7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 v03 – Section 6.0

Test Settings

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

Test Setup

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

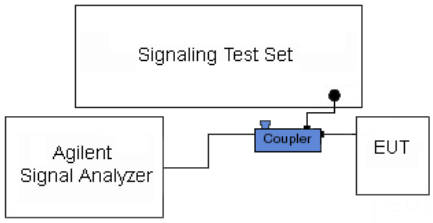


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

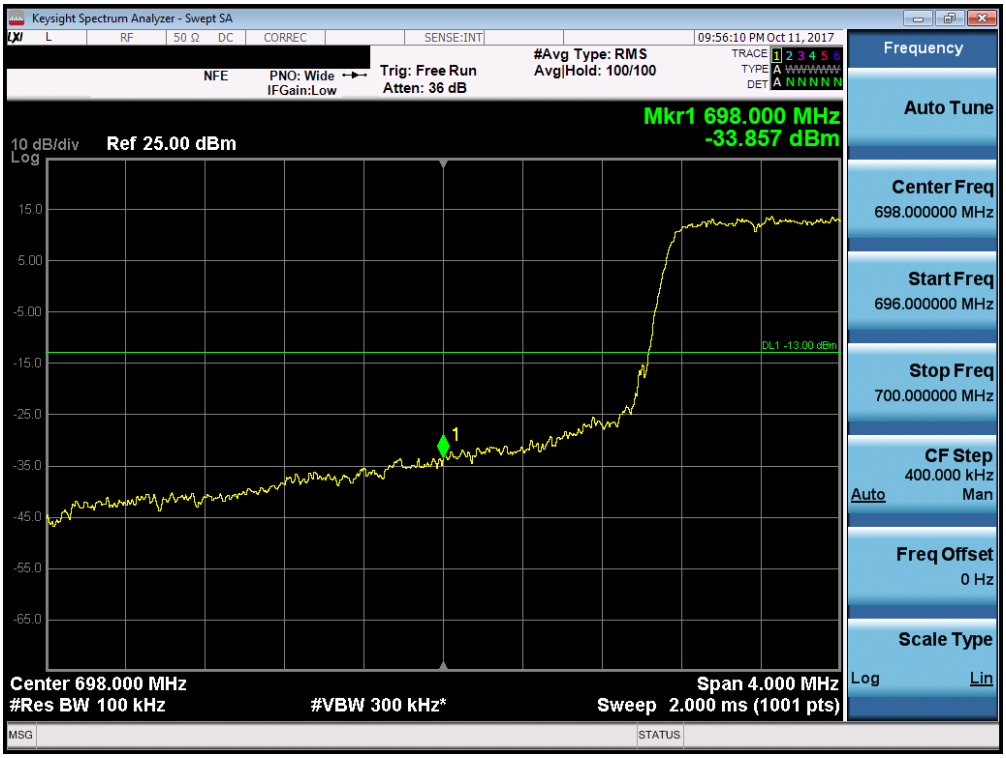
Per 22.917(b) 24.238(a) 27.53(h) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.5) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Per 27.53(g) RSS-130(4.6) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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

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

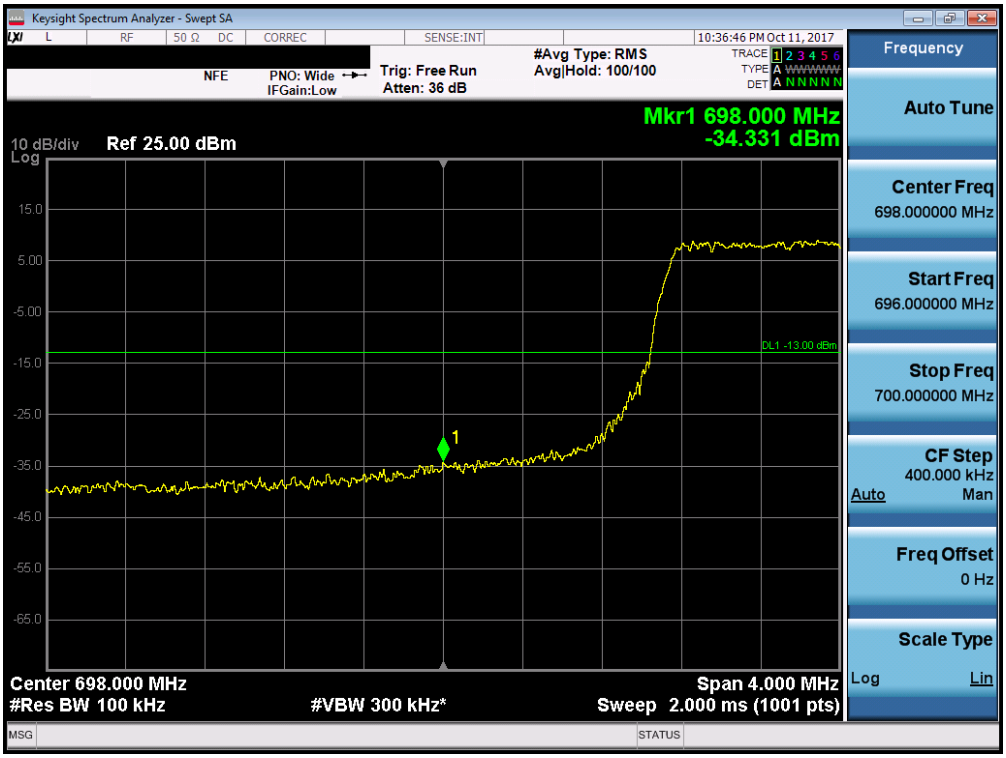
Band 12



Plot 7-132. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

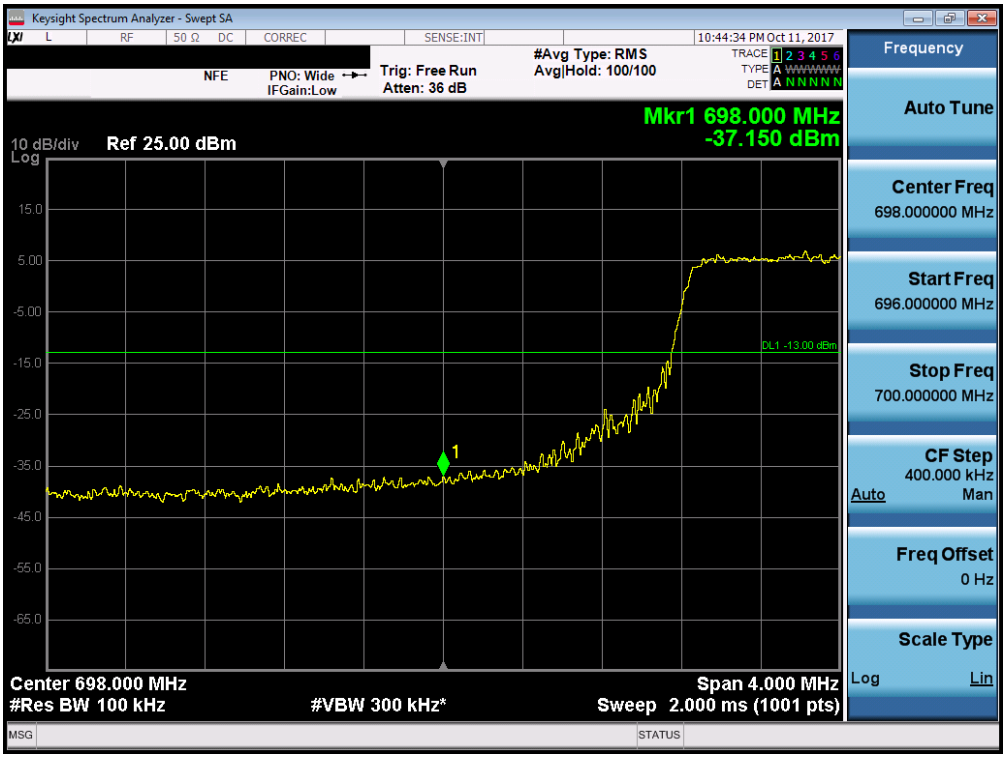
Plot 7-133. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

Band 12

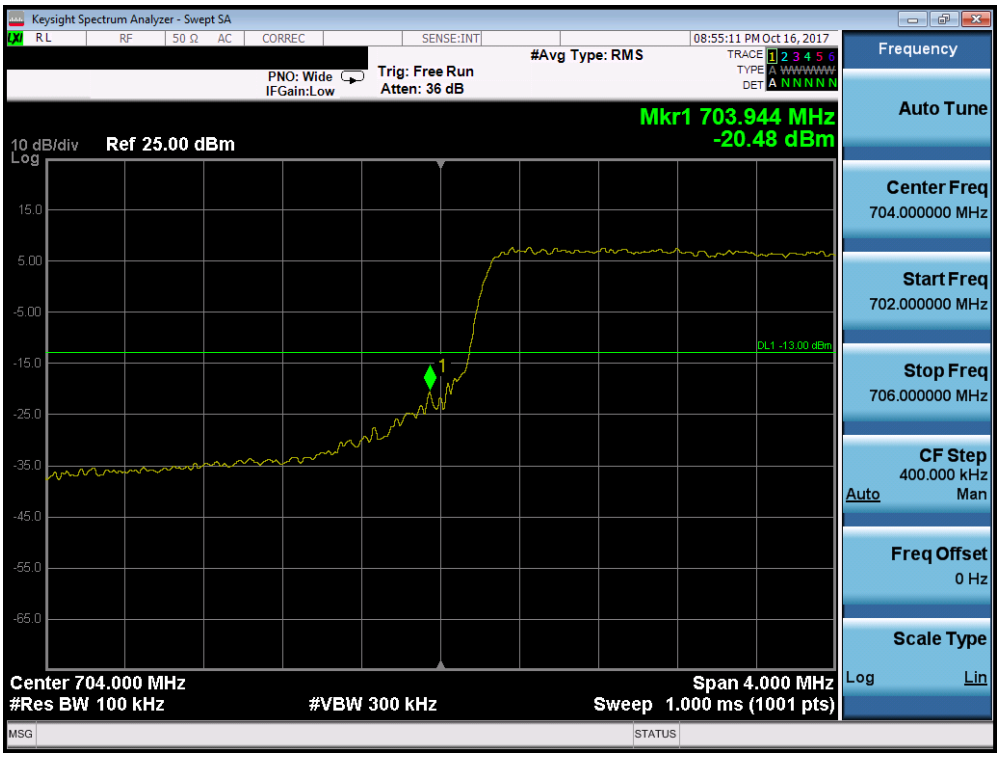


Plot 7-134. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

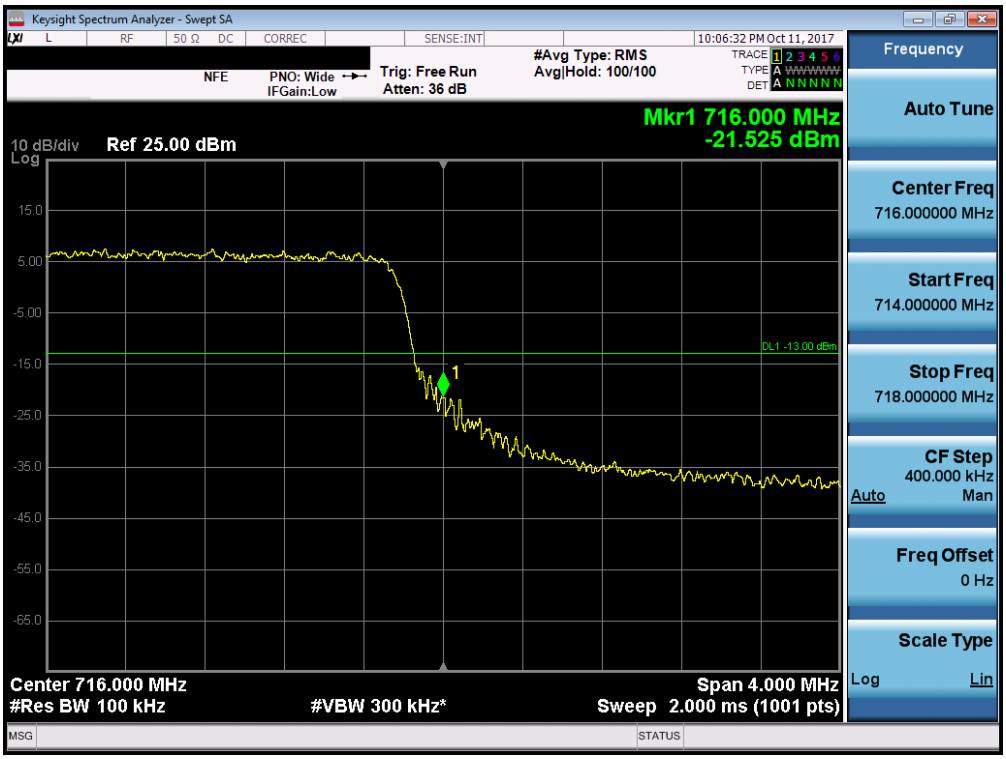
Plot 7-135. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



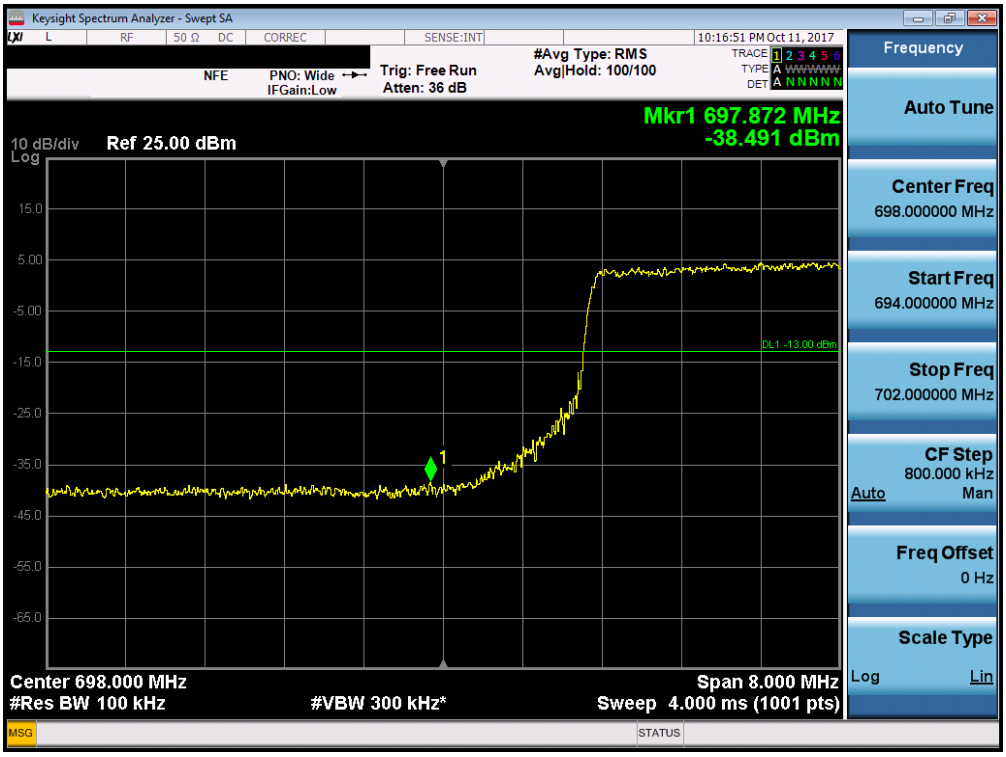
Plot 7-136. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



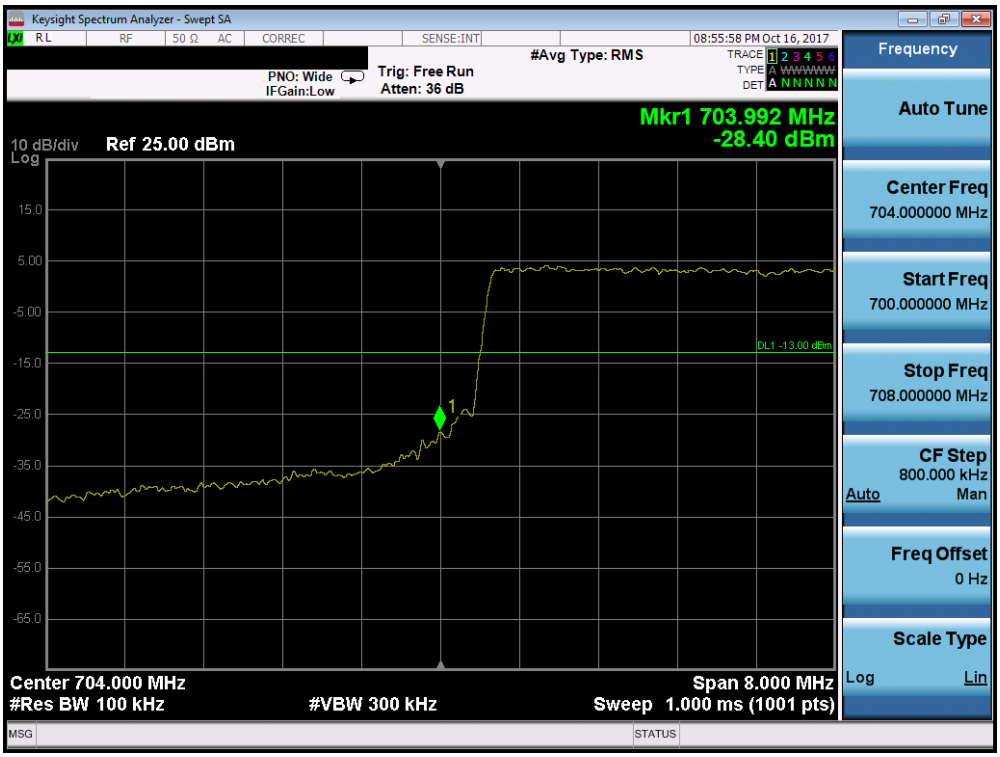
Plot 7-137. Lower Band Edge Plot (Band 17 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-138. Upper Band Edge Plot (Band 12/17 - 5.0MHz QPSK - Full RB Configuration)



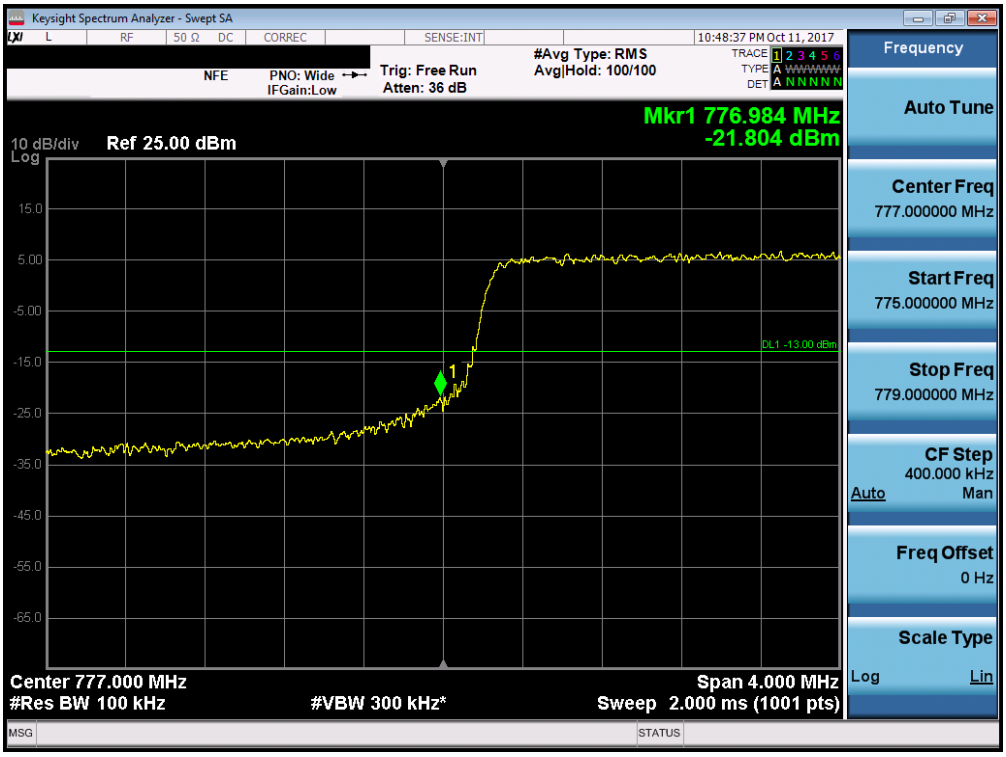
Plot 7-139. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



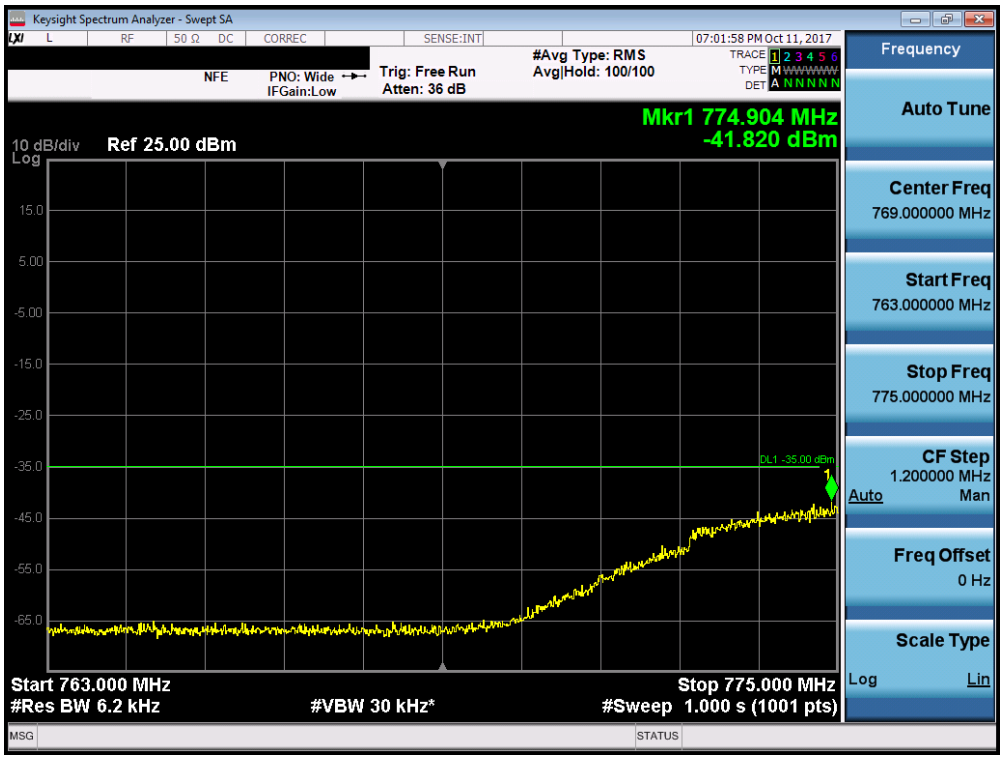
Plot 7-140. Lower Band Edge Plot (Band 17 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-141. Upper Band Edge Plot (Band 12/17 - 10.0MHz QPSK - Full RB Configuration)

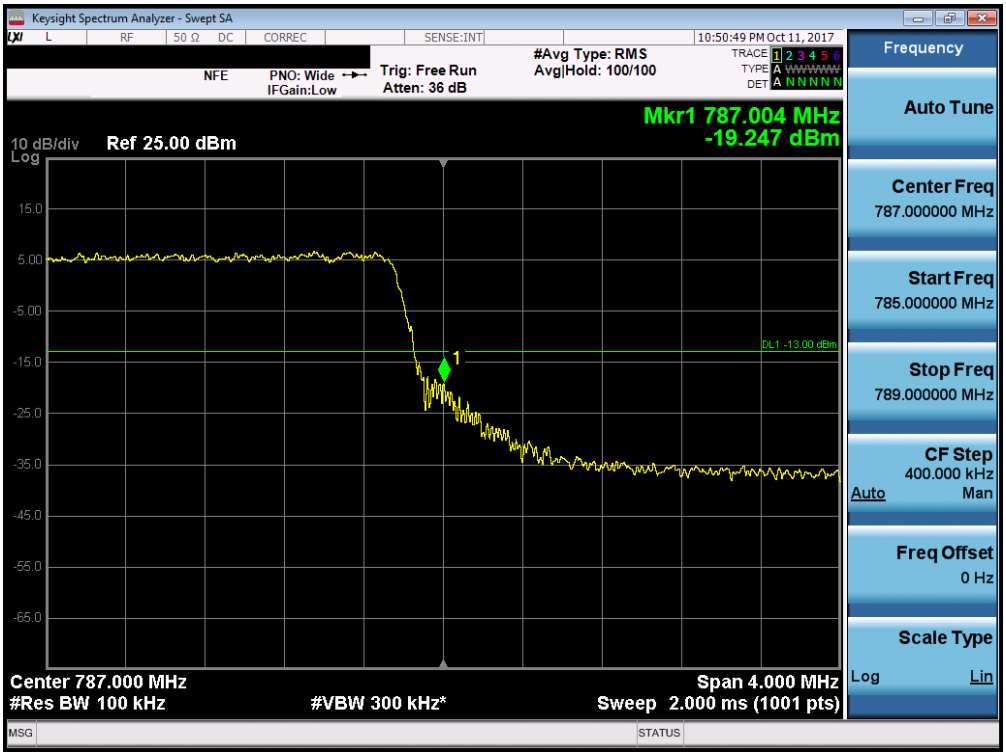
Band 13



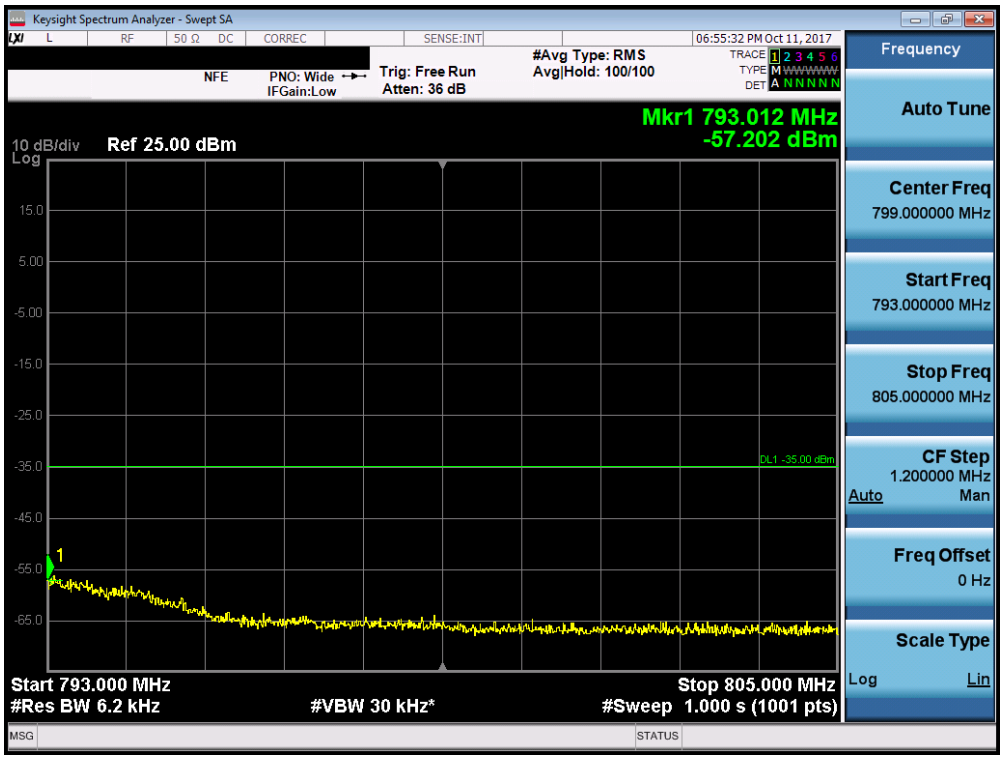
Plot 7-142. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



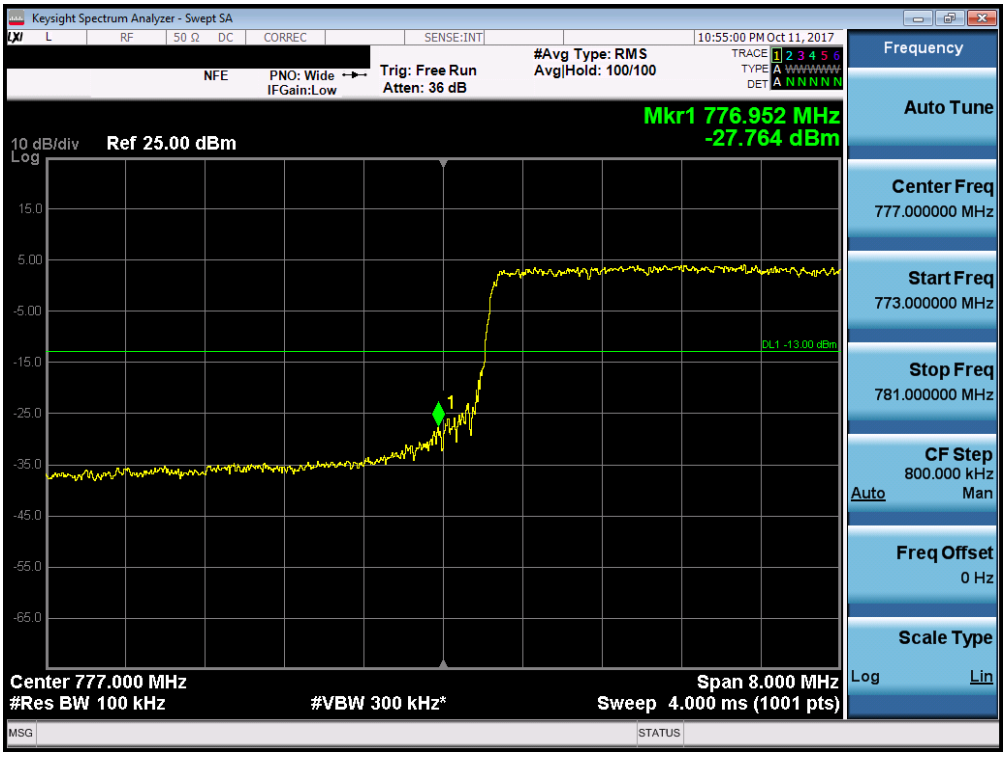
Plot 7-143. Lower Emission Mask Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



