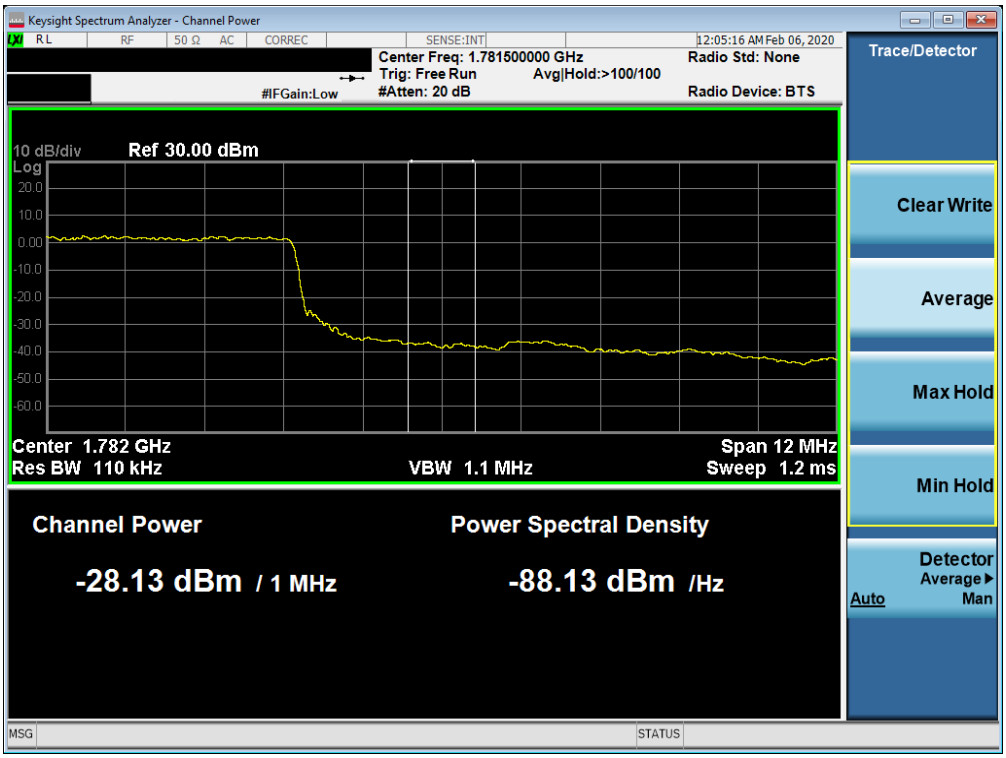


Plot 7-162. Upper Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-163. Upper Extended Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)

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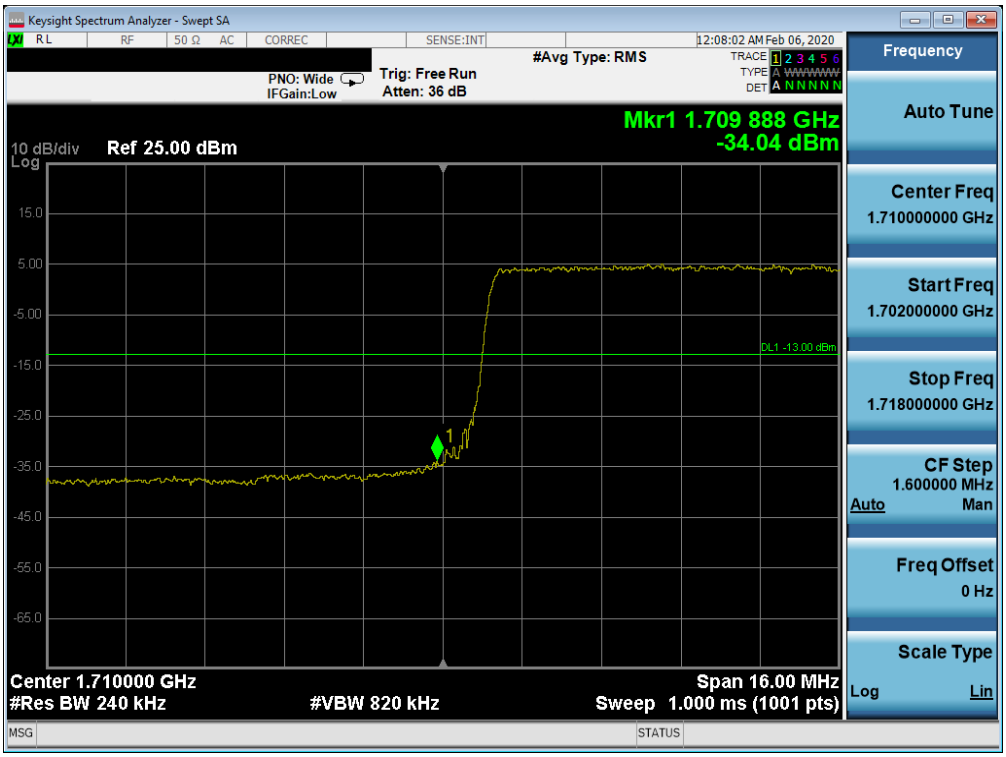
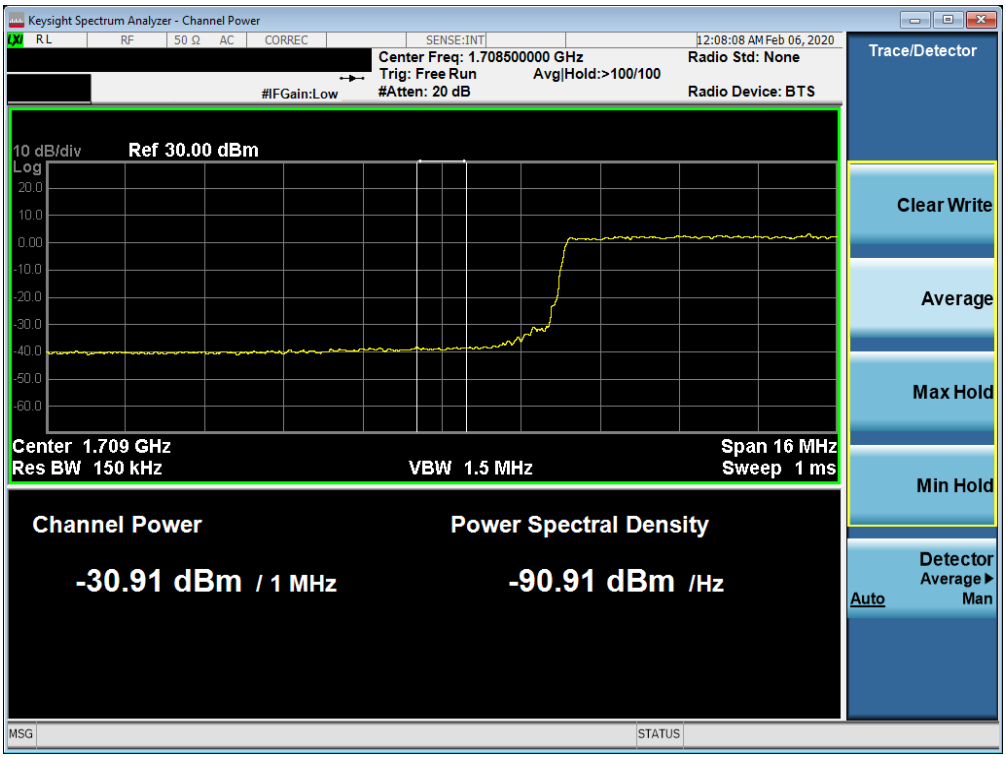


Plot 7-164. Lower Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-165. Lower Extended Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

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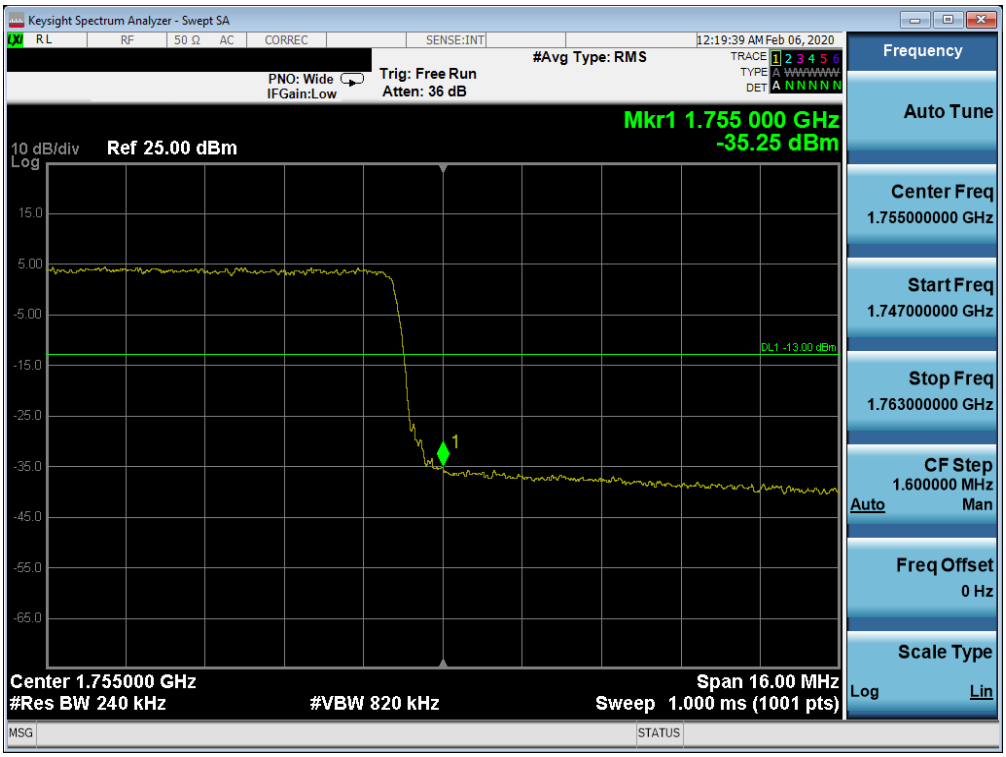
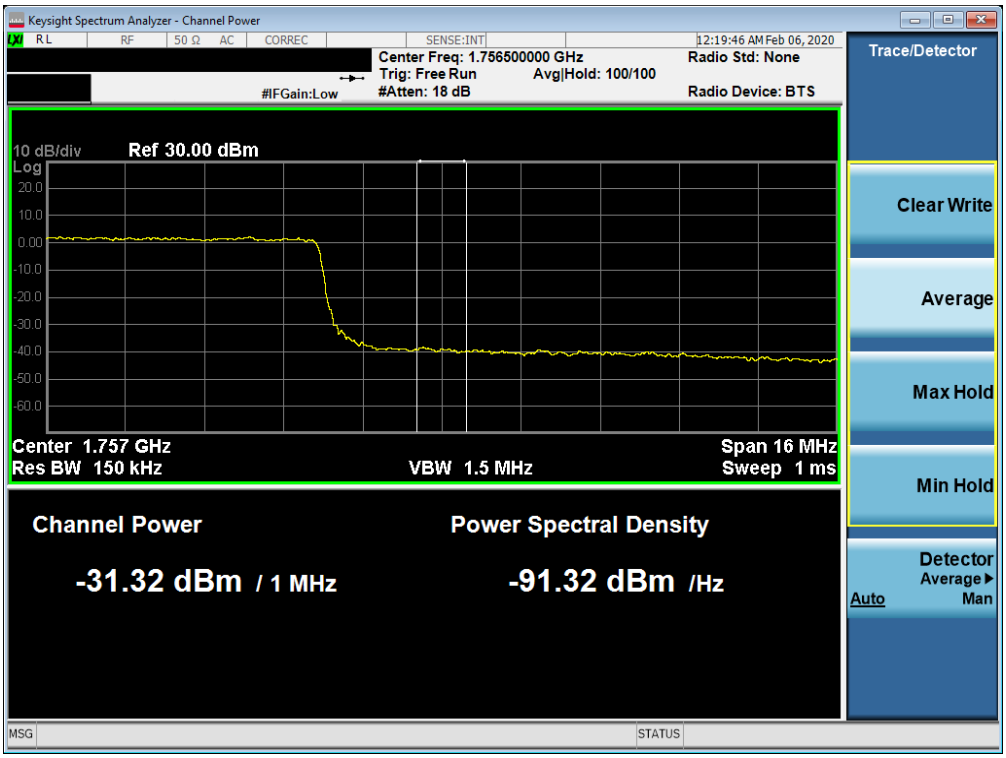


Plot 7-166. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-167. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

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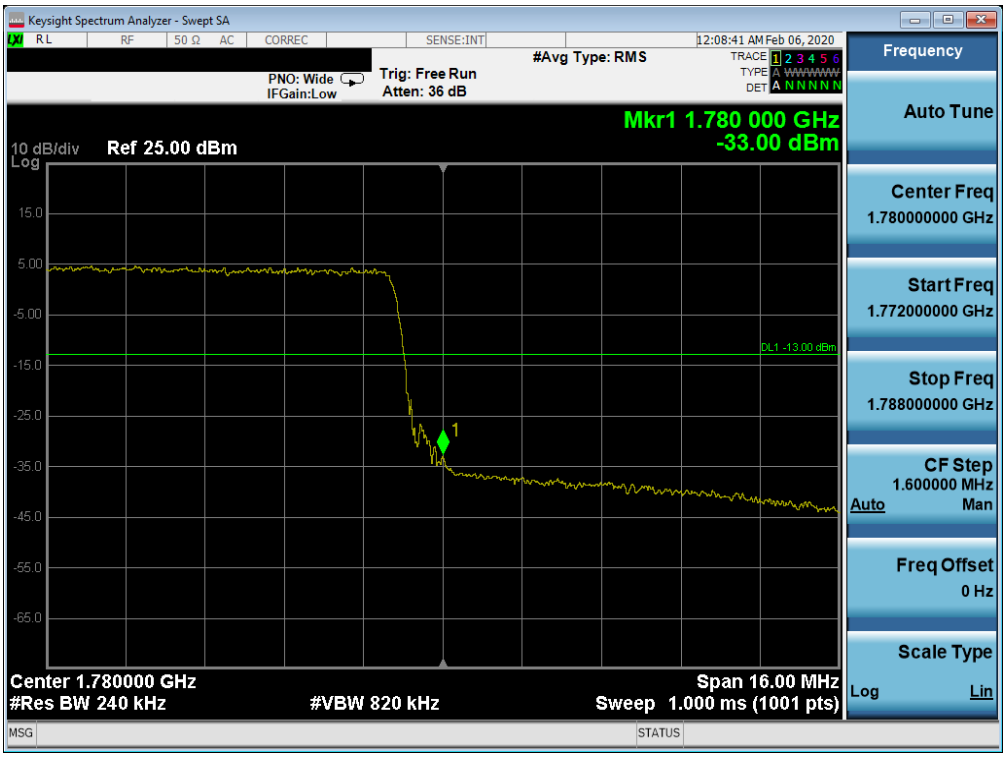
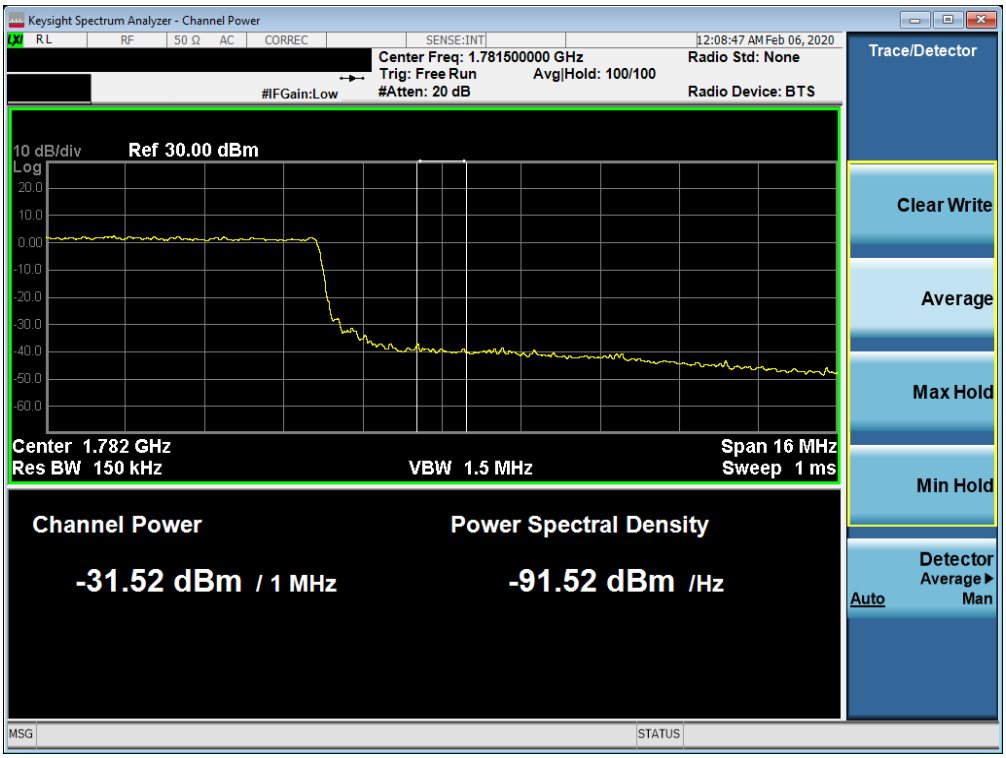


Plot 7-168. Upper Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-169. Upper Extended Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

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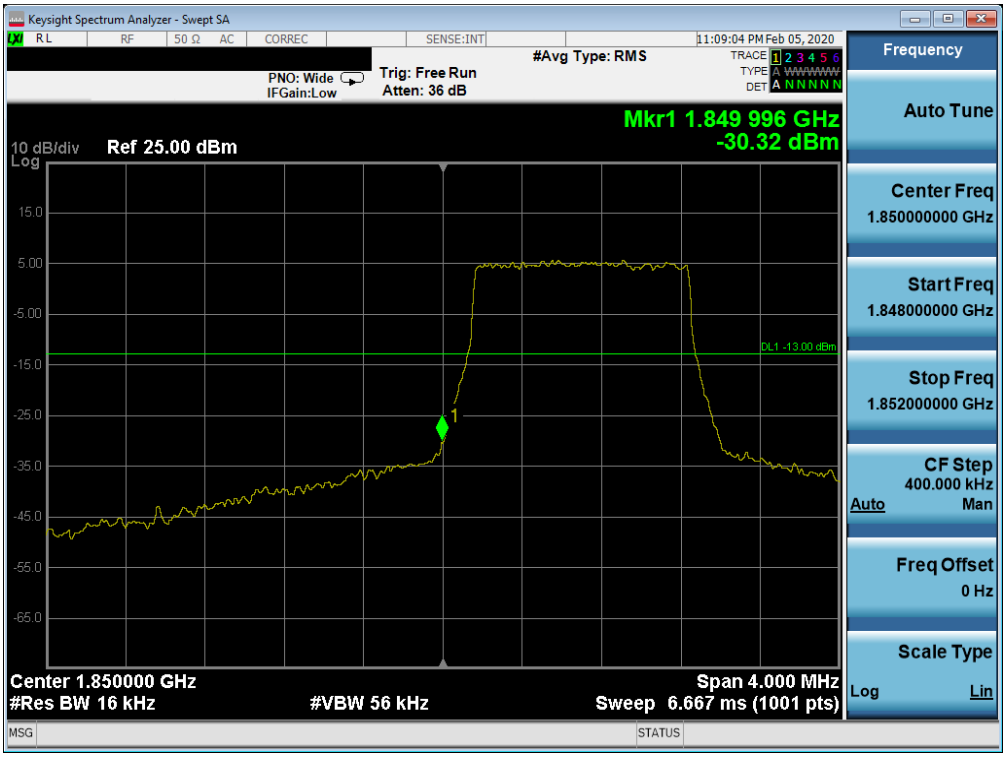
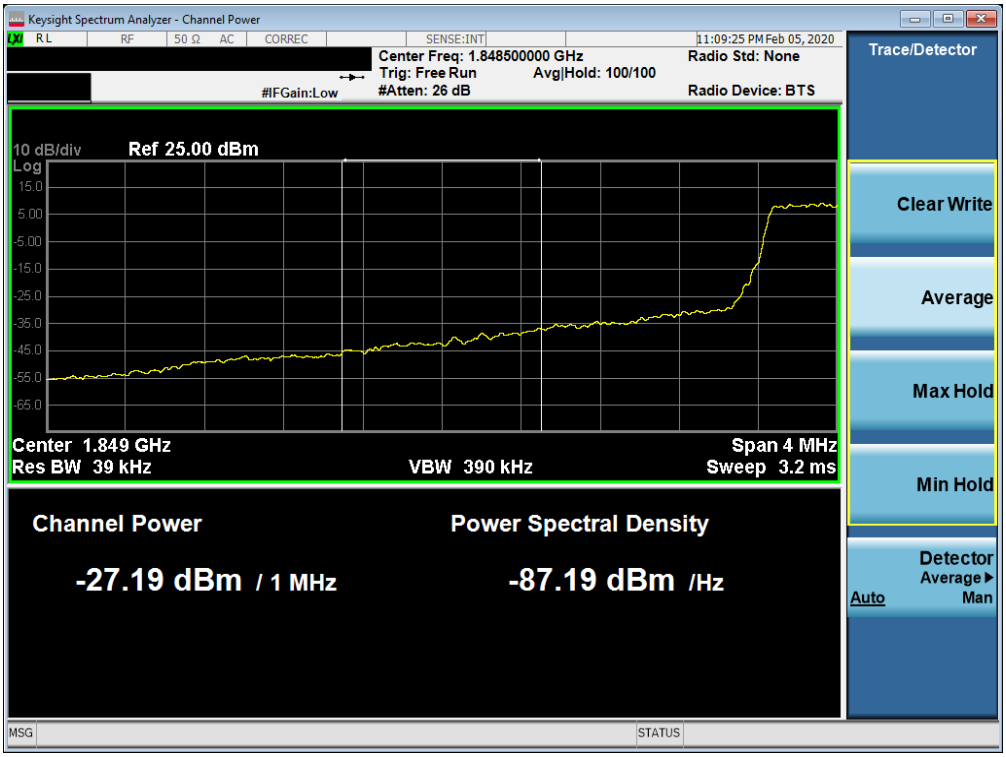
Band 2



Plot 7-170. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-171. Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

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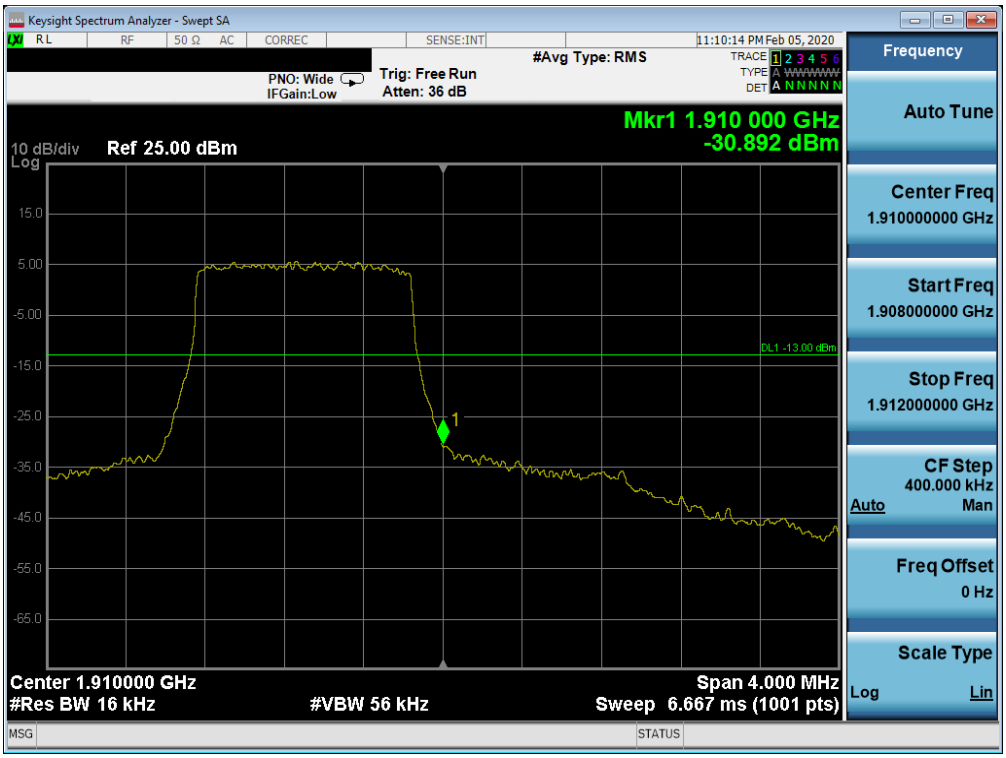
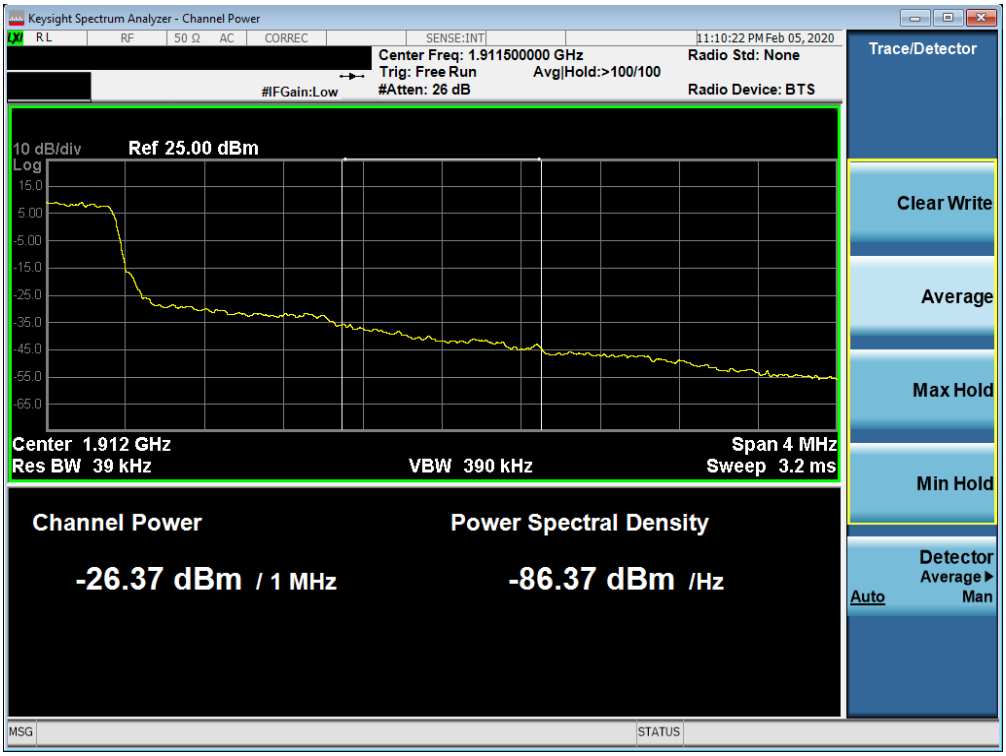