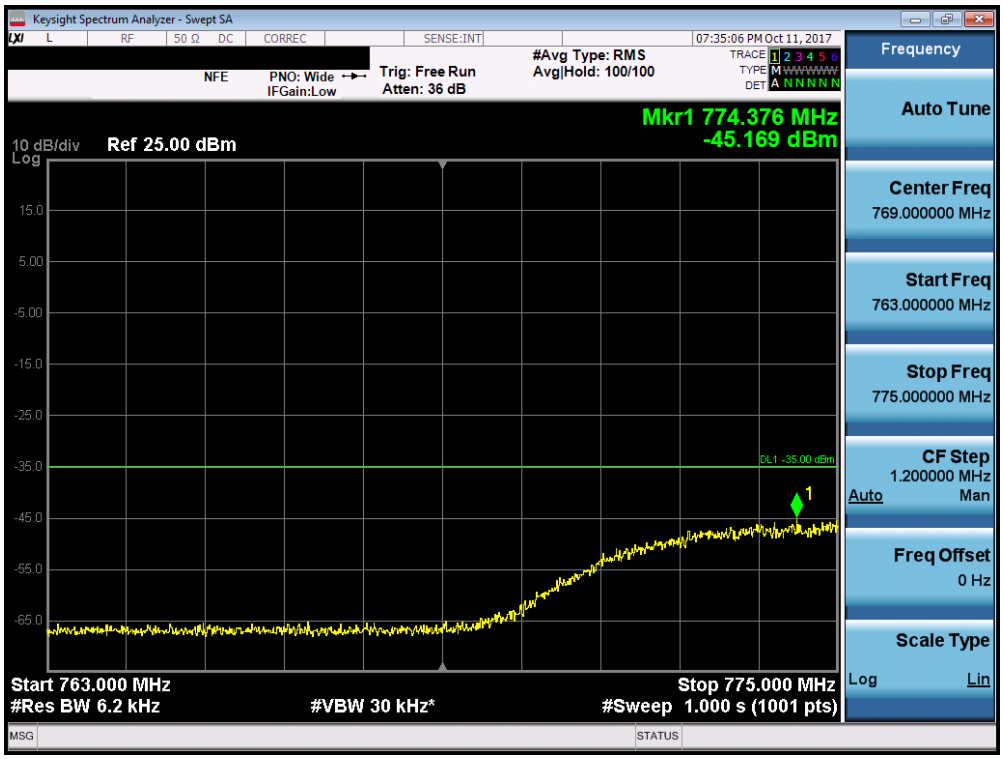
Plot 7-144. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



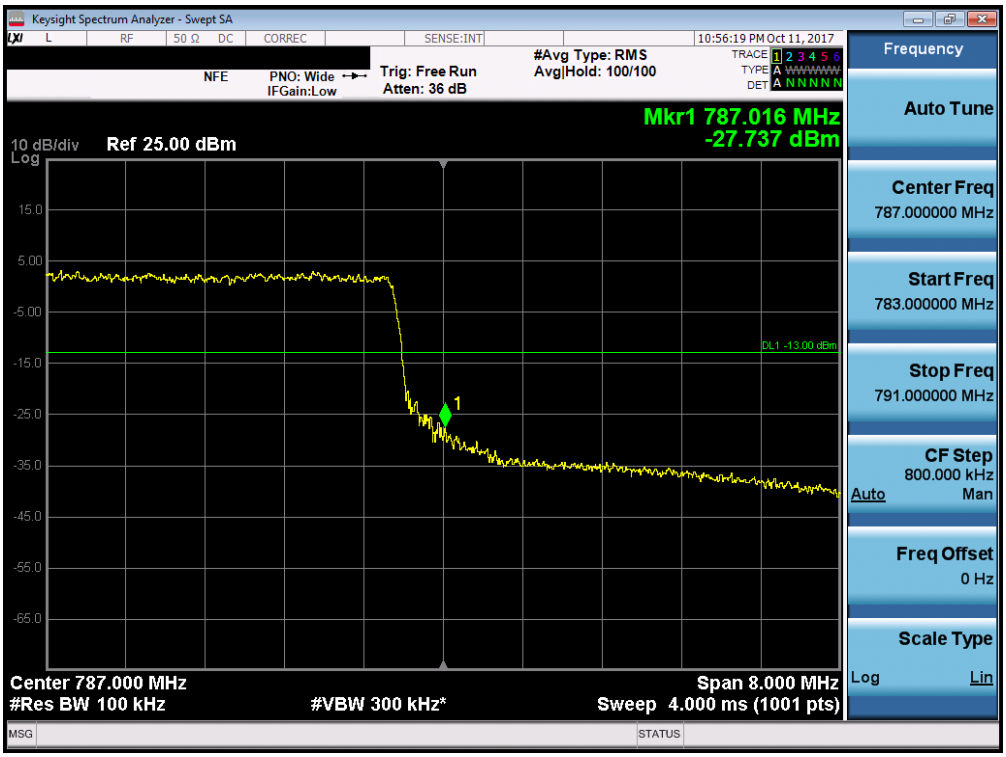
Plot 7-145. Upper Emission Mask Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



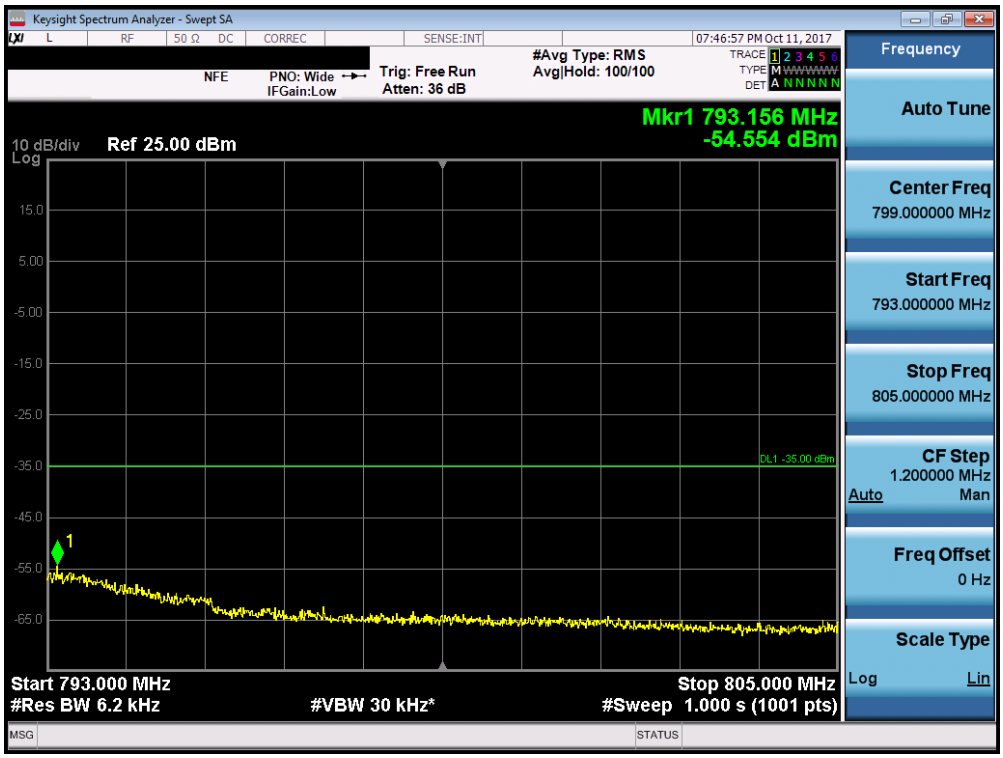
Plot 7-146. Lower Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



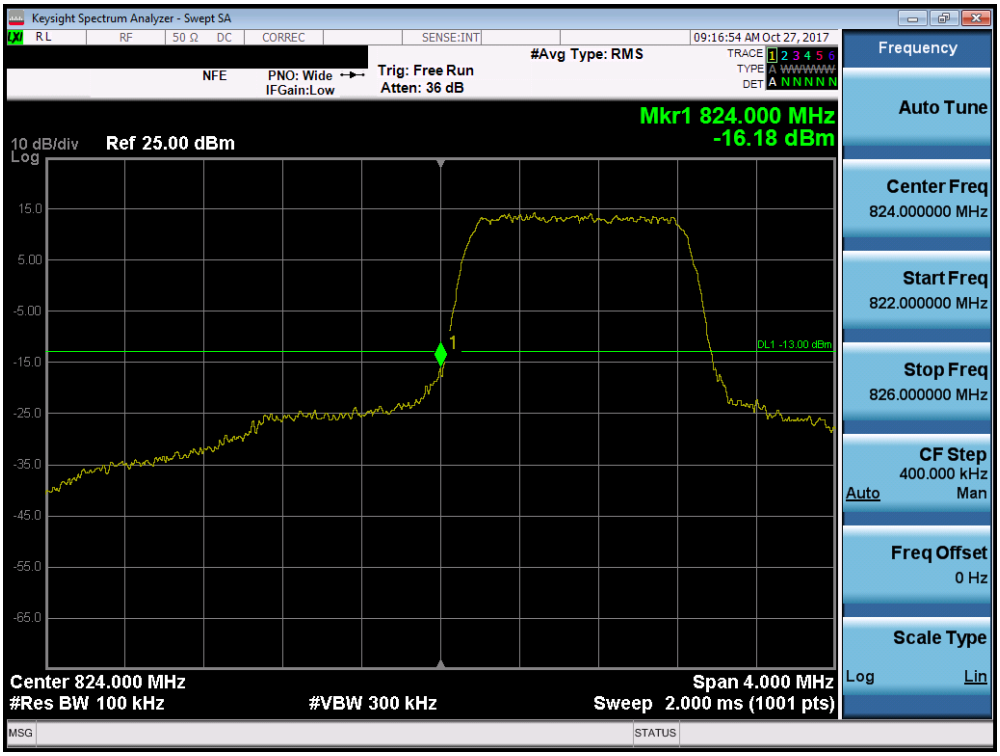
Plot 7-147. Lower Emission Mask Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-148. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

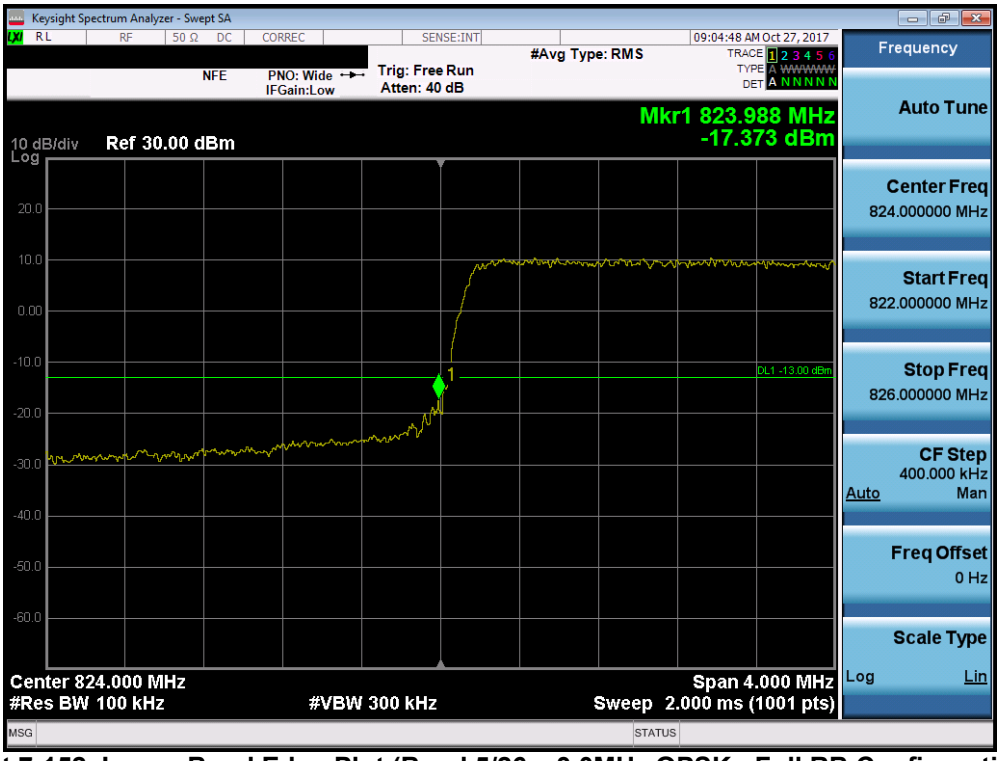


Plot 7-149. Upper Emission Mask Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-150. Lower Band Edge Plot (Band 5/26 - 1.4MHz QPSK - Full RB Configuration)

Plot 7-151. Upper Band Edge Plot (Band 5/26 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-152. Lower Band Edge Plot (Band 5/26 – 3.0MHz QPSK - Full RB Configuration)

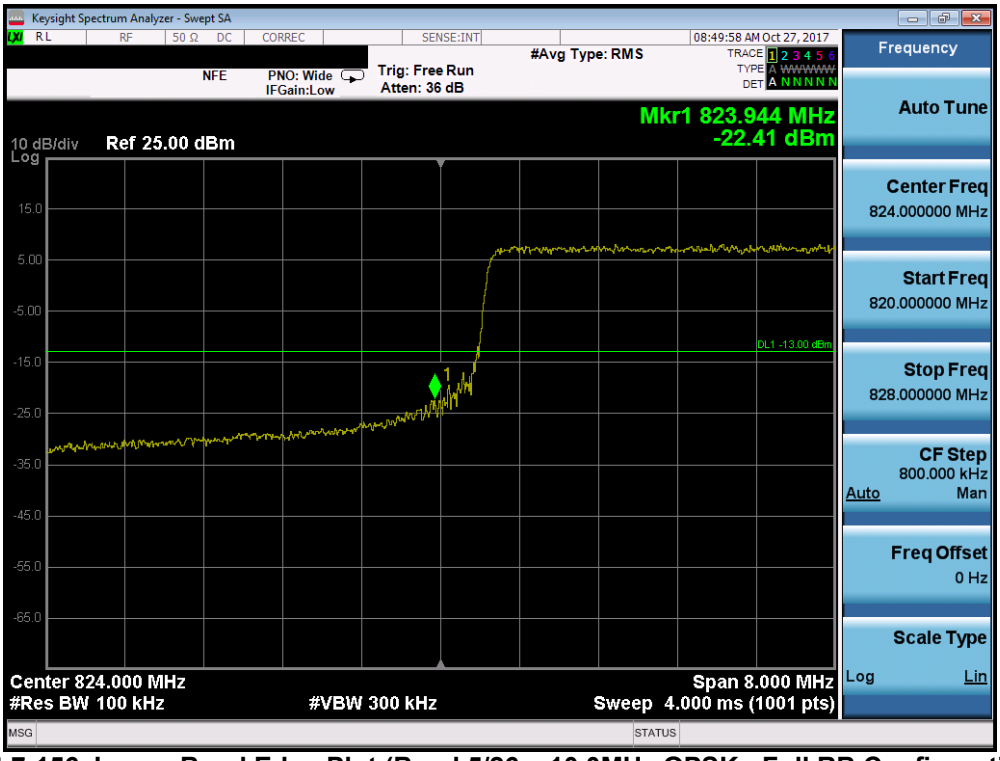
Plot 7-153. Upper Band Edge Plot (Band 5/26 - 3.0MHz QPSK - Full RB Configuration)

Band 5/26

Plot 7-154. Lower Band Edge Plot (Band 5/26 – 5.0MHz QPSK - Full RB Configuration)

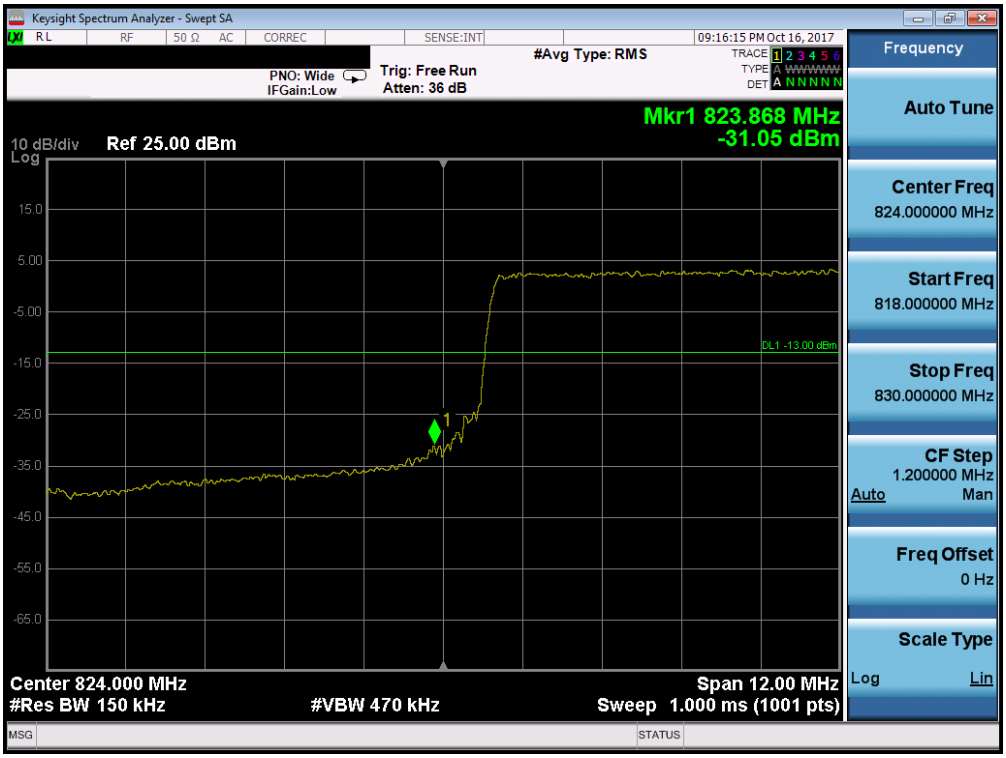
Plot 7-155. Upper Band Edge Plot (Band 5/26 - 5.0MHz QPSK - Full RB Configuration)

Band 5/26



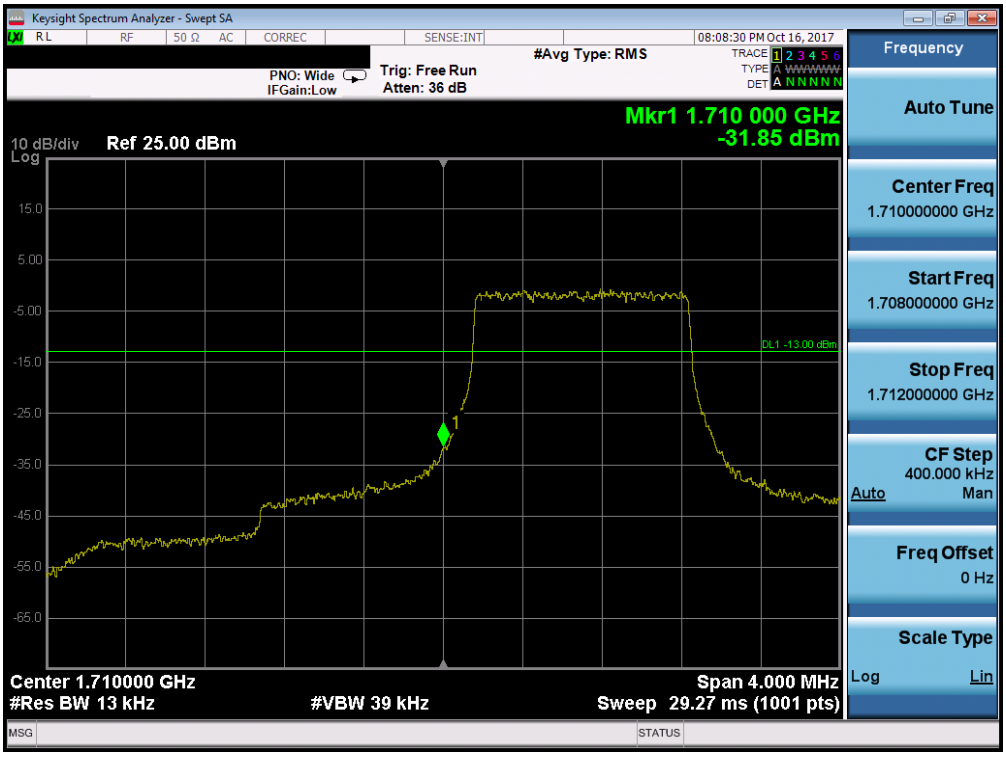
Plot 7-156. Lower Band Edge Plot (Band 5/26 – 10.0MHz QPSK - Full RB Configuration)

Plot 7-157. Upper Band Edge Plot (Band 5/26 - 10.0MHz QPSK - Full RB Configuration)

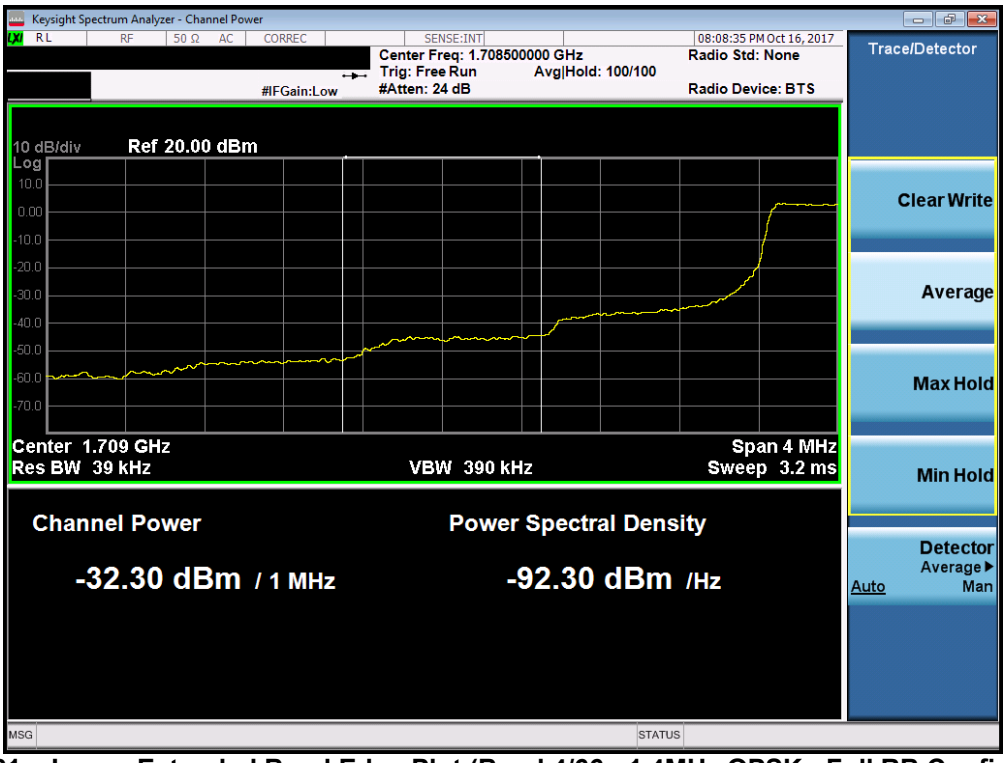


Plot 7-158. Lower Band Edge Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)

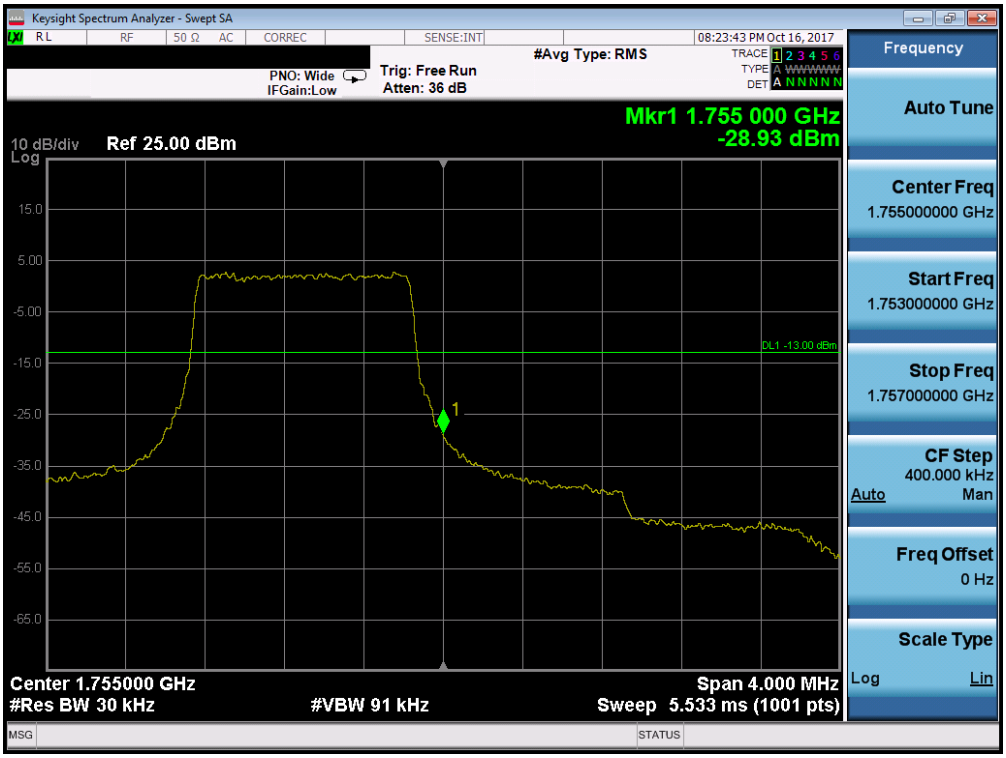
Plot 7-159. Upper Band Edge Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)



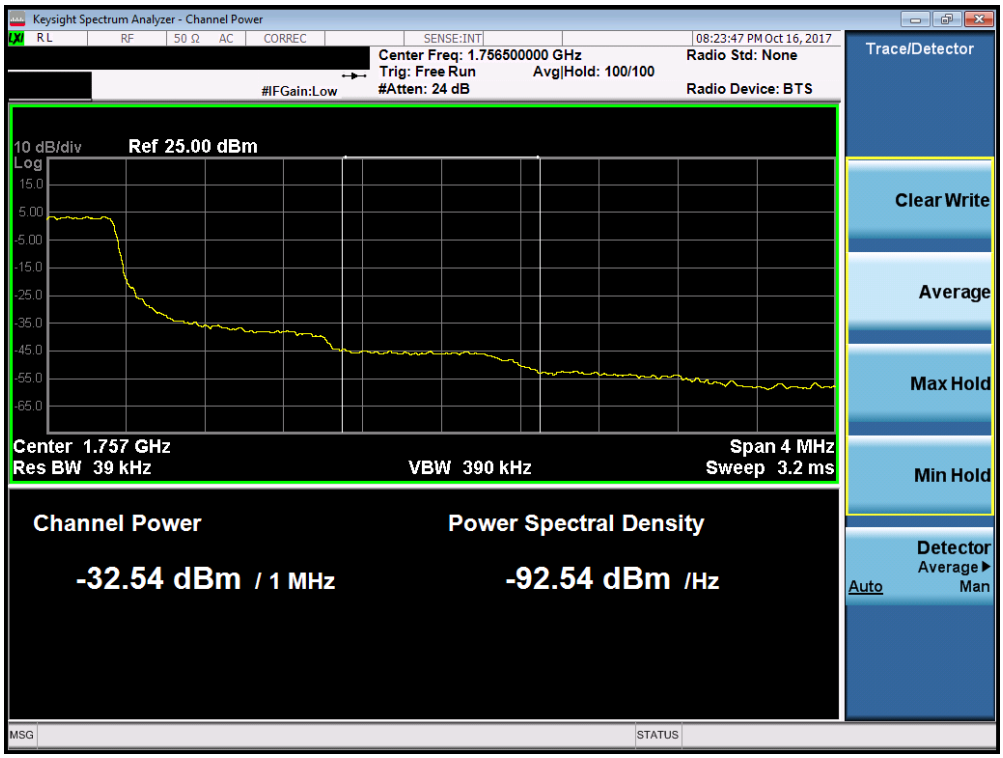
Plot 7-160. Lower Band Edge Plot (Band 4/66 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-161. . Lower Extended Band Edge Plot (Band 4/66 - 1.4MHz QPSK - Full RB Configuration)

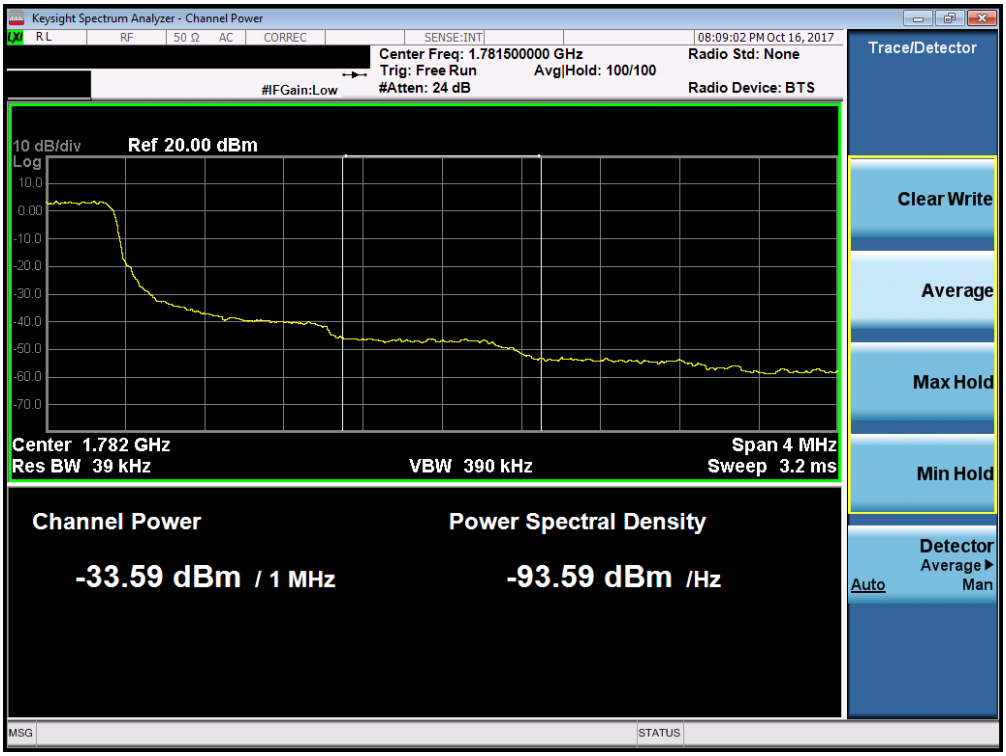


Plot 7-162. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

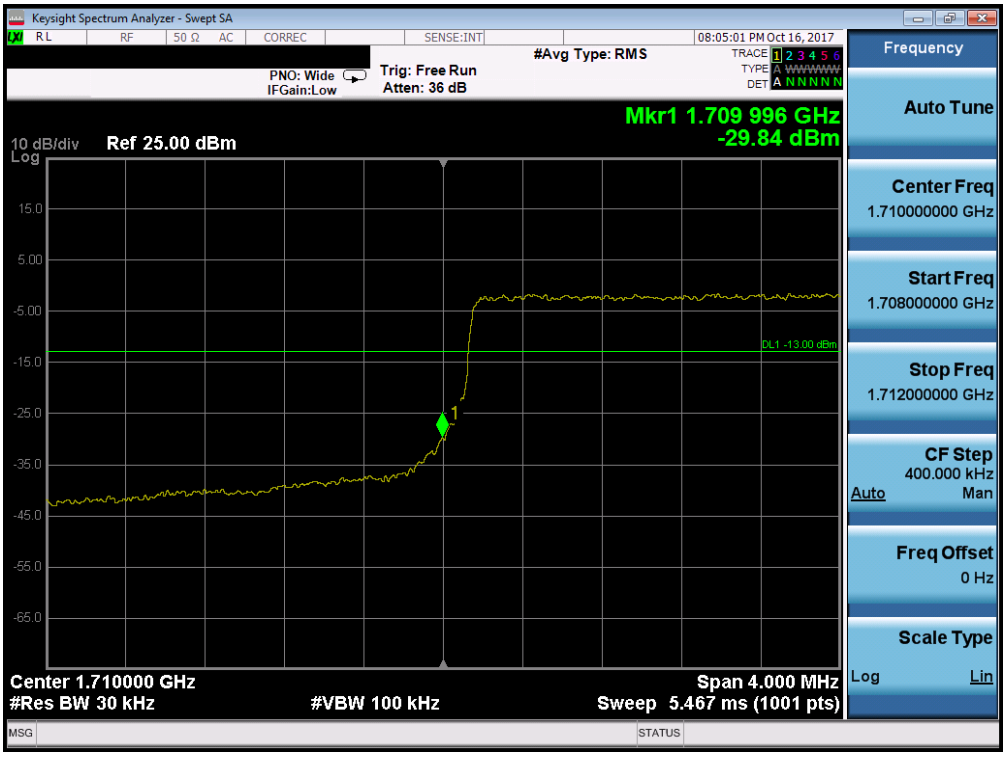


Plot 7-163. . Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

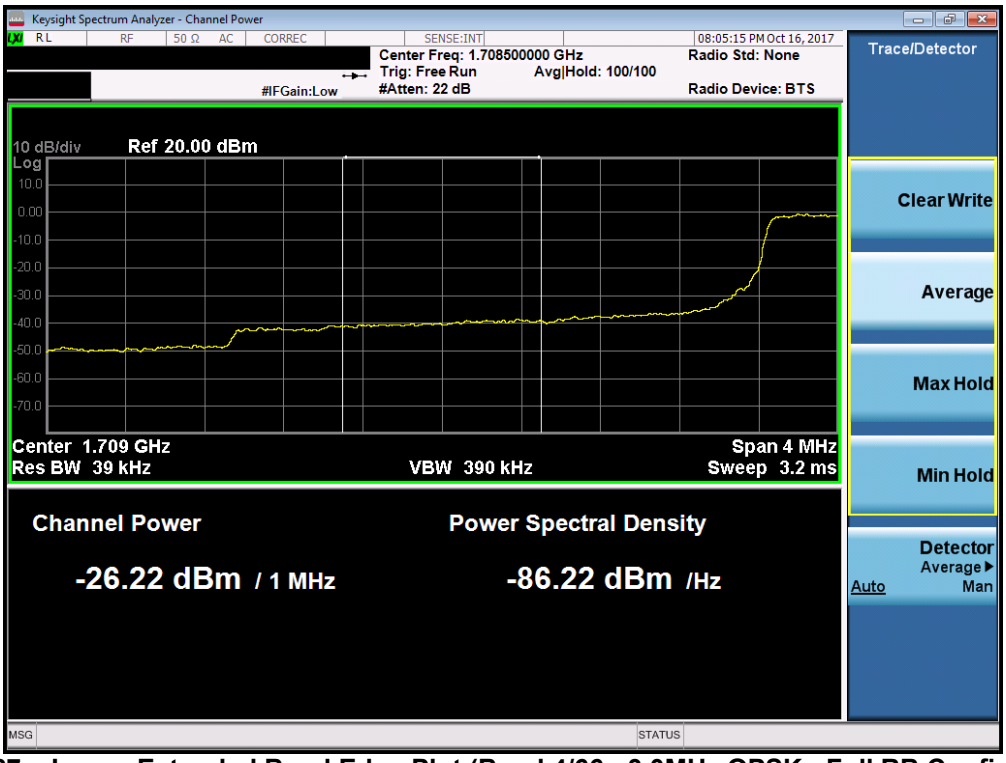
Plot 7-164. Upper Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



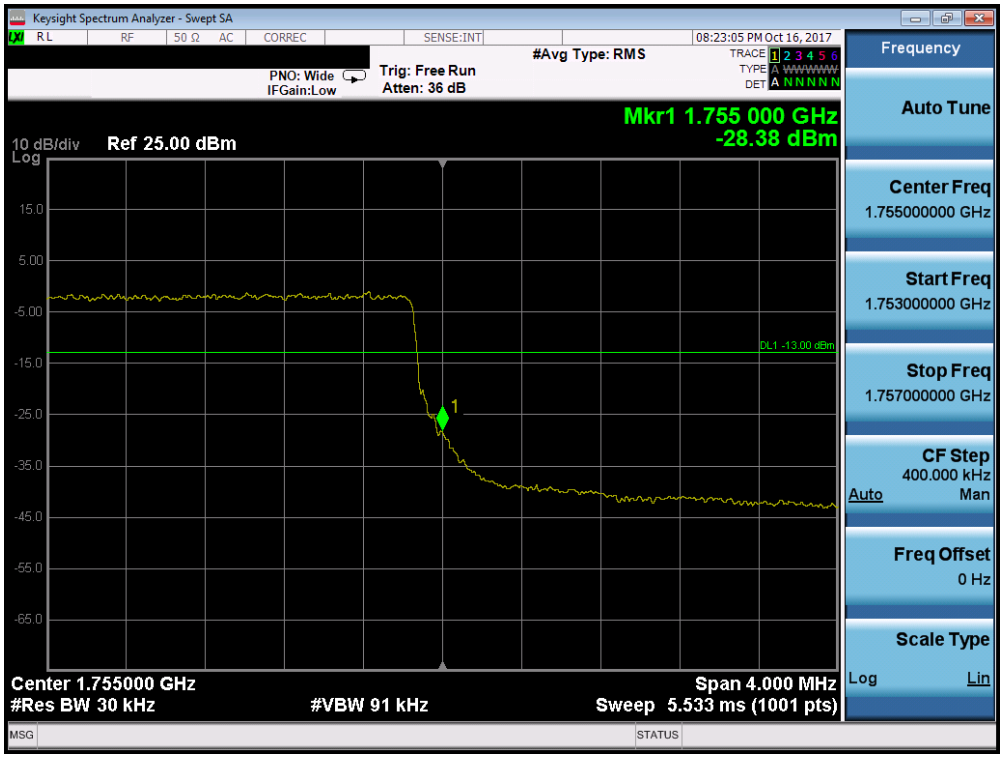
Plot 7-165. . Upper Extended Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



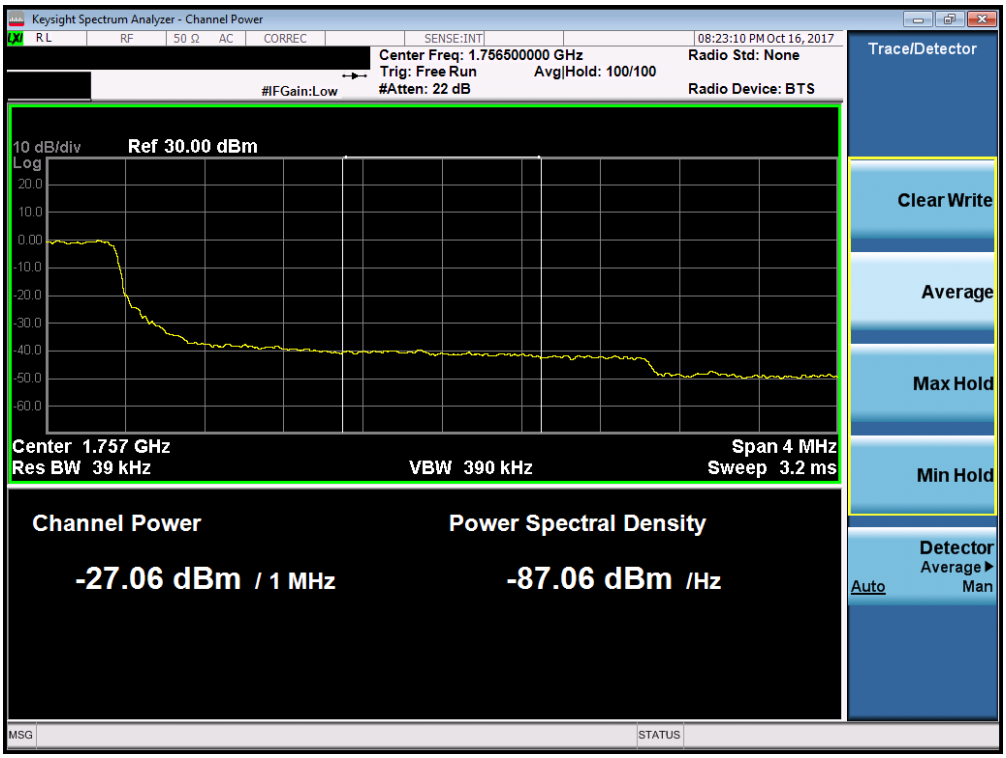
Plot 7-166. Lower Band Edge Plot (Band 4/66 - 3.0MHz QPSK - Full RB Configuration)



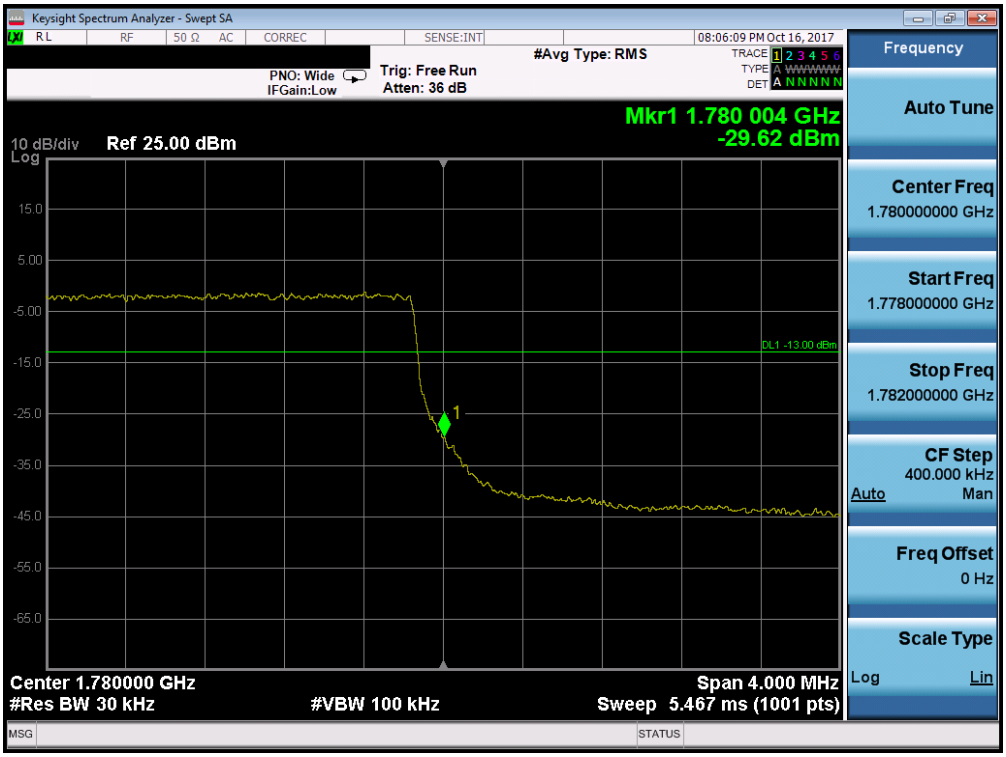
Plot 7-167. . Lower Extended Band Edge Plot (Band 4/66 - 3.0MHz QPSK - Full RB Configuration)



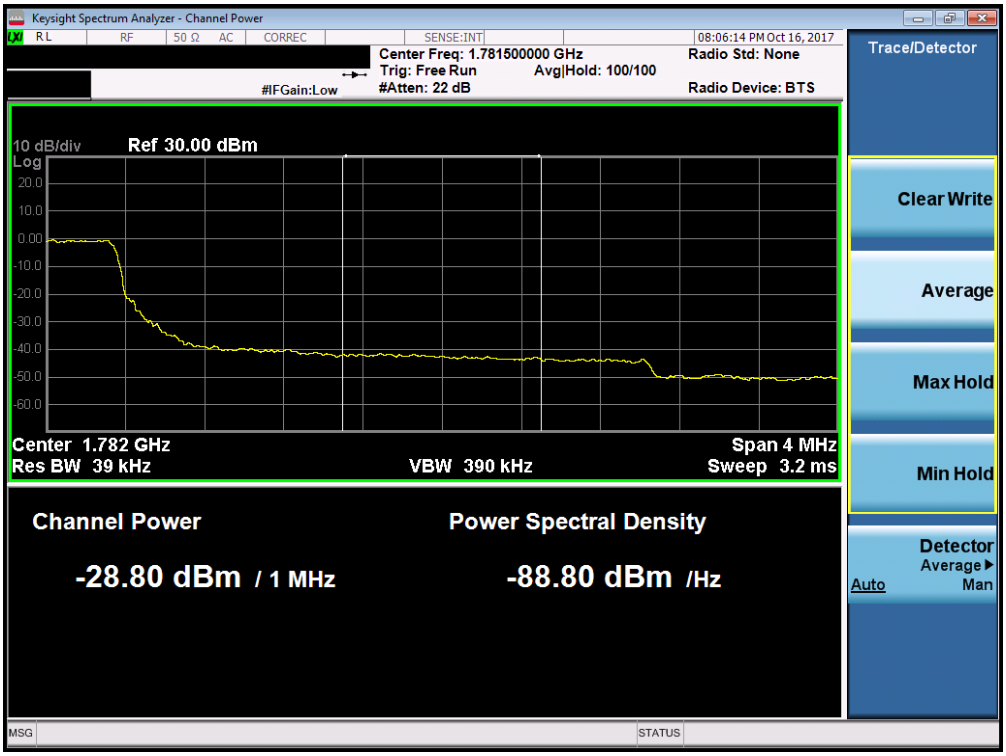
Plot 7-168. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



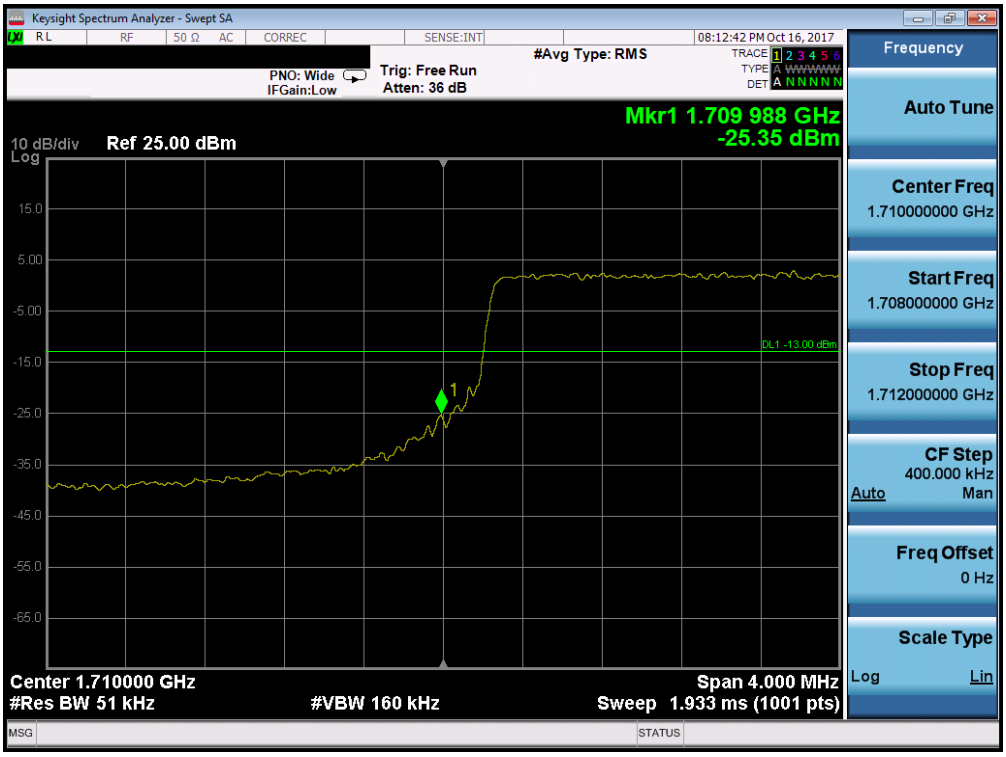
Plot 7-169. . Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



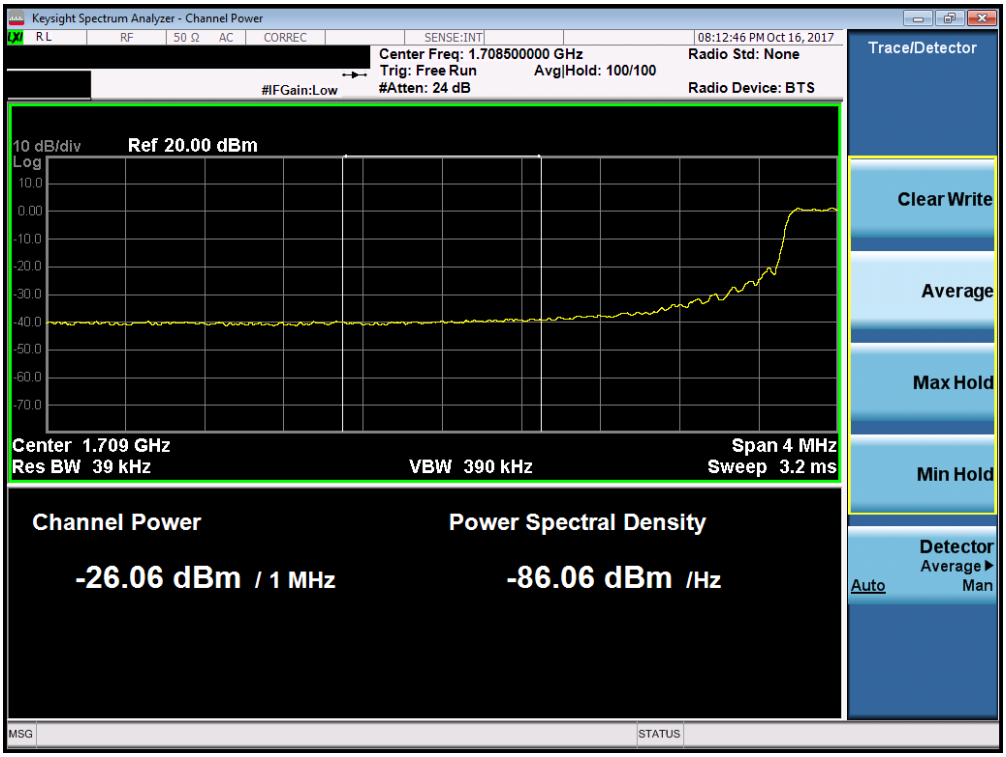
Plot 7-170. Upper Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



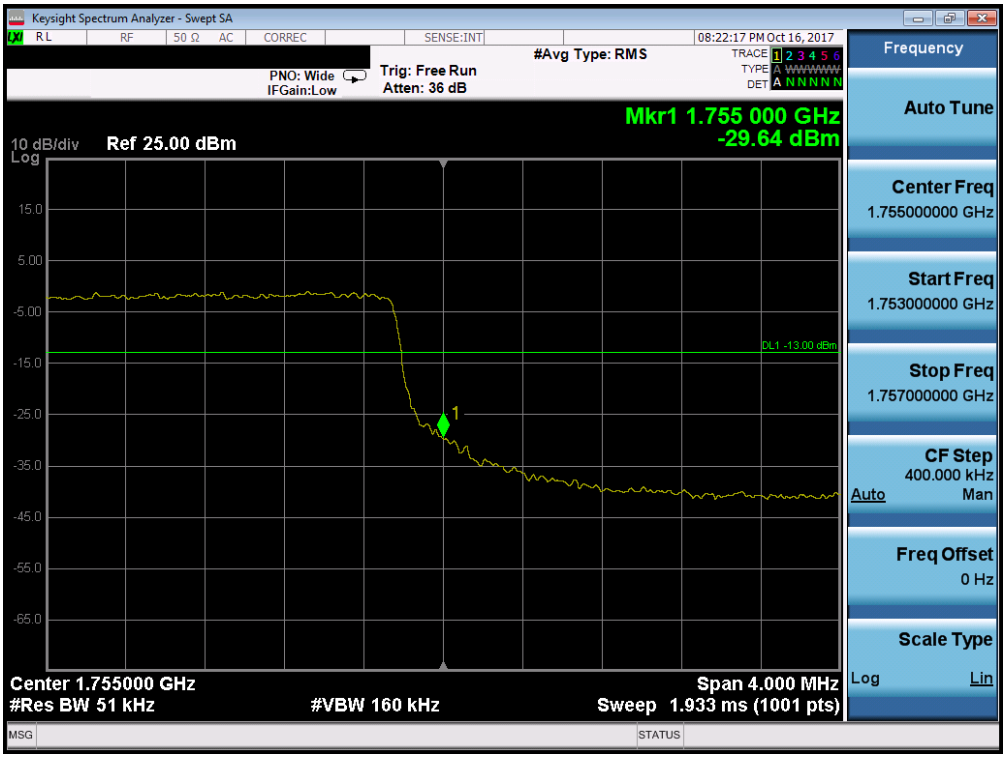
Plot 7-171. . Upper Extended Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



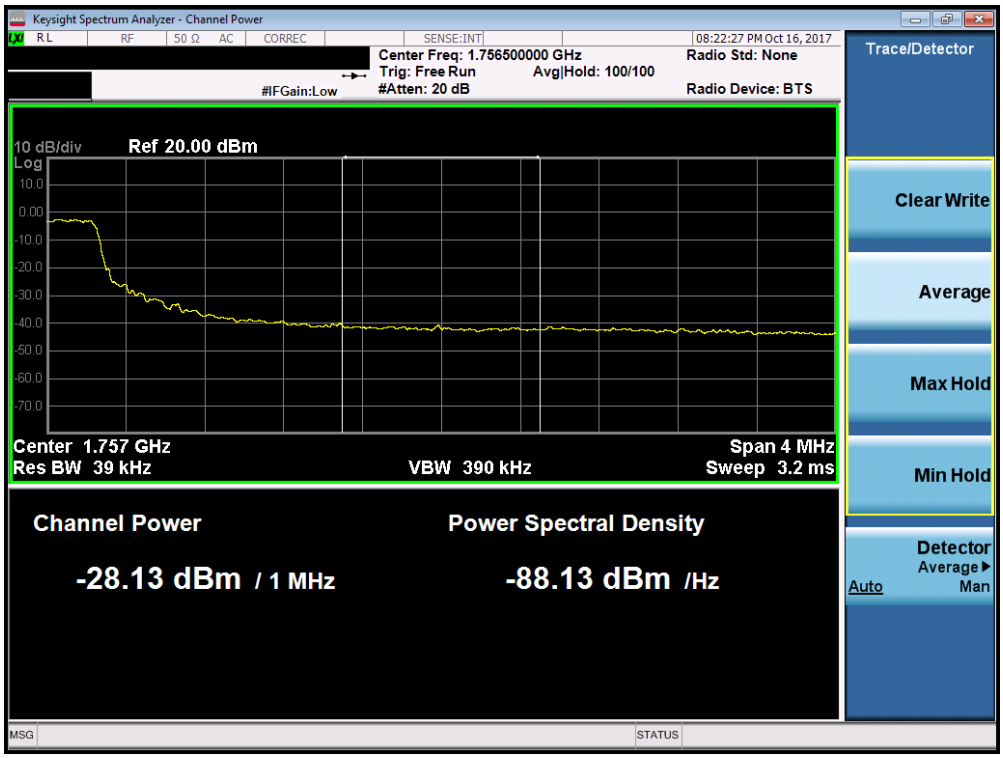
Plot 7-172. Lower Band Edge Plot (Band 4/66 - 5.0MHz QPSK - Full RB Configuration)



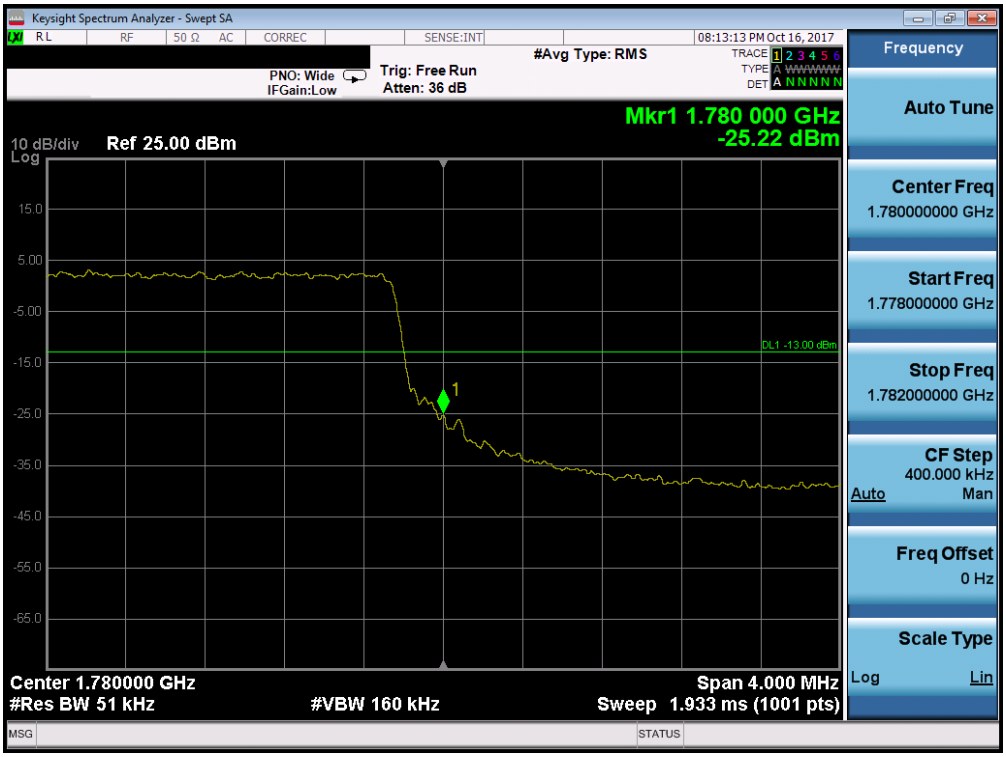
Plot 7-173. . Lower Extended Band Edge Plot (Band 4/66 - 5.0MHz QPSK - Full RB Configuration)



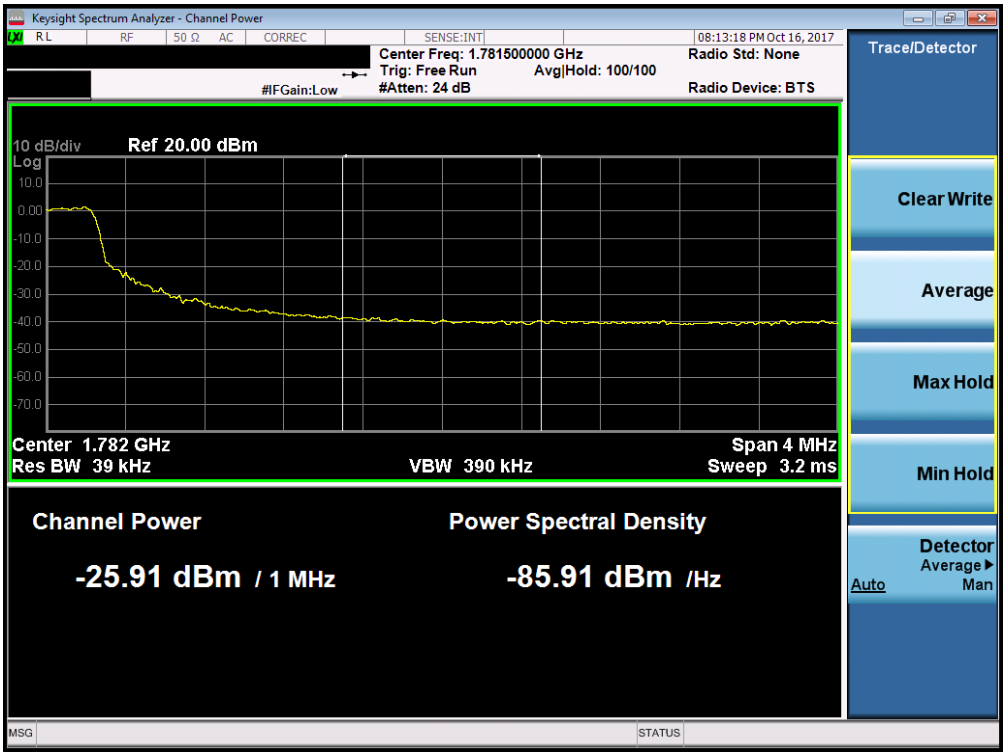
Plot 7-174. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