Plot 7-172. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-173. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

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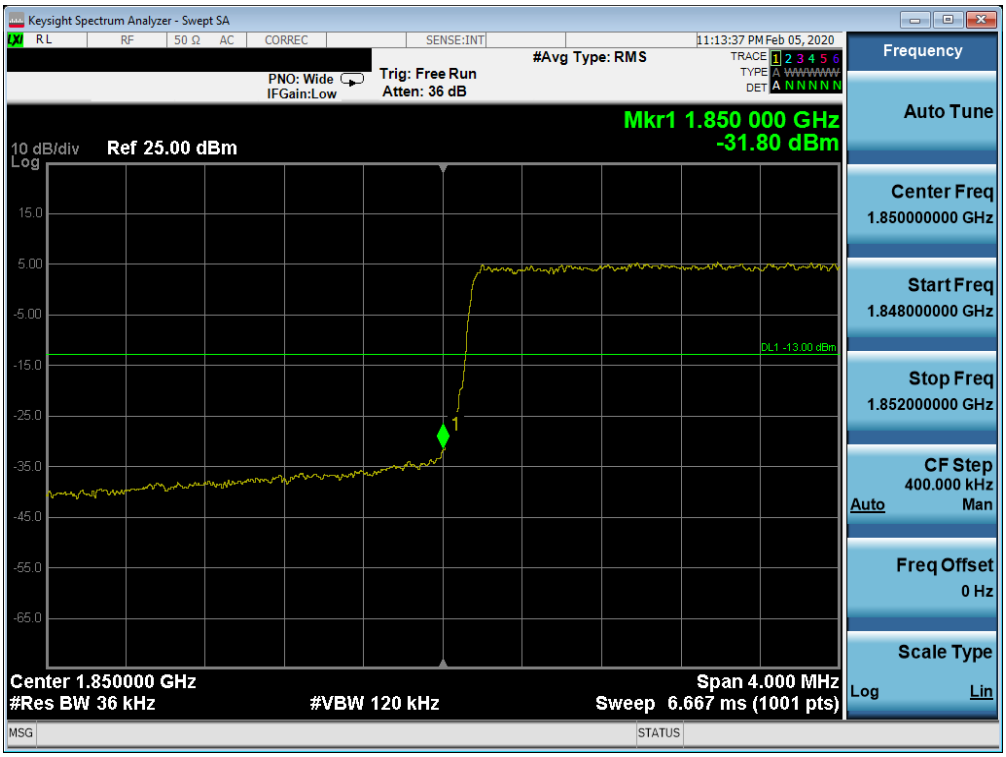
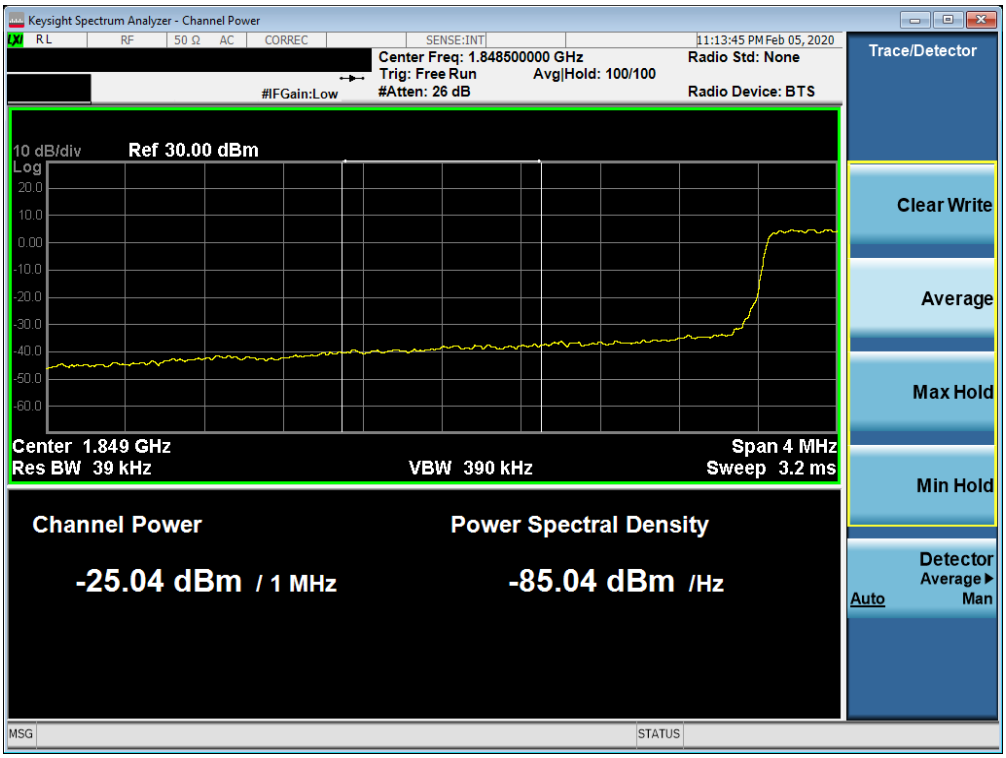


Plot 7-174. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-175. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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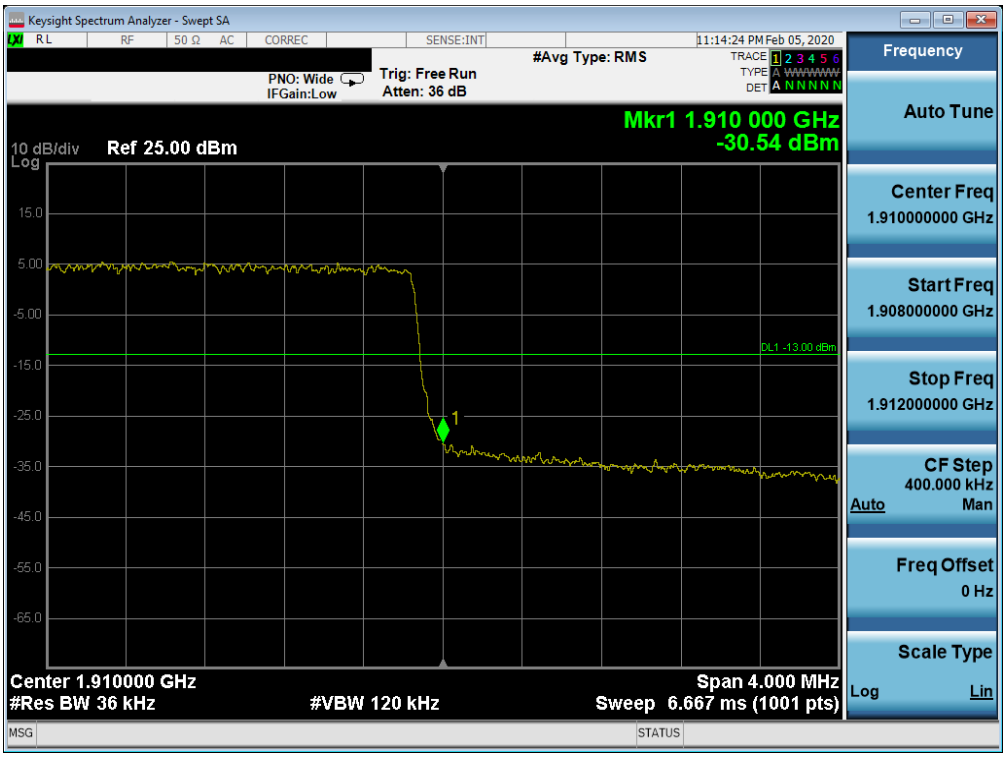
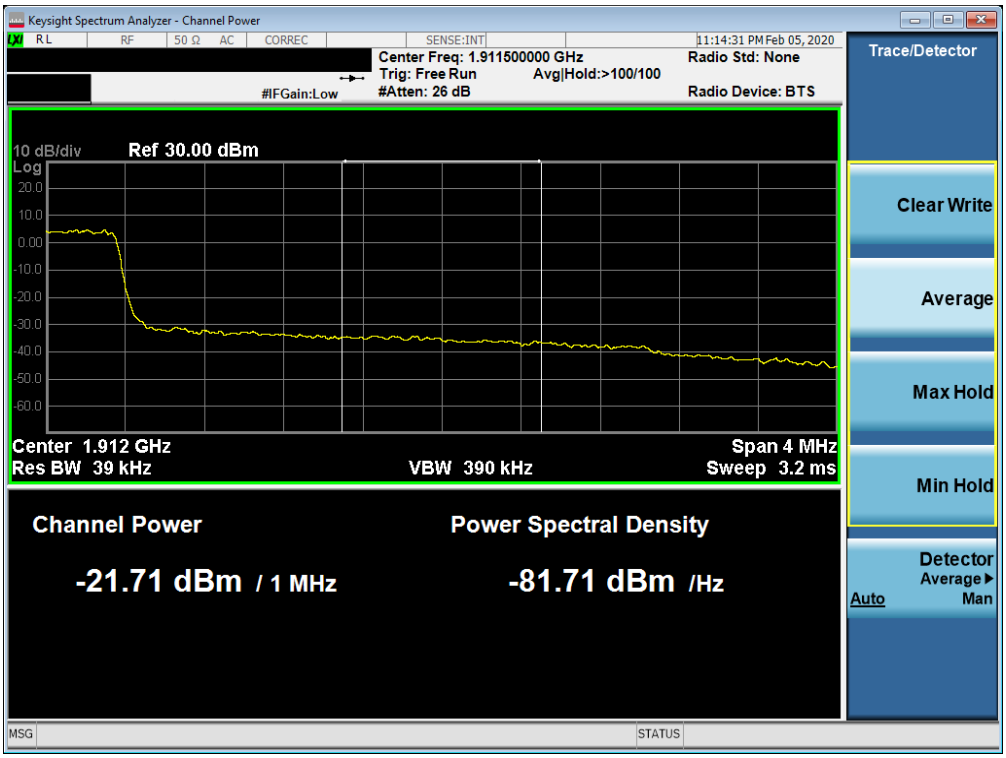


Plot 7-176. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-177. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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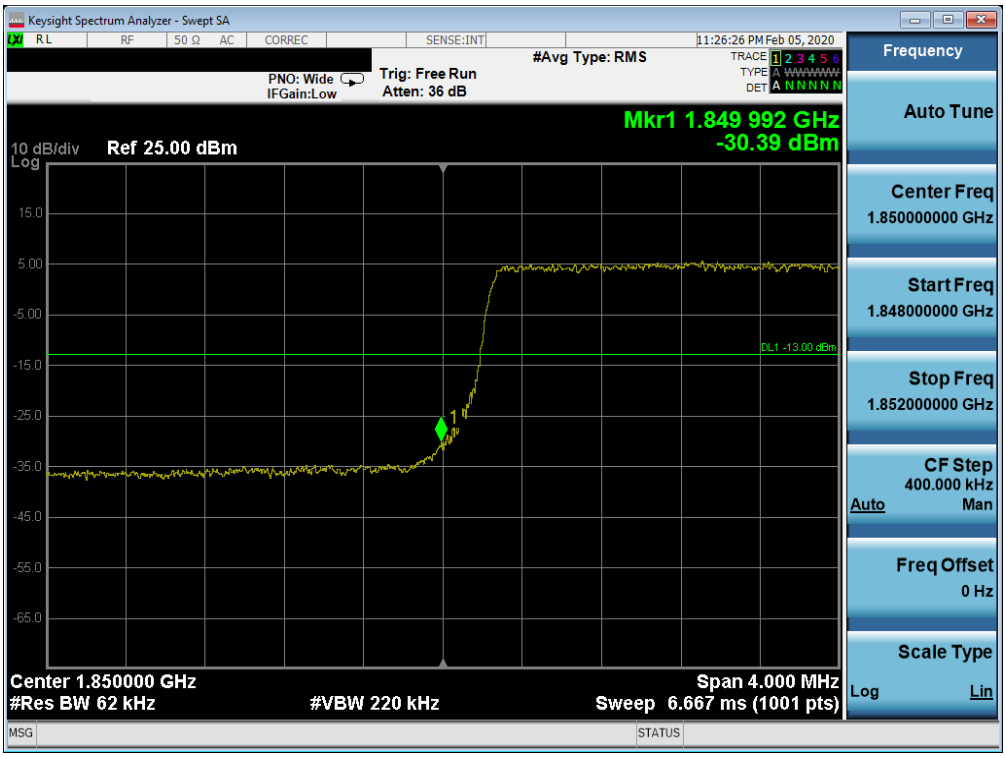
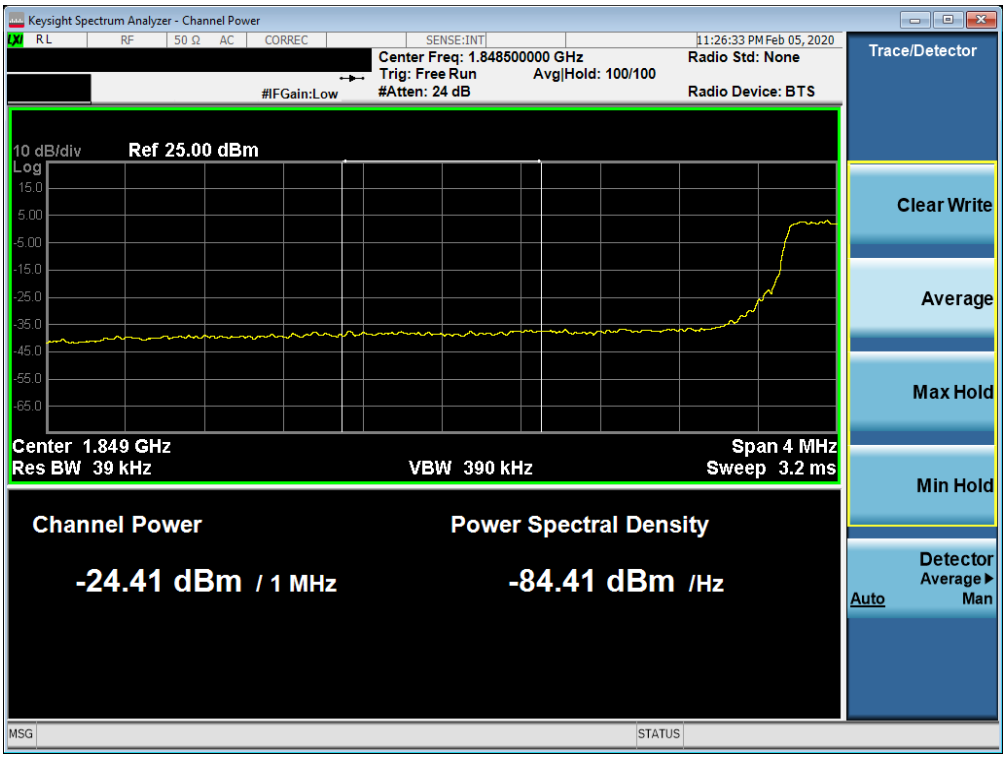


Plot 7-178. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-179. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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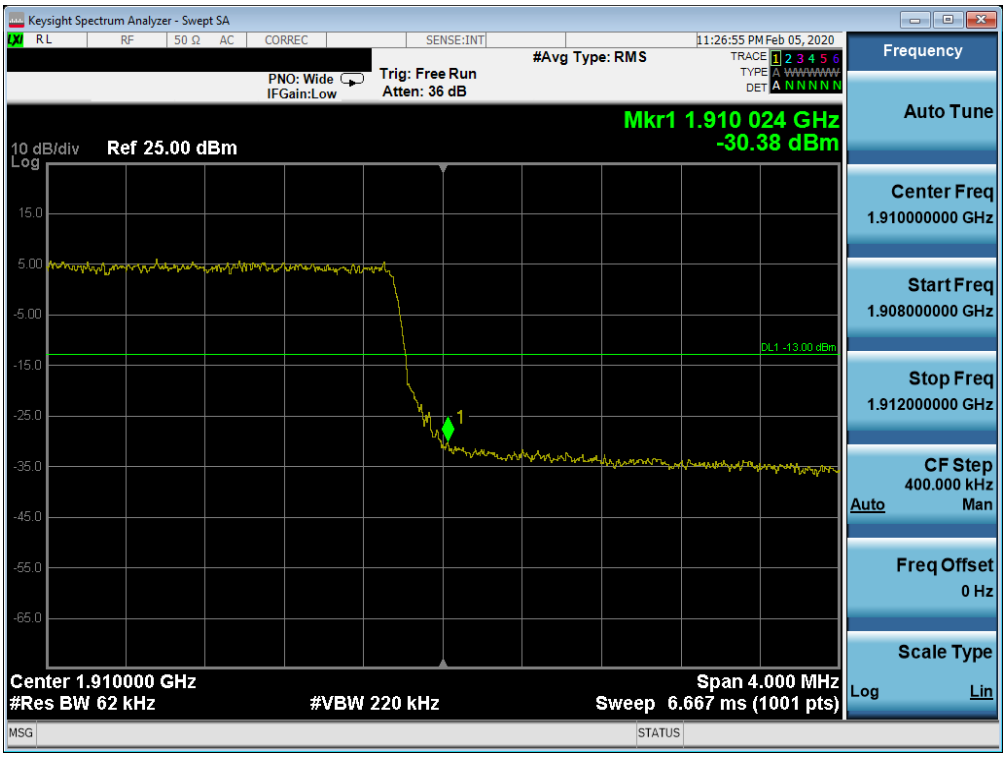
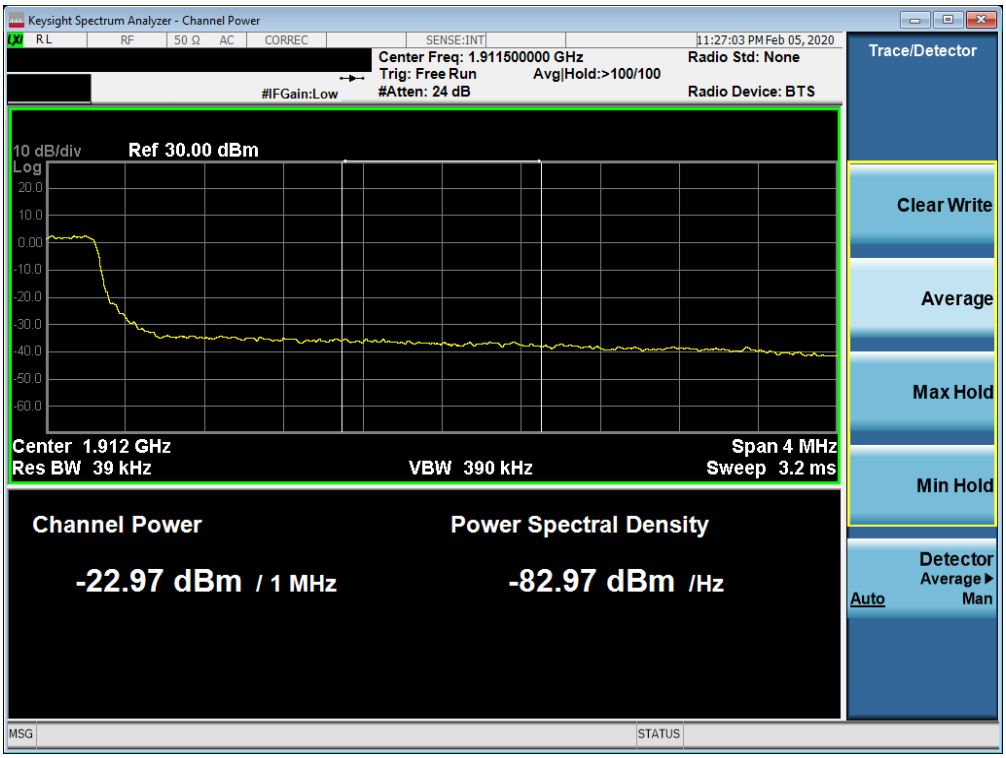


Plot 7-180. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-181. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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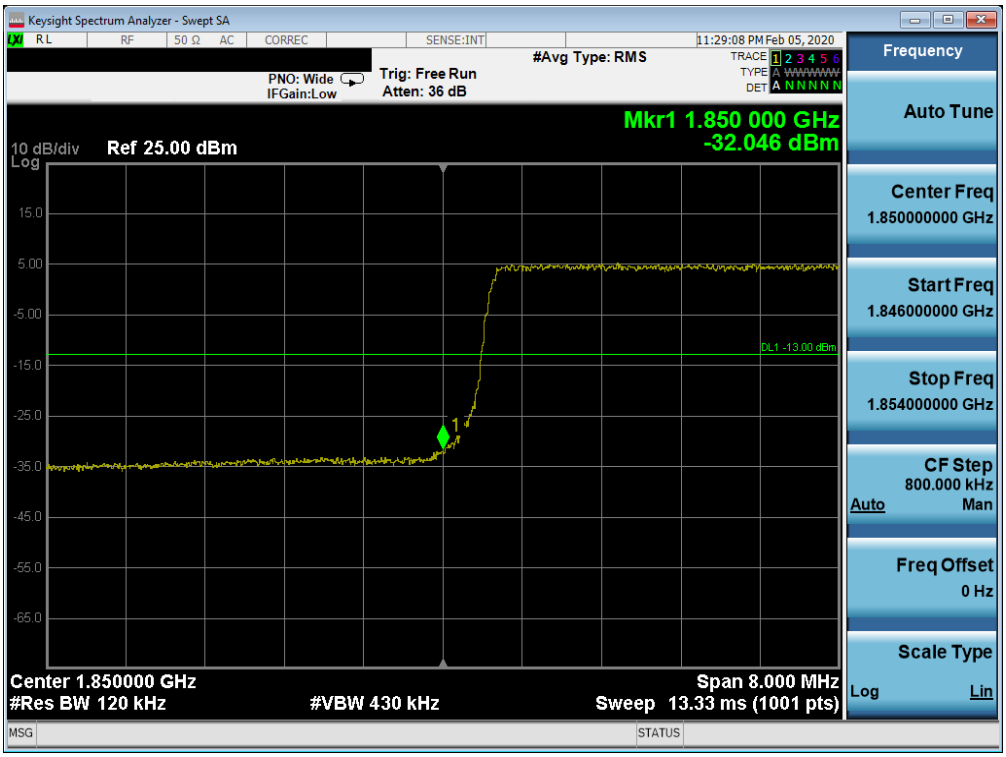
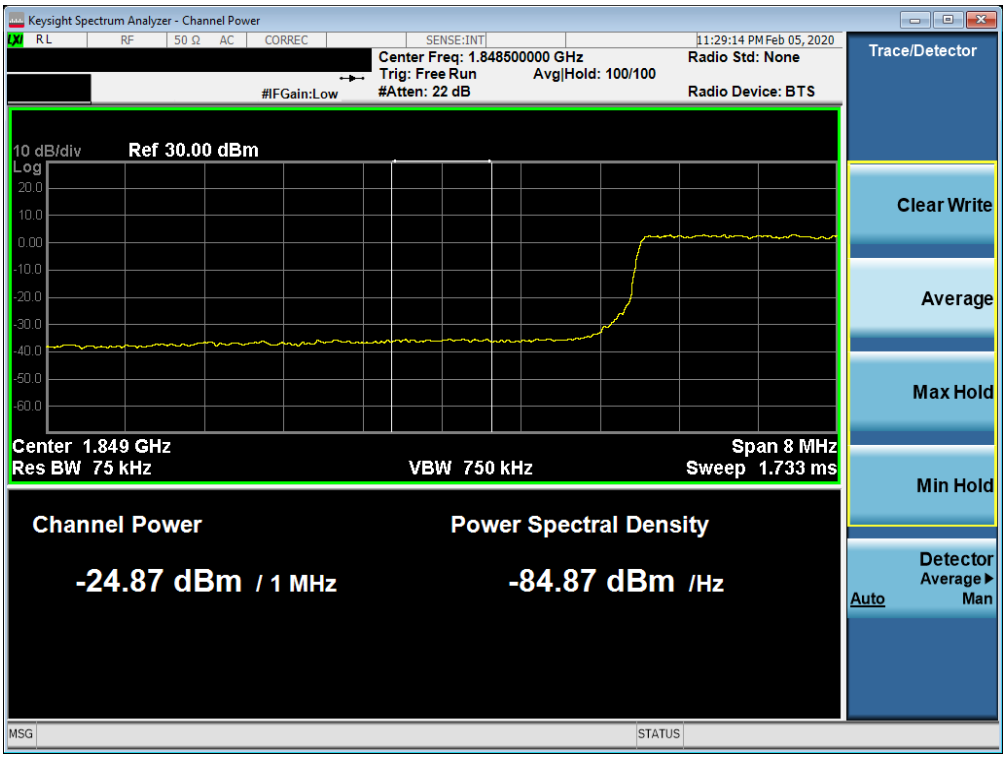


Plot 7-182. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-183. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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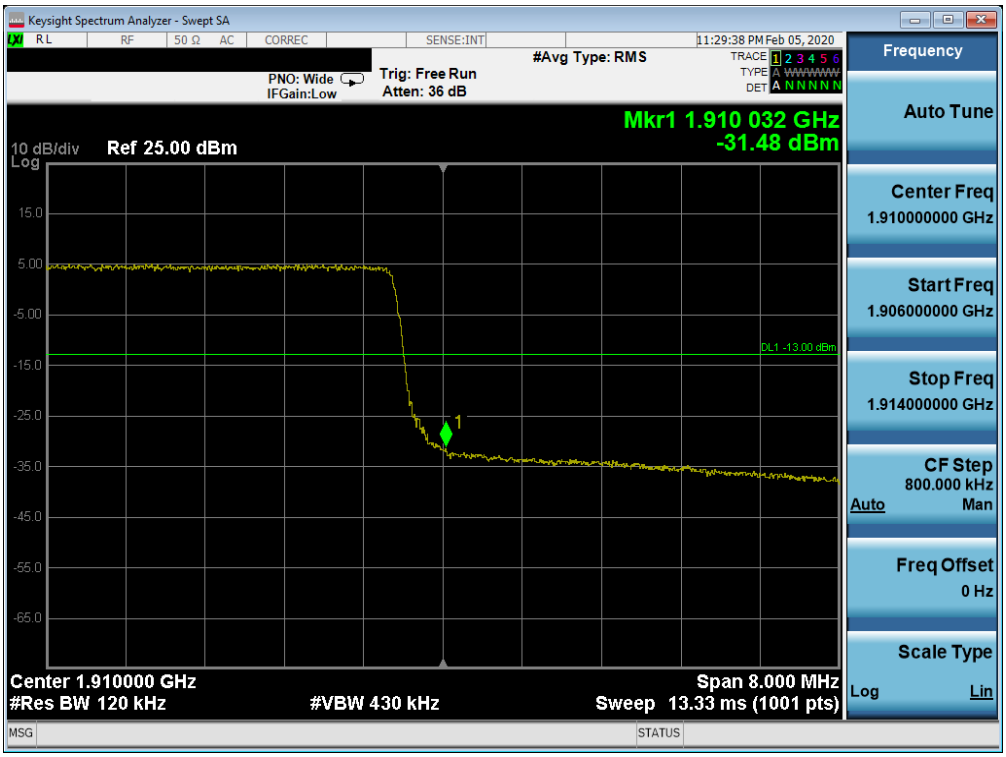