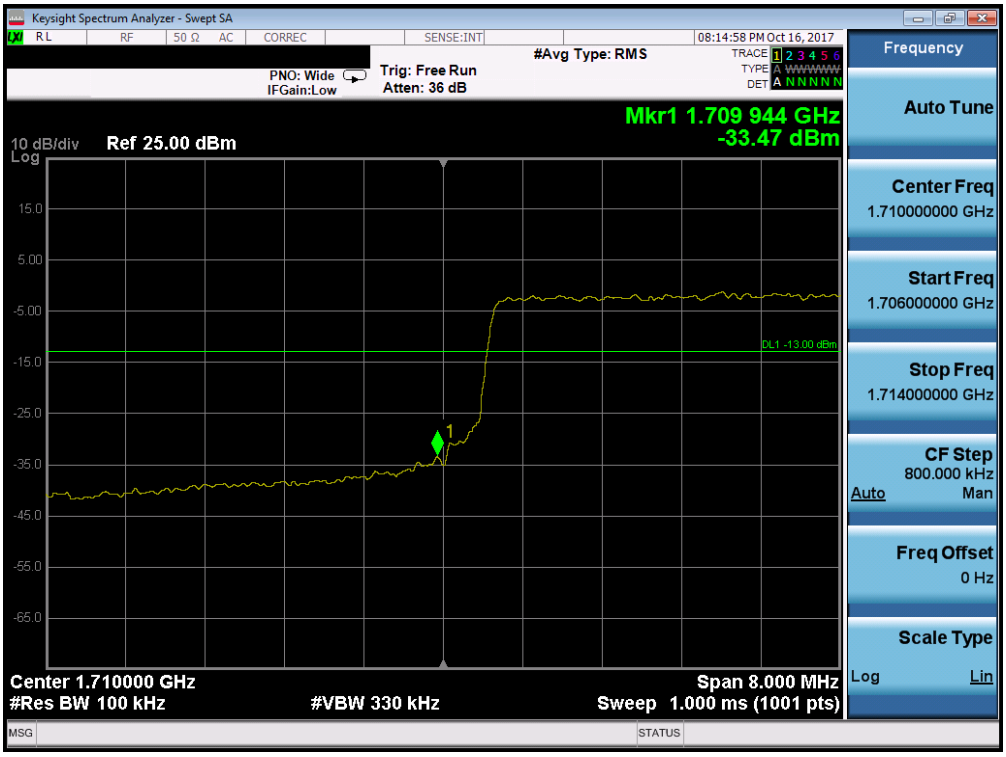
Plot 7-175. . Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



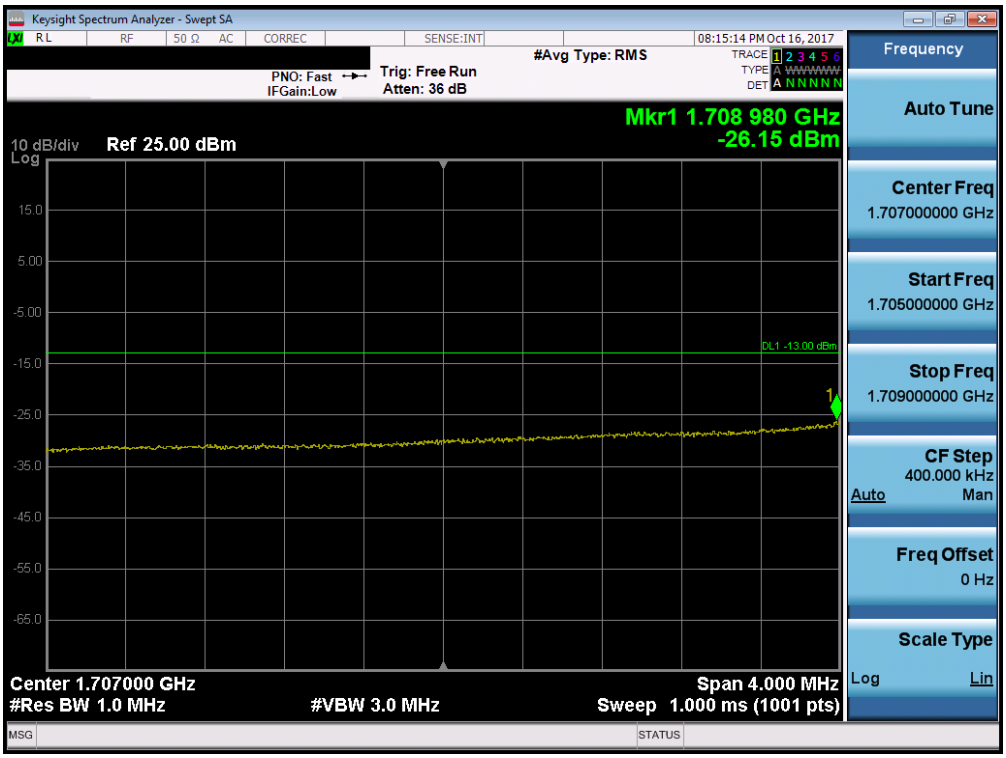
Plot 7-176. Upper Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



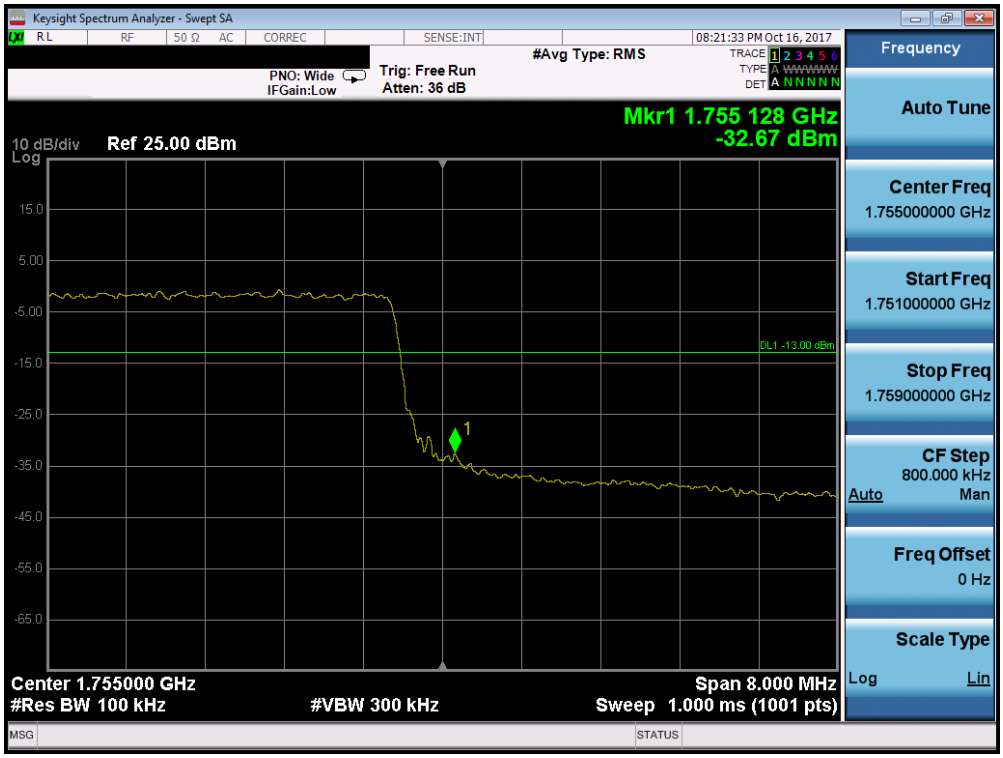
Plot 7-177. . Upper Extended Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



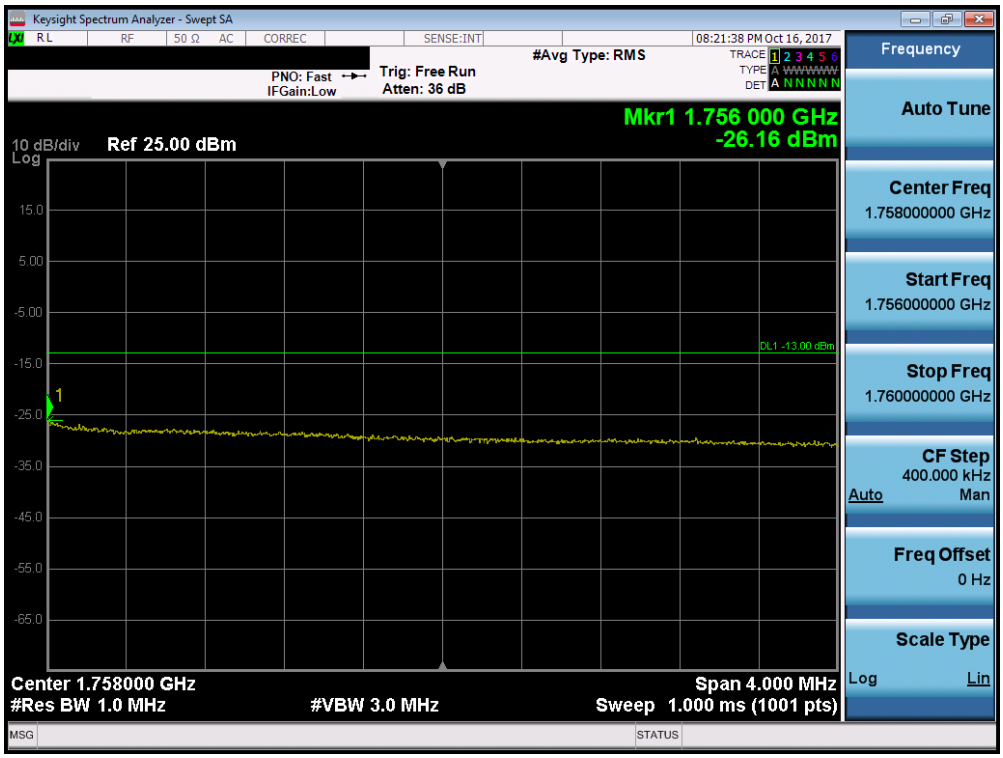
Plot 7-178. Lower Band Edge Plot (Band 4/66 - 10.0MHz QPSK - Full RB Configuration)



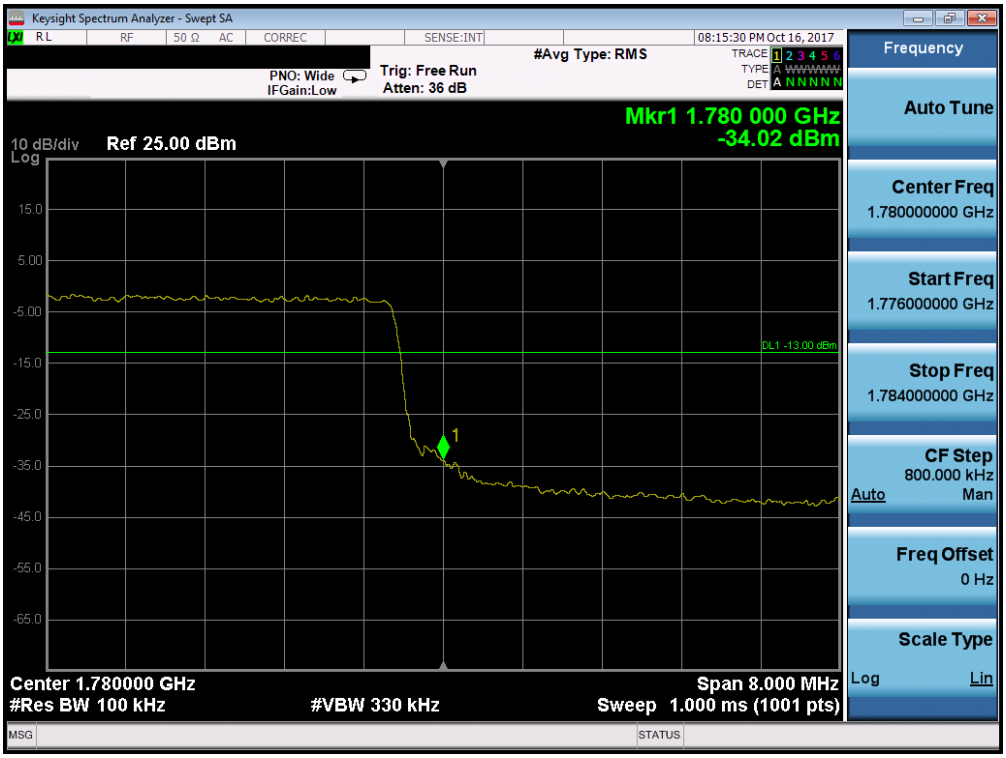
Plot 7-179. . Lower Extended Band Edge Plot (Band 4/66 - 10.0MHz QPSK - Full RB Configuration)



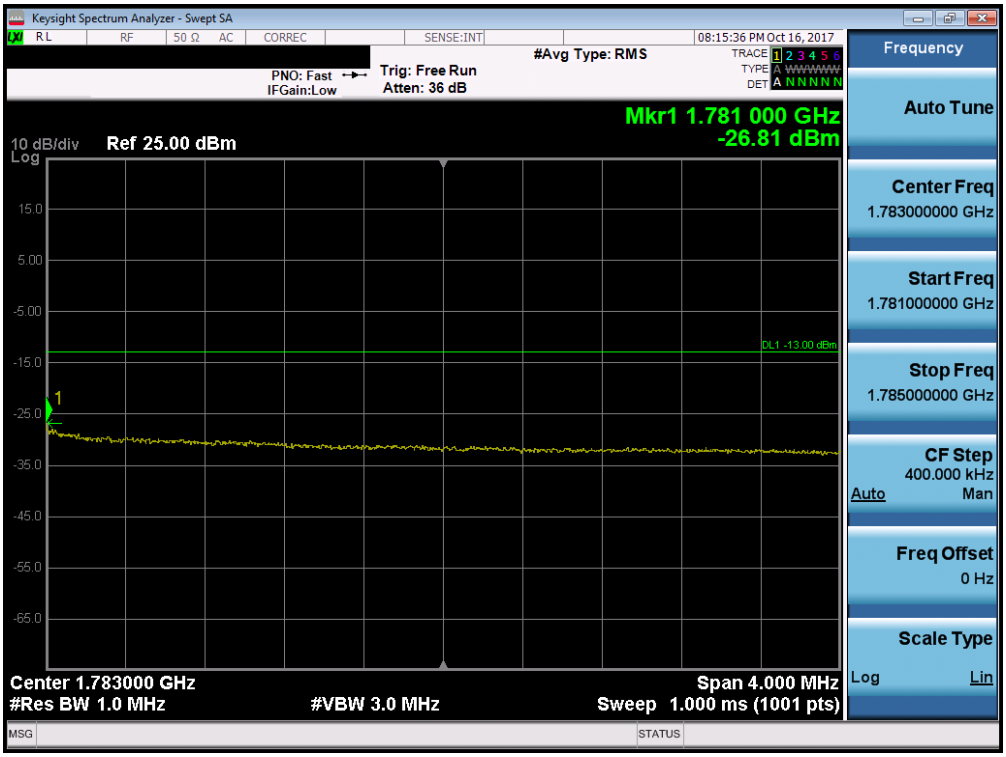
Plot 7-180. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



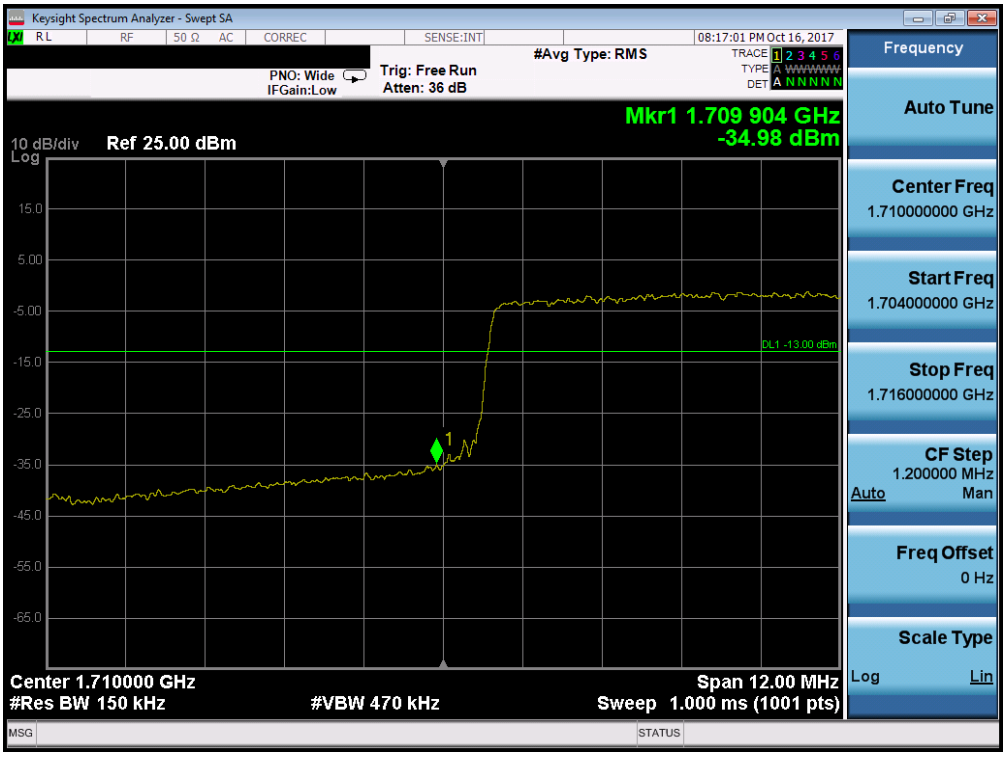
Plot 7-181. . Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



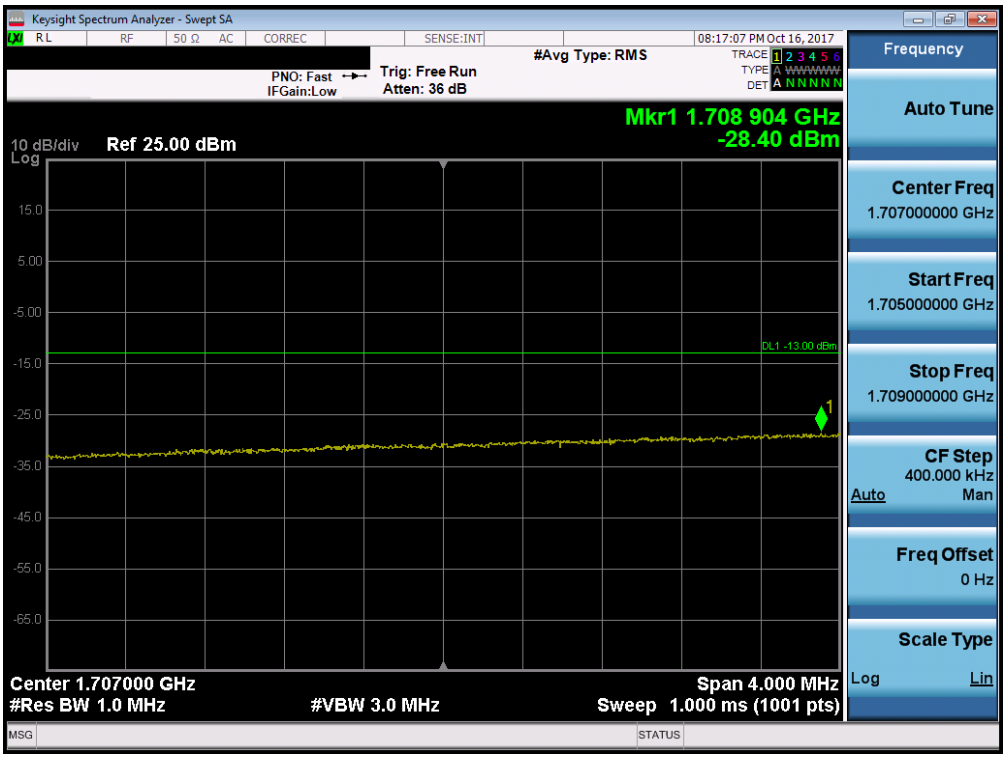
Plot 7-182. Upper Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-183. . Upper Extended Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

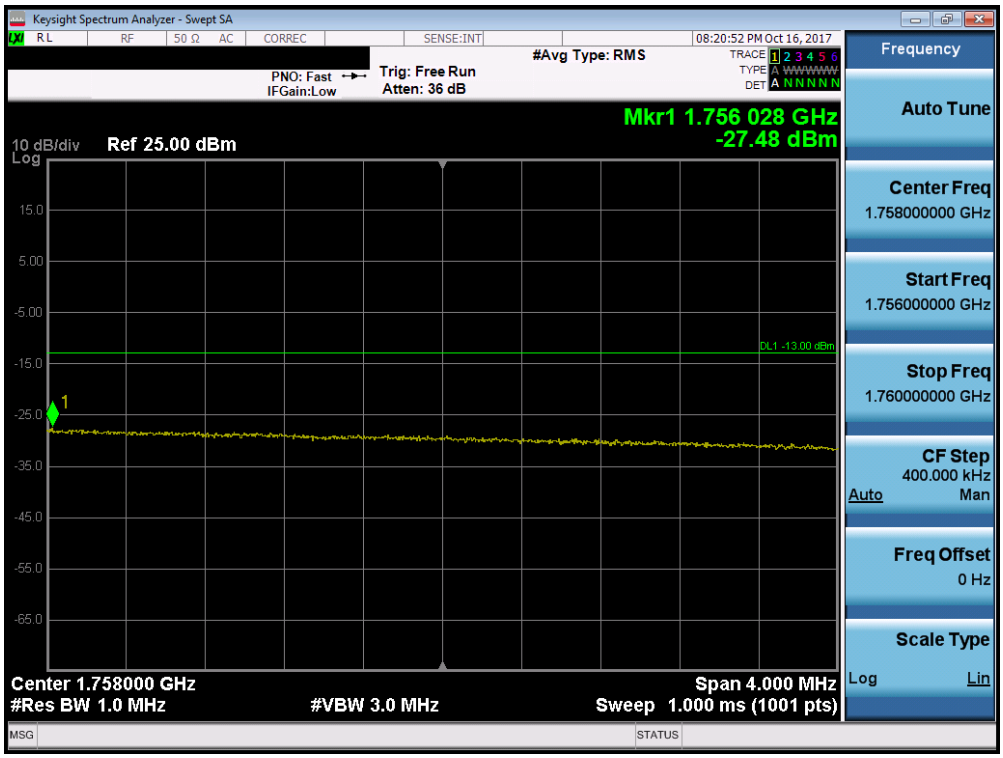


Plot 7-184. Lower Band Edge Plot (Band 4/66 - 15.0MHz QPSK - Full RB Configuration)

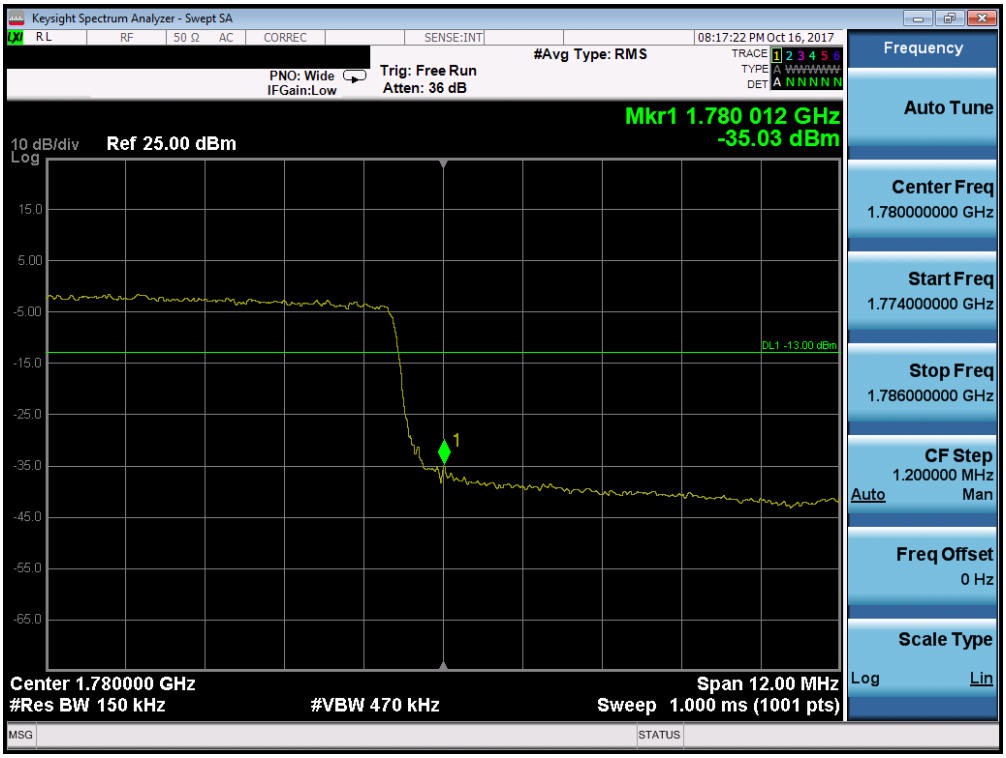


Plot 7-185. . Lower Extended Band Edge Plot (Band 4/66 - 15.0MHz QPSK - Full RB Configuration)

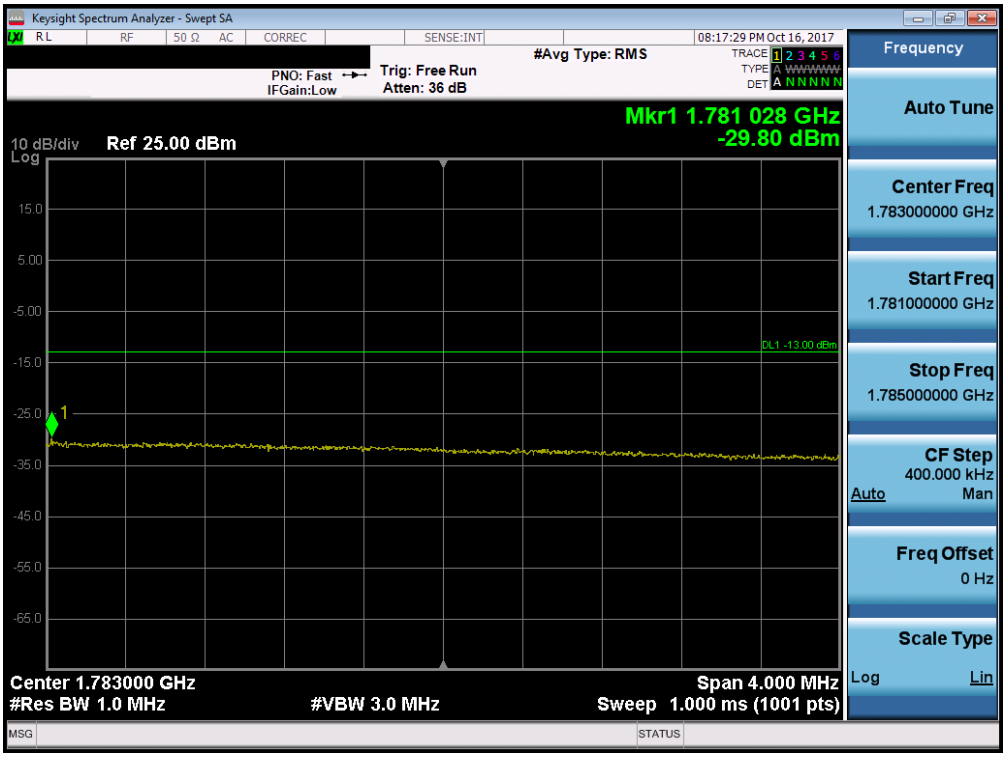
Plot 7-186. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



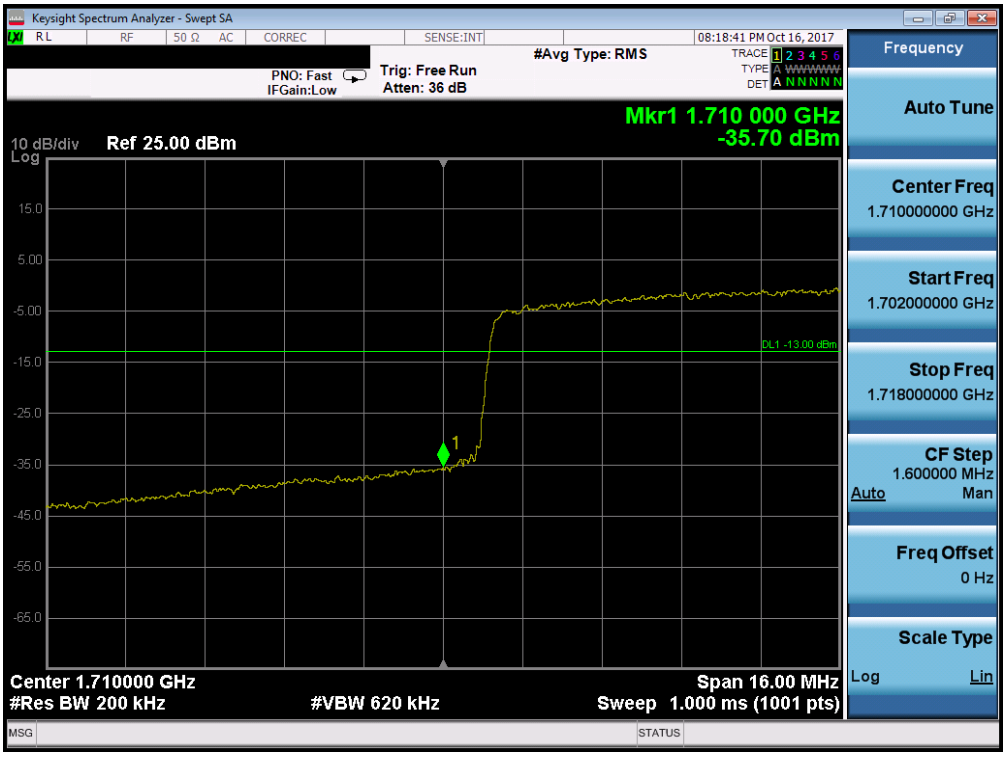
Plot 7-187. . Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



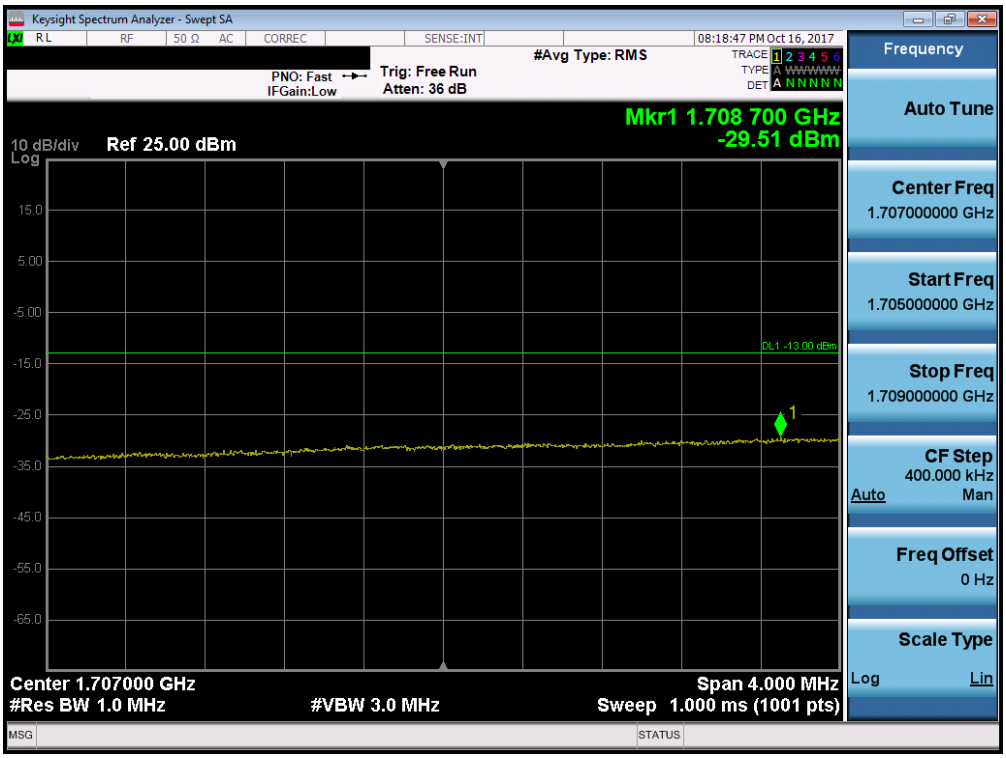
Plot 7-188. Upper Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



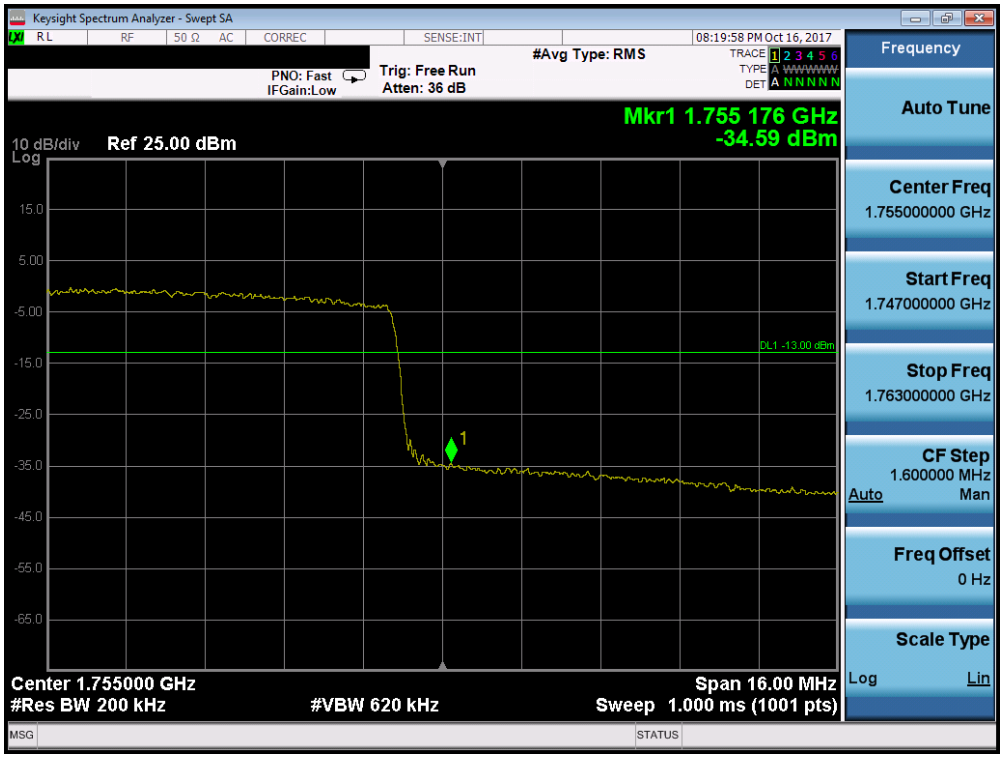
Plot 7-189. . Upper Extended Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



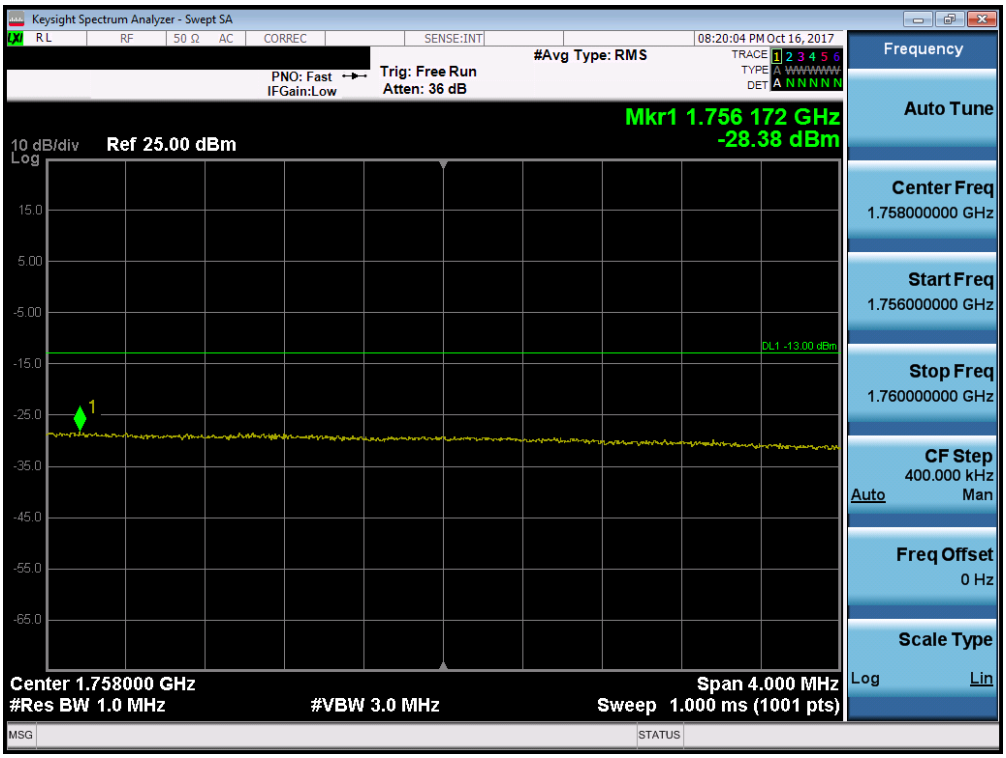
Plot 7-190. Lower Band Edge Plot (Band 4/66 - 20.0MHz QPSK - Full RB Configuration)



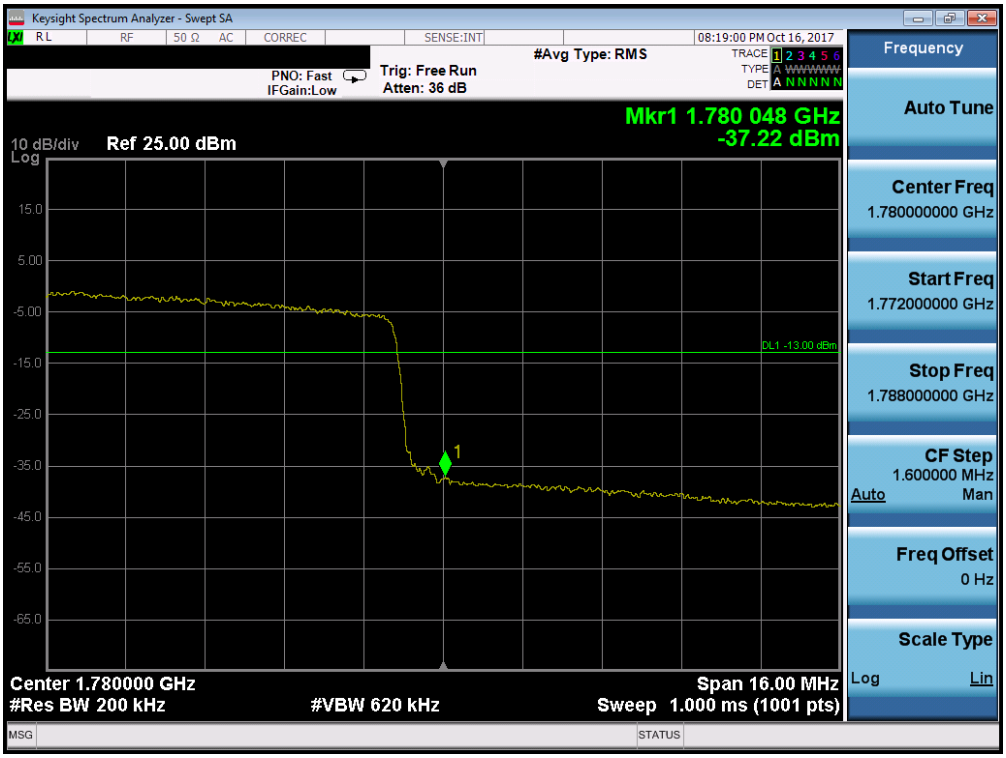
Plot 7-191. . Lower Extended Band Edge Plot (Band 4/66 - 20.0MHz QPSK - Full RB Configuration)



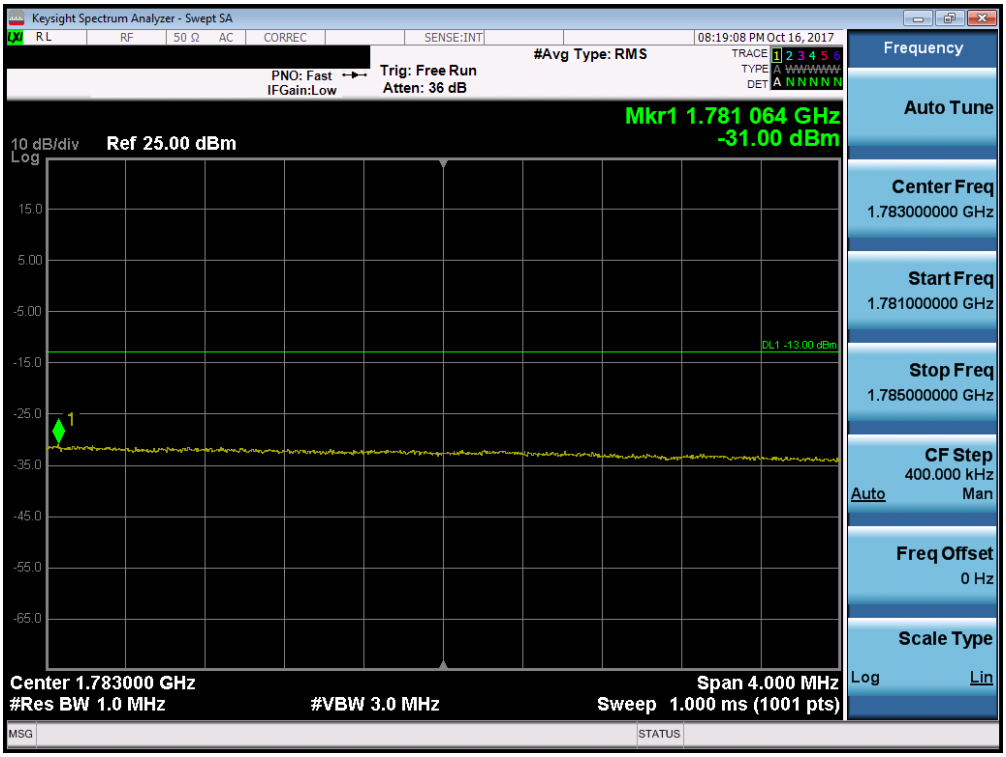
Plot 7-192. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-193. . Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

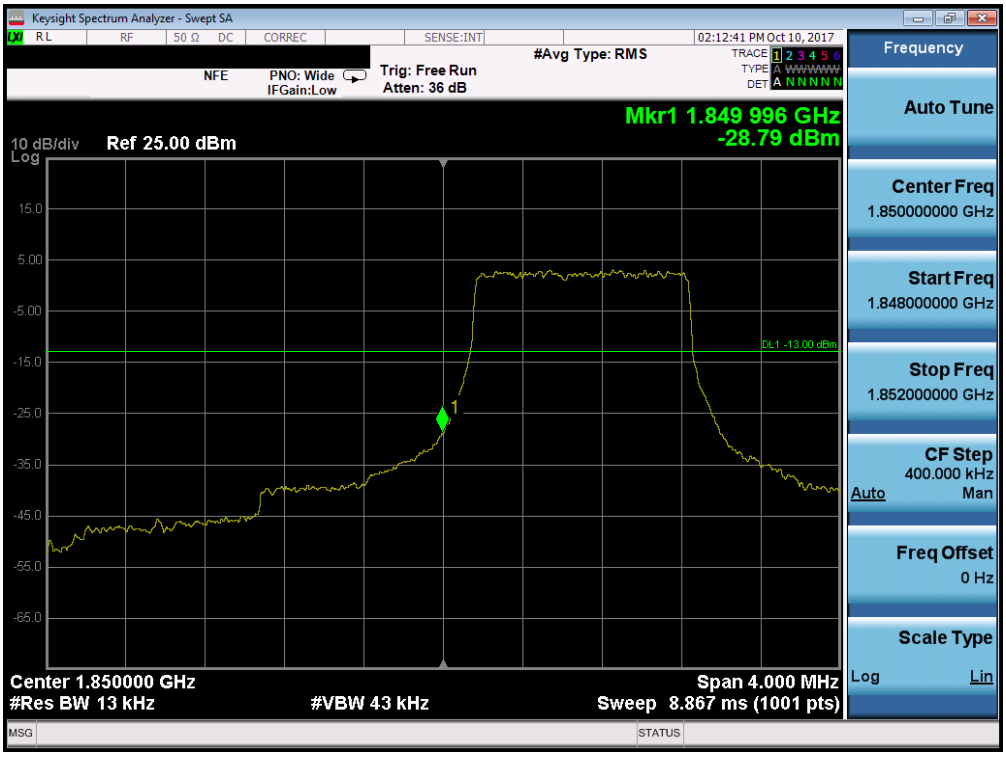


Plot 7-194. Upper Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

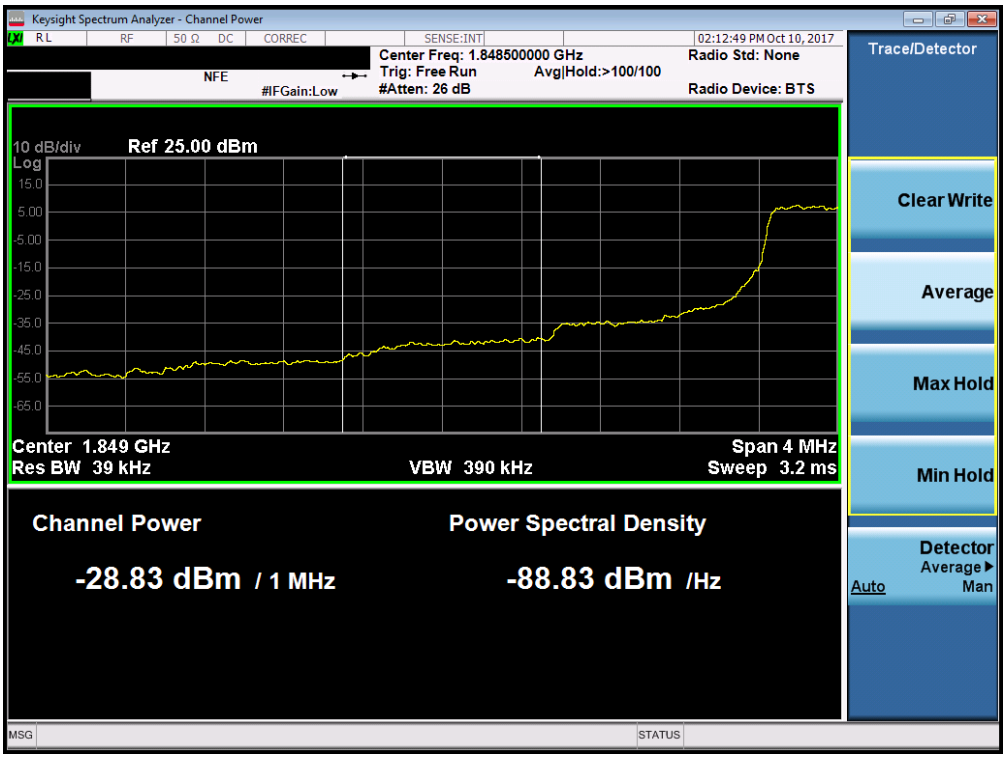


Plot 7-195. . Upper Extended Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

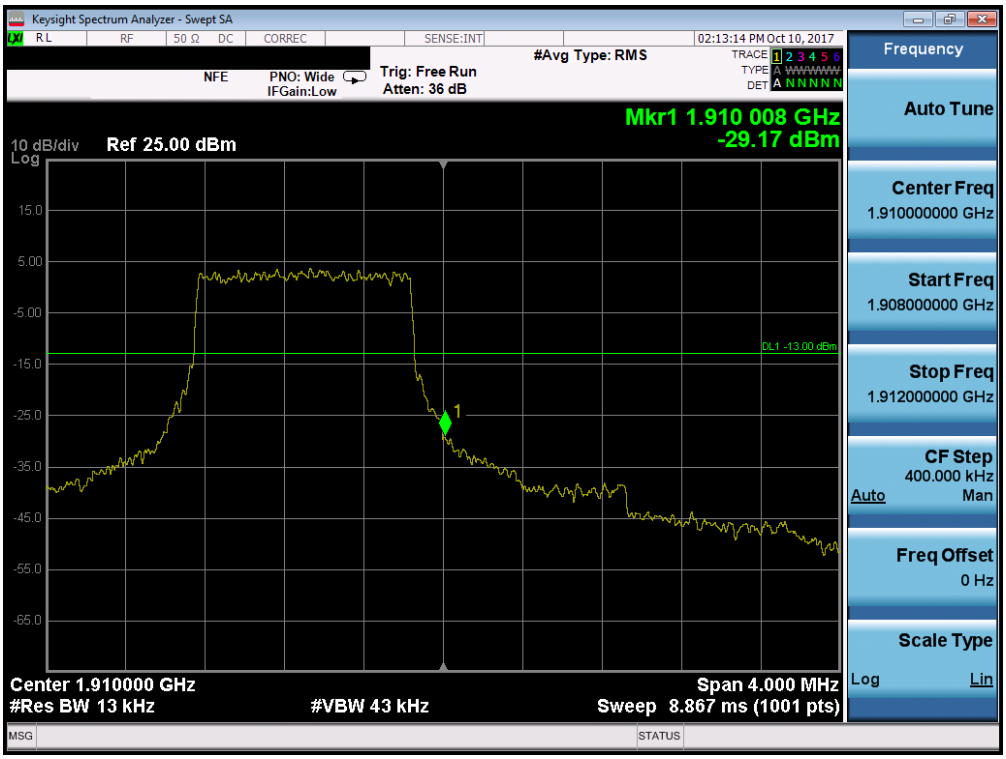
Band 2



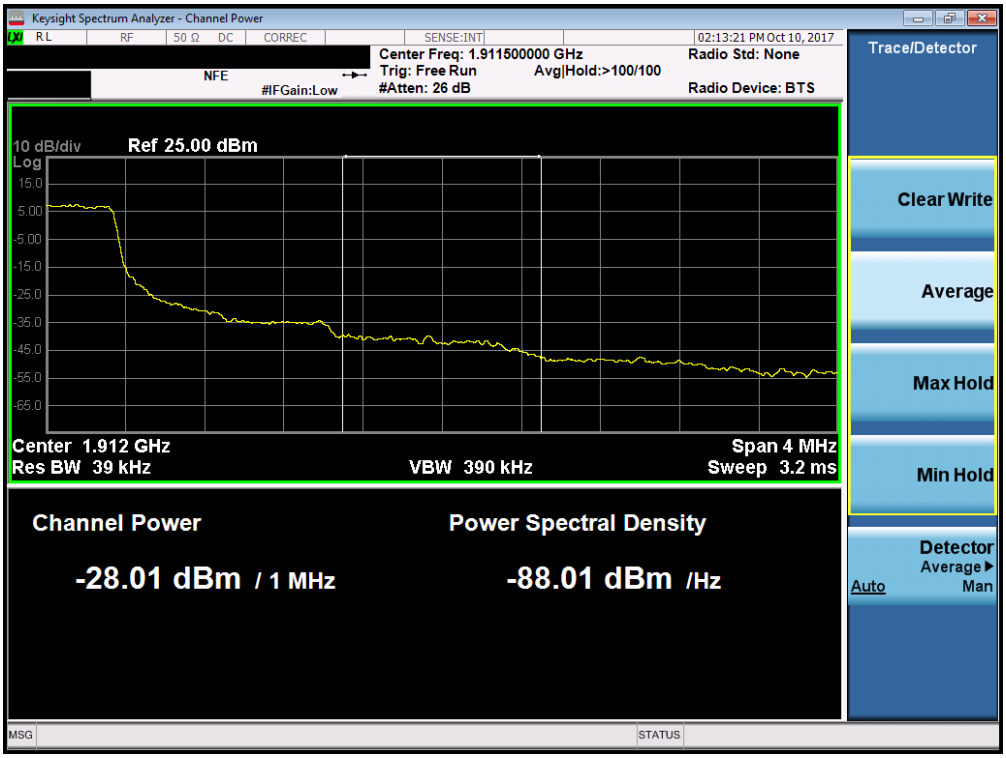
Plot 7-196. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-197. . Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

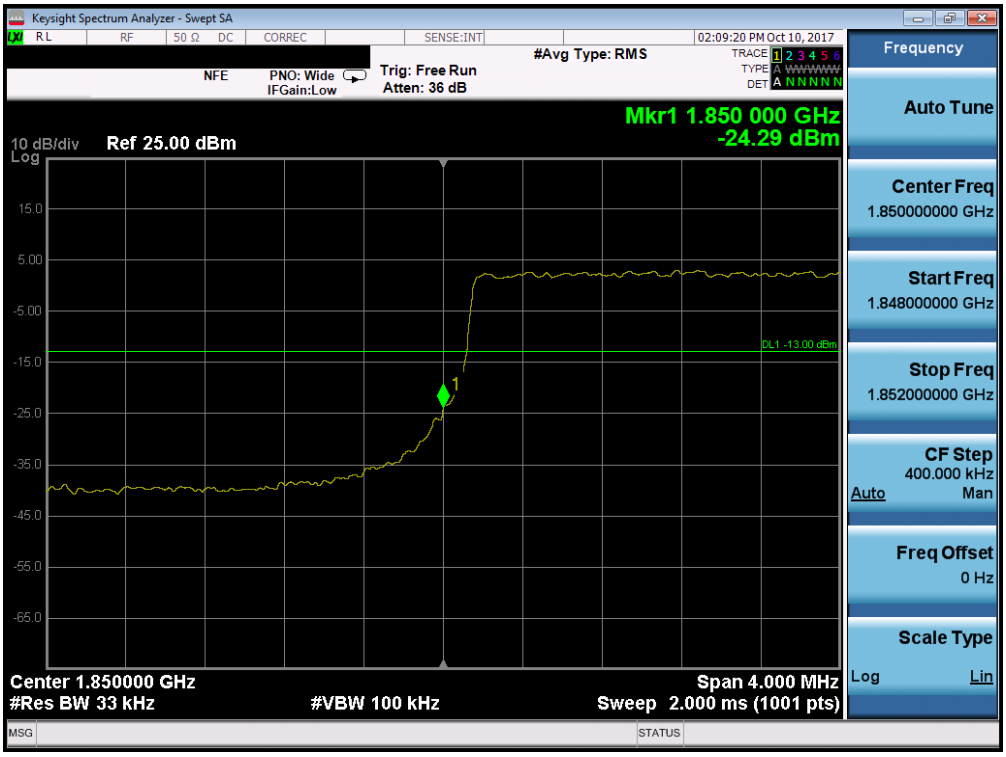


Plot 7-198. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

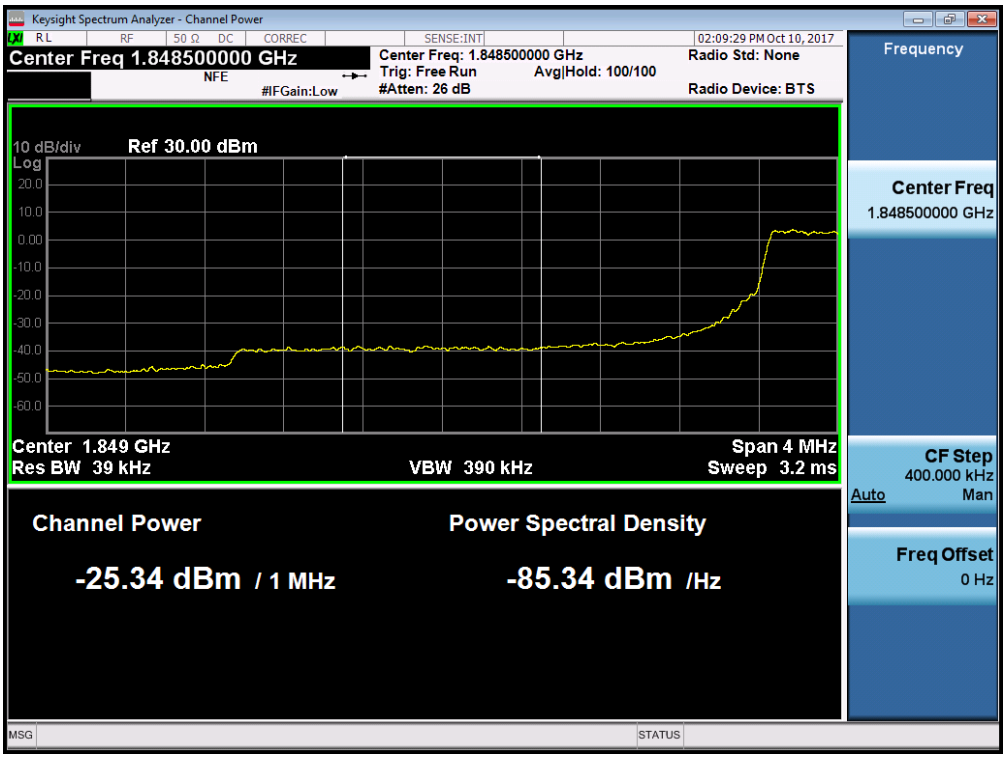


Plot 7-199. . Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

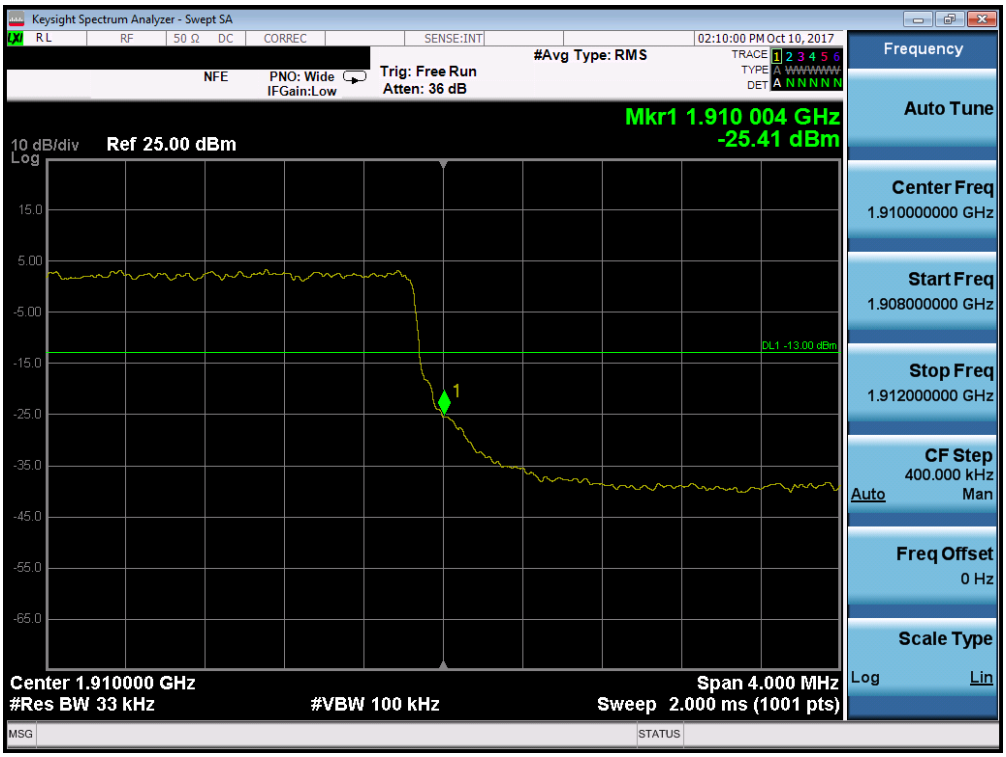
Band 2



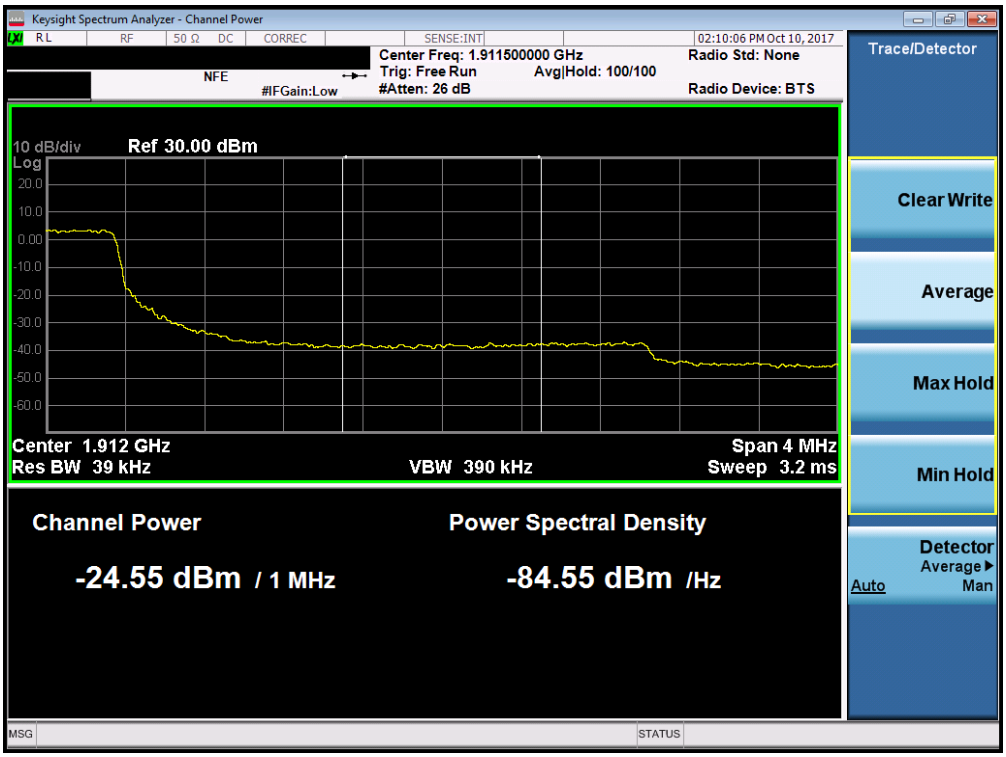
Plot 7-200. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