Plot 7-184. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-185. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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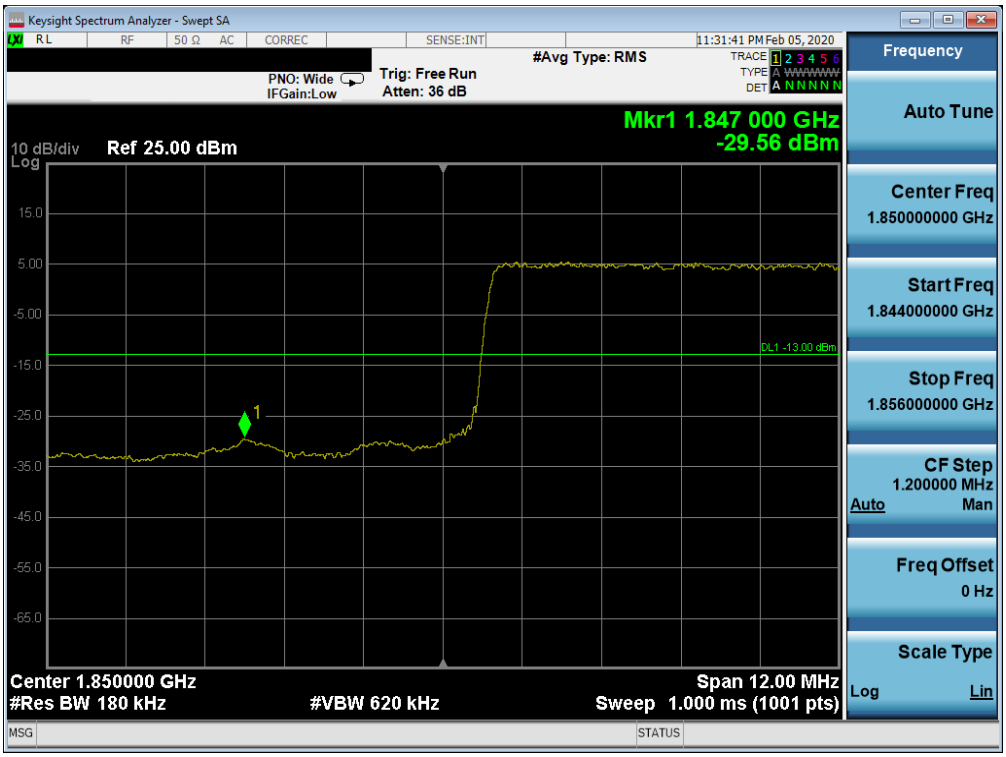
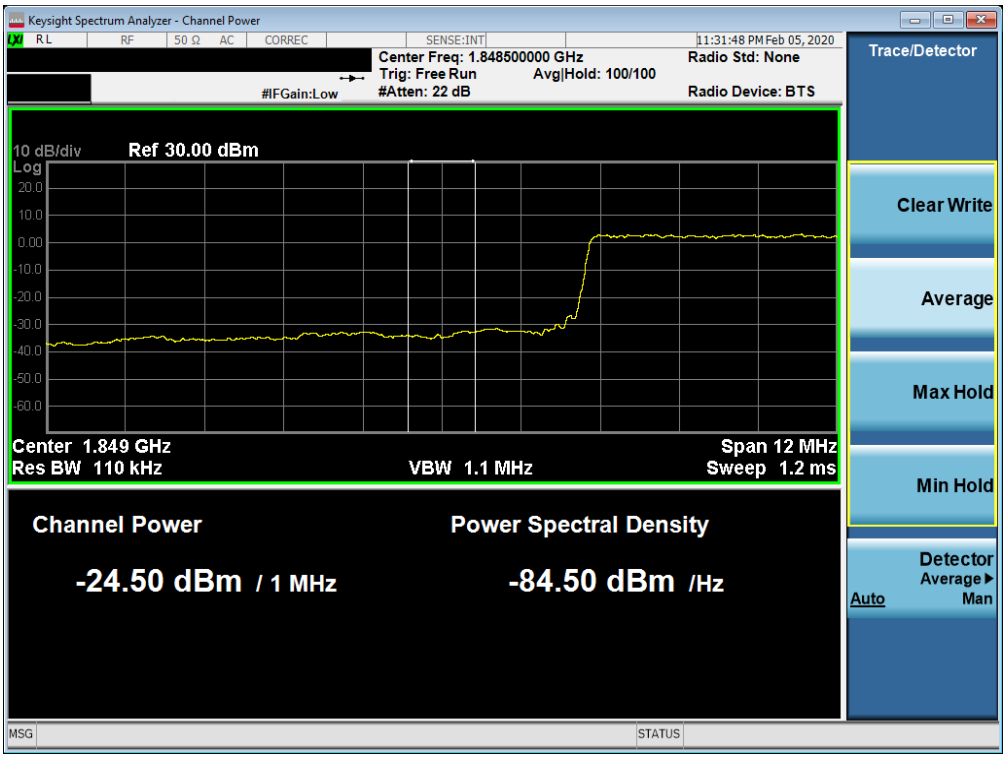


Plot 7-186. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-187. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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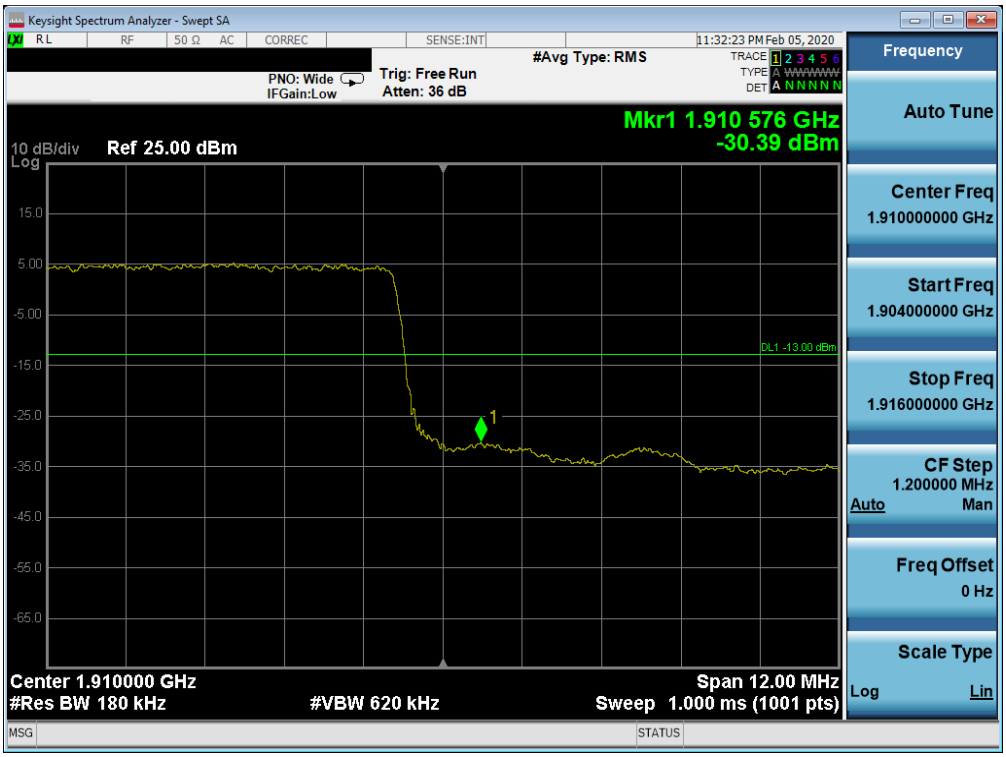
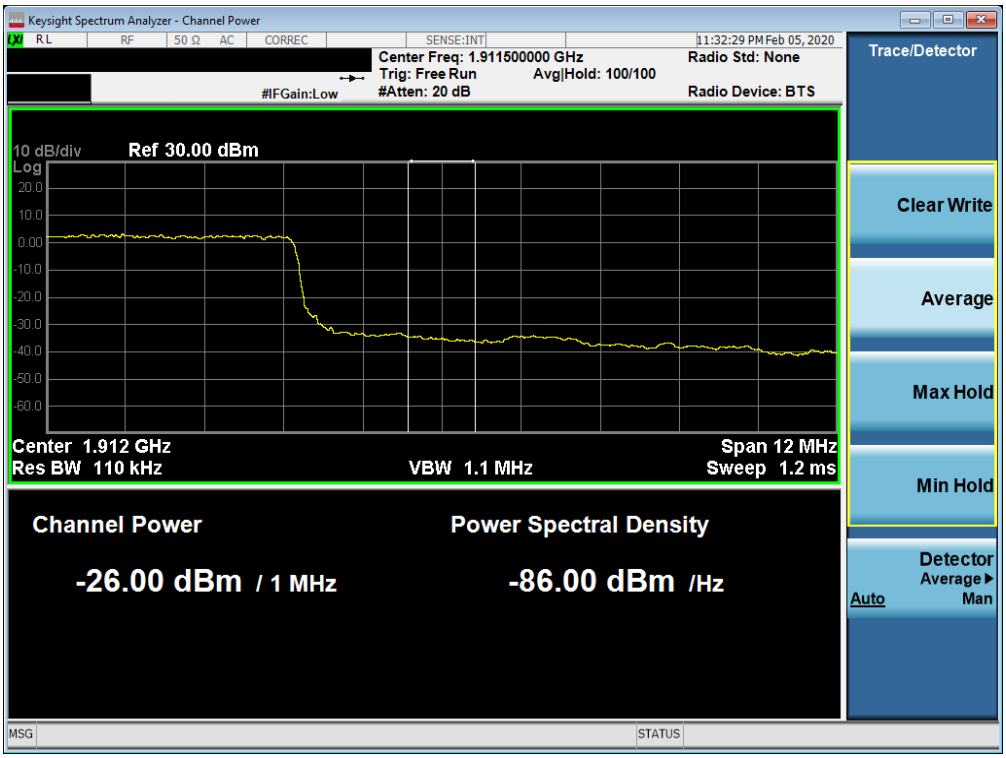


Plot 7-188. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-189. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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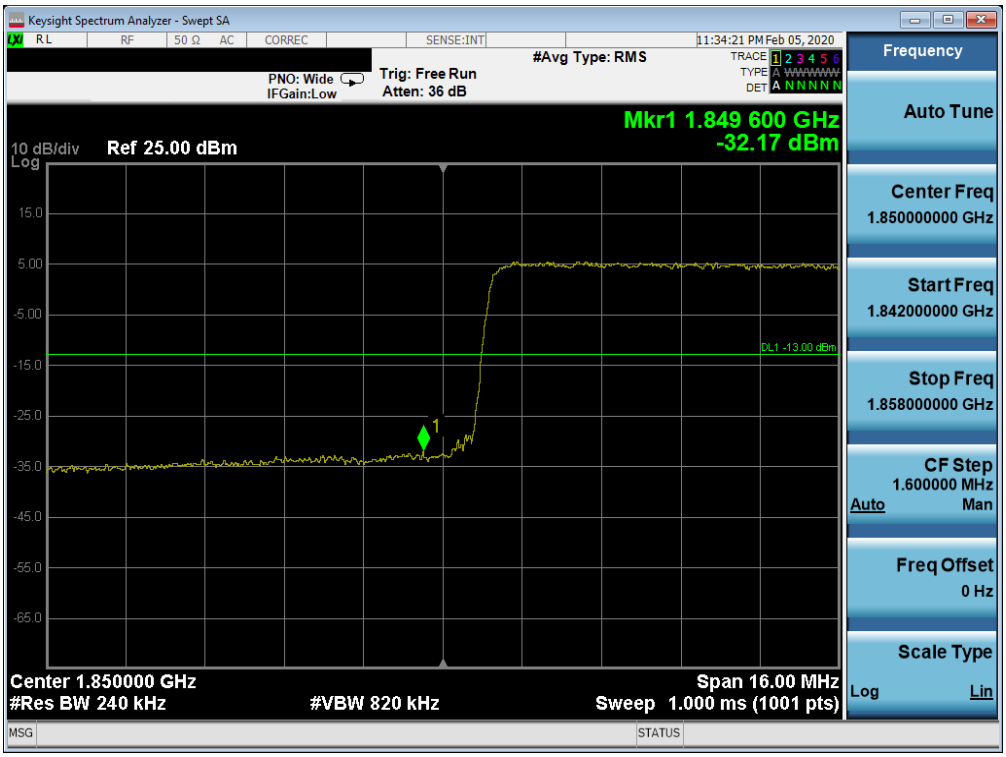
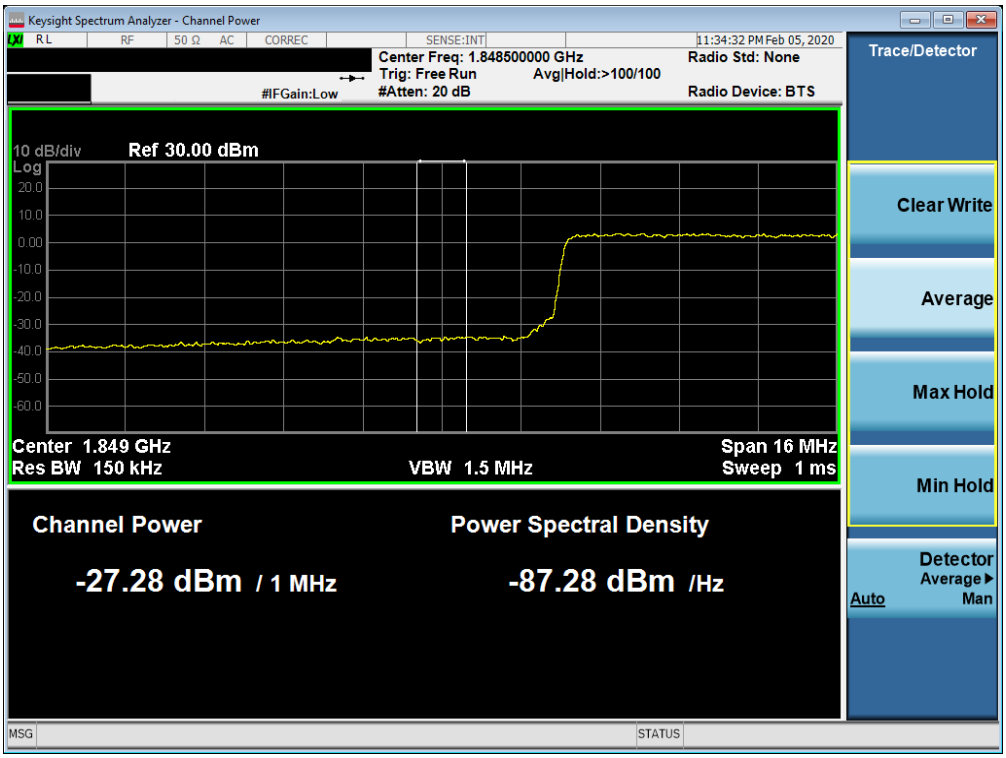


Plot 7-190. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-191. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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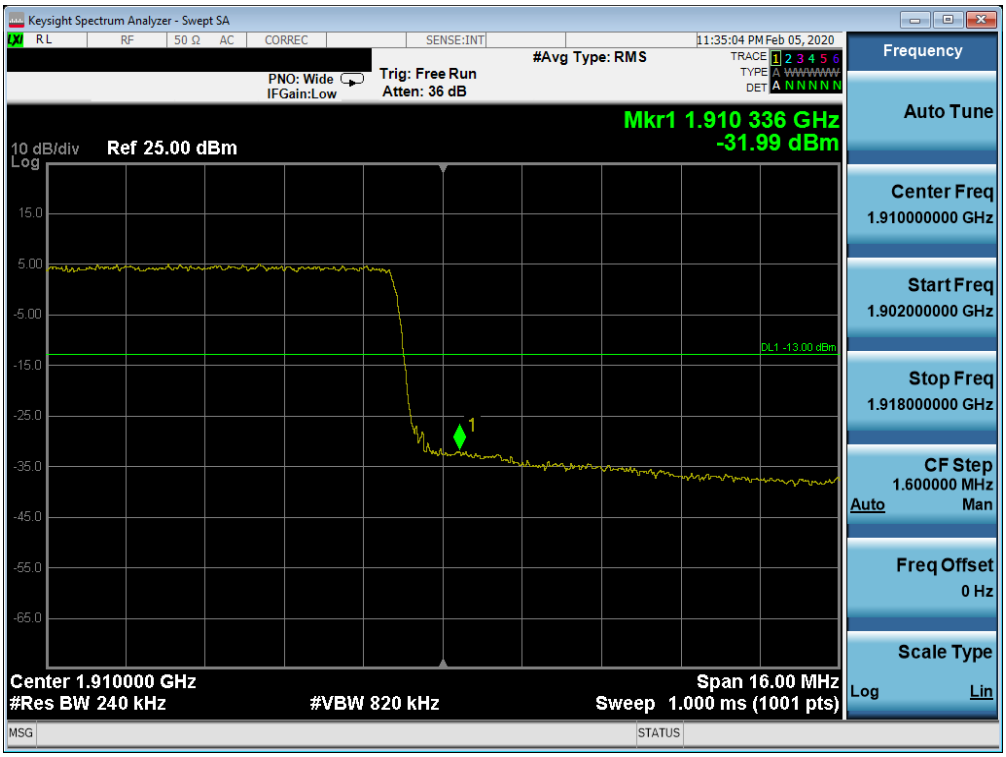
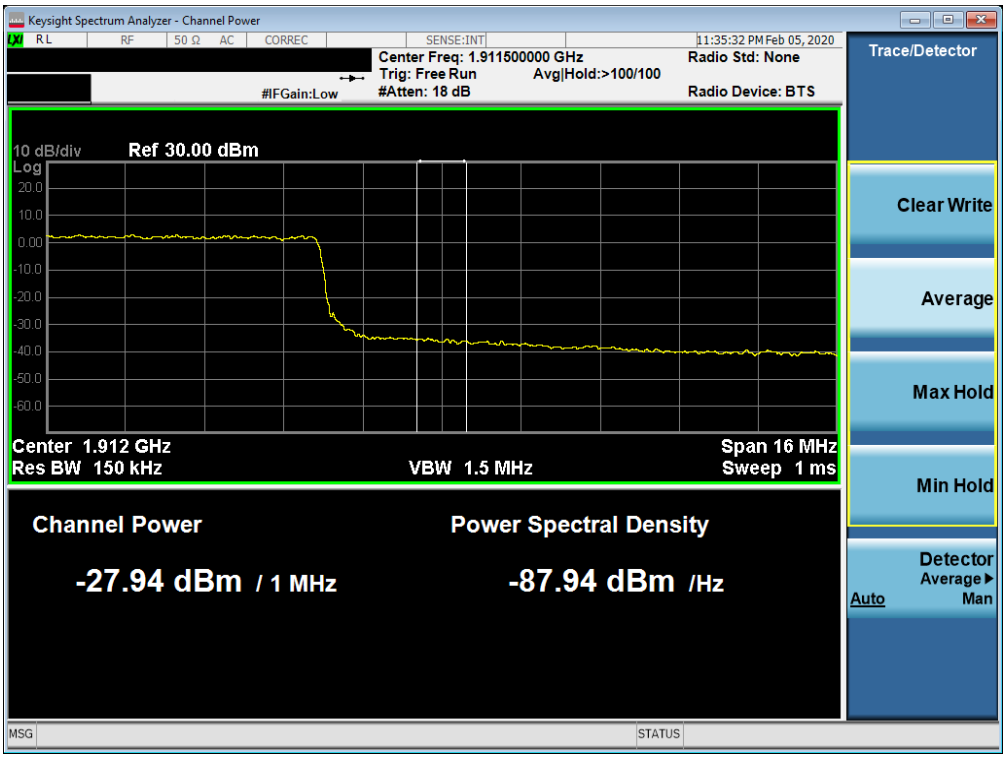


Plot 7-192. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-193. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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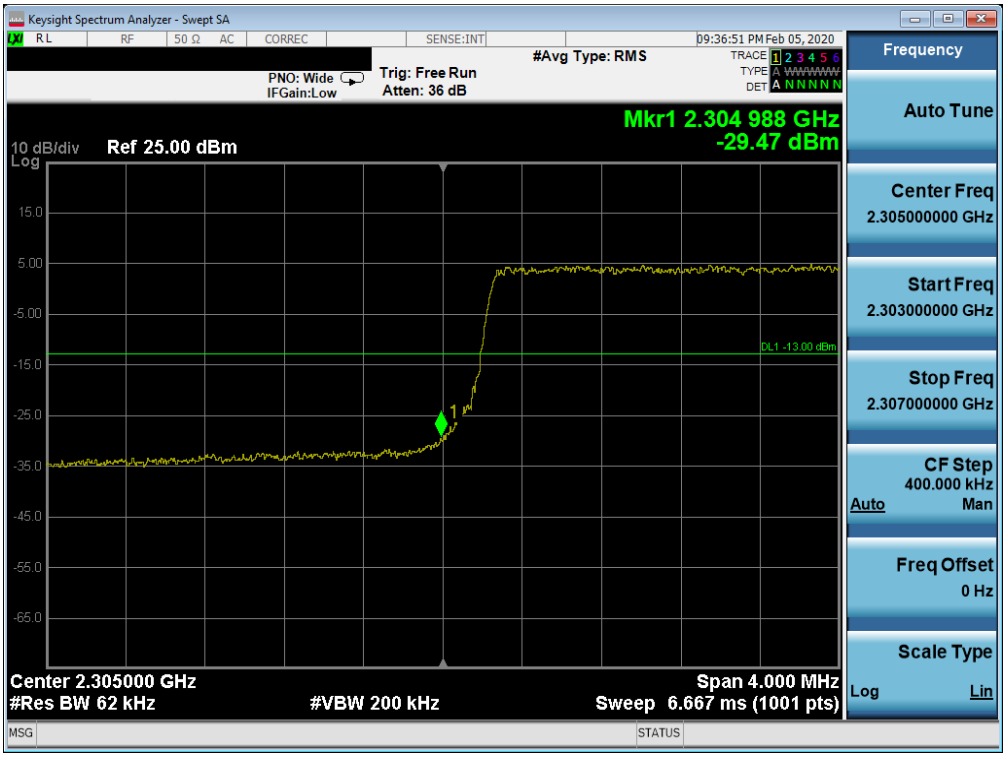
Band 30



Plot 7-194. Lower Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-195. Lower Extended Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

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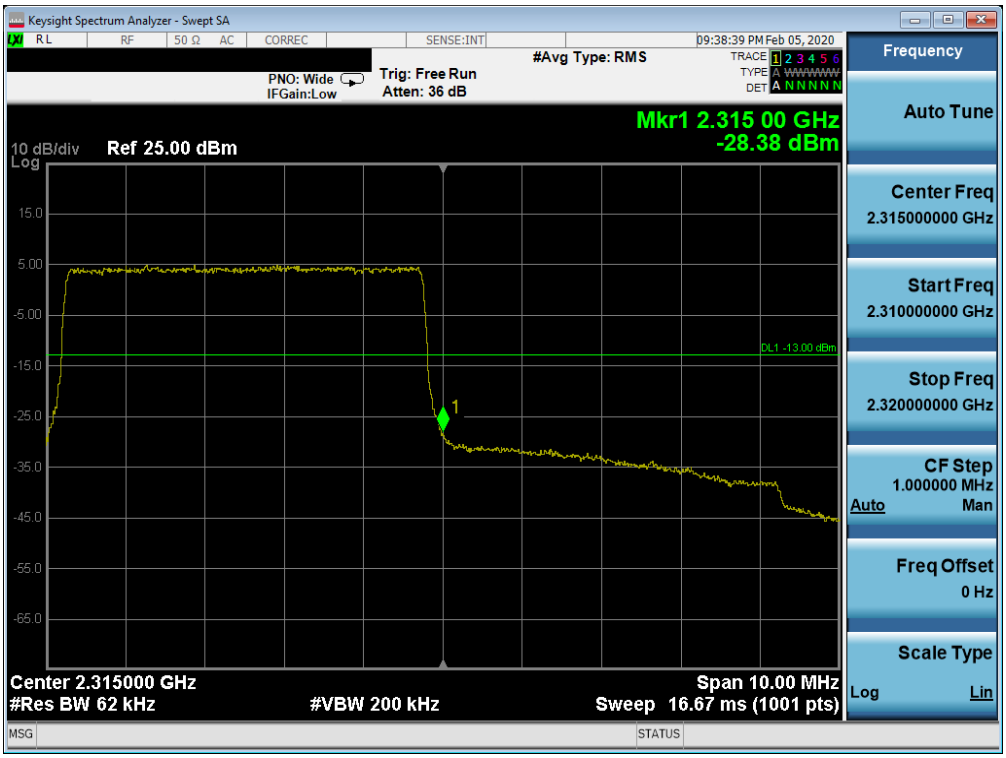
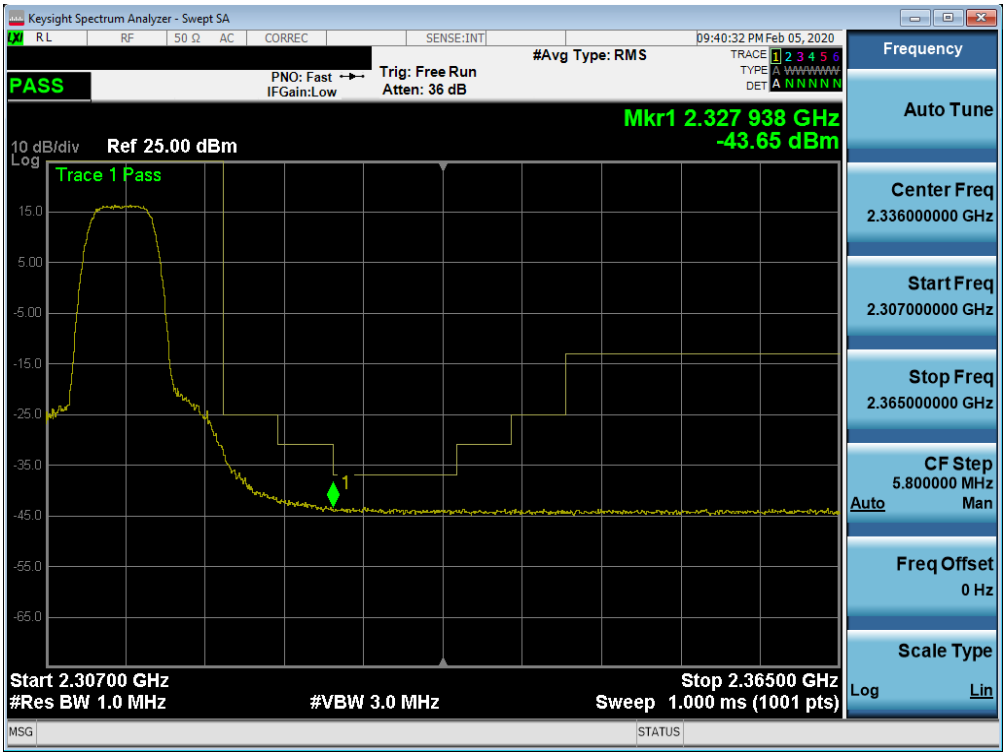