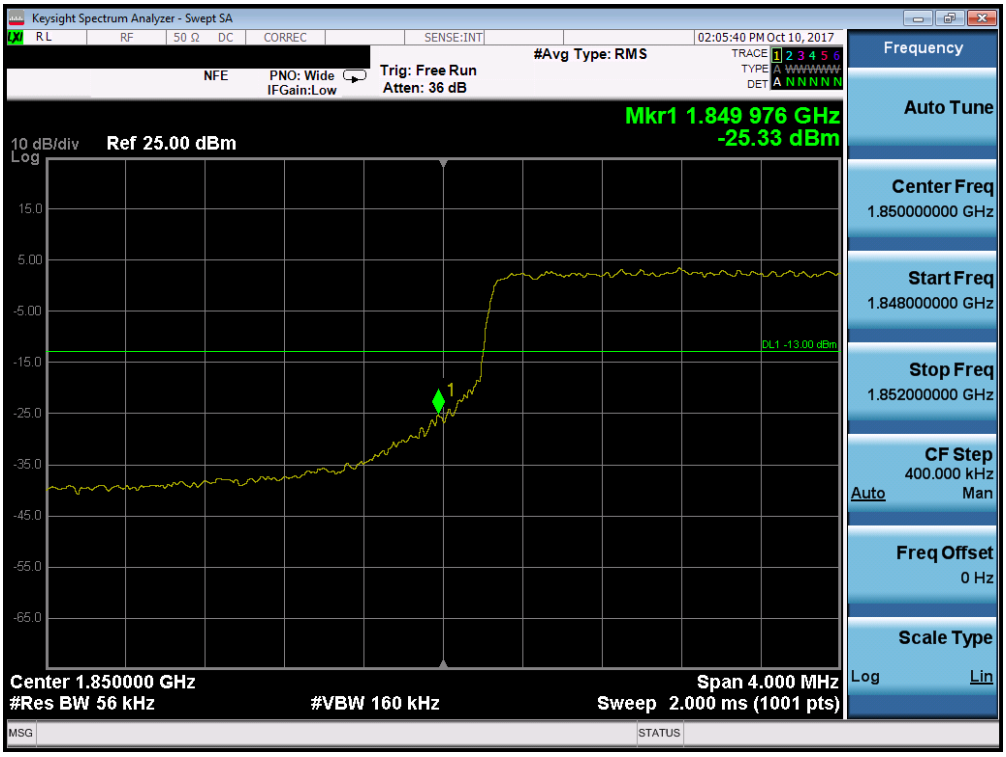
Plot 7-201. . Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



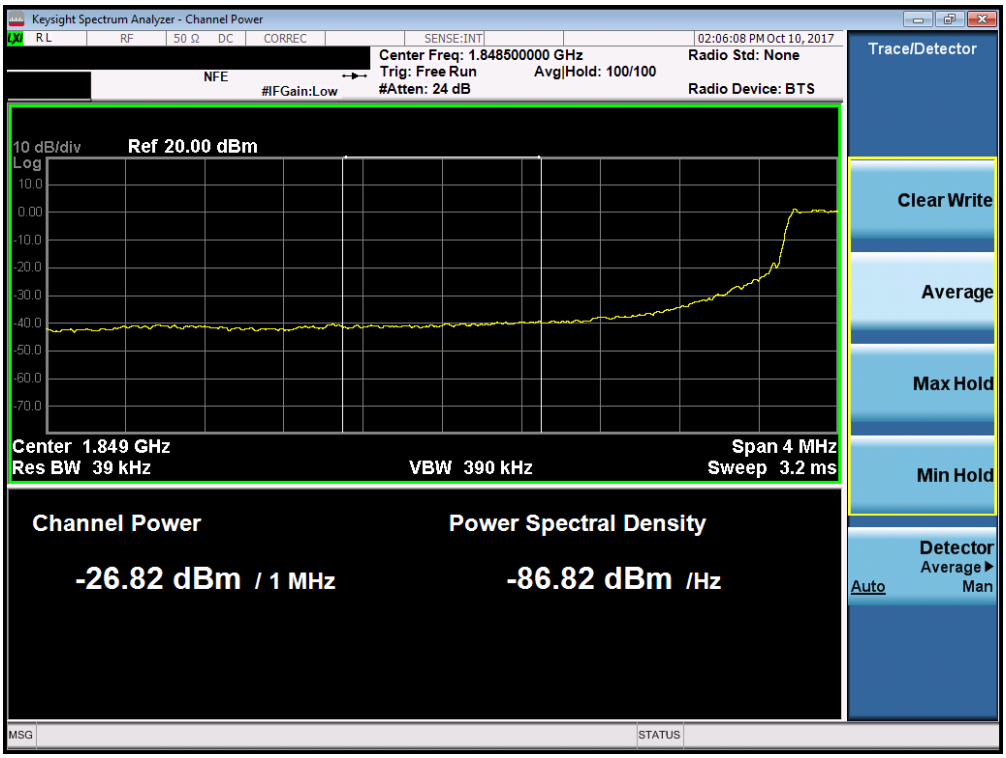
Plot 7-202. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



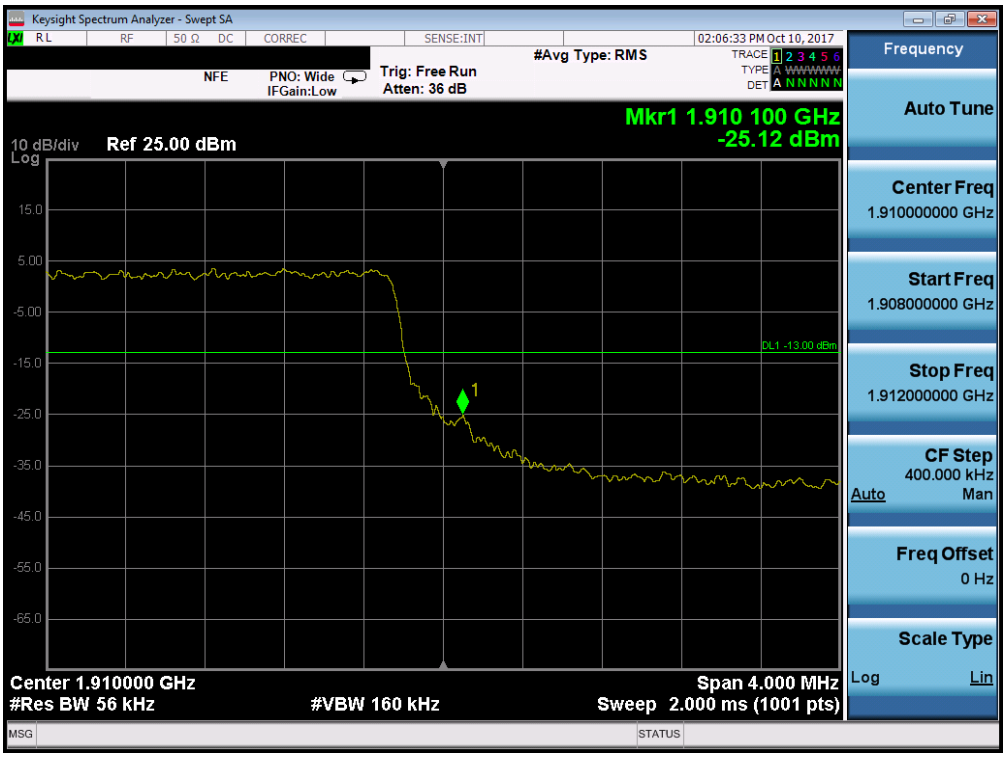
Plot 7-203. . Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



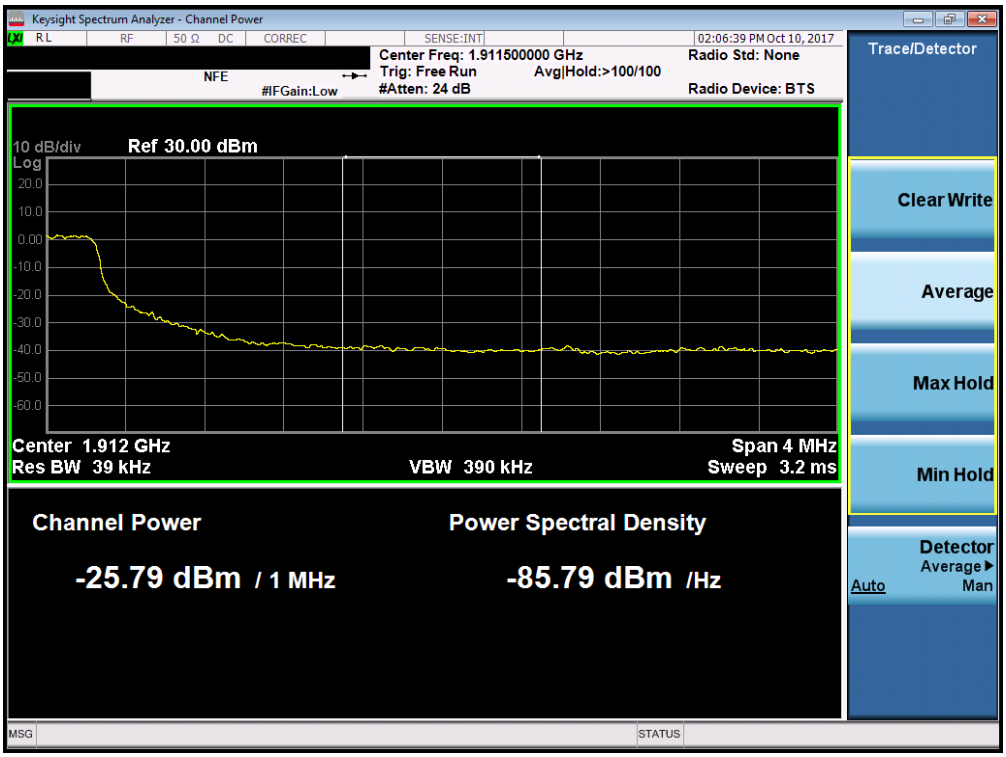
Plot 7-204. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



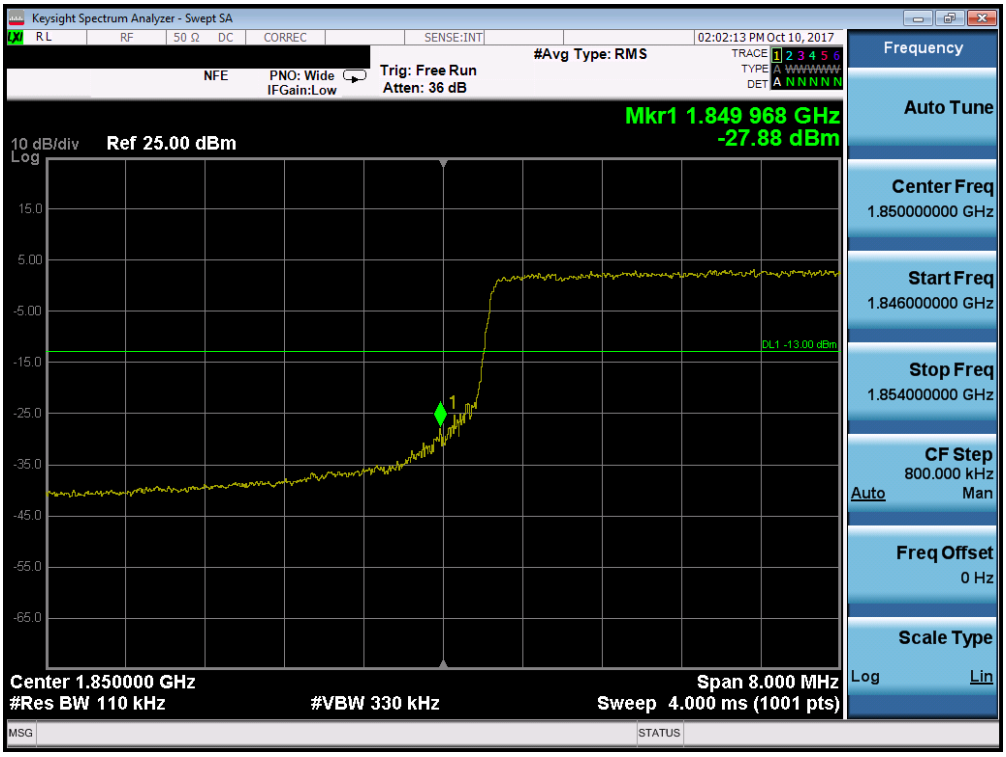
Plot 7-205. . Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



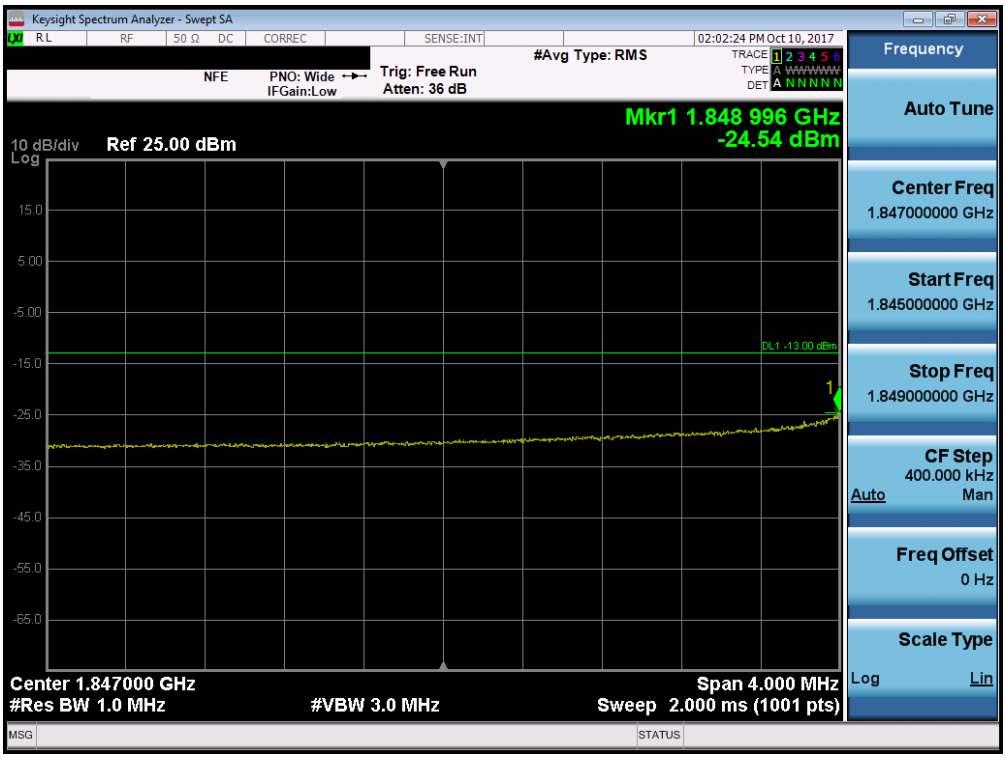
Plot 7-206. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



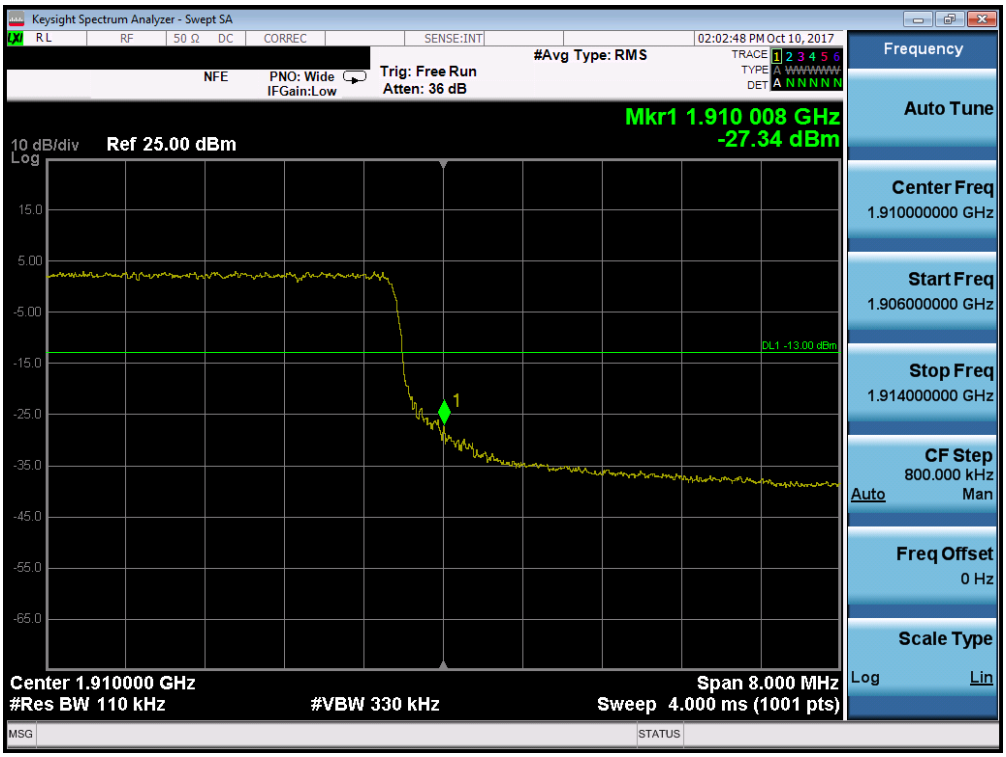
Plot 7-207. . Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



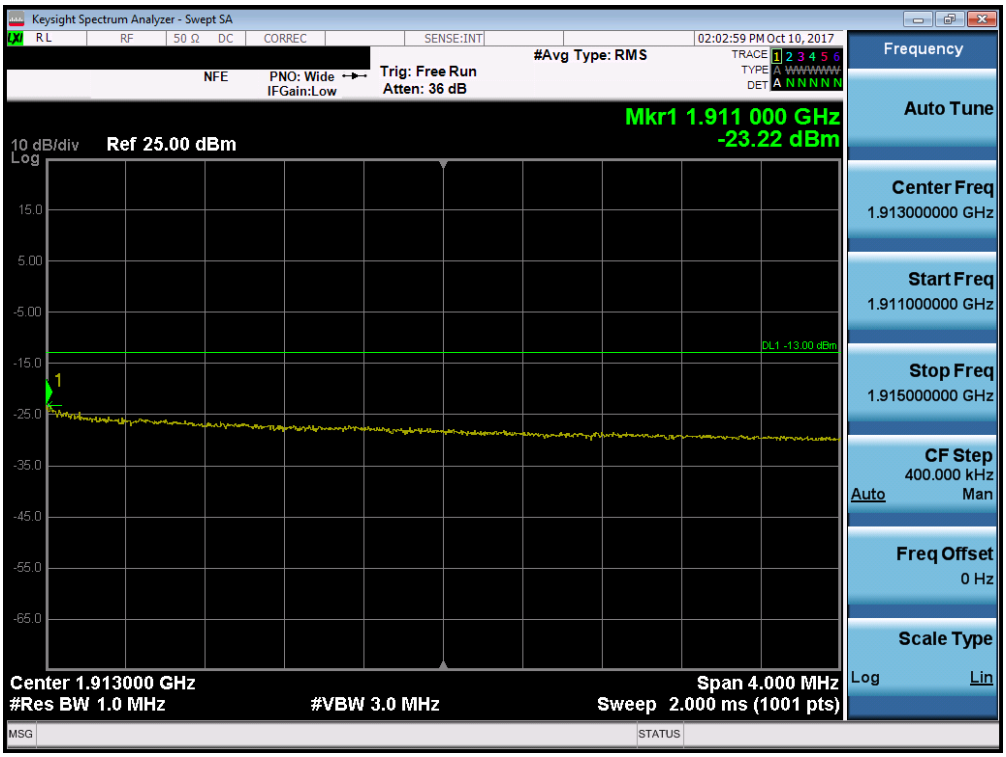
Plot 7-208. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-209. . Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

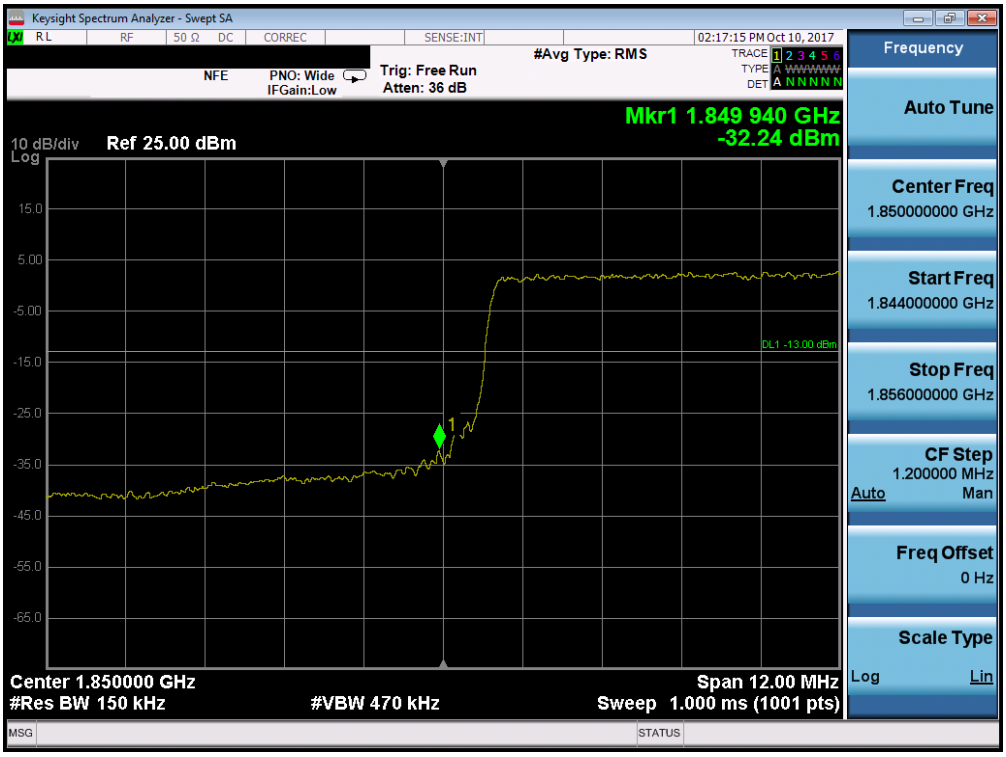


Plot 7-210. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

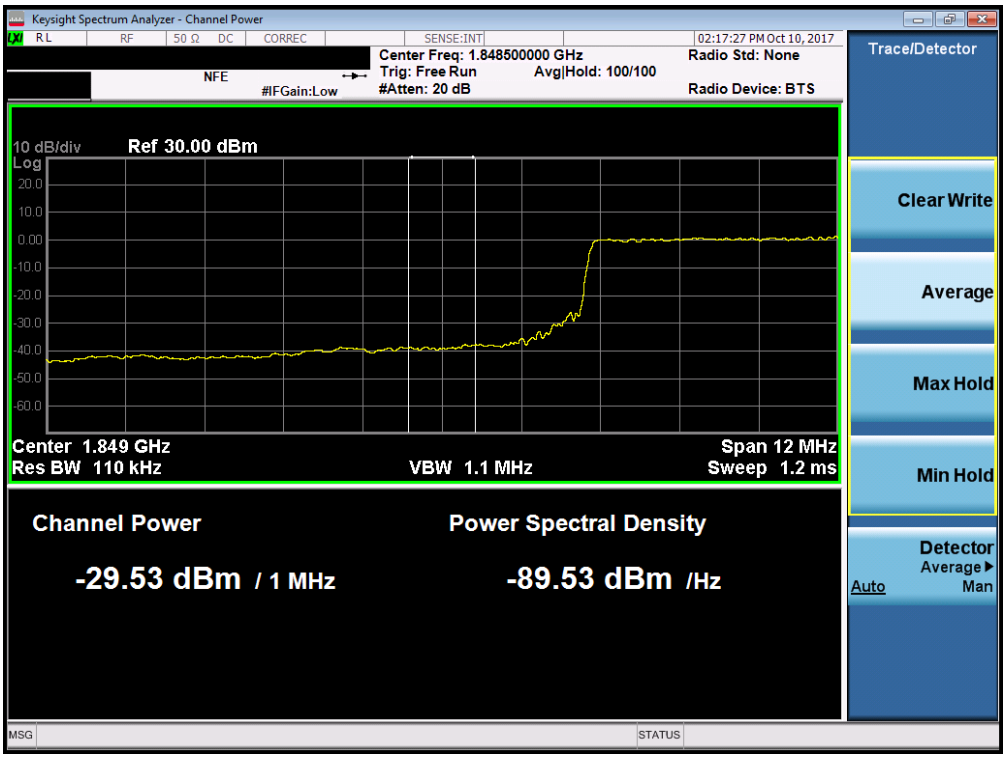


Plot 7-211. . Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

Band 2

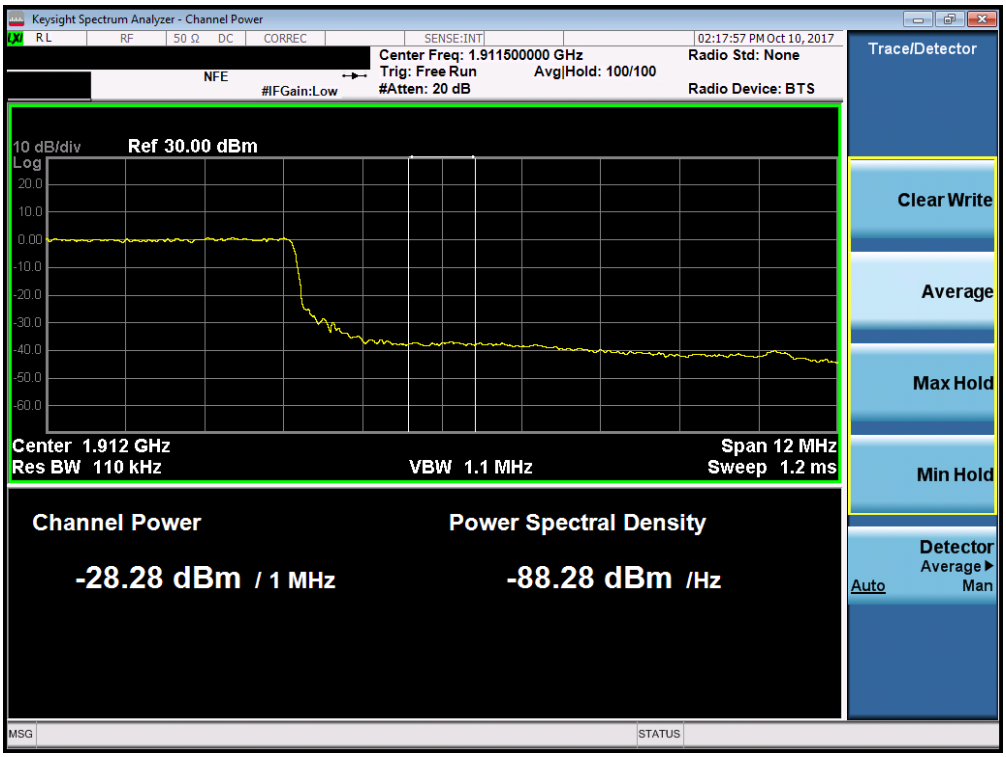


Plot 7-212. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



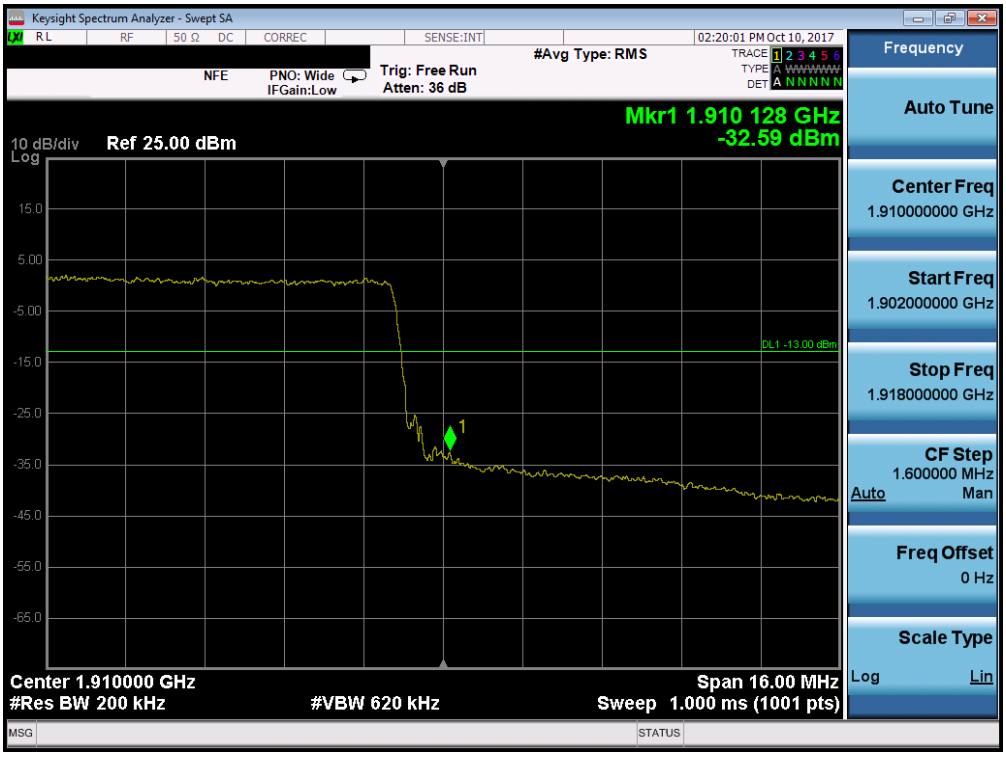
Plot 7-213. . Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

Plot 7-214. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

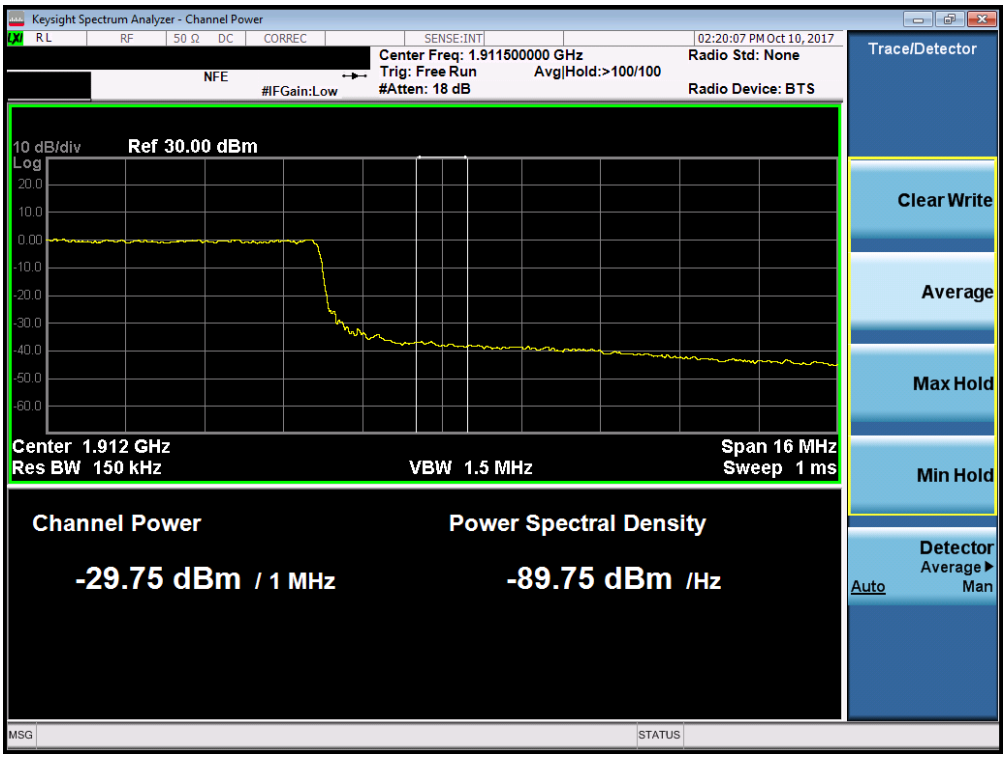


Plot 7-215. . Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

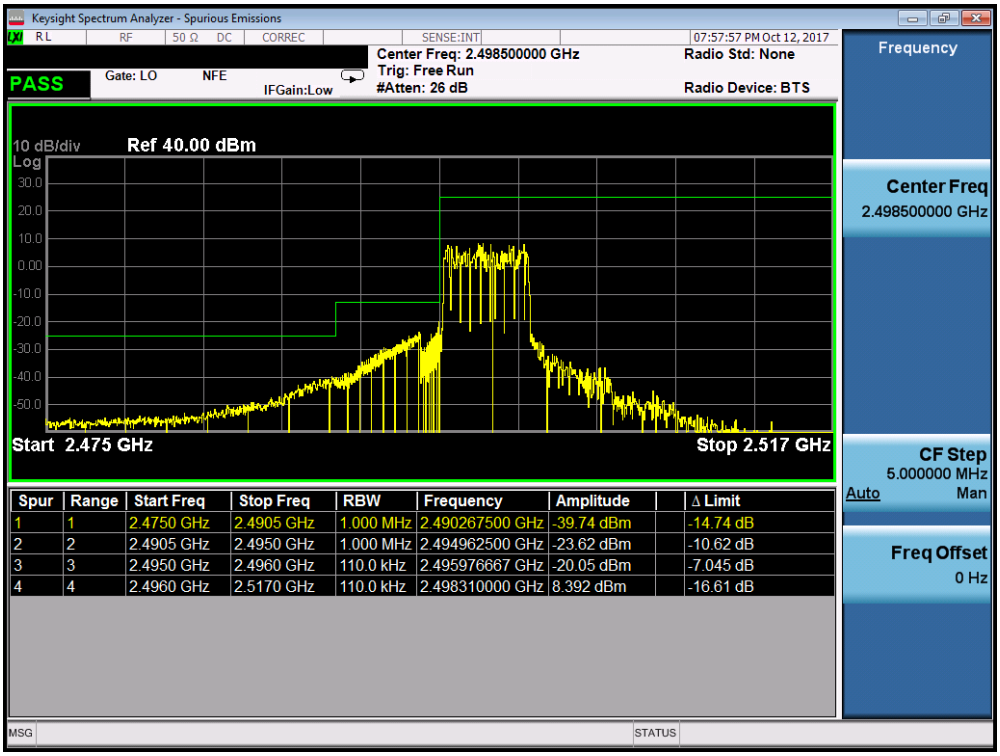
Band 2



Plot 7-216. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

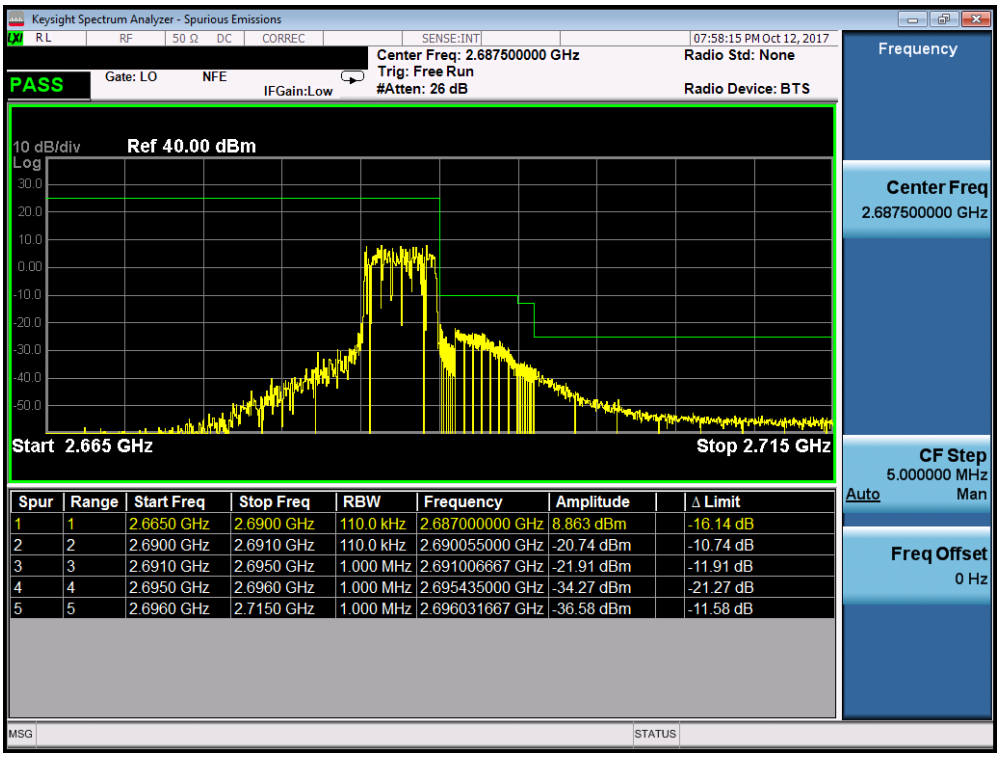


Plot 7-217. . Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



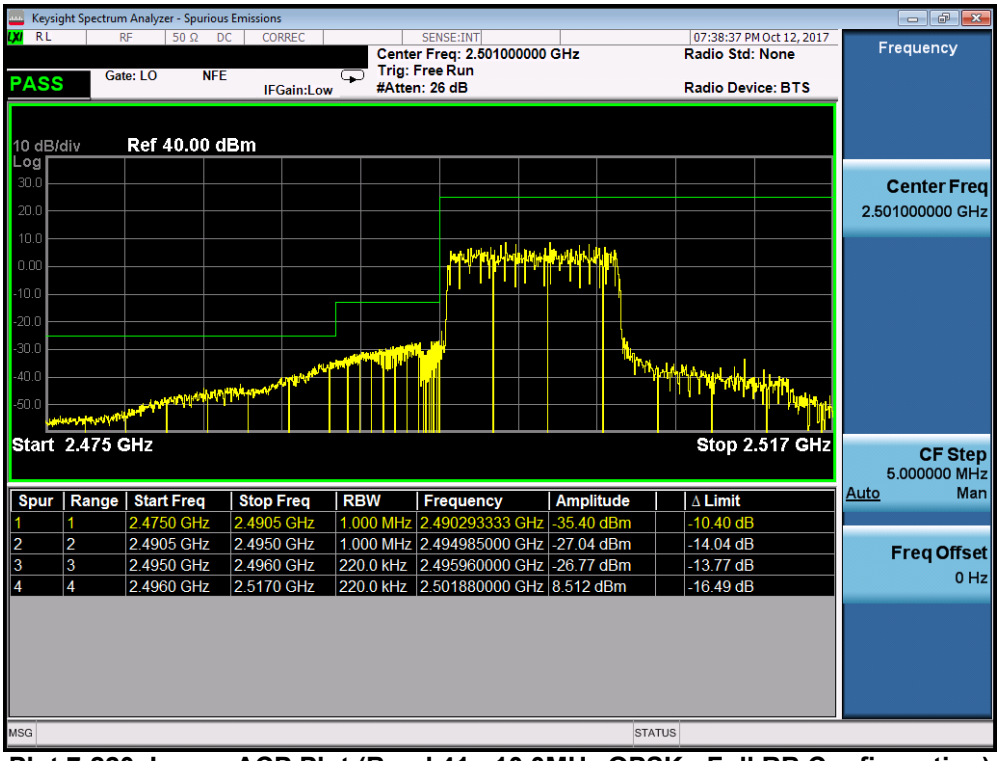
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490267500 GHz	-39.74 dBm	-14.74 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494962500 GHz	-23.62 dBm	-10.62 dB
3	3	2.4950 GHz	2.4960 GHz	110.0 kHz	2.495976667 GHz	-20.05 dBm	-7.045 dB
4	4	2.4960 GHz	2.5170 GHz	110.0 kHz	2.498310000 GHz	8.392 dBm	-16.61 dB

Plot 7-218. Lower ACP Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)



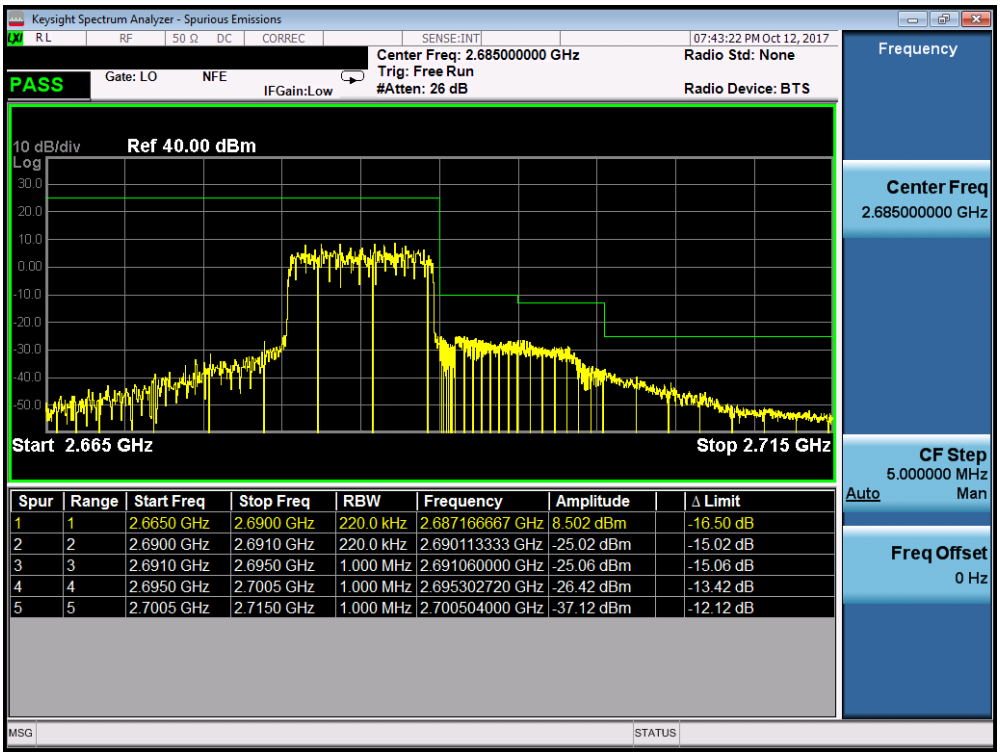
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	110.0 kHz	2.687000000 GHz	8.863 dBm	-16.14 dB
2	2	2.6900 GHz	2.6910 GHz	110.0 kHz	2.690055000 GHz	-20.74 dBm	-10.74 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691006667 GHz	-21.91 dBm	-11.91 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695435000 GHz	-34.27 dBm	-21.27 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696031667 GHz	-36.58 dBm	-11.58 dB

Plot 7-219. Upper ACP Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)



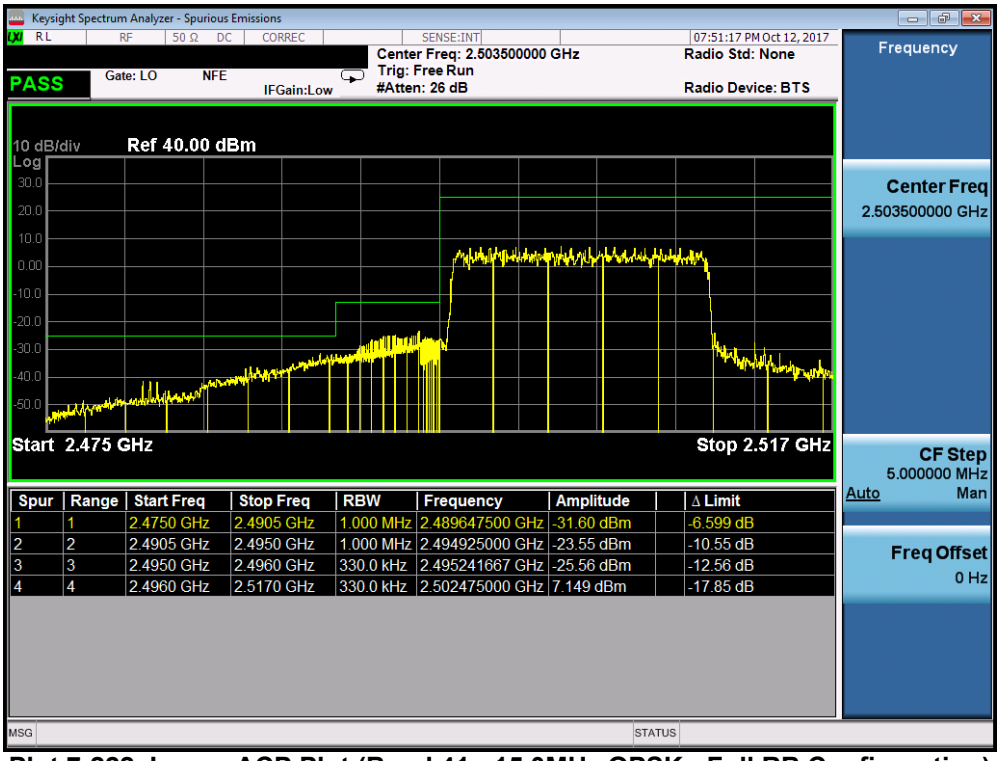
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490293333 GHz	-35.40 dBm	-10.40 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494985000 GHz	-27.04 dBm	-14.04 dB
3	3	2.4950 GHz	2.4960 GHz	220.0 kHz	2.495960000 GHz	-26.77 dBm	-13.77 dB
4	4	2.4960 GHz	2.5170 GHz	220.0 kHz	2.501880000 GHz	8.512 dBm	-16.49 dB

Plot 7-220. Lower ACP Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)



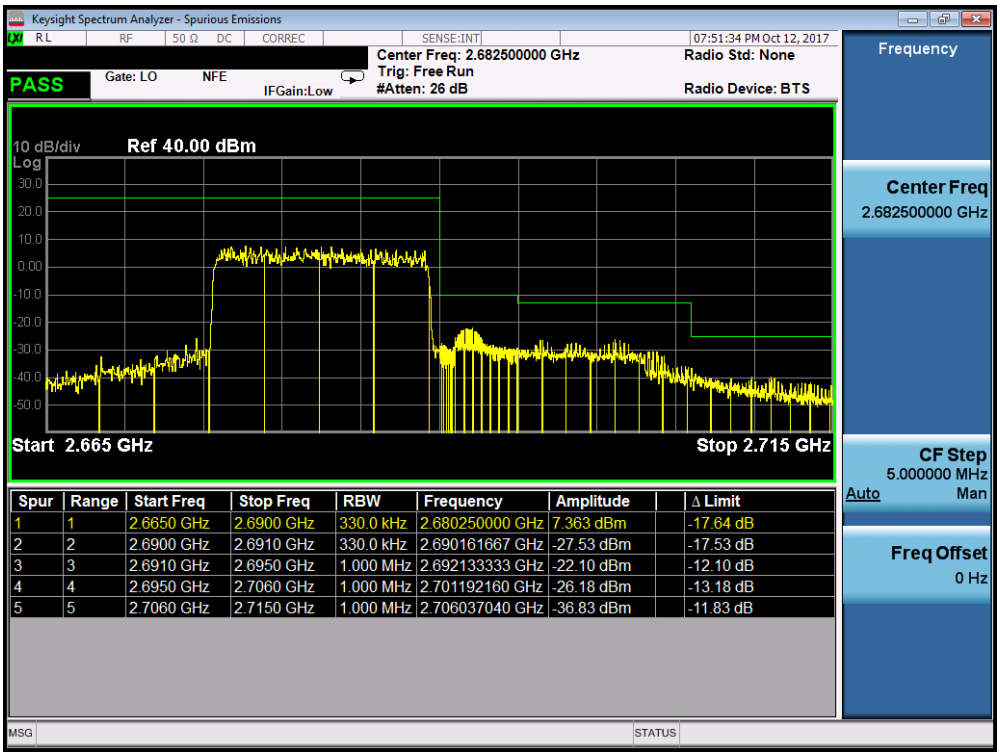
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	220.0 kHz	2.687166667 GHz	8.502 dBm	-16.50 dB
2	2	2.6900 GHz	2.6910 GHz	220.0 kHz	2.690113333 GHz	-25.02 dBm	-15.02 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691060000 GHz	-25.06 dBm	-15.06 dB
4	4	2.6950 GHz	2.7005 GHz	1.000 MHz	2.695302720 GHz	-26.42 dBm	-13.42 dB
5	5	2.7005 GHz	2.7150 GHz	1.000 MHz	2.700504000 GHz	-37.12 dBm	-12.12 dB

Plot 7-221. Upper ACP Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)



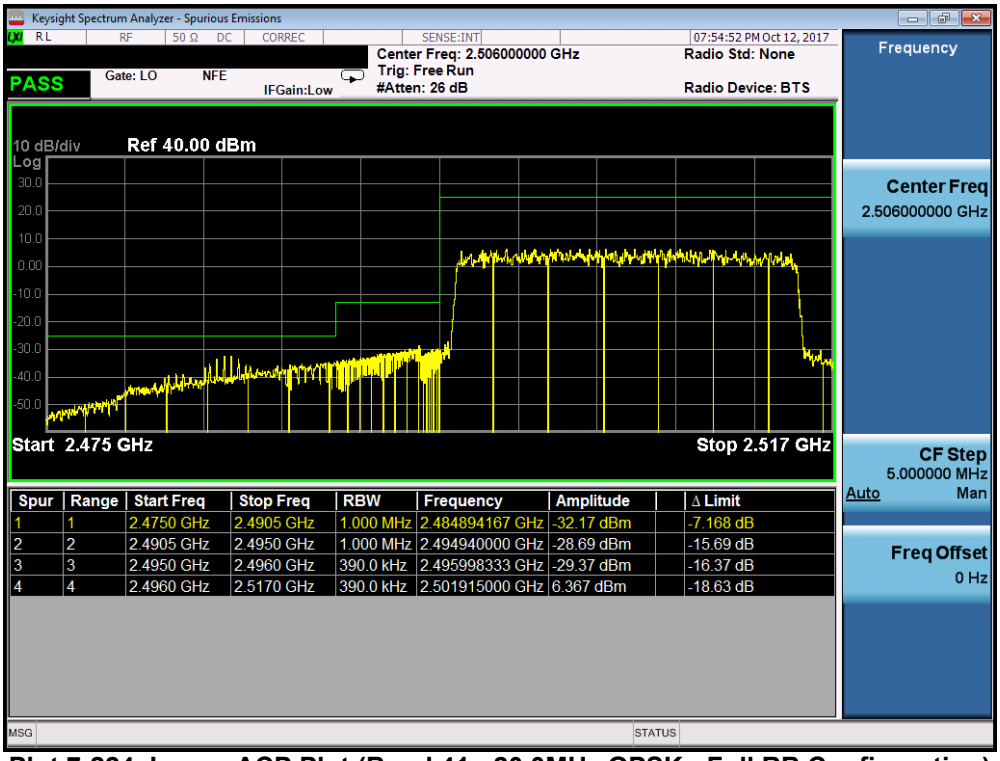
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489647500 GHz	-31.60 dBm	-6.599 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494925000 GHz	-23.55 dBm	-10.55 dB
3	3	2.4950 GHz	2.4960 GHz	330.0 kHz	2.495241667 GHz	-25.56 dBm	-12.56 dB
4	4	2.4960 GHz	2.5170 GHz	330.0 kHz	2.502475000 GHz	7.149 dBm	-17.85 dB

Plot 7-222. Lower ACP Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)



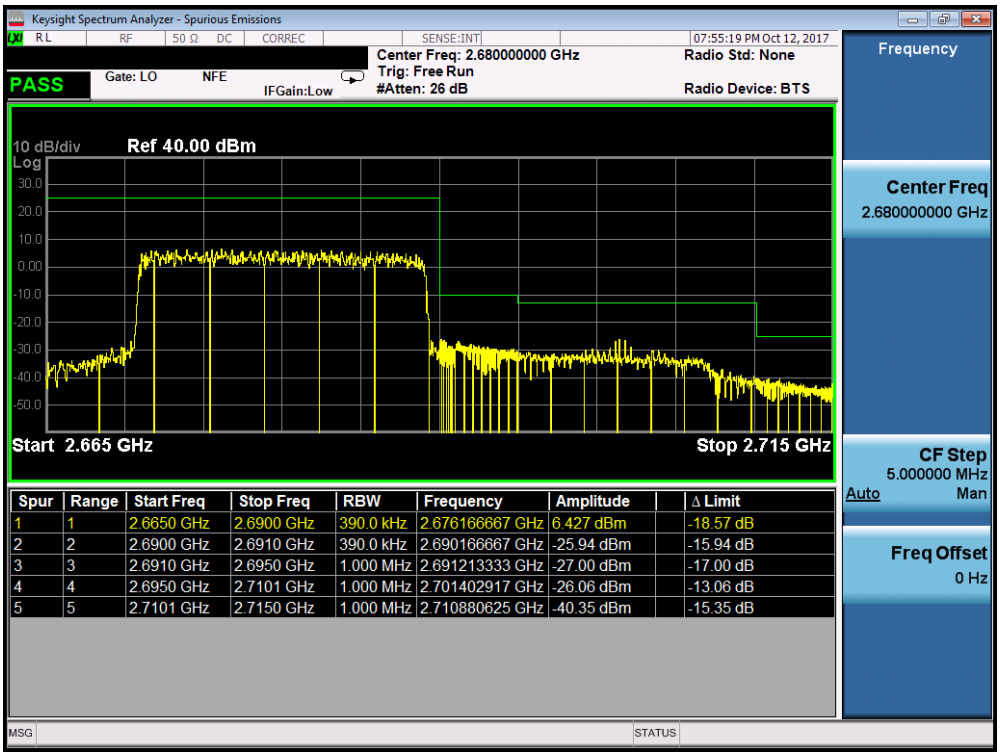
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	330.0 kHz	2.680250000 GHz	7.363 dBm	-17.64 dB
2	2	2.6900 GHz	2.6910 GHz	330.0 kHz	2.690161667 GHz	-27.53 dBm	-17.53 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692133333 GHz	-22.10 dBm	-12.10 dB
4	4	2.6950 GHz	2.7060 GHz	1.000 MHz	2.701192160 GHz	-26.18 dBm	-13.18 dB
5	5	2.7060 GHz	2.7150 GHz	1.000 MHz	2.706037040 GHz	-36.83 dBm	-11.83 dB

Plot 7-223. Upper ACP Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.484894167 GHz	-32.17 dBm	-7.168 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494940000 GHz	-28.69 dBm	-15.69 dB
3	3	2.4950 GHz	2.4960 GHz	390.0 kHz	2.495998333 GHz	-29.37 dBm	-16.37 dB
4	4	2.4960 GHz	2.5170 GHz	390.0 kHz	2.501915000 GHz	6.367 dBm	-18.63 dB

Plot 7-224. Lower ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	390.0 kHz	2.676166667 GHz	6.427 dBm	-18.57 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690166667 GHz	-25.94 dBm	-15.94 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691213333 GHz	-27.00 dBm	-17.00 dB
4	4	2.6950 GHz	2.7101 GHz	1.000 MHz	2.701402917 GHz	-26.06 dBm	-13.06 dB
5	5	2.7101 GHz	2.7150 GHz	1.000 MHz	2.710880625 GHz	-40.35 dBm	-15.35 dB

Plot 7-225. Upper ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

7.5 Peak-Average Ratio

§24.232(d) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

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 v03 – Section 5.7.1

Test Settings

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

Test Setup

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

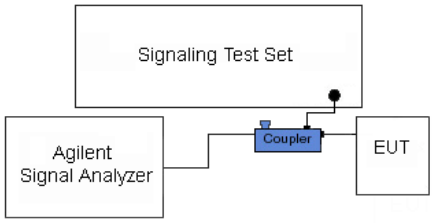
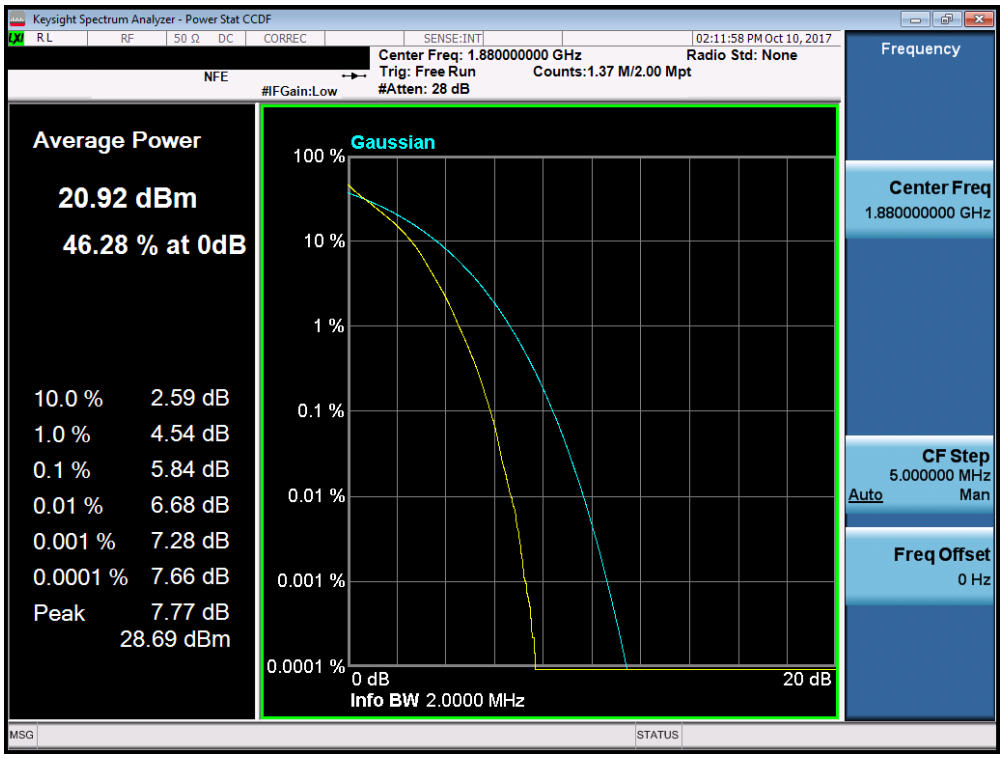


Figure 7-4. Test Instrument & Measurement Setup

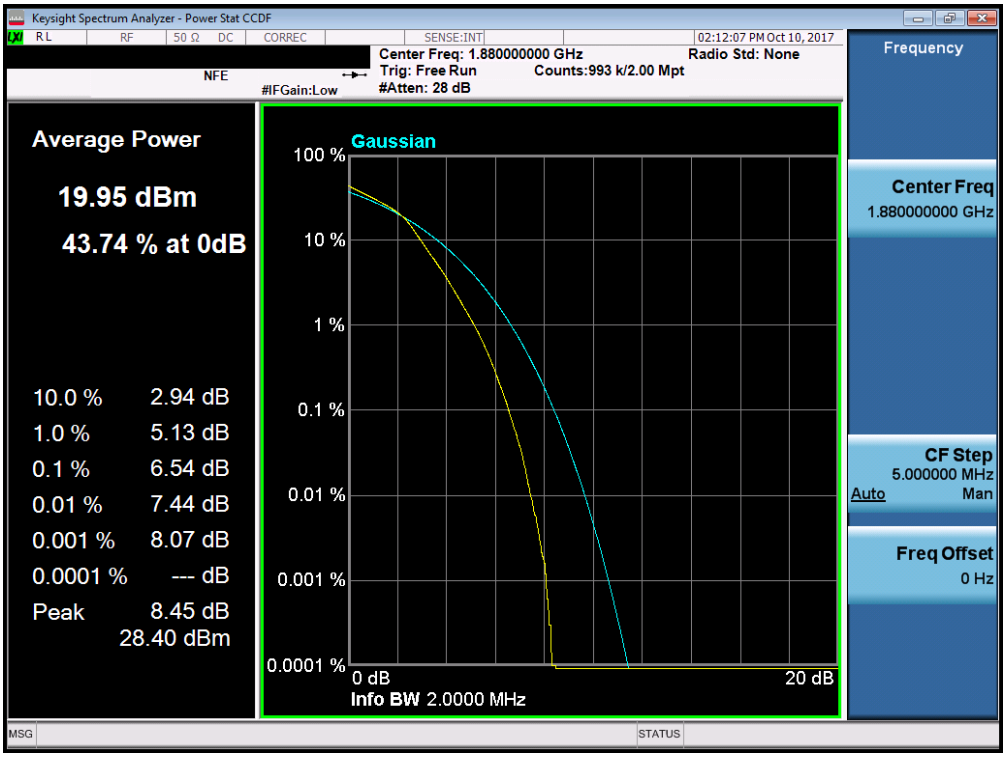
Test Notes

None.