Plot 7-196. Upper Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-197. Upper Extended Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

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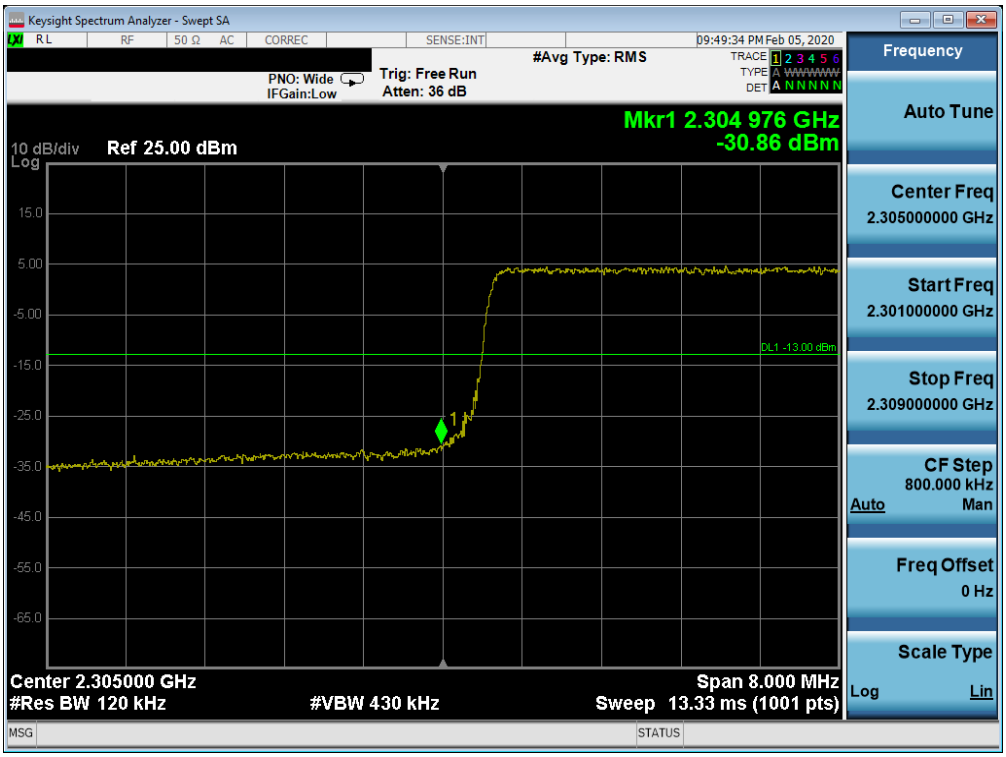
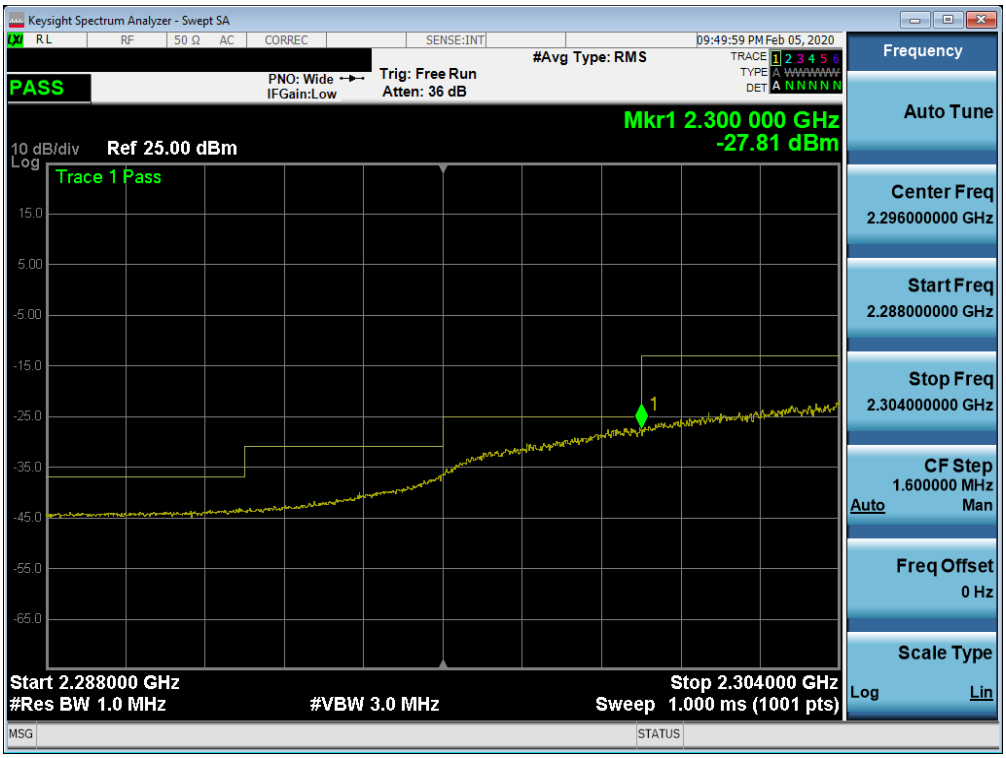


Plot 7-198. Lower Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-199. Lower Extended Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)

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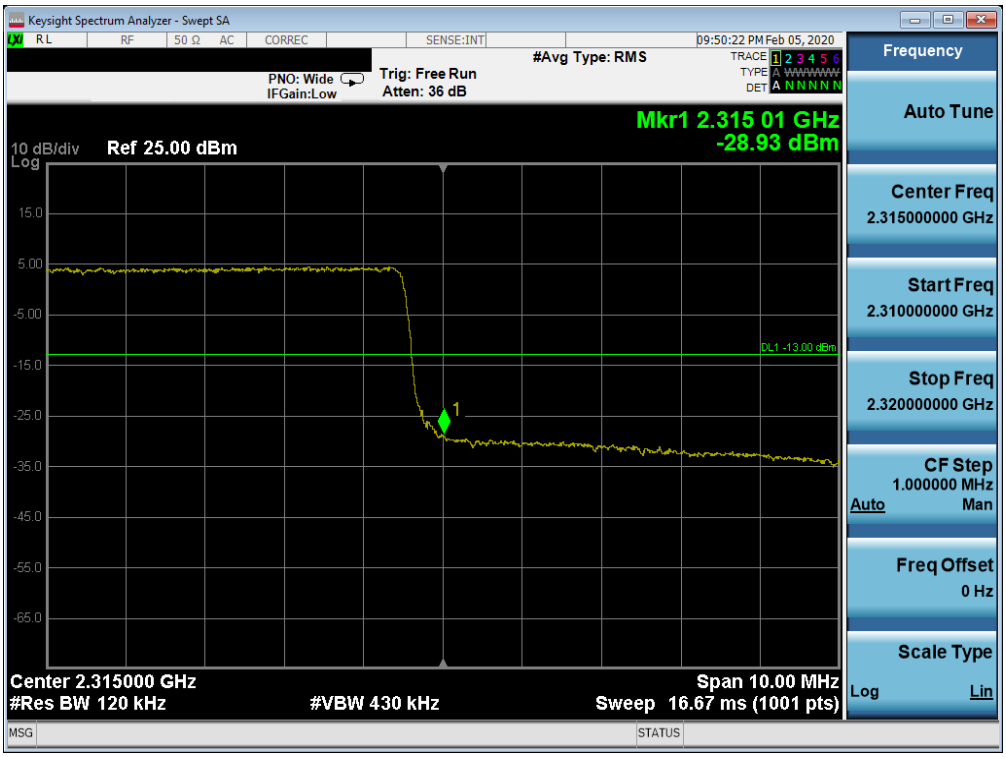
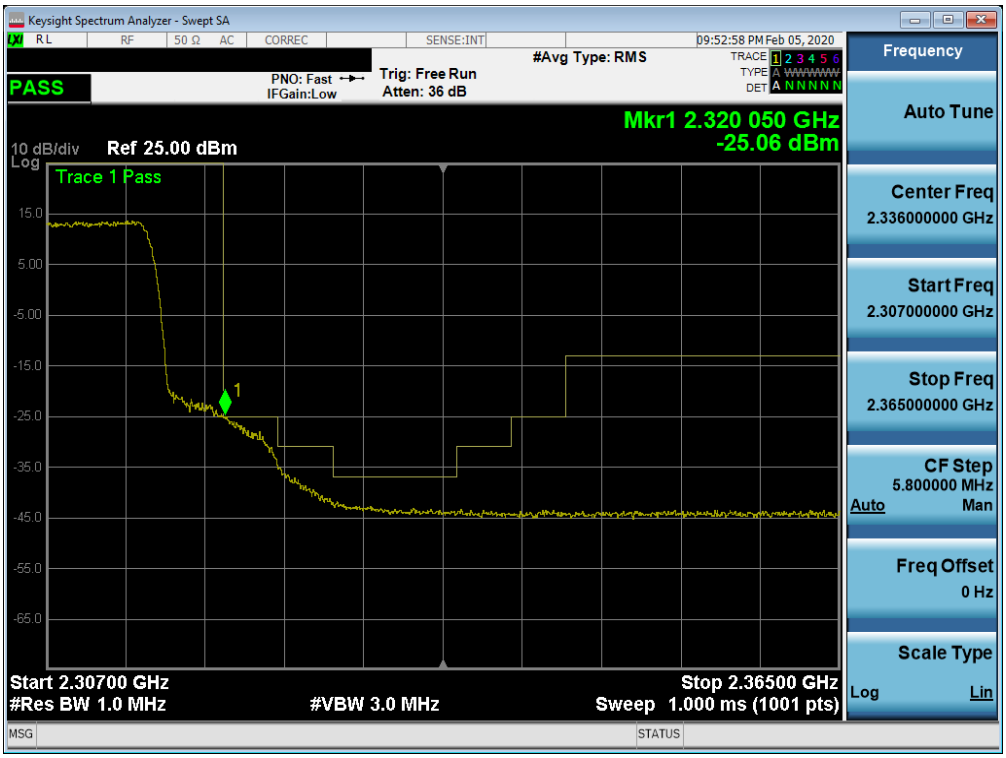


Plot 7-200. Upper Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-201. Upper Extended Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)

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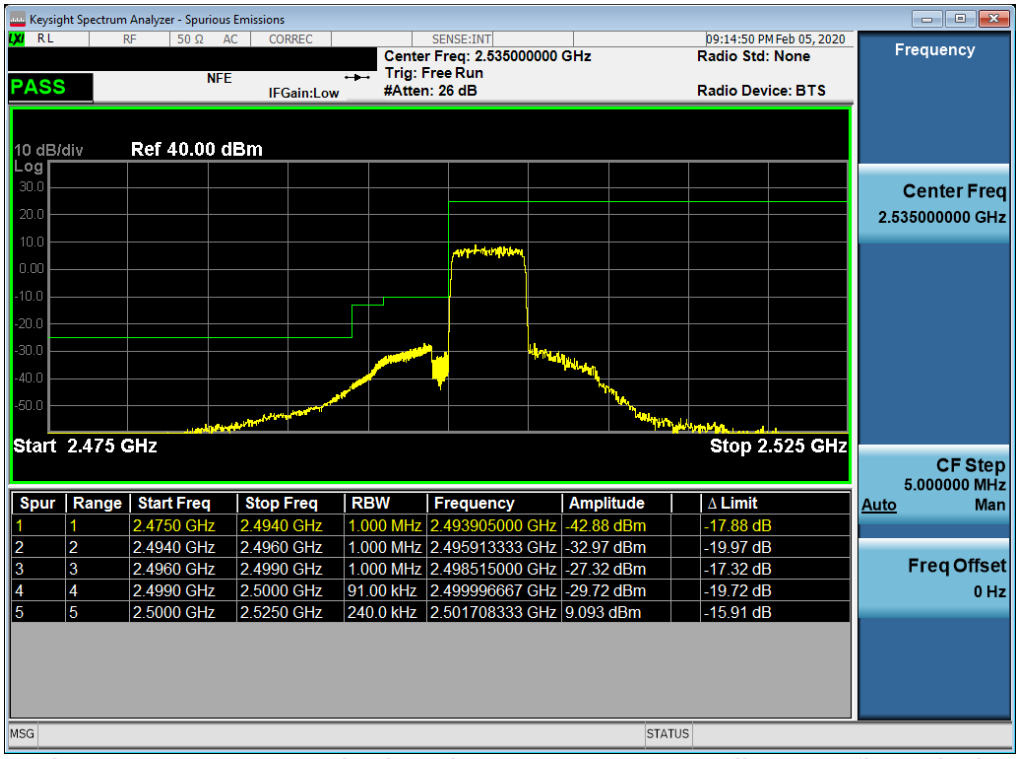
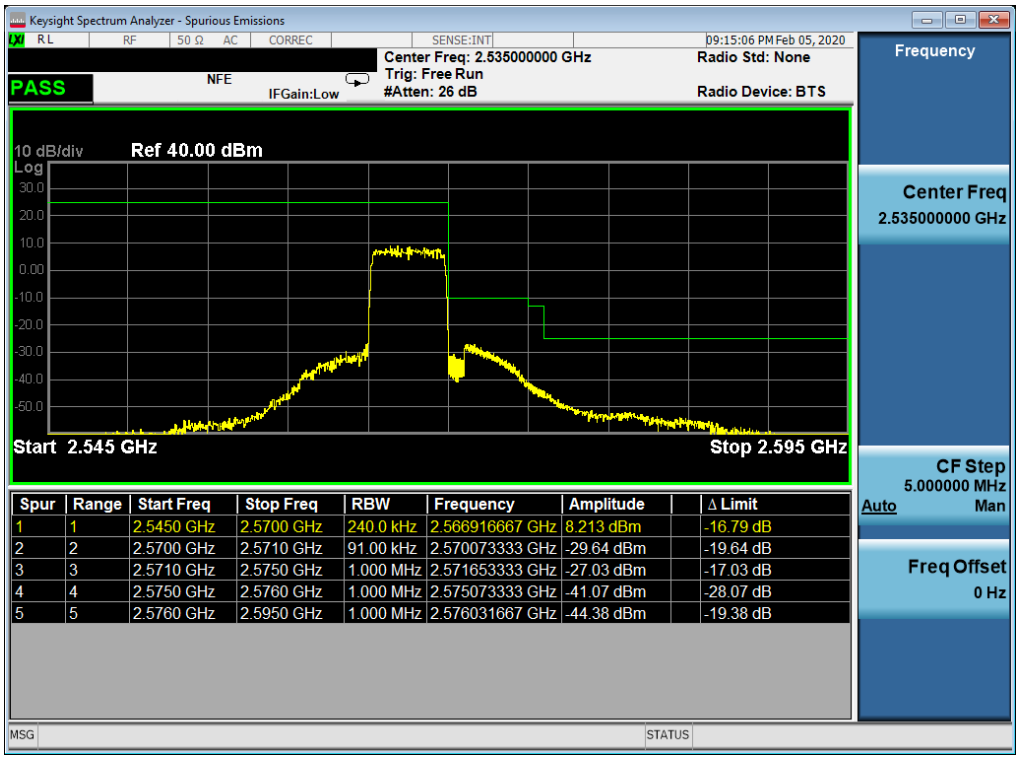
Band 7



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.4750 GHz	2.4940 GHz	1.000 MHz	2.493905000 GHz	-42.88 dBm		-17.88 dB
2	2	2.4940 GHz	2.4960 GHz	1.000 MHz	2.495913333 GHz	-32.97 dBm		-19.97 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498515000 GHz	-27.32 dBm		-17.32 dB
4	4	2.4990 GHz	2.5000 GHz	91.00 kHz	2.499996667 GHz	-29.72 dBm		-19.72 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.501708333 GHz	9.093 dBm		-15.91 dB

Plot 7-202. Lower ACP Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.566916667 GHz	8.213 dBm		-16.79 dB
2	2	2.5700 GHz	2.5710 GHz	91.00 kHz	2.570073333 GHz	-29.64 dBm		-19.64 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571653333 GHz	-27.03 dBm		-17.03 dB
4	4	2.5750 GHz	2.5760 GHz	1.000 MHz	2.575073333 GHz	-41.07 dBm		-28.07 dB
5	5	2.5760 GHz	2.5950 GHz	1.000 MHz	2.576031667 GHz	-44.38 dBm		-19.38 dB

Plot 7-203. Upper ACP Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)

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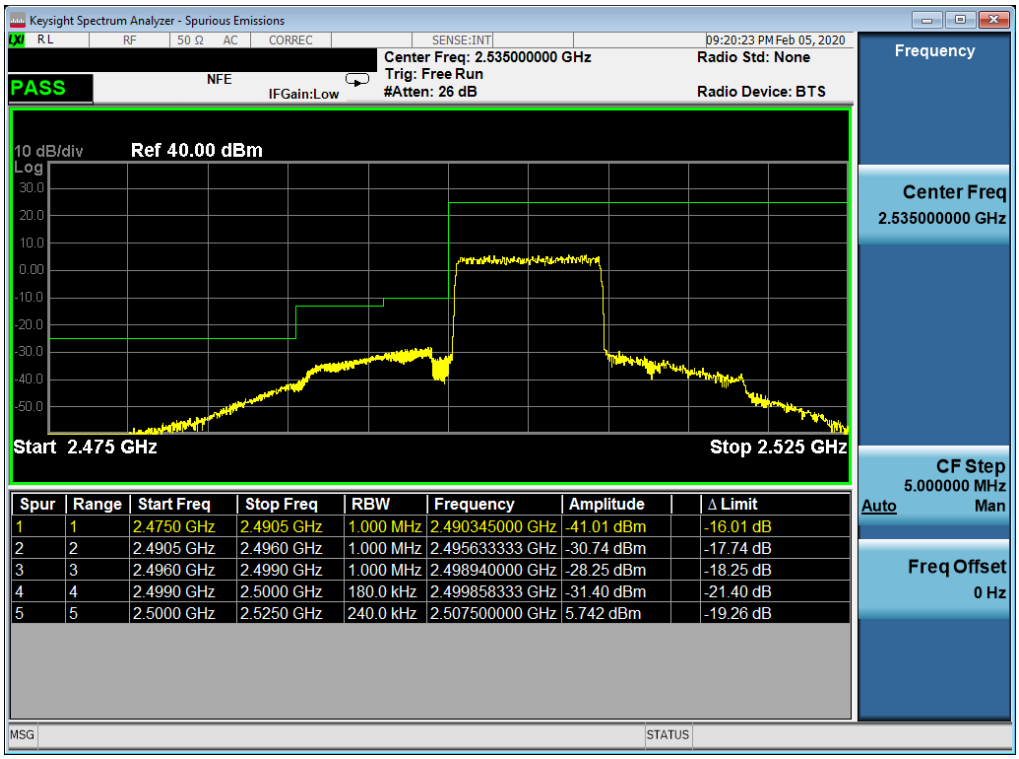
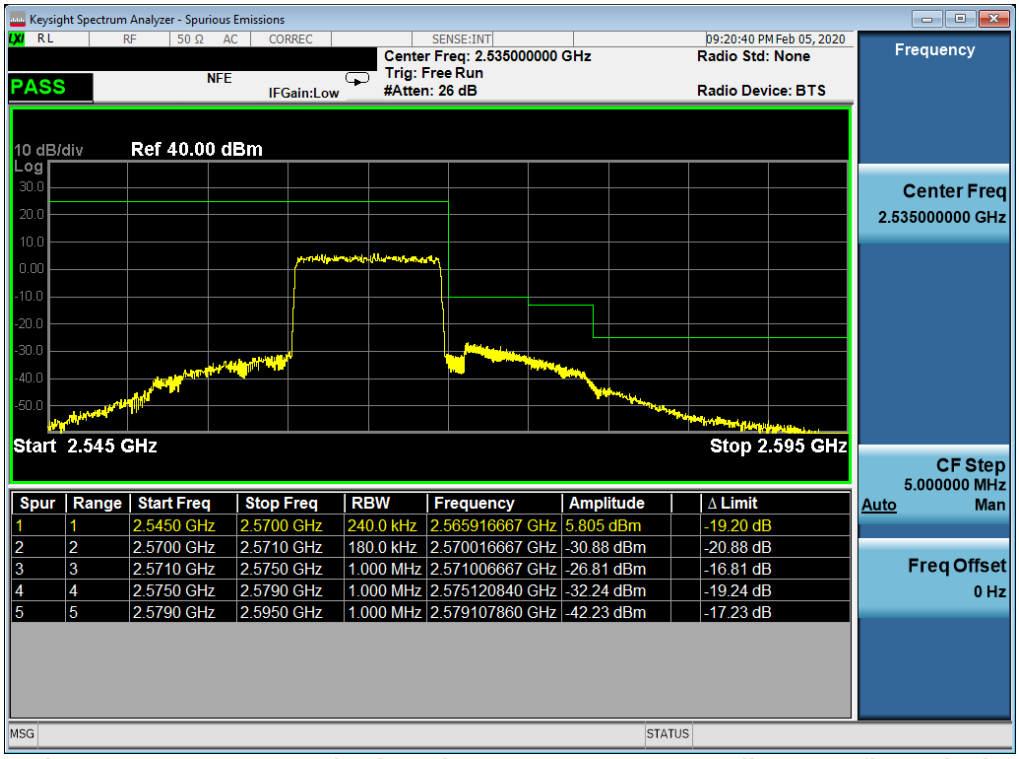


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490345000 GHz	-41.01 dBm	-16.01 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495633333 GHz	-30.74 dBm	-17.74 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498940000 GHz	-28.25 dBm	-18.25 dB
4	4	2.4990 GHz	2.5000 GHz	180.0 kHz	2.499858333 GHz	-31.40 dBm	-21.40 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.507500000 GHz	5.742 dBm	-19.26 dB

Plot 7-204. Lower ACP Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.565916667 GHz	5.805 dBm	-19.20 dB
2	2	2.5700 GHz	2.5710 GHz	180.0 kHz	2.570016667 GHz	-30.88 dBm	-20.88 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571006667 GHz	-26.81 dBm	-16.81 dB
4	4	2.5750 GHz	2.5790 GHz	1.000 MHz	2.575120840 GHz	-32.24 dBm	-19.24 dB
5	5	2.5790 GHz	2.5950 GHz	1.000 MHz	2.579107860 GHz	-42.23 dBm	-17.23 dB

Plot 7-205. Upper ACP Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)

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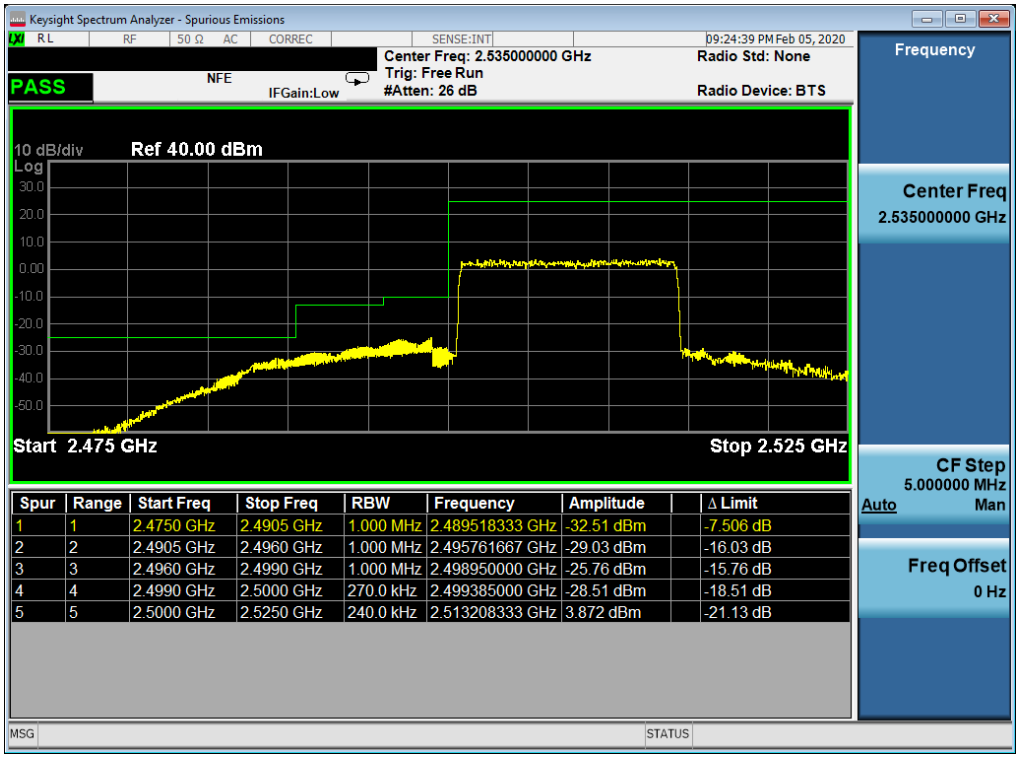

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489518333 GHz	-32.51 dBm	-7.506 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495761667 GHz	-29.03 dBm	-16.03 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498950000 GHz	-25.76 dBm	-15.76 dB
4	4	2.4990 GHz	2.5000 GHz	270.0 kHz	2.499385000 GHz	-28.51 dBm	-18.51 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.513208333 GHz	3.872 dBm	-21.13 dB

Plot 7-206. Lower ACP Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.557916667 GHz	4.456 dBm	-20.54 dB
2	2	2.5700 GHz	2.5710 GHz	270.0 kHz	2.570573333 GHz	-28.52 dBm	-18.52 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571186667 GHz	-24.68 dBm	-14.68 dB
4	4	2.5750 GHz	2.5835 GHz	1.000 MHz	2.575508860 GHz	-27.81 dBm	-14.81 dB
5	5	2.5835 GHz	2.5950 GHz	1.000 MHz	2.583596190 GHz	-39.57 dBm	-14.57 dB

Plot 7-207. Upper ACP Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

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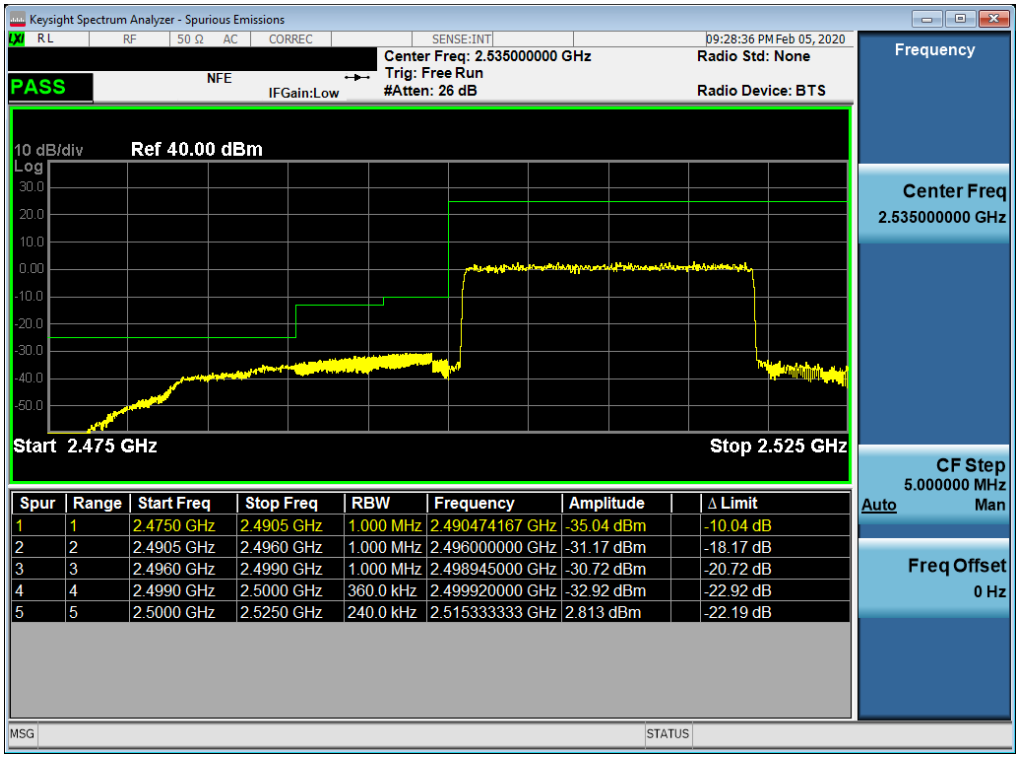

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490474167 GHz	-35.04 dBm	-10.04 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.496000000 GHz	-31.17 dBm	-18.17 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498945000 GHz	-30.72 dBm	-20.72 dB
4	4	2.4990 GHz	2.5000 GHz	360.0 kHz	2.499920000 GHz	-32.92 dBm	-22.92 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.515333333 GHz	2.813 dBm	-22.19 dB

Plot 7-208. Lower ACP Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.555000000 GHz	3.077 dBm	-21.92 dB
2	2	2.5700 GHz	2.5710 GHz	360.0 kHz	2.570180000 GHz	-32.46 dBm	-22.46 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571080000 GHz	-29.55 dBm	-19.55 dB
4	4	2.5750 GHz	2.5880 GHz	1.000 MHz	2.575695147 GHz	-32.81 dBm	-19.81 dB
5	5	2.5880 GHz	2.5950 GHz	1.000 MHz	2.588092050 GHz	-45.03 dBm	-20.03 dB

Plot 7-209. Upper ACP Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)

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7.5 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW ≥ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

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

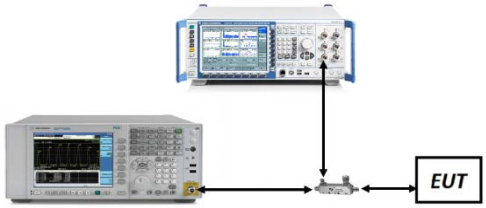

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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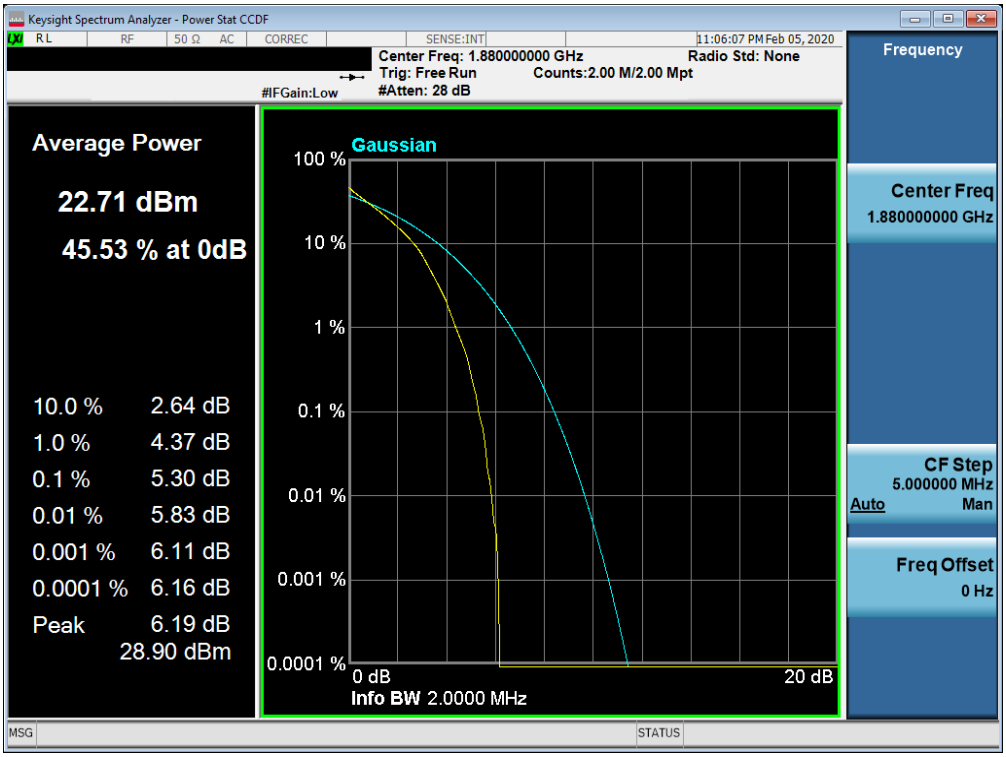
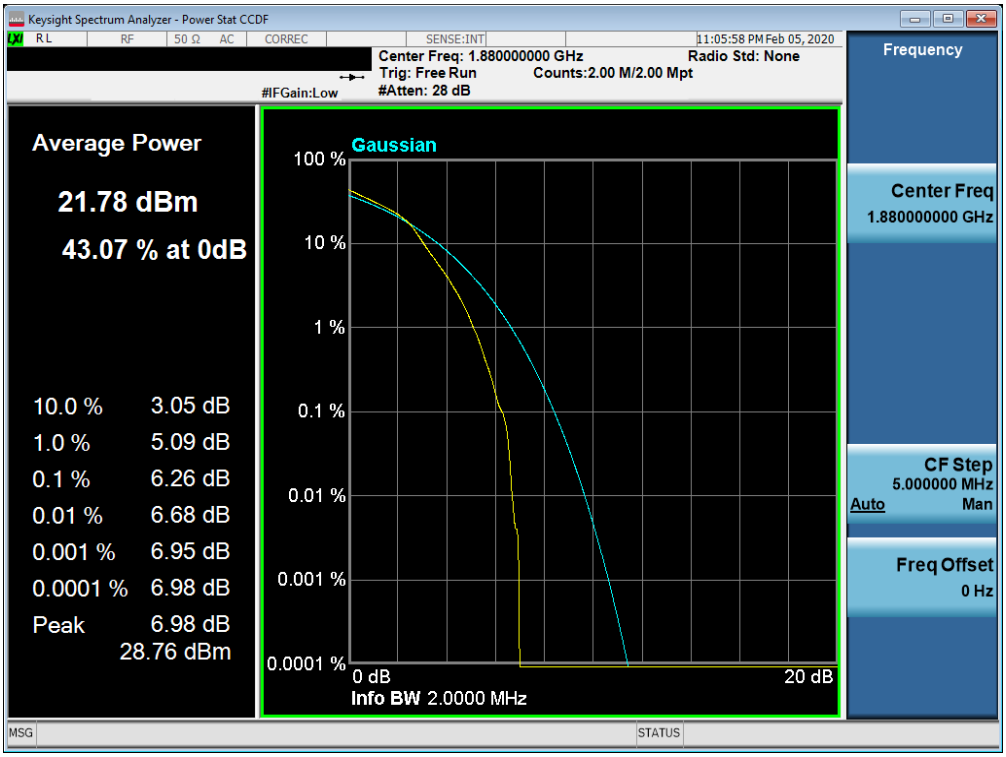
Band 2



Plot 7-210. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-211. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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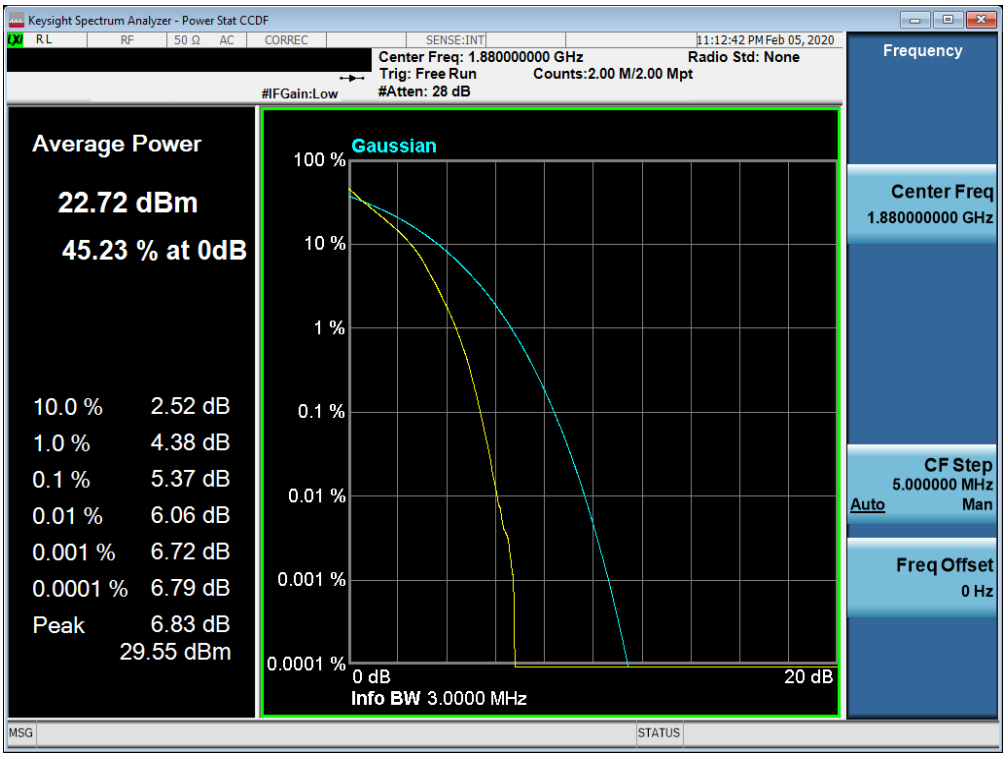
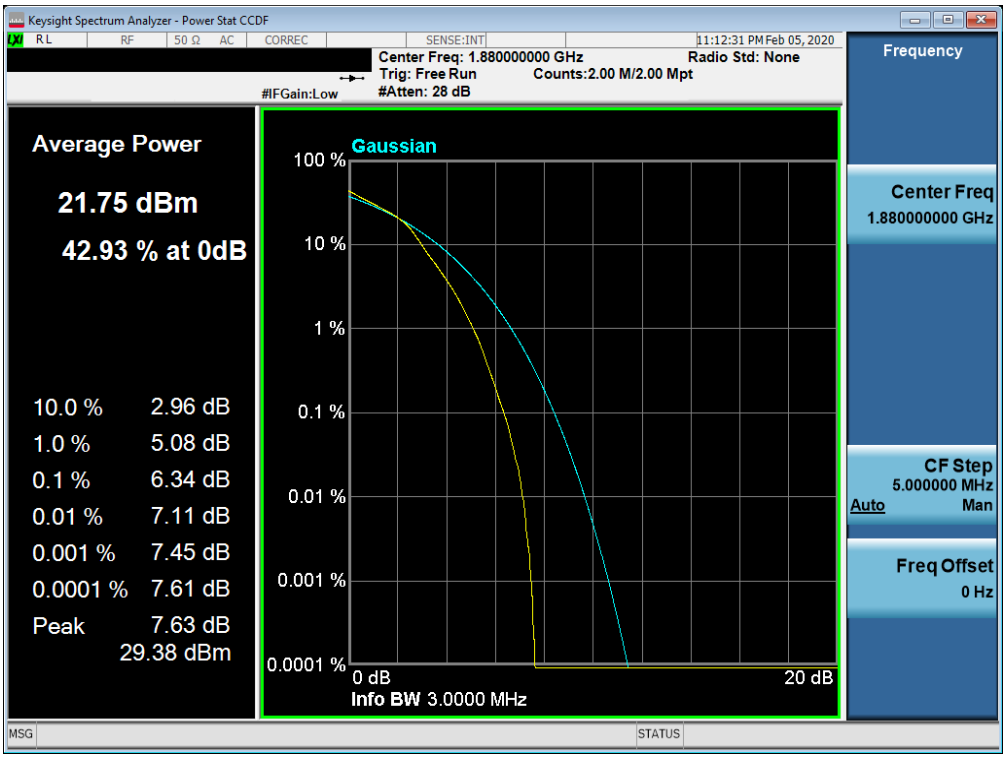


Plot 7-212. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-213. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

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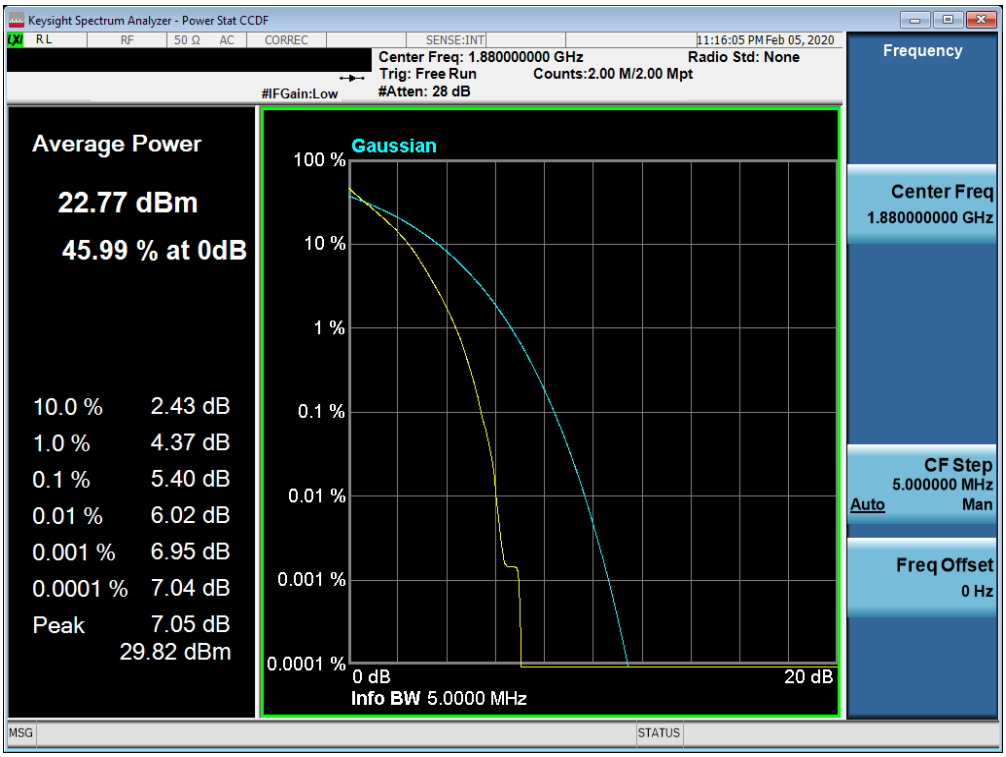
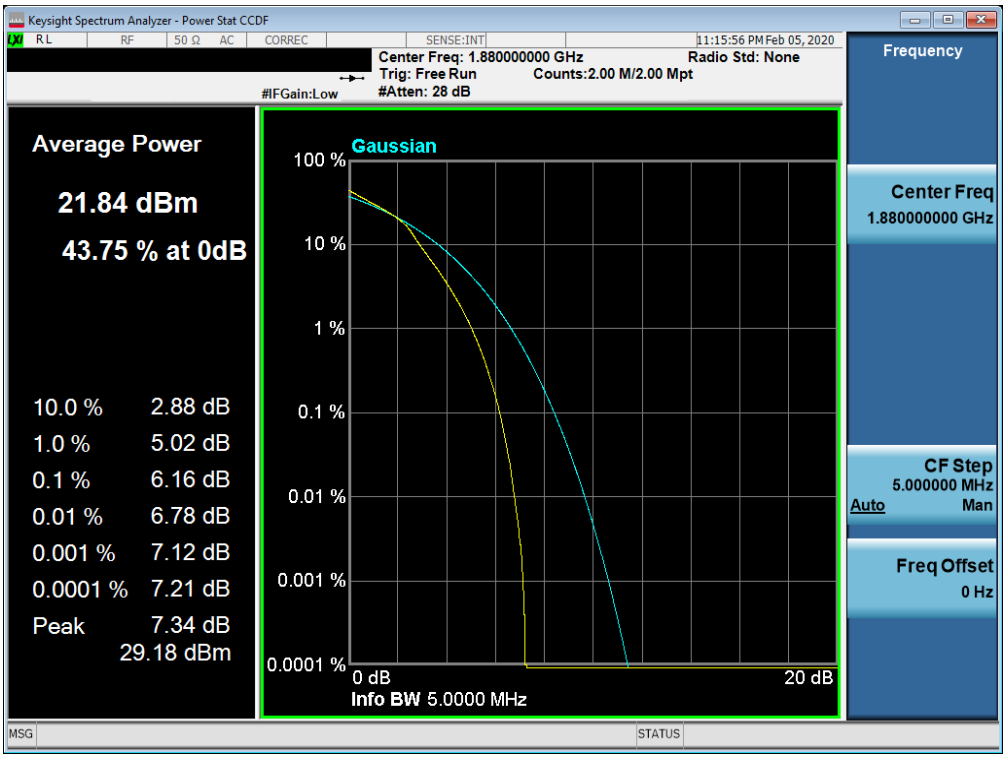


Plot 7-214. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-215. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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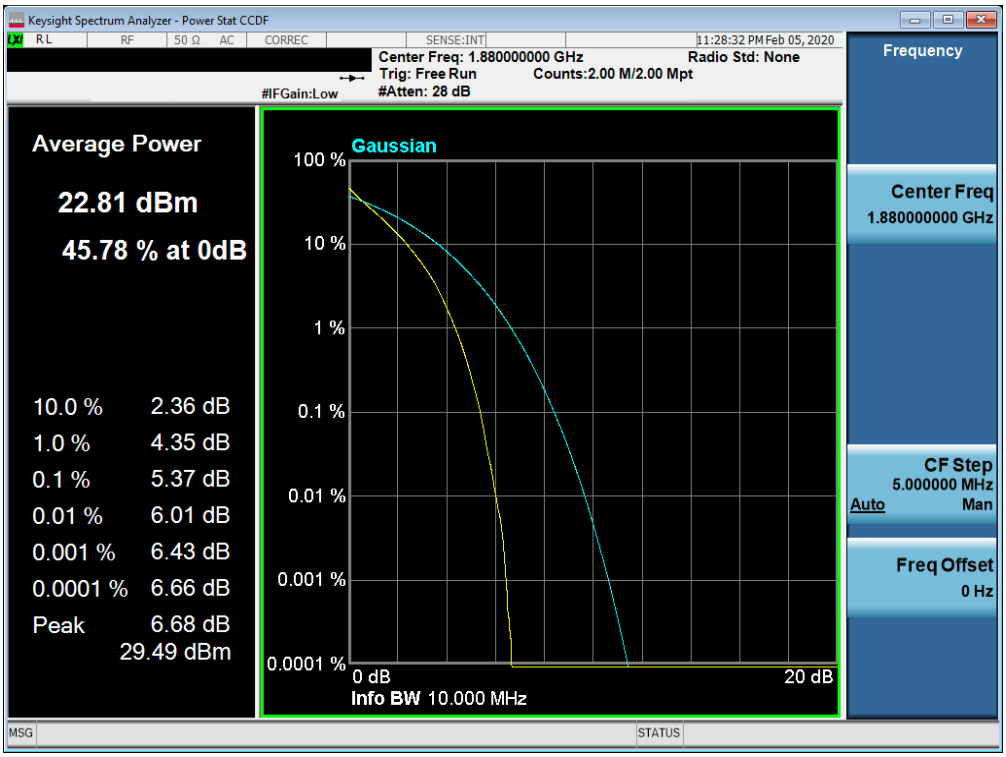
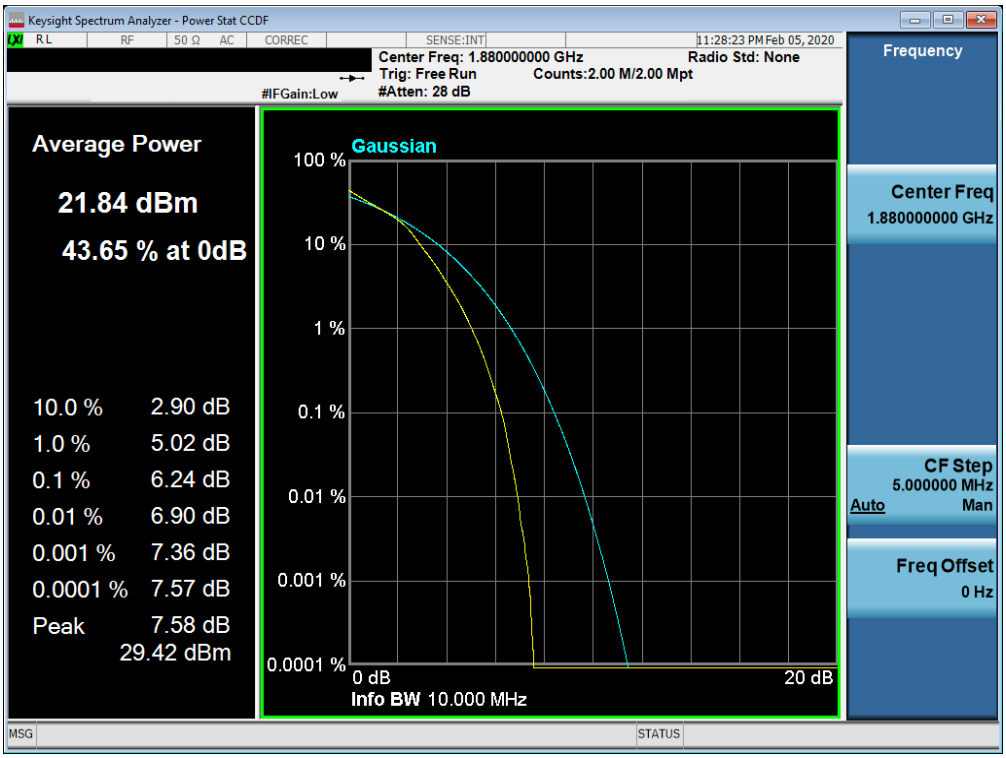


Plot 7-216. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-217. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

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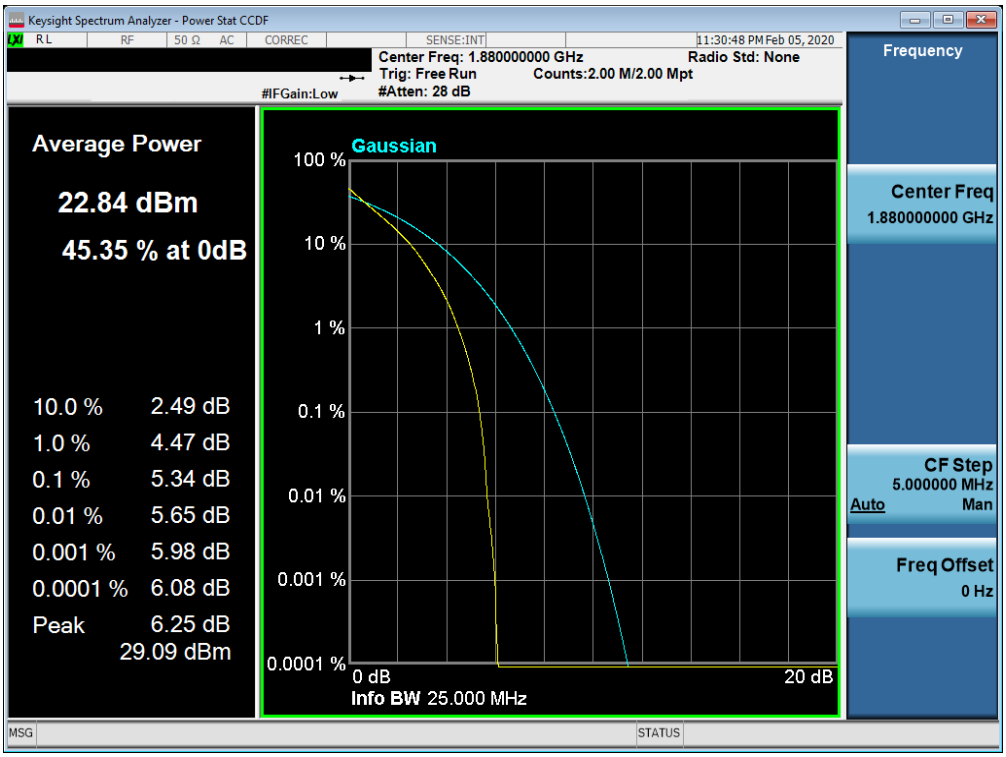
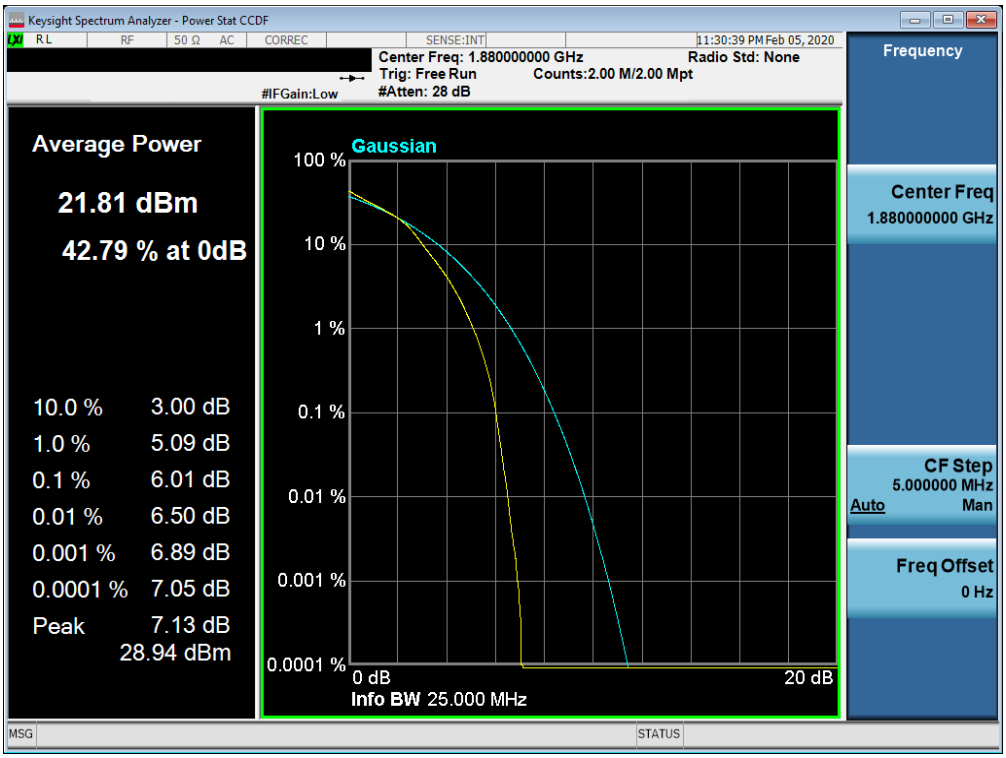


Plot 7-218. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-219. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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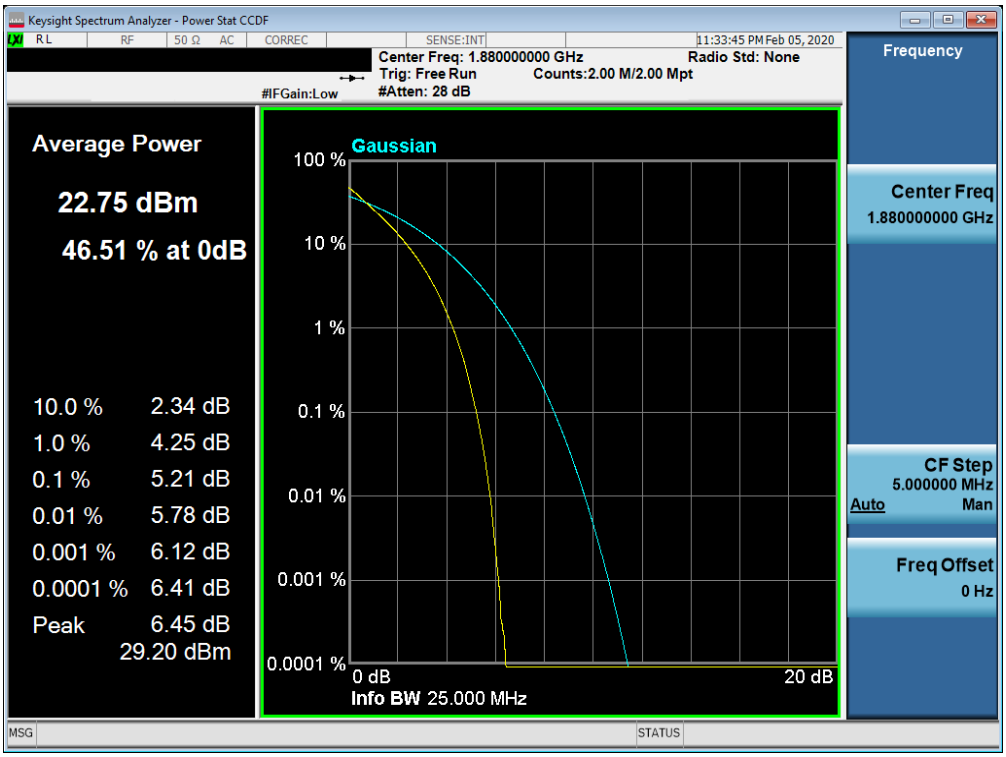
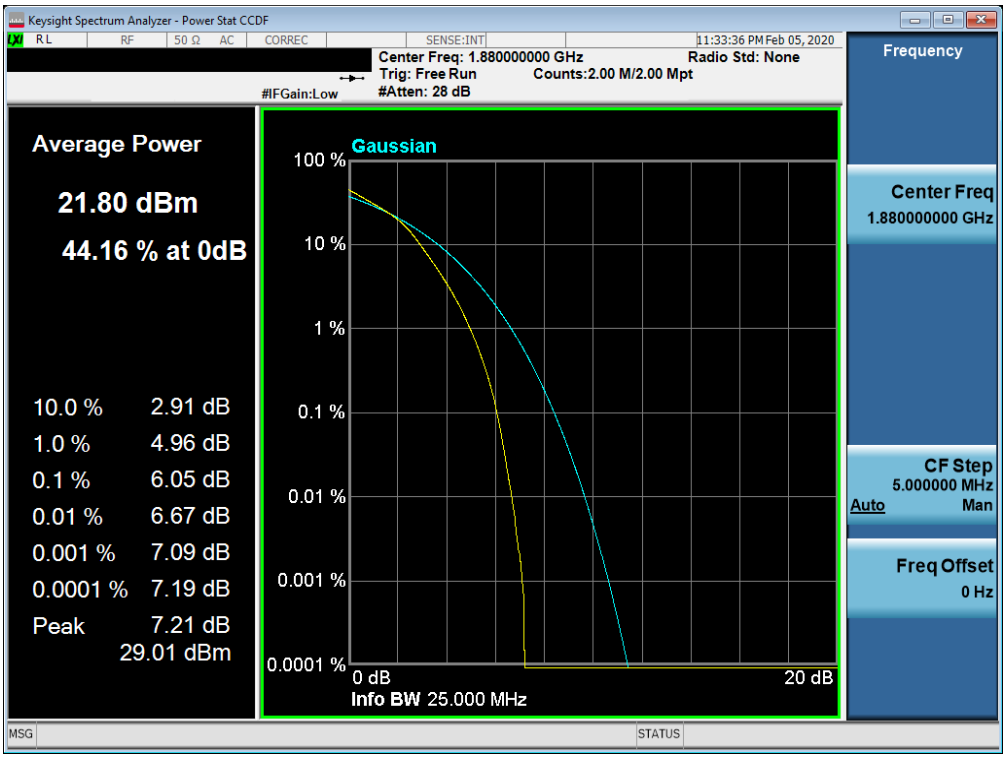


Plot 7-220. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-221. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

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7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

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

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Test Setup

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

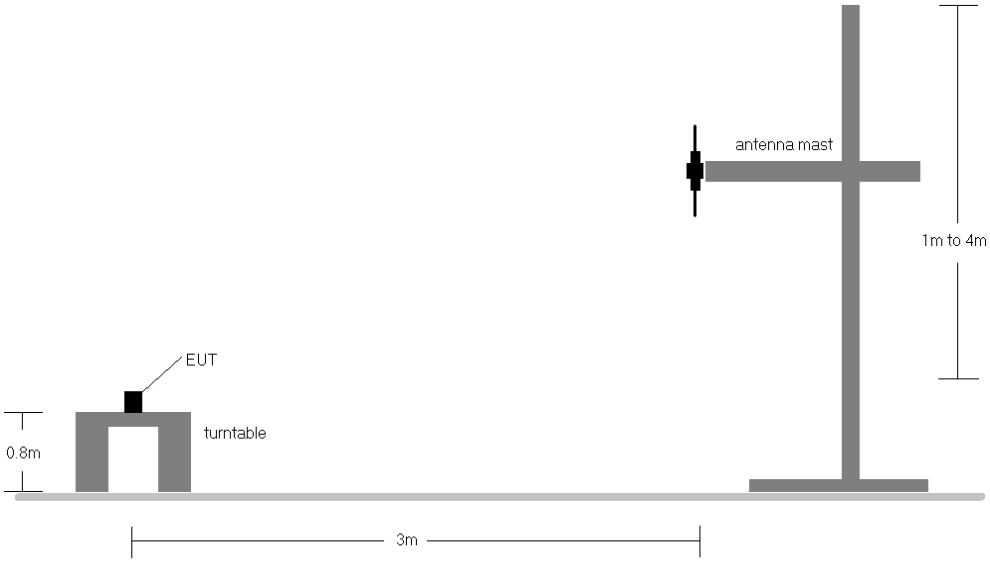

Figure 7-5. Radiated Test Setup <1GHz

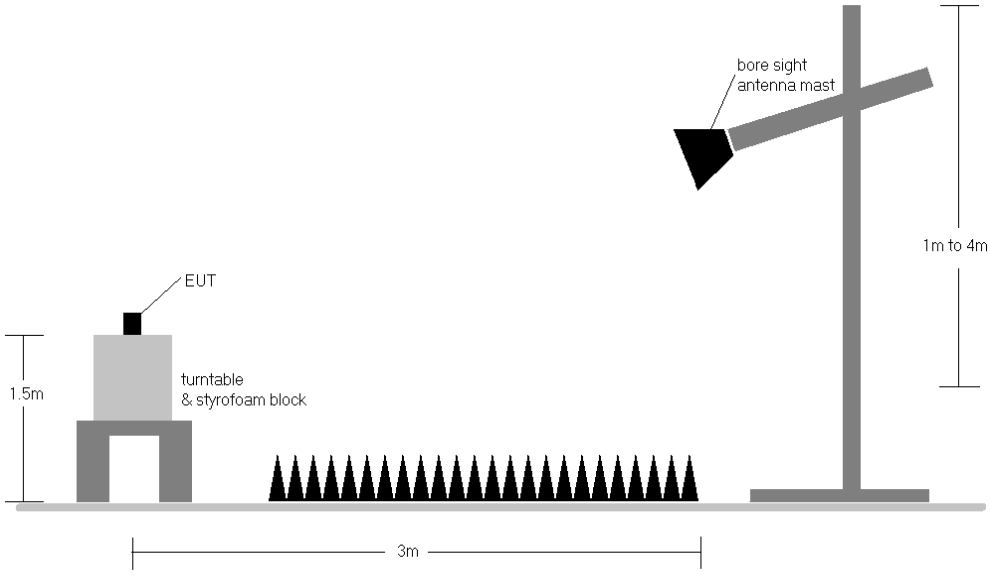

Figure 7-6. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	127	13	1 / 5	16.50	3.40	17.75	0.060	34.77	-17.02	19.90	0.098	36.99	-17.09
707.50	1.4	QPSK	H	121	12	3 / 2	16.58	3.65	18.08	0.064	34.77	-16.69	20.23	0.105	36.99	-16.76
715.30	1.4	QPSK	H	110	22	1 / 0	16.69	3.70	**18.24**	0.067	34.77	-16.53	**20.39**	0.109	36.99	-16.60
715.30	1.4	16-QAM	H	110	22	3 / 2	16.26	3.70	**17.81**	0.060	34.77	-16.96	**19.96**	0.099	36.99	-17.03
700.50	3	QPSK	H	119	4	1 / 0	16.32	3.40	17.57	0.057	34.77	-17.20	19.72	0.094	36.99	-17.27
707.50	3	QPSK	H	111	22	1 / 0	16.42	3.65	17.92	0.062	34.77	-16.85	20.07	0.102	36.99	-16.92
714.50	3	QPSK	H	102	25	1 / 14	16.67	3.70	**18.22**	0.066	34.77	-16.55	**20.37**	0.109	36.99	-16.62
714.50	3	16-QAM	H	102	25	1 / 14	16.06	3.70	**17.61**	0.058	34.77	-17.16	**19.76**	0.095	36.99	-17.23

Table 7-3. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
701.50	5	QPSK	H	125	12	1 / 0	16.39	3.40	17.64	0.058	34.77	-17.13	19.79	0.095	36.99	-17.20
707.50	5	QPSK	H	117	19	1 / 0	16.48	3.65	17.98	0.063	34.77	-16.79	20.13	0.103	36.99	-16.86
713.50	5	QPSK	H	113	27	1 / 24	16.73	3.70	**18.28**	**0.067**	34.77	-16.49	**20.43**	**0.110**	36.99	-16.56
713.50	5	16-QAM	H	113	27	1 / 24	16.12	3.70	**17.67**	0.058	34.77	-17.10	**19.82**	0.096	36.99	-17.17
704.00	10	QPSK	H	120	9	1 / 49	16.24	3.50	17.59	0.057	34.77	-17.18	19.74	0.094	36.99	-17.25
707.50	10	QPSK	H	117	15	1 / 49	16.39	3.65	17.89	0.062	34.77	-16.88	20.04	0.101	36.99	-16.95
711.00	10	QPSK	H	107	24	1 / 49	16.59	3.70	**18.14**	0.065	34.77	-16.63	**20.29**	0.107	36.99	-16.70
711.00	10	16-QAM	H	107	24	1 / 49	15.69	3.70	**17.24**	0.053	34.77	-17.53	**19.39**	0.087	36.99	-17.60
713.50	5	QPSK	V	171	32	1 / 24	16.17	3.70	17.72	0.059	34.77	-17.05	19.87	0.097	36.99	-17.12

Table 7-4. ERP Data (Band 12/17)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	202	119	1 / 0	13.26	5.70	**16.81**	0.048	34.77	-17.96	**18.96**	0.079	36.99	-18.03
782.00	5	QPSK	V	197	130	1 / 0	12.65	5.80	16.30	0.043	34.77	-18.47	18.45	0.070	36.99	-18.54
784.50	5	QPSK	V	216	116	1 / 0	12.92	5.80	16.57	0.045	34.77	-18.20	18.72	0.074	36.99	-18.27
779.50	5	16-QAM	V	202	119	1 / 0	12.45	5.70	**16.00**	0.040	34.77	-18.77	**18.15**	0.065	36.99	-18.84
782.00	10	QPSK	V	194	130	1 / 0	13.49	5.80	**17.14**	**0.052**	34.77	-17.63	**19.29**	**0.085**	36.99	-17.70
782.00	10	16-QAM	V	194	130	1 / 0	12.64	5.80	**16.29**	0.043	34.77	-18.48	**18.44**	0.070	36.99	-18.55
782.00	10	QPSK	H	232	35	1 / 0	13.13	5.80	16.78	0.048	34.77	-17.99	18.93	0.078	36.99	-18.06

Table 7-5. ERP Data (Band 13)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	145	188	3 / 2	13.64	6.30	17.79	0.060	38.45	-20.66	19.94	0.099	40.61	-20.67
836.50	1.4	QPSK	V	152	177	1 / 5	13.61	6.40	17.86	0.061	38.45	-20.59	20.01	0.100	40.61	-20.60
848.30	1.4	QPSK	V	151	177	3 / 2	13.61	6.50	**17.96**	0.063	38.45	-20.49	**20.11**	0.103	40.61	-20.50
836.50	1.4	16-QAM	V	152	177	3 / 2	12.36	6.40	**16.61**	0.046	38.45	-21.84	**18.76**	0.075	40.61	-21.85
825.50	3	QPSK	V	143	174	1 / 0	13.72	6.30	17.87	0.061	38.45	-20.58	20.02	0.100	40.61	-20.59
836.50	3	QPSK	V	153	177	1 / 0	13.61	6.40	17.86	0.061	38.45	-20.59	20.01	0.100	40.61	-20.60
847.50	3	QPSK	V	142	169	1 / 0	13.66	6.50	**18.01**	**0.063**	38.45	-20.44	**20.16**	**0.104**	40.61	-20.45
847.50	3	16-QAM	V	142	169	1 / 0	12.12	6.50	**16.47**	0.044	38.45	-21.98	**18.62**	0.073	40.61	-21.99
826.50	5	QPSK	V	141	176	1 / 24	13.40	6.30	17.55	0.057	38.45	-20.90	19.70	0.093	40.61	-20.91
836.50	5	QPSK	V	157	170	1 / 0	13.54	6.40	17.79	0.060	38.45	-20.66	19.94	0.099	40.61	-20.67
846.50	5	QPSK	V	155	177	1 / 24	13.50	6.50	**17.85**	0.061	38.45	-20.60	**20.00**	0.100	40.61	-20.61
826.50	5	16-QAM	V	141	176	1 / 24	12.27	6.30	**16.42**	0.044	38.45	-22.03	**18.57**	0.072	40.61	-22.04
829.00	10	QPSK	V	144	181	1 / 49	13.51	6.30	17.66	0.058	38.45	-20.79	19.81	0.096	40.61	-20.80
836.50	10	QPSK	V	150	176	1 / 0	13.54	6.40	**17.79**	0.060	38.45	-20.66	**19.94**	0.099	40.61	-20.67
844.00	10	QPSK	V	149	170	1 / 0	13.40	6.40	17.65	0.058	38.45	-20.80	19.80	0.095	40.61	-20.81
836.50	10	16-QAM	V	150	176	1 / 0	12.34	6.40	**16.59**	0.046	38.45	-21.86	**18.74**	0.075	40.61	-21.87
847.50	3	QPSK	H	220	301	1 / 0	12.77	6.70	17.32	0.054	38.45	-21.13	19.47	0.089	40.61	-21.14

Table 7-6. ERP Data (Band 5)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	180	227	3 / 2	14.09	9.44	**23.53**	**0.226**	30.00	-6.47
1745.00	1.4	QPSK	H	175	24	1 / 5	13.79	9.23	23.02	0.200	30.00	-6.98
1779.30	1.4	QPSK	H	183	30	3 / 2	14.04	9.26	23.30	0.214	30.00	-6.70
1710.70	1.4	16-QAM	H	180	227	1 / 5	13.24	9.44	**22.68**	0.185	30.00	-7.32
1711.50	3	QPSK	H	189	234	1 / 0	14.03	9.44	**23.47**	0.222	30.00	-6.53
1745.00	3	QPSK	H	178	15	1 / 0	13.88	9.23	23.11	0.205	30.00	-6.89
1778.50	3	QPSK	H	178	31	1 / 0	13.96	9.26	23.22	0.210	30.00	-6.78
1711.50	3	16-QAM	H	189	234	1 / 0	13.27	9.44	**22.71**	0.187	30.00	-7.29
1712.50	5	QPSK	H	190	226	1 / 0	13.96	9.43	**23.39**	0.218	30.00	-6.61
1745.00	5	QPSK	H	169	15	1 / 0	13.56	9.23	22.79	0.190	30.00	-7.21
1777.50	5	QPSK	H	178	22	1 / 24	13.86	9.26	23.12	0.205	30.00	-6.88
1712.50	5	16-QAM	H	190	226	1 / 0	13.26	9.43	**22.69**	0.186	30.00	-7.31
1715.00	10	QPSK	H	194	235	1 / 0	14.10	9.42	**23.52**	0.225	30.00	-6.48
1745.00	10	QPSK	H	174	16	1 / 0	13.70	9.23	22.93	0.196	30.00	-7.07
1775.00	10	QPSK	H	170	25	1 / 49	13.82	9.25	23.07	0.203	30.00	-6.93
1715.00	10	16-QAM	H	194	235	1 / 0	13.43	9.42	**22.85**	0.193	30.00	-7.15
1717.50	15	QPSK	H	188	224	1 / 0	13.79	9.40	**23.19**	0.208	30.00	-6.81
1745.00	15	QPSK	H	177	12	1 / 0	13.64	9.23	22.87	0.194	30.00	-7.13
1772.50	15	QPSK	H	183	22	1 / 74	13.75	9.25	23.00	0.199	30.00	-7.00
1717.50	15	16-QAM	H	188	224	1 / 0	13.03	9.40	**22.43**	0.175	30.00	-7.57
1720.00	20	QPSK	H	187	229	1 / 99	13.82	9.38	**23.20**	0.209	30.00	-6.80
1745.00	20	QPSK	H	175	18	1 / 0	13.50	9.23	22.73	0.188	30.00	-7.27
1770.00	20	QPSK	H	176	27	1 / 99	13.57	9.24	22.81	0.191	30.00	-7.19
1720.00	20	16-QAM	H	187	229	1 / 99	13.12	9.38	**22.50**	0.178	30.00	-7.50
1710.70	1	QPSK	V	117	101	3 / 2	12.41	9.11	21.52	0.142	30.00	-8.48

Table 7-7. EIRP Data (Band 66/4)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	107	83	3 / 2	12.66	9.88	22.54	0.179	33.01	-10.47
1880.00	1.4	QPSK	V	110	94	1 / 5	13.35	10.10	23.45	0.222	33.01	-9.56
1909.30	1.4	QPSK	V	109	78	3 / 2	13.65	10.31	**23.96**	0.249	33.01	-9.05
1909.30	1.4	16-QAM	V	109	78	1 / 5	12.71	10.31	**23.02**	0.200	33.01	-9.99
1851.50	3	QPSK	V	103	89	1 / 14	12.76	9.88	22.64	0.184	33.01	-10.37
1880.00	3	QPSK	V	104	93	1 / 0	13.30	10.10	23.40	0.219	33.01	-9.61
1908.50	3	QPSK	V	107	85	1 / 0	13.67	10.30	**23.97**	**0.250**	33.01	-9.04
1908.50	3	16-QAM	V	107	85	1 / 14	12.75	10.30	**23.05**	0.202	33.01	-9.96
1852.50	5	QPSK	V	100	83	1 / 0	12.54	9.89	22.43	0.175	33.01	-10.58
1880.00	5	QPSK	V	103	90	1 / 0	13.10	10.10	23.20	0.209	33.01	-9.81
1907.50	5	QPSK	V	113	87	1 / 0	13.47	10.30	**23.77**	0.238	33.01	-9.24
1880.00	5	16-QAM	V	103	90	1 / 0	12.73	10.10	**22.83**	0.192	33.01	-10.18
1855.00	10	QPSK	V	106	80	1 / 0	12.75	9.91	22.66	0.185	33.01	-10.35
1880.00	10	QPSK	V	102	92	1 / 0	13.29	10.10	23.39	0.218	33.01	-9.62
1905.00	10	QPSK	V	111	85	1 / 49	13.46	10.28	**23.74**	0.237	33.01	-9.27
1905.00	10	16-QAM	V	111	85	1 / 0	12.86	10.28	**23.14**	0.206	33.01	-9.87
1857.50	15	QPSK	V	100	84	1 / 0	12.40	9.93	22.33	0.171	33.01	-10.68
1880.00	15	QPSK	V	103	85	1 / 0	13.20	10.10	23.30	0.214	33.01	-9.71
1902.50	15	QPSK	V	110	81	1 / 74	13.39	10.27	**23.66**	0.232	33.01	-9.35
1902.50	15	16-QAM	V	110	81	1 / 0	12.80	10.27	**23.07**	0.203	33.01	-9.94
1860.00	20	QPSK	V	102	83	1 / 99	12.49	9.95	22.44	0.175	33.01	-10.57
1880.00	20	QPSK	V	104	87	1 / 99	13.14	10.10	23.24	0.211	33.01	-9.77
1900.00	20	QPSK	V	109	85	1 / 0	13.21	10.26	**23.47**	0.222	33.01	-9.54
1900.00	20	16-QAM	V	109	85	1 / 0	12.49	10.26	**22.75**	0.188	33.01	-10.26
1908.50	3	QPSK	H	110	243	1 / 0	13.21	10.18	23.39	0.218	33.01	-9.62

Table 7-8. EIRP Data (Band 2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2307.50	5	QPSK	H	115	204	1 / 24	9.68	10.31	19.99	0.100	23.98	-3.99
2312.50	5	QPSK	H	116	209	12 / 6	10.16	10.31	**20.47**	0.111	23.98	-3.51
2312.50	5	16-QAM	H	116	209	12 / 6	9.17	10.31	**19.48**	0.089	23.98	-4.50
2310.00	10	QPSK	H	121	202	1 / 49	10.83	10.31	**21.14**	**0.130**	23.98	-2.84
2310.00	10	16-QAM	H	121	202	1 / 49	10.00	10.31	**20.31**	0.107	23.98	-3.67
2310.00	10	QPSK	V	191	252	1 / 49	10.54	10.22	20.76	0.119	23.98	-3.22

Table 7-9. EIRP Data (Band 30)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	128	240	1 / 0	9.71	9.43	19.14	0.082	33.01	-13.87
2535.00	5	QPSK	H	126	222	1 / 0	9.42	9.39	18.81	0.076	33.01	-14.20
2567.50	5	QPSK	H	125	239	1 / 24	10.97	9.45	**20.42**	**0.110**	33.01	-12.59
2567.50	5	16-QAM	H	125	239	1 / 0	9.96	9.45	**19.41**	0.087	33.01	-13.60
2505.00	10	QPSK	H	131	229	1 / 0	9.85	9.43	19.28	0.085	33.01	-13.73
2535.00	10	QPSK	H	122	222	1 / 0	9.60	9.39	18.99	0.079	33.01	-14.02
2565.00	10	QPSK	H	120	226	1 / 49	10.90	9.44	**20.34**	0.108	33.01	-12.67
2565.00	10	16-QAM	H	120	226	1 / 49	10.29	9.44	**19.73**	0.094	33.01	-13.28
2507.50	15	QPSK	H	119	233	1 / 0	9.55	9.42	18.97	0.079	33.01	-14.04
2535.00	15	QPSK	H	127	232	1 / 0	9.51	9.39	18.90	0.078	33.01	-14.11
2562.50	15	QPSK	H	118	229	1 / 74	10.81	9.43	**20.24**	0.106	33.01	-12.77
2562.50	15	16-QAM	H	118	229	1 / 74	10.39	9.43	**19.82**	0.096	33.01	-13.19
2510.00	20	QPSK	H	126	233	1 / 99	9.51	9.42	18.93	0.078	33.01	-14.08
2535.00	20	QPSK	H	121	224	1 / 99	9.38	9.39	18.77	0.075	33.01	-14.24
2560.00	20	QPSK	H	118	233	1 / 99	10.68	9.42	**20.10**	0.102	33.01	-12.91
2560.00	20	16-QAM	H	118	233	1 / 99	9.86	9.42	**19.28**	0.085	33.01	-13.73
2567.50	5	QPSK	V	136	267	1 / 24	8.45	9.42	17.87	0.061	33.01	-15.14

Table 7-10. EIRP Data (Band 7)

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7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

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

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Test Setup

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

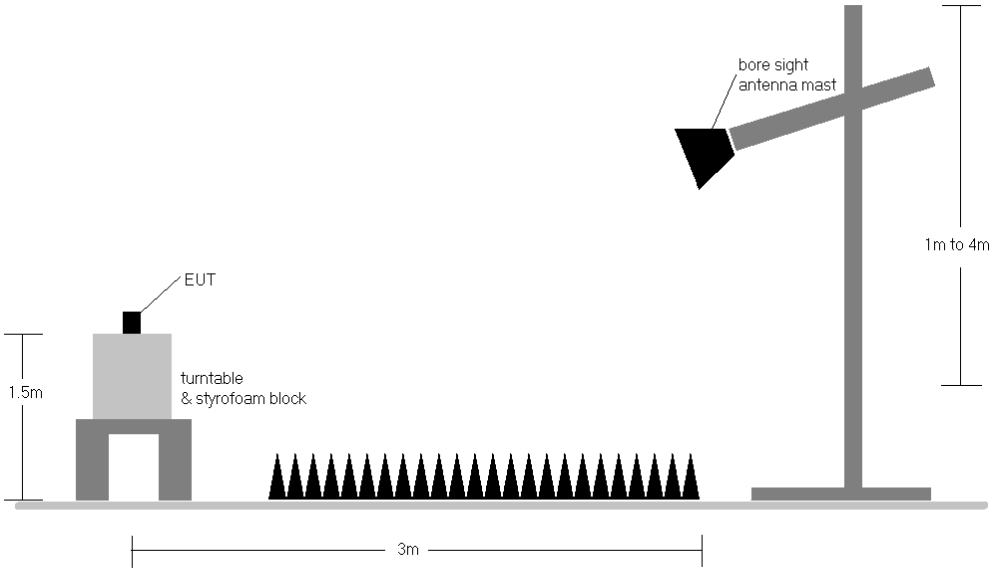

Figure 7-7. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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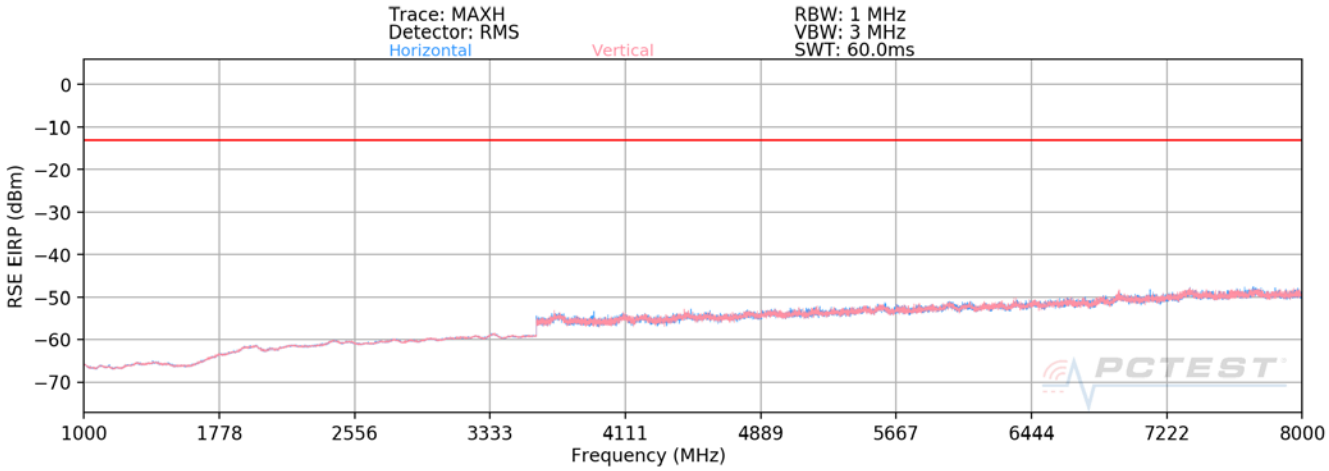
Band 12/17



Plot 7-222. Radiated Spurious Plot above 1GHz (Band 12/17)

OPERATING FREQUENCY:	704.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1408.00	H	186	149	-60.34	2.71	-57.62	-44.6
2112.00	H	305	148	-58.28	3.57	-54.71	-41.7
2816.00	H	318	315	-58.05	4.98	-53.07	-40.1
3520.00	H	-	-	-55.79	6.33	-49.46	-36.5
4224.00	H	-	-	-59.06	7.75	-51.30	-38.3
4928.00	H	-	-	-58.52	8.56	-49.96	-37.0
5632.00	H	-	-	-57.55	8.80	-48.75	-35.7
6336.00	H	-	-	-55.85	9.01	-46.84	-33.8
7040.00	H	-	-	-55.55	8.73	-46.82	-33.8

Table 7-11. Radiated Spurious Data (Band 12/17 – Low Channel)

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OPERATING FREQUENCY: 707.50 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 10.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	116	259	-60.74	2.80	-57.94	-44.9
2122.50	H	186	173	-58.04	3.57	-54.46	-41.5
2830.00	H	156	18	-57.42	5.02	-52.40	-39.4
3537.50	H	136	291	-54.76	6.31	-48.45	-35.5
4245.00	H	-	-	-59.75	7.80	-51.95	-38.9
4952.50	H	-	-	-58.21	8.56	-49.64	-36.6

Table 7-12. Radiated Spurious Data (Band 12/17 – Mid Channel)

OPERATING FREQUENCY: 711.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 10.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1422.00	H	398	343	-60.71	2.88	-57.83	-44.8
2133.00	H	208	177	-57.12	3.58	-53.54	-40.5
2844.00	H	302	130	-58.05	5.07	-52.98	-40.0
3555.00	H	-	-	-55.00	6.31	-48.69	-35.7
4266.00	H	-	-	-58.91	7.84	-51.07	-38.1
4977.00	H	-	-	-57.69	8.56	-49.13	-36.1

Table 7-13. Radiated Spurious Data (Band 12/17 – High Channel)

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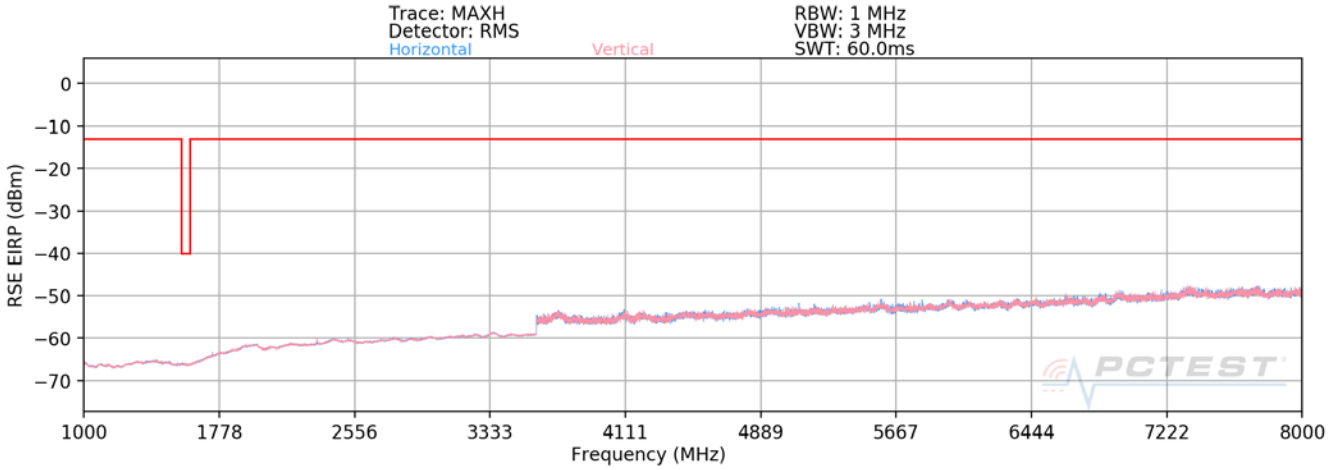
Band 13



Plot 7-223. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	779.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2338.50	H	185	89	-61.19	3.53	-57.66	-44.7
3118.00	H	235	221	-58.34	4.00	-54.34	-41.3
3897.50	H	336	79	-56.33	5.38	-50.95	-37.9
4677.00	H	-	-	-57.84	7.09	-50.75	-37.7
5456.50	H	-	-	-59.92	8.37	-51.55	-38.6
6236.00	H	-	-	-57.11	8.73	-48.38	-35.4

Table 7-14. Radiated Spurious Data (Band 13 – Low Channel)

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OPERATING FREQUENCY: 782.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 5.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	H	264	316	-57.84	4.00	-53.84	-40.8
3128.00	H	157	309	-56.02	5.38	-50.64	-37.6
3910.00	H	173	63	-51.78	7.09	-44.69	-31.7
4692.00	H	-	-	-57.55	8.37	-49.18	-36.2
5474.00	H	-	-	-55.97	8.73	-47.24	-34.2
6256.00	H	-	-	-56.04	9.00	-47.04	-34.0
7038.00	H	-	-	-55.13	8.73	-46.40	-33.4

Table 7-15. Radiated Spurious Data (Band 13 – Mid Channel)

OPERATING FREQUENCY: 784.50 MHz
MODULATION SIGNAL: 784.50
BANDWIDTH: 5.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2353.50	H	354	175	-56.63	4.00	-52.63	-39.6
3138.00	H	195	165	-56.27	5.38	-50.89	-37.9
3922.50	H	202	354	-58.68	7.09	-51.59	-38.6
4707.00	H	-	-	-58.73	8.37	-50.36	-37.4
5491.50	H	-	-	-57.27	8.73	-48.54	-35.5
6276.00	H	-	-	-55.85	9.00	-46.85	-33.8

Table 7-16. Radiated Spurious Data (Band 13 – High Channel)

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MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	H	169	147	-75.39	3.53	-71.86	-31.9
1564.00	H	184	54	-74.97	3.53	-71.44	-31.4
1569.00	H	398	52	-75.56	3.53	-72.03	-32.0

Table 7-17. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

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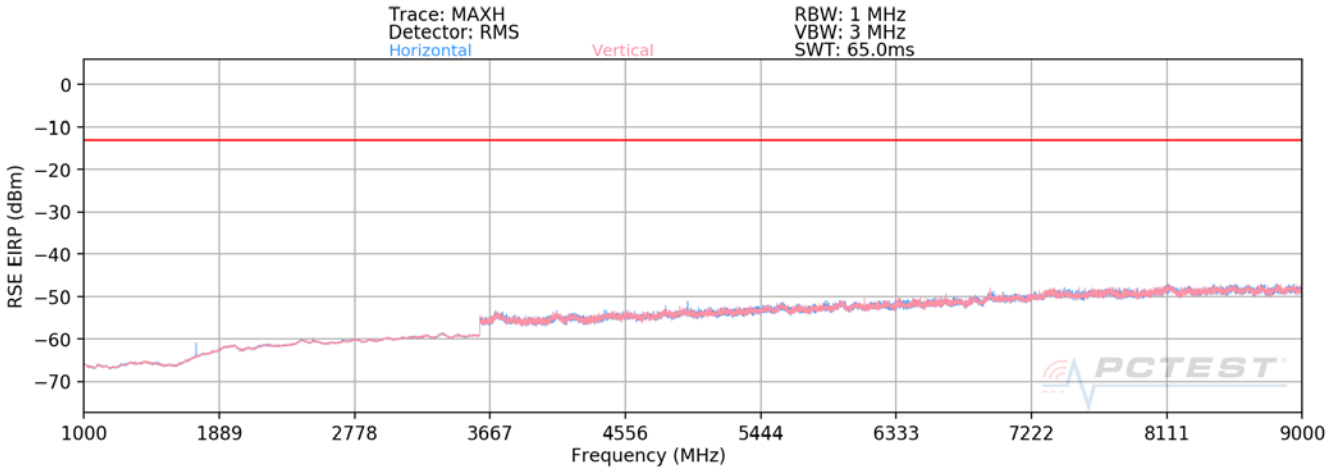
Band 5



Plot 7-224. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	829.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	H	205	327	-59.61	3.61	-56.00	-43.0
2487.00	H	-	-	-57.55	4.25	-53.31	-40.3
3316.00	H	-	-	-58.95	5.83	-53.13	-40.1
4145.00	H	-	-	-60.14	7.66	-52.48	-39.5

Table 7-18. Radiated Spurious Data (Band 5 – Low Channel)

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OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	113	341	-59.46	3.62	-55.84	-42.8
2509.50	H	-	-	-56.80	4.33	-52.46	-39.5
3346.00	H	-	-	-58.48	5.92	-52.56	-39.6
4182.50	H	-	-	-59.38	7.69	-51.69	-38.7

Table 7-19. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	844.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	H	211	-1	-59.35	3.63	-55.72	-42.7
2532.00	H	-	-	-57.41	4.47	-52.94	-39.9
3376.00	H	-	-	-58.42	6.05	-52.38	-39.4
4220.00	H	-	-	-59.95	7.75	-52.20	-39.2

Table 7-20. Radiated Spurious Data (Band 5 – High Channel)

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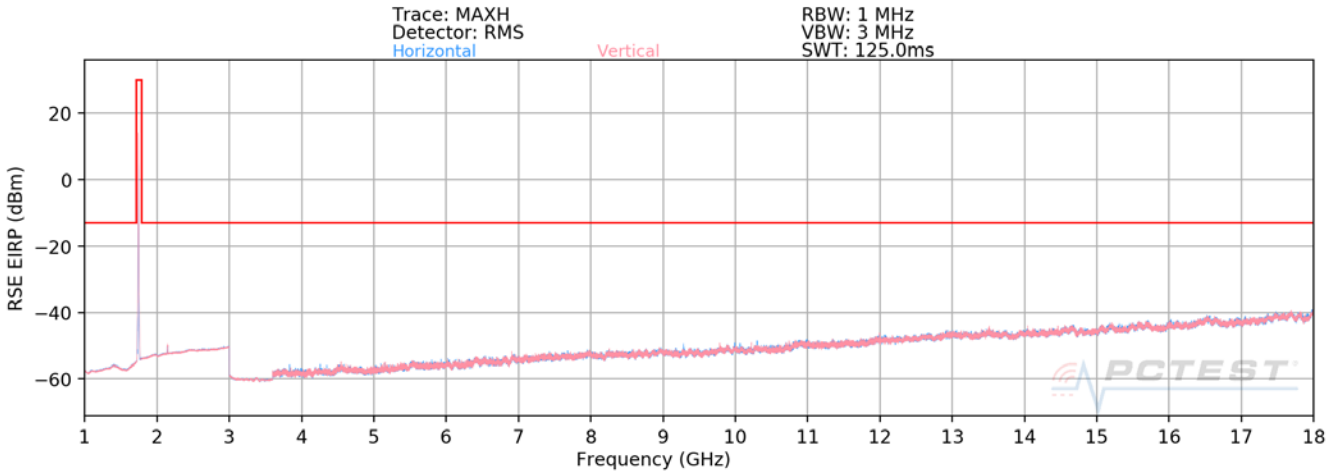
Band 66/4



Plot 7-225. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1720.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	H	113	141	-68.20	6.22	-61.98	-49.0
5160.00	H	-	-	-70.02	8.68	-61.35	-48.3
6880.00	H	249	50	-68.85	8.76	-60.09	-47.1
8600.00	H	-	-	-68.55	9.17	-59.38	-46.4
10320.00	H	-	-	-65.33	9.64	-55.69	-42.7

Table 7-21. Radiated Spurious Data (Band 66/4 – Low Channel)

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OPERATING FREQUENCY: 1745.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 20.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	H	115	51	-67.51	6.32	-61.18	-48.2
5235.00	H	-	-	-70.02	8.71	-61.30	-48.3
6980.00	H	238	56	-68.37	8.74	-59.64	-46.6
8725.00	H	-	-	-67.33	9.42	-57.92	-44.9
10470.00	H	-	-	-64.69	9.62	-55.07	-42.1

Table 7-22. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY: 1770.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 20.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	H	114	54	-64.03	6.31	-57.72	-44.7
5310.00	H	-	-	-70.70	8.74	-61.96	-49.0
7080.00	H	-	-	-69.19	8.66	-60.53	-47.5
8850.00	H	-	-	-67.38	9.53	-57.85	-44.8

Table 7-23. Radiated Spurious Data (Band 66/4 – High Channel)

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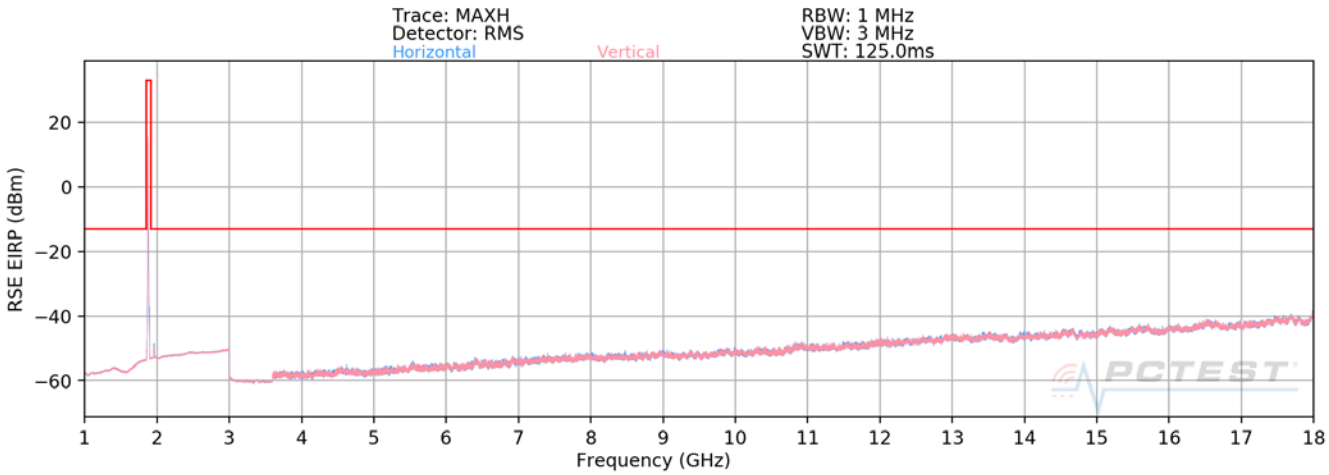
Band 2



Plot 7-226. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY:	1860.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	H	117	152	-68.51	6.58	-61.93	-48.9
5580.00	H	-	-	-69.54	8.74	-60.80	-47.8
7440.00	H	-	-	-68.64	8.41	-60.22	-47.2

Table 7-24. Radiated Spurious Data (Band 2 – Low Channel)

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OPERATING FREQUENCY:	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	109	199	-65.48	6.67	-58.81	-45.8
5640.00	H	-	-	-70.57	8.81	-61.76	-48.8
7520.00	H	-	-	-68.79	8.48	-60.31	-47.3

Table 7-25. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1900.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3800.00	H	109	359	-62.98	6.87	-56.11	-43.1
5700.00	H	-	-	-70.92	8.76	-62.15	-49.2
7600.00	H	-	-	-67.90	8.47	-59.43	-46.4

Table 7-26. Radiated Spurious Data (Band 2 – High Channel)

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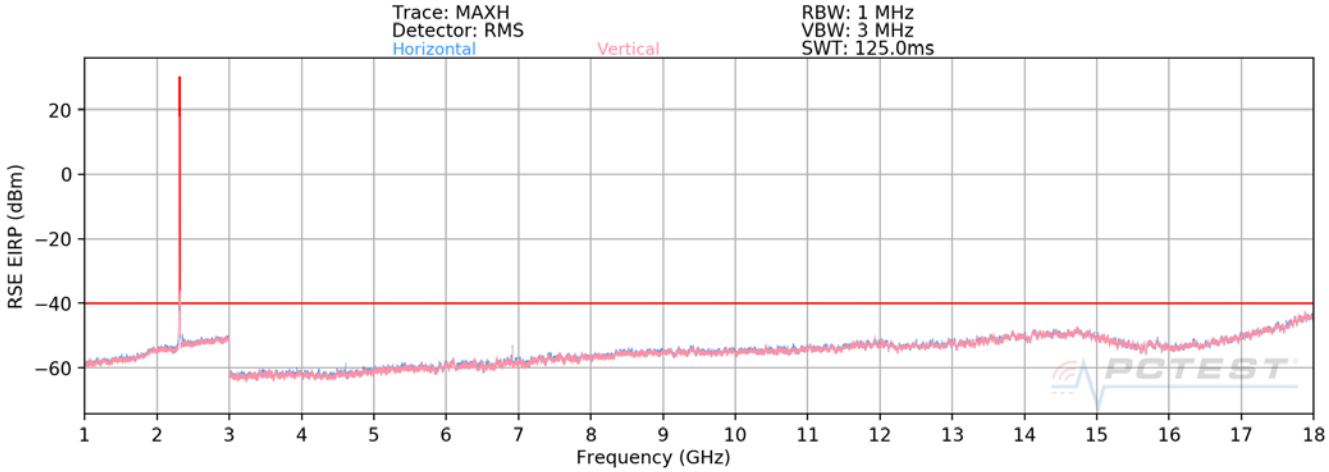
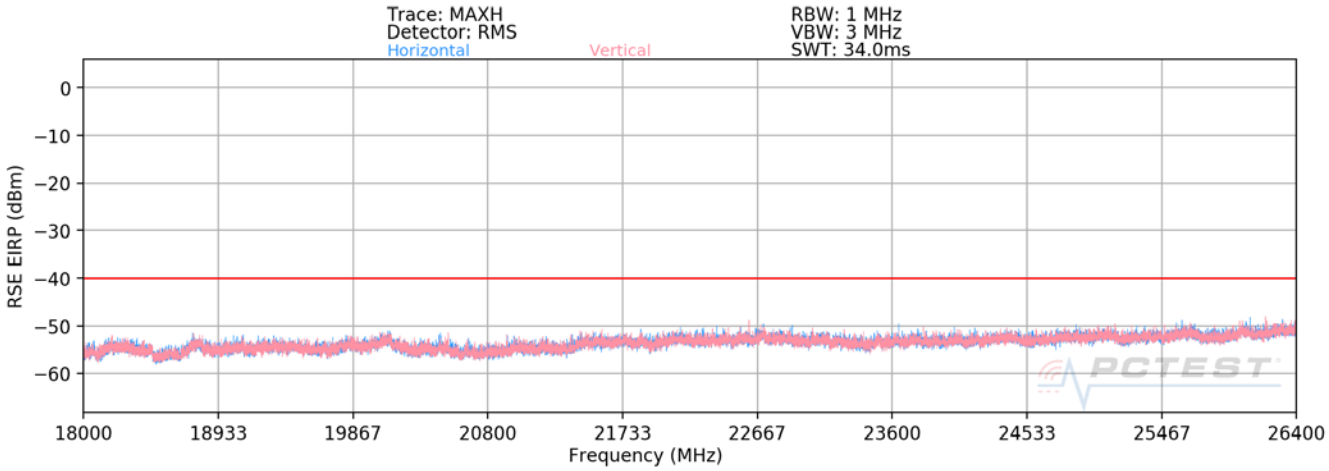
Band 30



Plot 7-227. Radiated Spurious Plot 1GHz - 18GHz (Band 30)



Plot 7-228. Radiated Spurious Plot 18GHz – 26.5GHz (Band 30)

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OPERATING FREQUENCY:	2310.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
4620.00	H	-	-	-72.71	8.26	-64.45	-24.4
6930.00	H	127	91	-66.72	8.72	-58.00	-18.0
9240.00	H	-	-	-69.46	9.49	-59.97	-20.0
11550.00	H	-	-	-67.36	9.19	-58.17	-18.2

Table 7-27. Radiated Spurious Data (Band 30)

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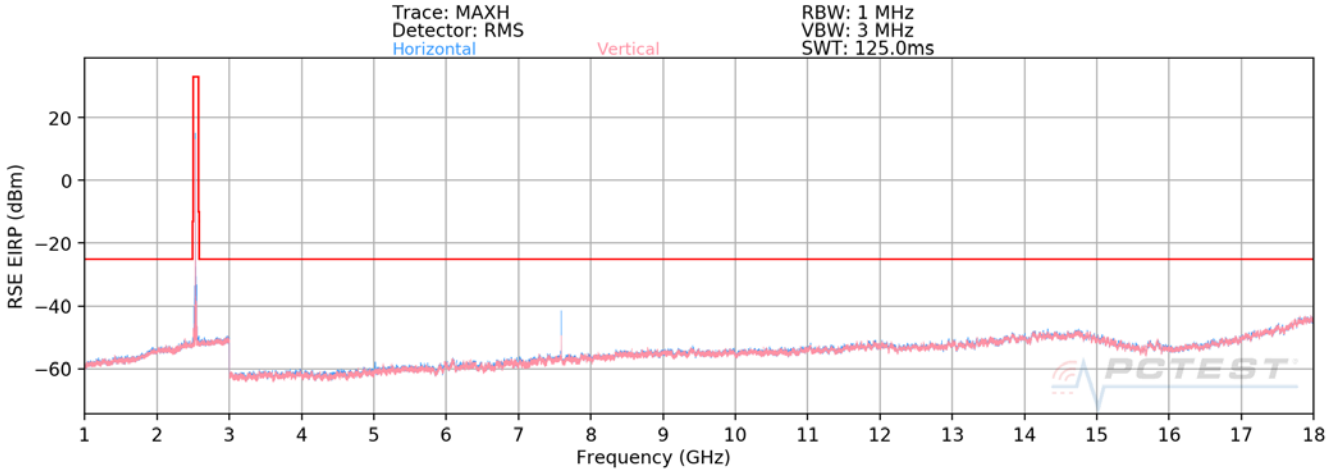
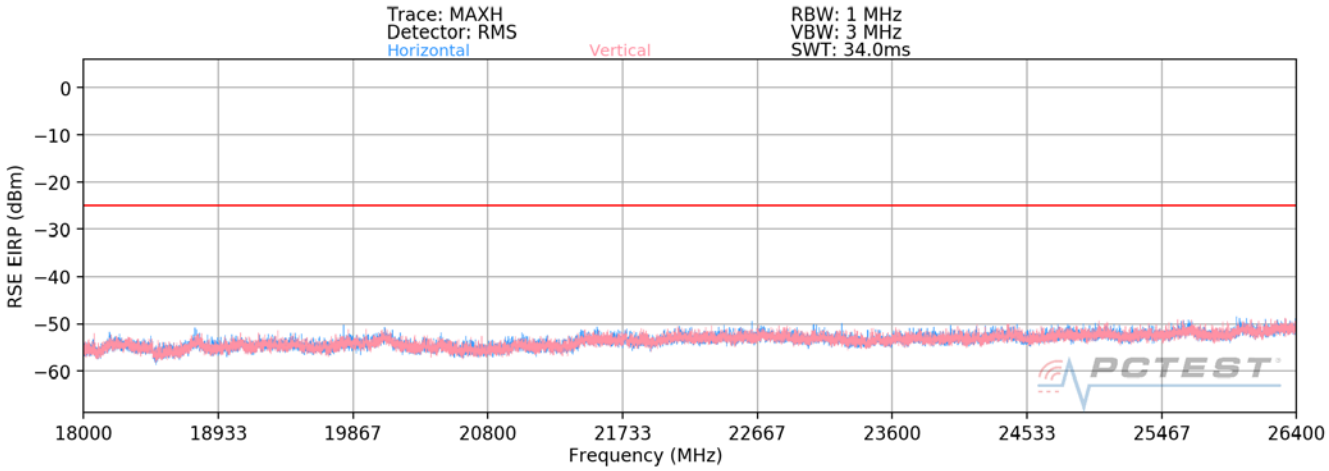
Band 7



Plot 7-229. Radiated Spurious Plot 1GHz - 18GHz (Band 7)



Plot 7-230. Radiated Spurious Plot 18GHz – 26.5GHz (Band 7)

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OPERATING FREQUENCY:	2510.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5020.00	H	-	-	-73.49	8.56	-64.92	-39.9
7530.00	H	-	-	-69.78	8.46	-61.32	-36.3
10040.00	H	-	-	-69.77	9.85	-59.92	-34.9

Table 7-28. Radiated Spurious Data (Band 7 – Low Channel)

OPERATING FREQUENCY:	2535.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	H	-	-	-73.99	8.60	-65.39	-40.4
7605.00	H	142	40	-69.73	8.48	-61.25	-36.3
10140.00	H	-	-	-68.86	9.78	-59.08	-34.1

Table 7-29. Radiated Spurious Data (Band 7 – Mid Channel)

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OPERATING FREQUENCY:	2560.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	H	-	-	-73.08	8.66	-64.43	-39.4
7680.00	H	-	-	-69.83	8.58	-61.26	-36.3
10240.00	H	-	-	-69.14	9.65	-59.49	-34.5

Table 7-30. Radiated Spurious Data (Band 7 – High Channel)

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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

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Band 12/17 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 4.39 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	707,499,869	-131	-0.0000185
100 %		- 20	707,499,987	-13	-0.0000018
100 %		- 10	707,500,154	154	0.0000218
100 %		0	707,499,642	-358	-0.0000506
100 %		+ 10	707,499,881	-119	-0.0000168
100 %		+ 20	707,499,990	-10	-0.0000014
100 %		+ 30	707,499,889	-111	-0.0000157
100 %		+ 40	707,500,203	203	0.0000287
100 %		+ 50	707,500,064	64	0.0000090
BATT. ENDPOINT	3.48	+ 20	707,499,730	-270	-0.0000382

Table 7-31. Frequency Stability Data (Band 12/17)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 12/17 Frequency Stability Measurements

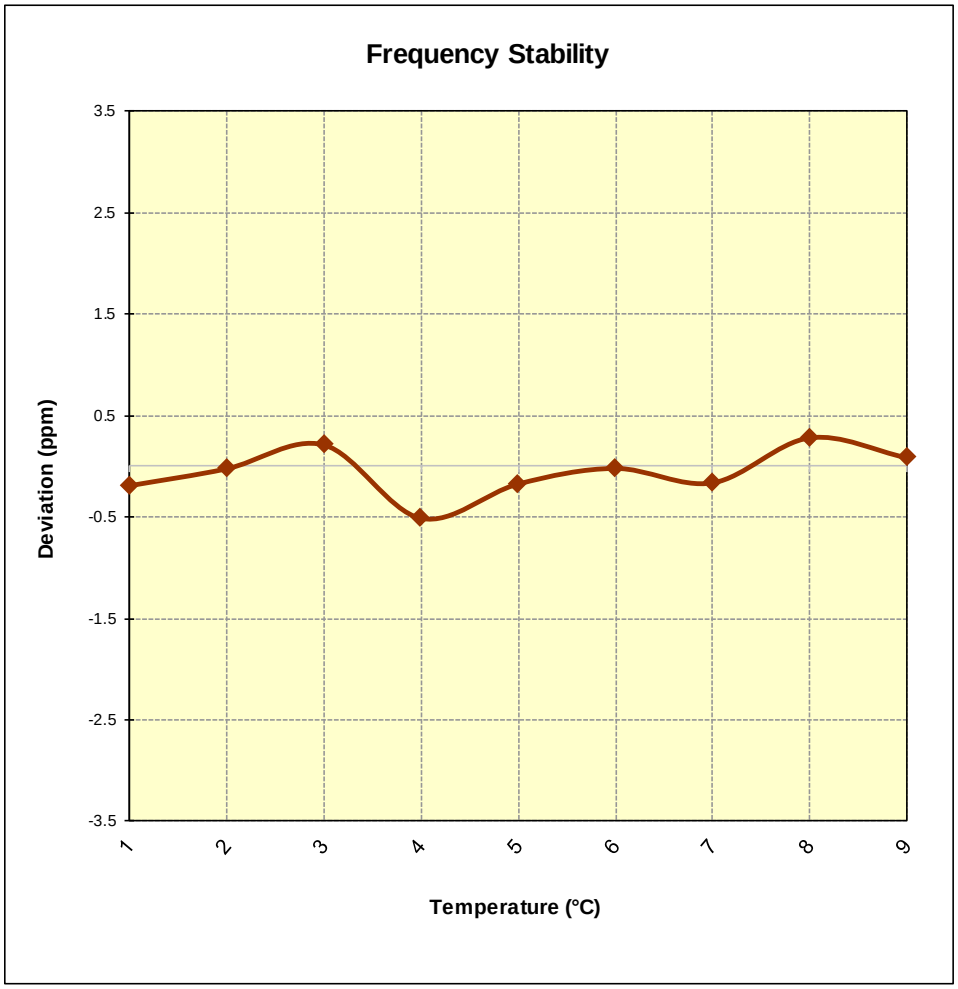

Figure 7-8. Frequency Stability Graph (Band 12/17)

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Band 13 Frequency Stability Measurements

OPERATING FREQUENCY: 782,000,000 Hz

CHANNEL: 23230

REFERENCE VOLTAGE: 4.39 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	781,999,800	-200	-0.0000256
100 %		- 20	781,999,730	-270	-0.0000345
100 %		- 10	782,000,111	111	0.0000142
100 %		0	781,999,951	-49	-0.0000063
100 %		+ 10	781,999,871	-129	-0.0000165
100 %		+ 20	782,000,013	13	0.0000017
100 %		+ 30	782,000,073	73	0.0000093
100 %		+ 40	782,000,079	79	0.0000101
100 %		+ 50	781,999,836	-164	-0.0000210
BATT. ENDPOINT	3.48	+ 20	782,000,298	298	0.0000381

Table 7-32. Frequency Stability Data (Band 13)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 13 Frequency Stability Measurements

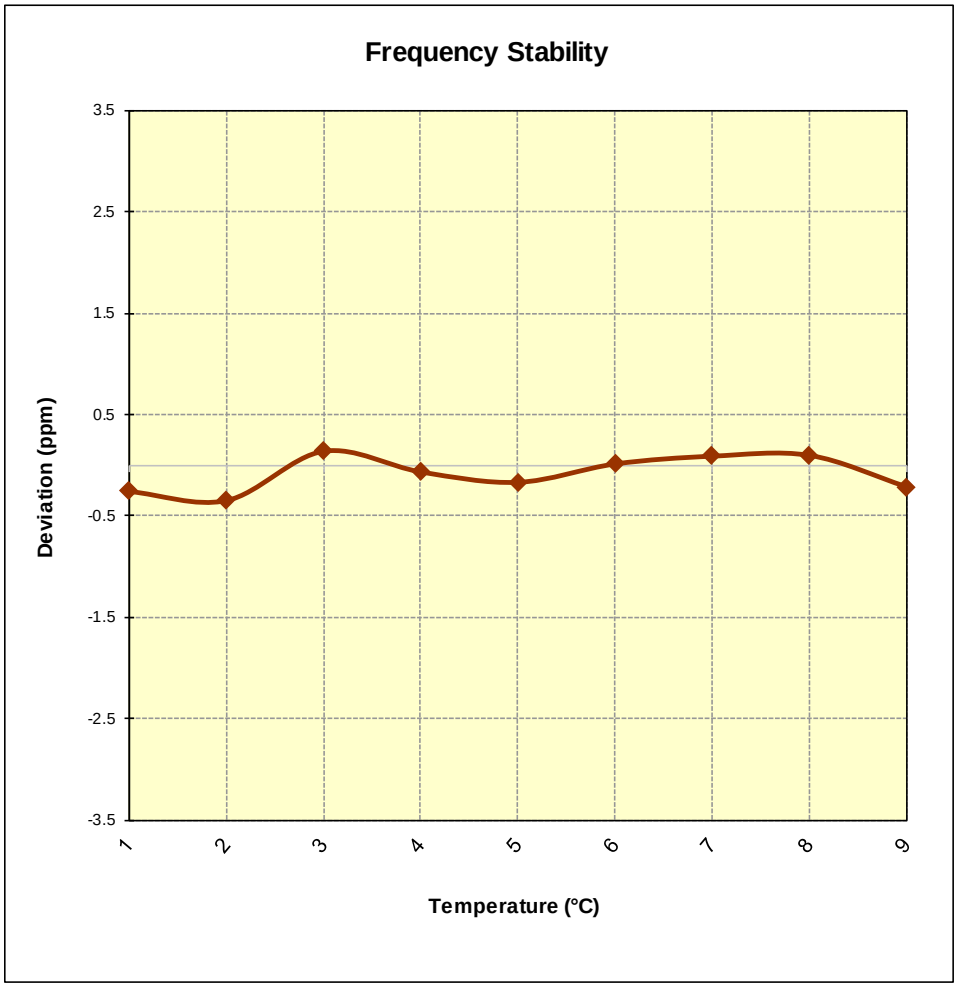

Figure 7-9. Frequency Stability Graph (Band 13)

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Band 5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	4.39	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	836,499,989	-11	-0.0000013
100 %		- 20	836,499,812	-188	-0.0000225
100 %		- 10	836,500,096	96	0.0000115
100 %		0	836,499,936	-64	-0.0000077
100 %		+ 10	836,500,184	184	0.0000220
100 %		+ 20	836,500,260	260	0.0000311
100 %		+ 30	836,500,255	255	0.0000305
100 %		+ 40	836,500,142	142	0.0000170
100 %		+ 50	836,500,165	165	0.0000197
BATT. ENDPOINT	3.48	+ 20	836,500,308	308	0.0000368

Table 7-33. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

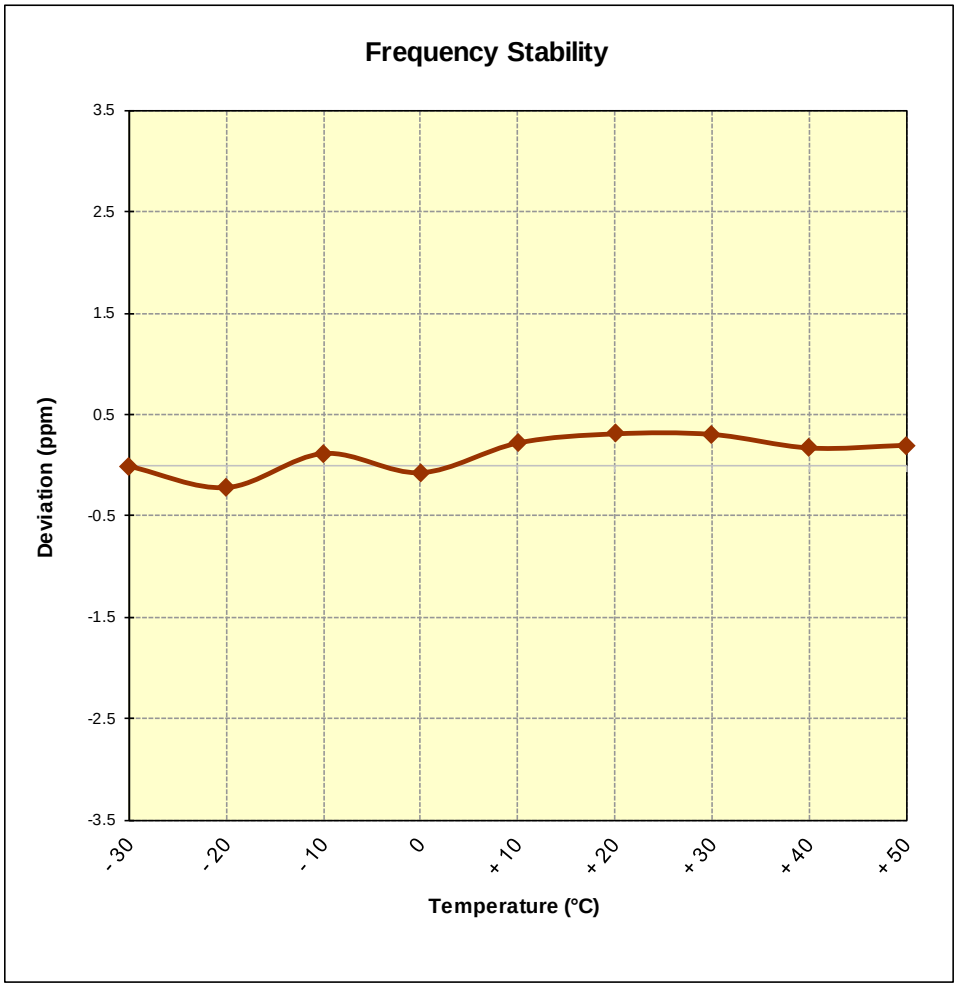

Figure 7-10. Frequency Stability Graph (Band 5)

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Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 4.39 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	1,745,000,336	336	0.0000193
100 %		- 20	1,745,000,337	337	0.0000193
100 %		- 10	1,745,000,009	9	0.0000005
100 %		0	1,744,999,967	-33	-0.0000019
100 %		+ 10	1,744,999,746	-254	-0.0000146
100 %		+ 20	1,745,000,025	25	0.0000014
100 %		+ 30	1,745,000,183	183	0.0000105
100 %		+ 40	1,745,000,024	24	0.0000014
100 %		+ 50	1,744,999,960	-40	-0.0000023
BATT. ENDPOINT	3.48	+ 20	1,745,000,123	123	0.0000070

Table 7-34. Frequency Stability Data (Band 66/4)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 66/4 Frequency Stability Measurements

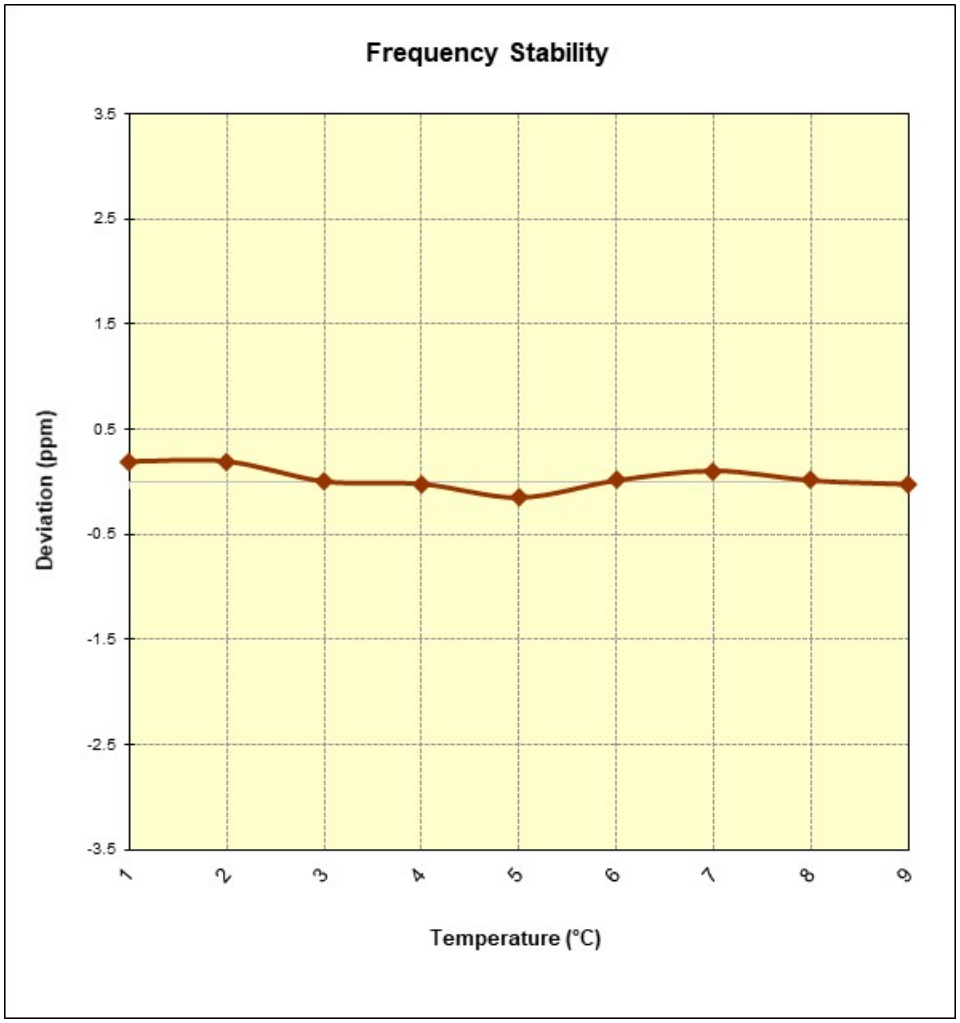

Figure 7-11. Frequency Stability Graph (Band 66/4)

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Band 2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 4.39 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	1,880,000,057	57	0.0000030
100 %		- 20	1,879,999,577	-423	-0.0000225
100 %		- 10	1,880,000,077	77	0.0000041
100 %		0	1,880,000,248	248	0.0000132
100 %		+ 10	1,880,000,044	44	0.0000023
100 %		+ 20	1,879,999,984	-16	-0.0000009
100 %		+ 30	1,879,999,950	-50	-0.0000027
100 %		+ 40	1,879,999,700	-300	-0.0000160
100 %		+ 50	1,880,000,362	362	0.0000193
BATT. ENDPOINT	3.48	+ 20	1,880,000,182	182	0.0000097

Table 7-35. Frequency Stability Data (Band 2)

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Band 2 Frequency Stability Measurements

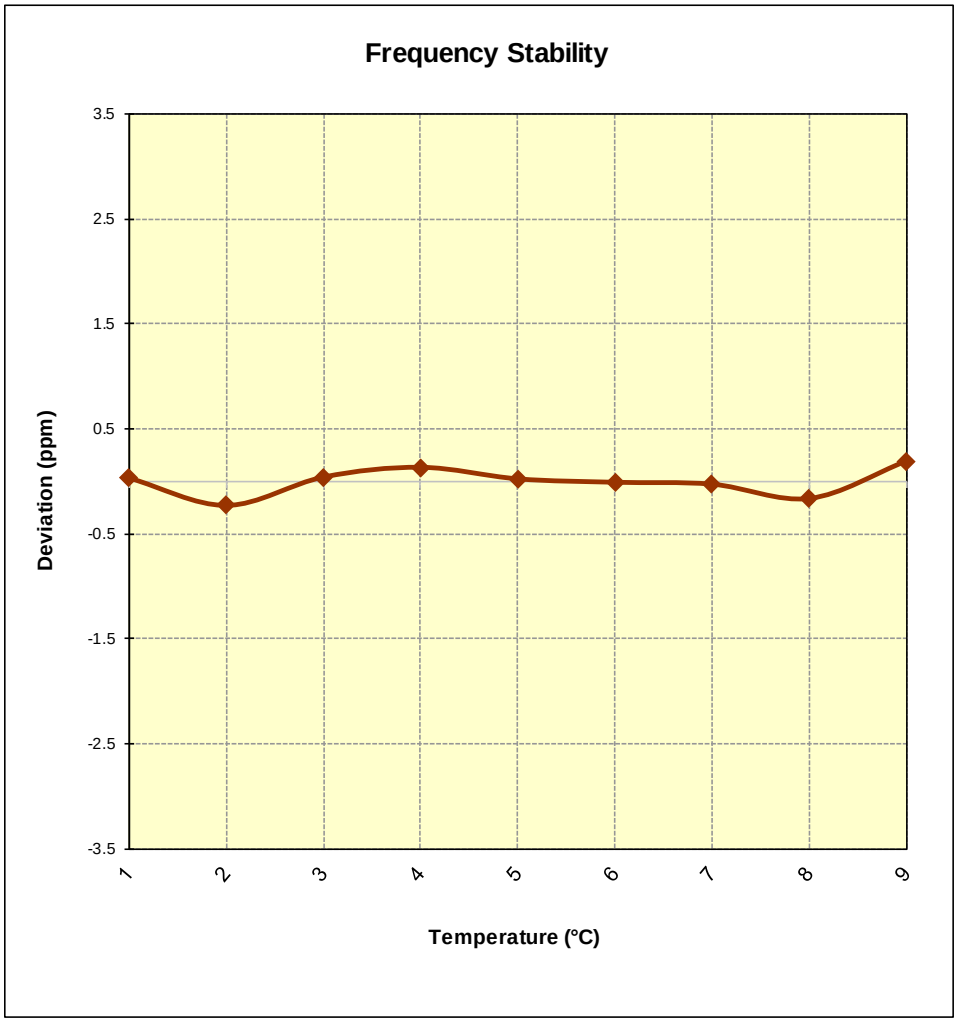

Figure 7-12. Frequency Stability Graph (Band 2)

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Band 30 Frequency Stability Measurements

OPERATING FREQUENCY: 2,310,000,000 Hz

CHANNEL: 27710

REFERENCE VOLTAGE: 4.39 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	2,309,999,927	-73	-0.0000032
100 %		- 20	2,310,000,328	328	0.0000142
100 %		- 10	2,310,000,320	320	0.0000139
100 %		0	2,310,000,230	230	0.0000100
100 %		+ 10	2,309,999,822	-178	-0.0000077
100 %		+ 20	2,309,999,903	-97	-0.0000042
100 %		+ 30	2,310,000,101	101	0.0000044
100 %		+ 40	2,309,999,992	-8	-0.0000003
100 %		+ 50	2,310,000,068	68	0.0000029
BATT. ENDPOINT	3.48	+ 20	2,309,999,696	-304	-0.0000132

Table 7-36. Frequency Stability Data (Band 30)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 30 Frequency Stability Measurements

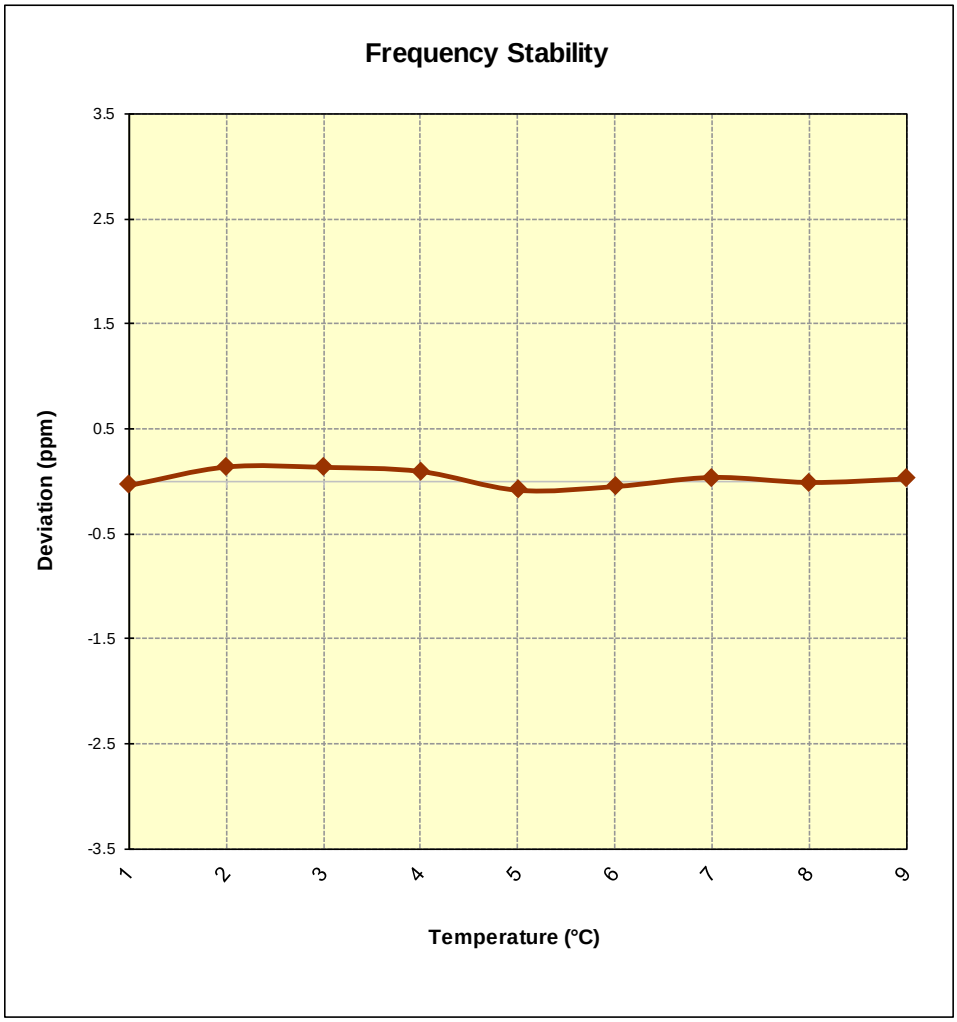

Figure 7-13. Frequency Stability Graph (Band 30)

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Band 7 Frequency Stability Measurements

OPERATING FREQUENCY: 2,535,000,000 Hz

CHANNEL: 21100

REFERENCE VOLTAGE: 4.39 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	2,535,000,198	198	0.0000078
100 %		- 20	2,535,000,066	66	0.0000026
100 %		- 10	2,535,000,417	417	0.0000164
100 %		0	2,534,999,973	-27	-0.0000011
100 %		+ 10	2,534,999,777	-223	-0.0000088
100 %		+ 20	2,535,000,117	117	0.0000046
100 %		+ 30	2,534,999,648	-352	-0.0000139
100 %		+ 40	2,534,999,803	-197	-0.0000078
100 %		+ 50	2,534,999,861	-139	-0.0000055
BATT. ENDPOINT	3.48	+ 20	2,534,999,964	-36	-0.0000014

Table 7-37. Frequency Stability Data (Band 7)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 7 Frequency Stability Measurements

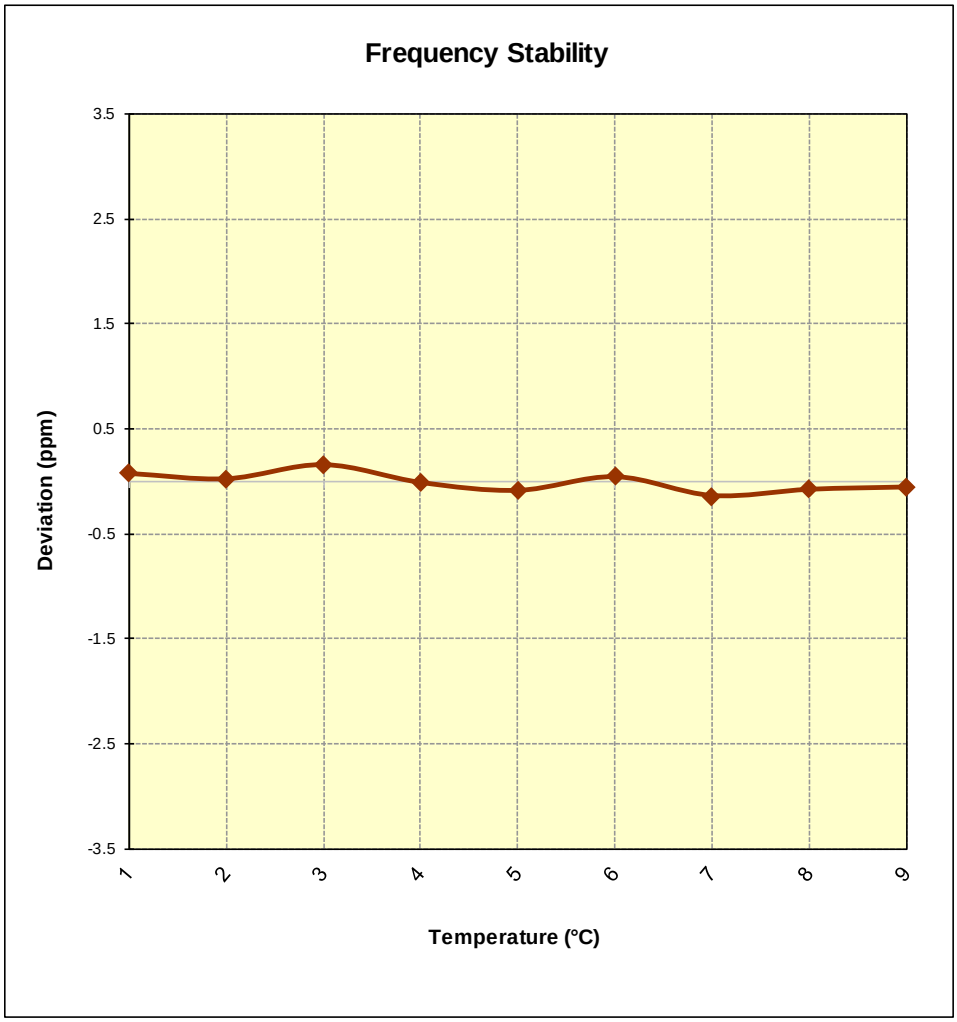

Figure 7-14. Frequency Stability Graph (Band 7)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFK410WM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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