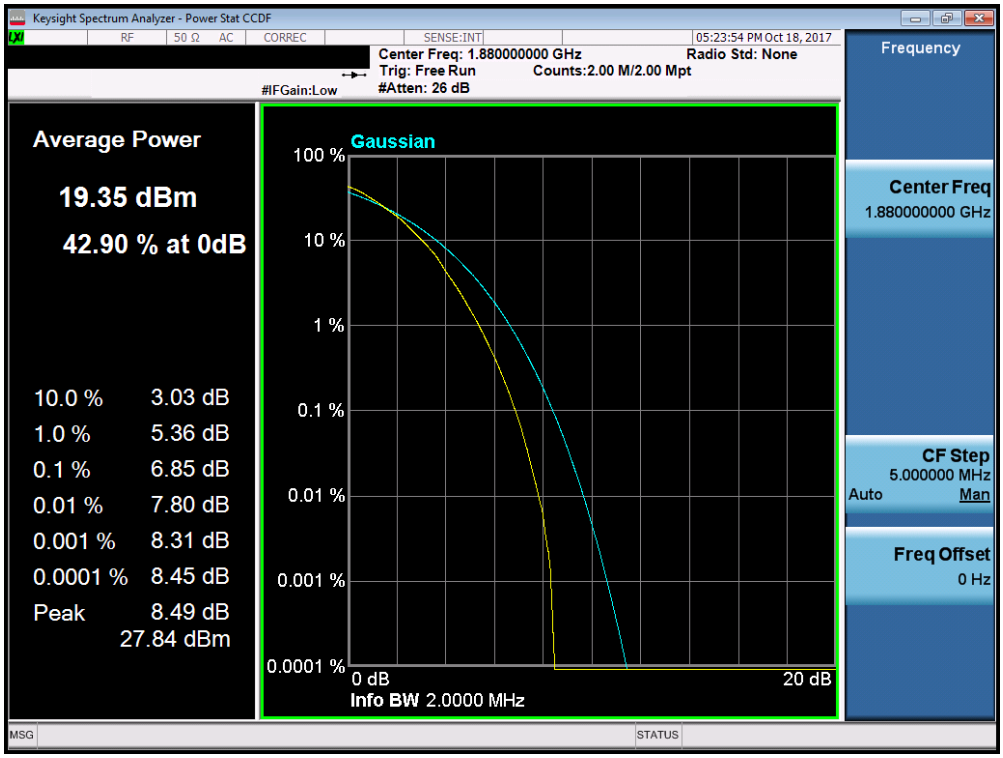
Band 2



Plot 7-226. PAR Plot (Band 2 – 1.4MHz QPSK - Full RB Configuration)

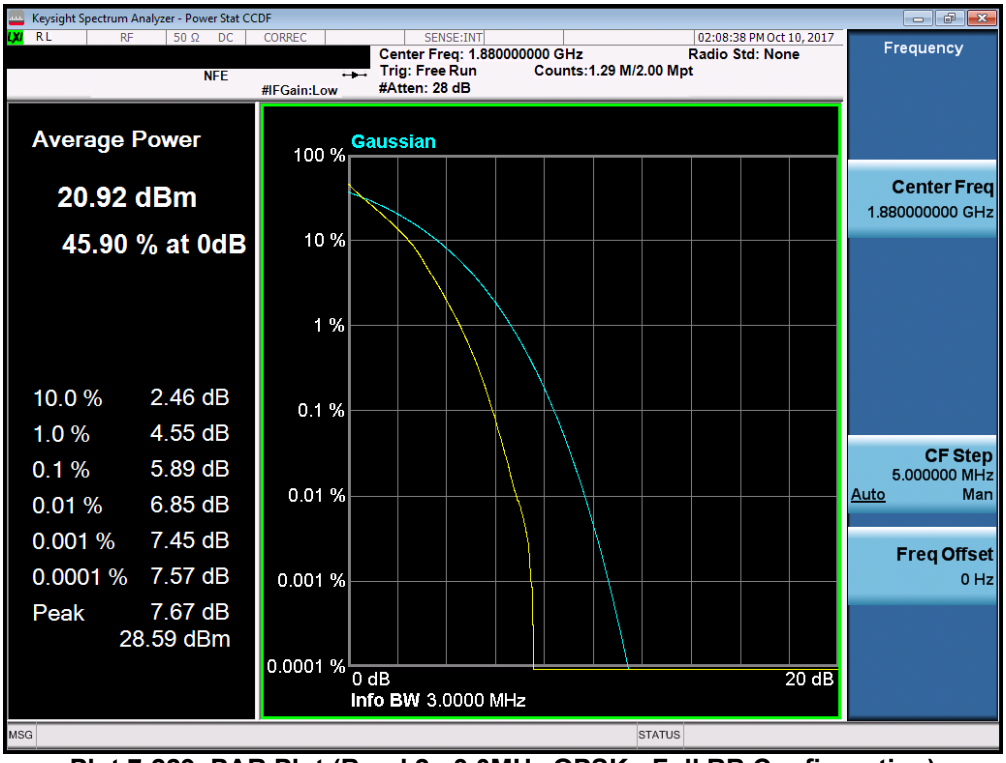


Plot 7-227. PAR Plot (Band 2 – 1.4MHz 16-QAM - Full RB Configuration)

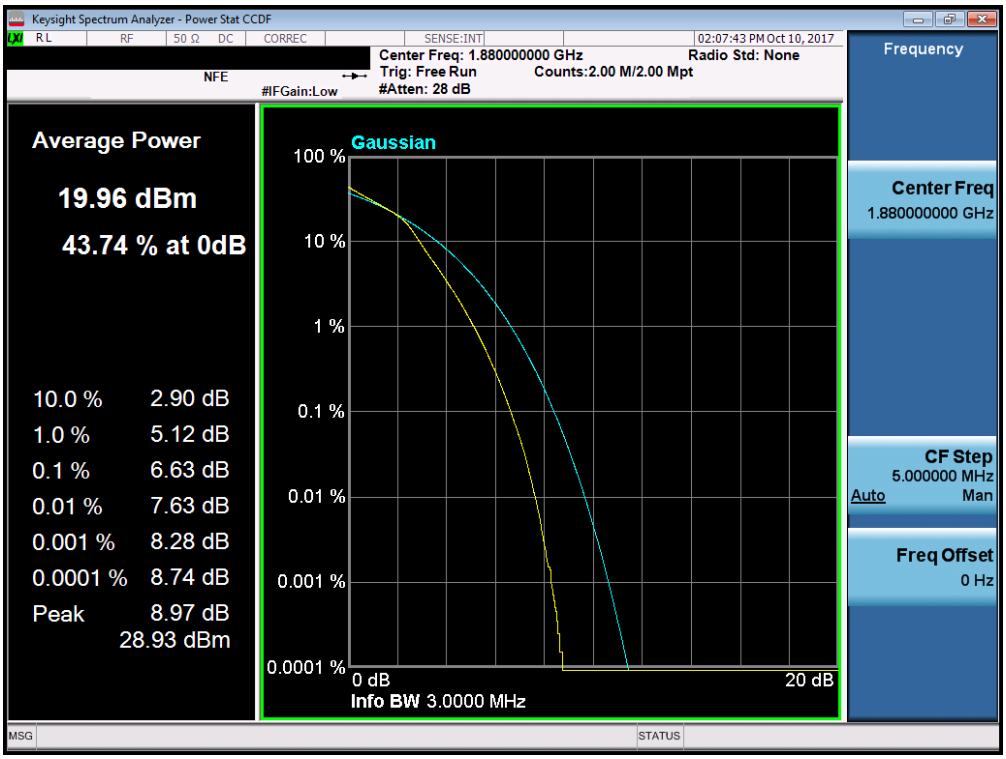


Plot 7-228. PAR Plot (Band 2 – 1.4MHz 64-QAM - Full RB Configuration)

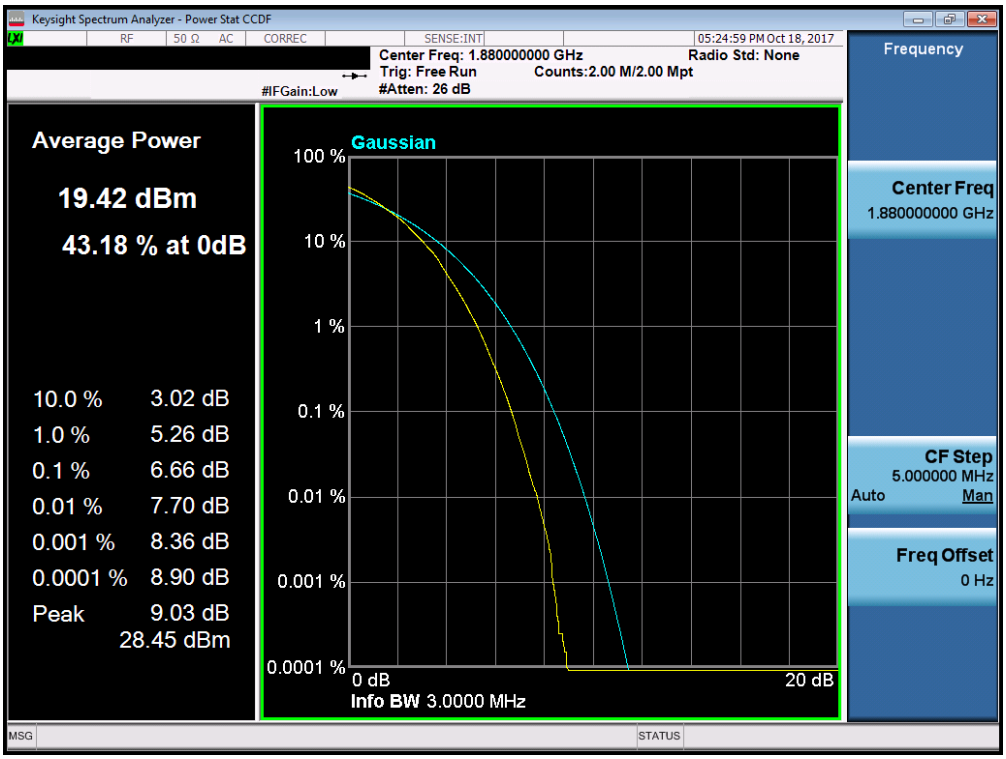
Band 2



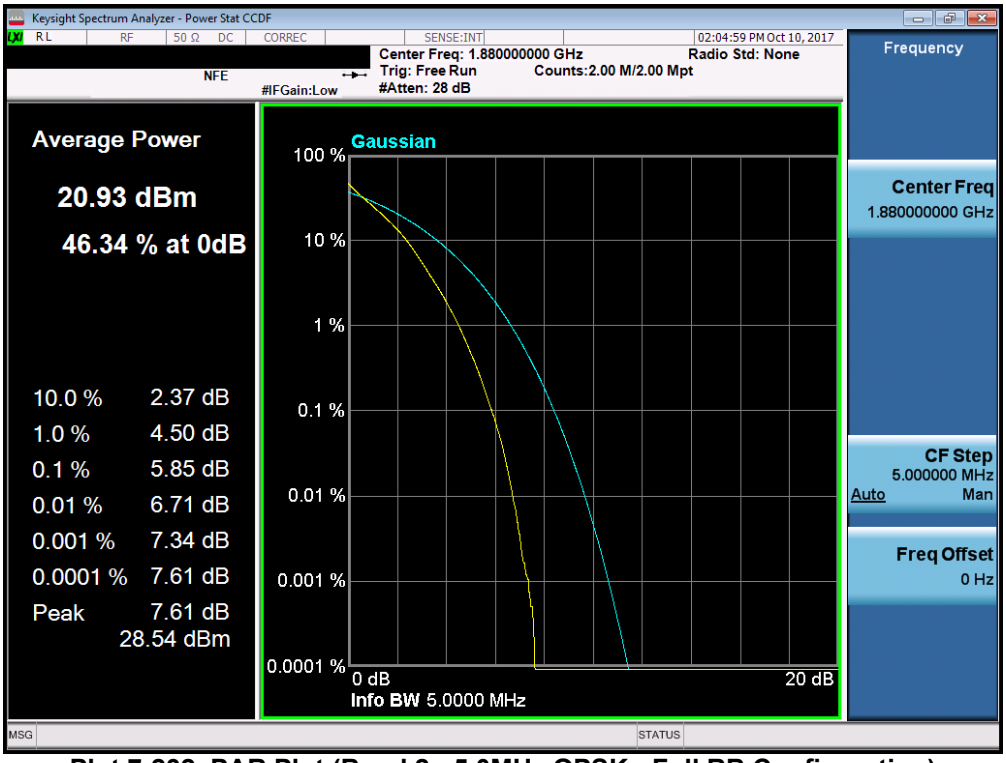
Plot 7-229. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



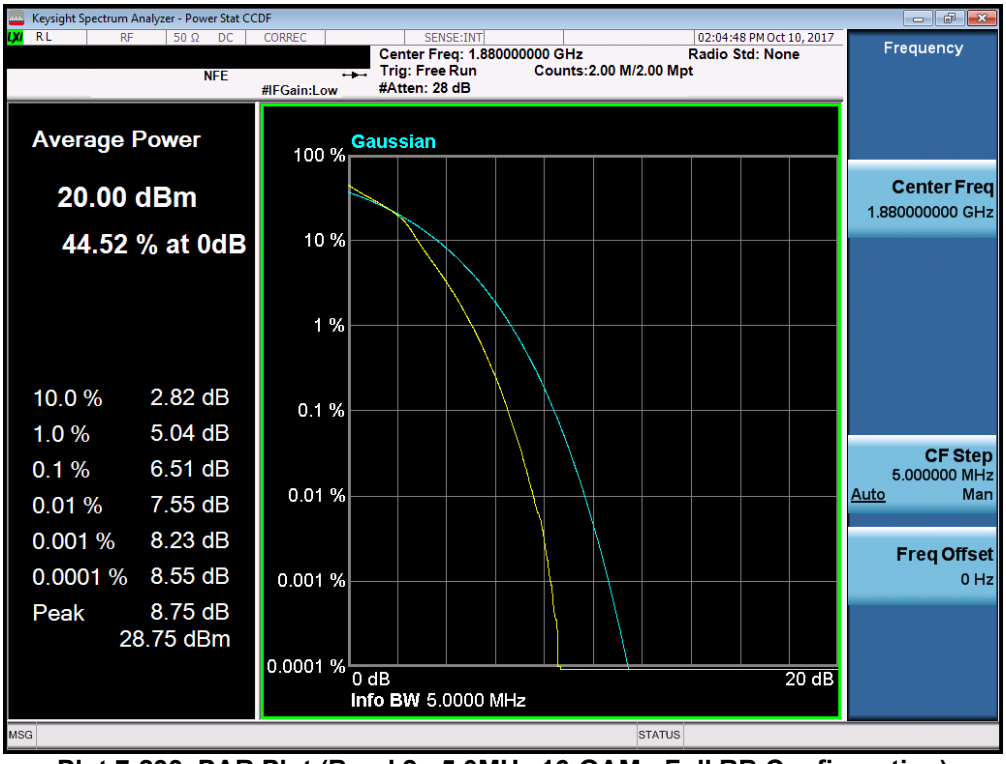
Plot 7-230. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



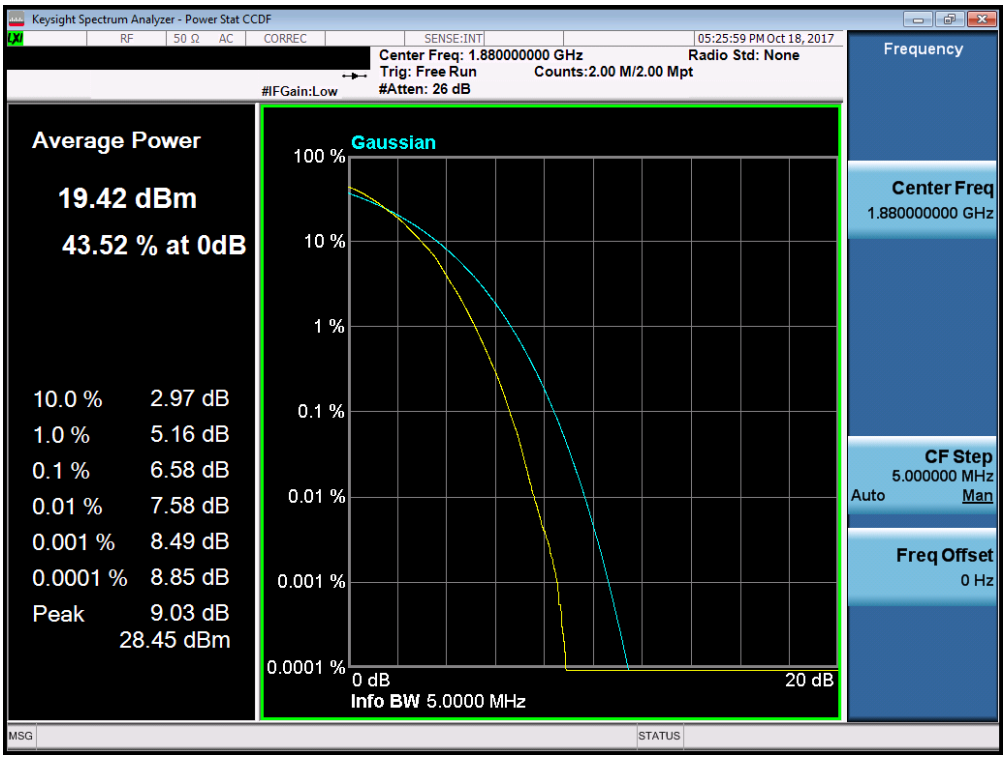
Plot 7-231. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)



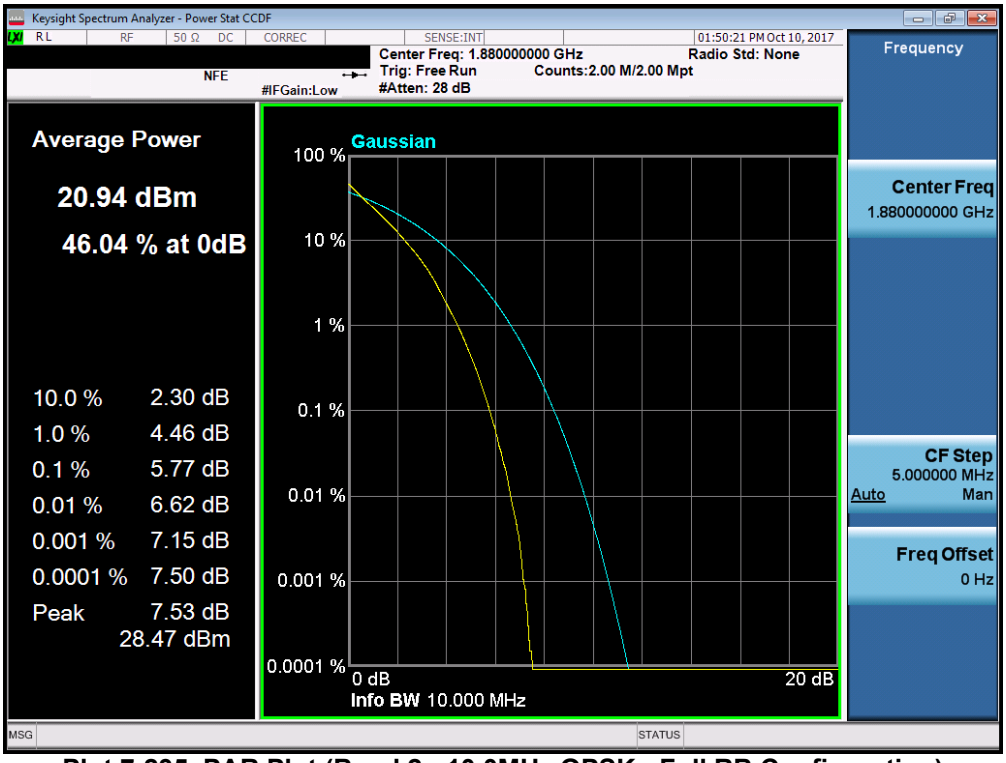
Plot 7-232. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



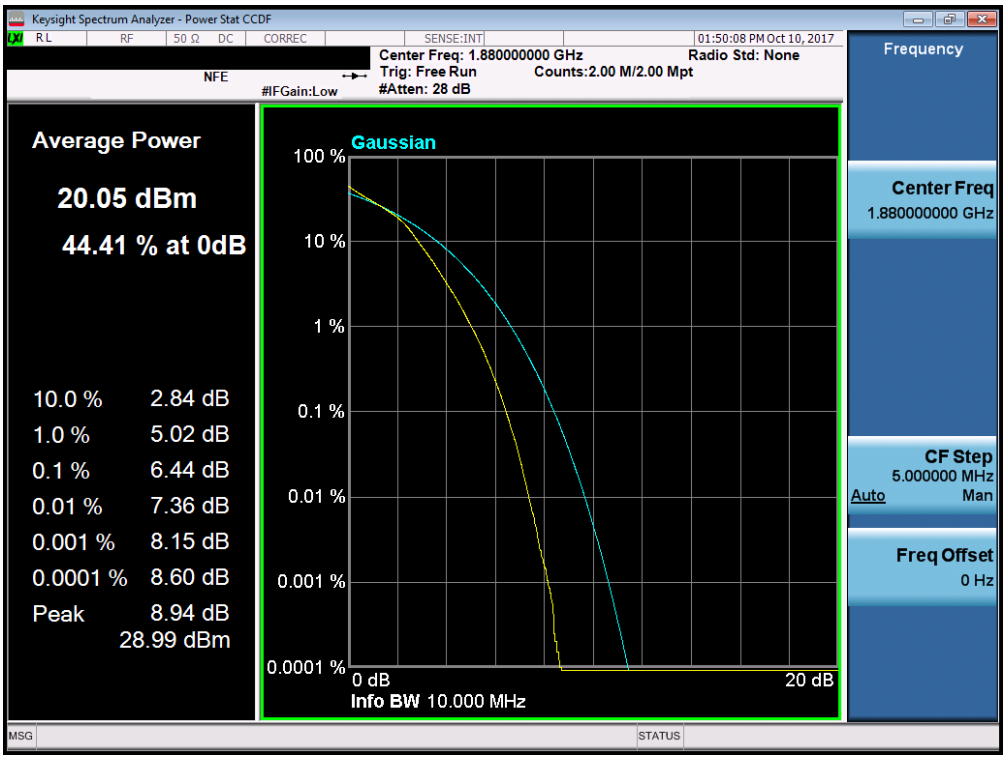
Plot 7-233. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)



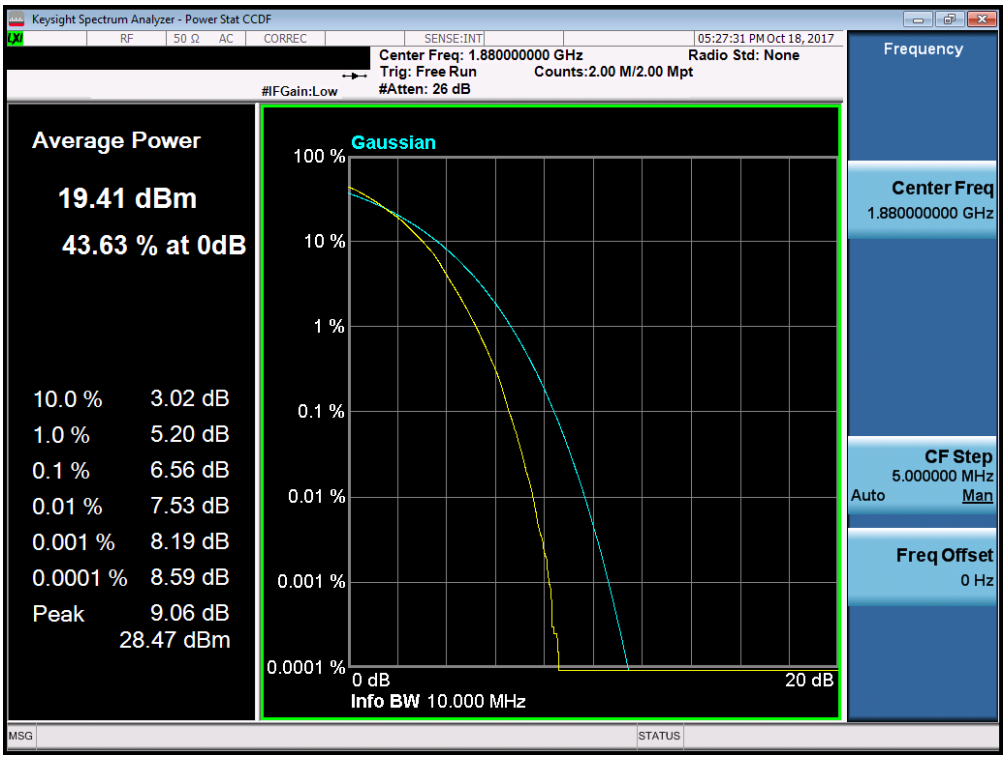
Plot 7-234. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-235. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

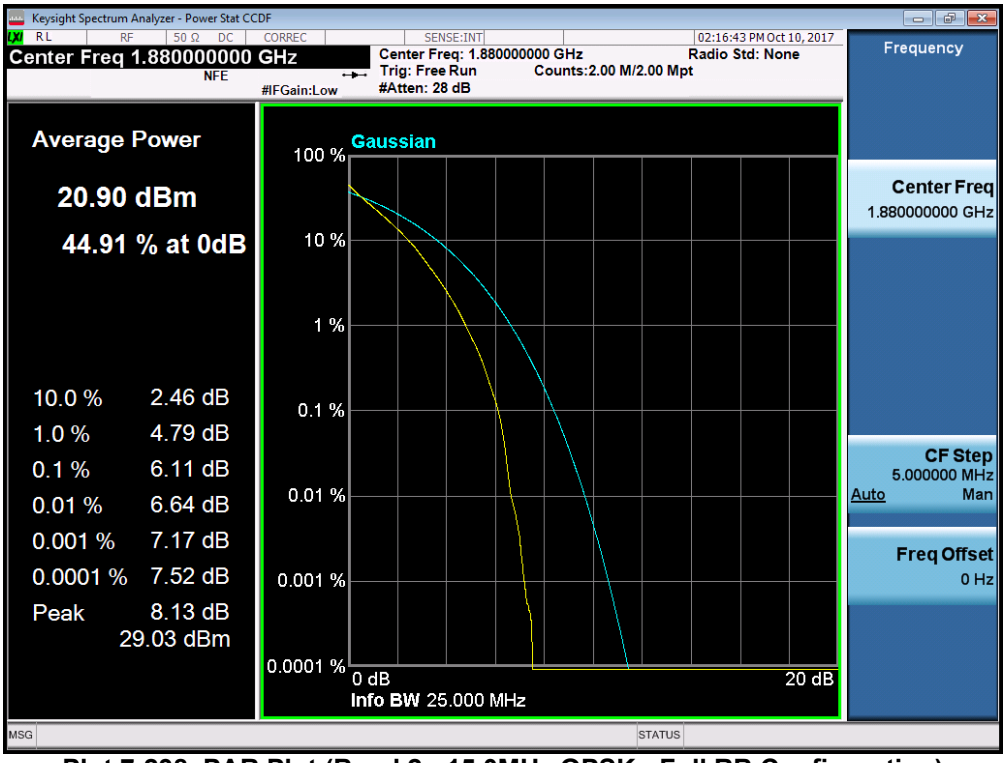


Plot 7-236. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

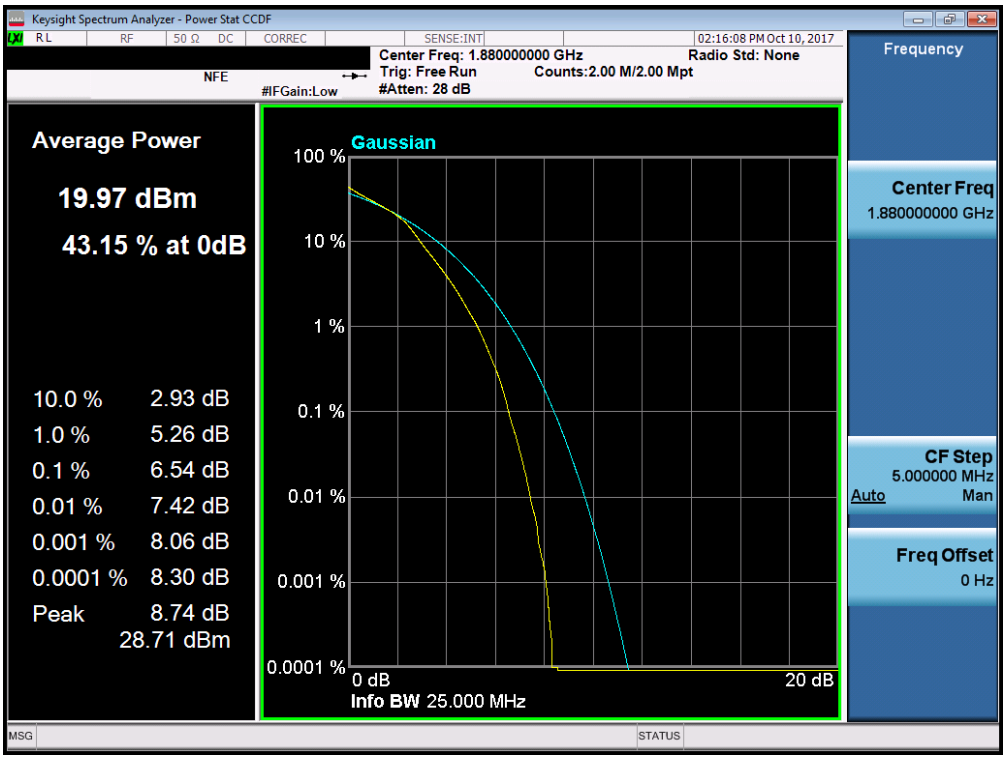


Plot 7-237. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)

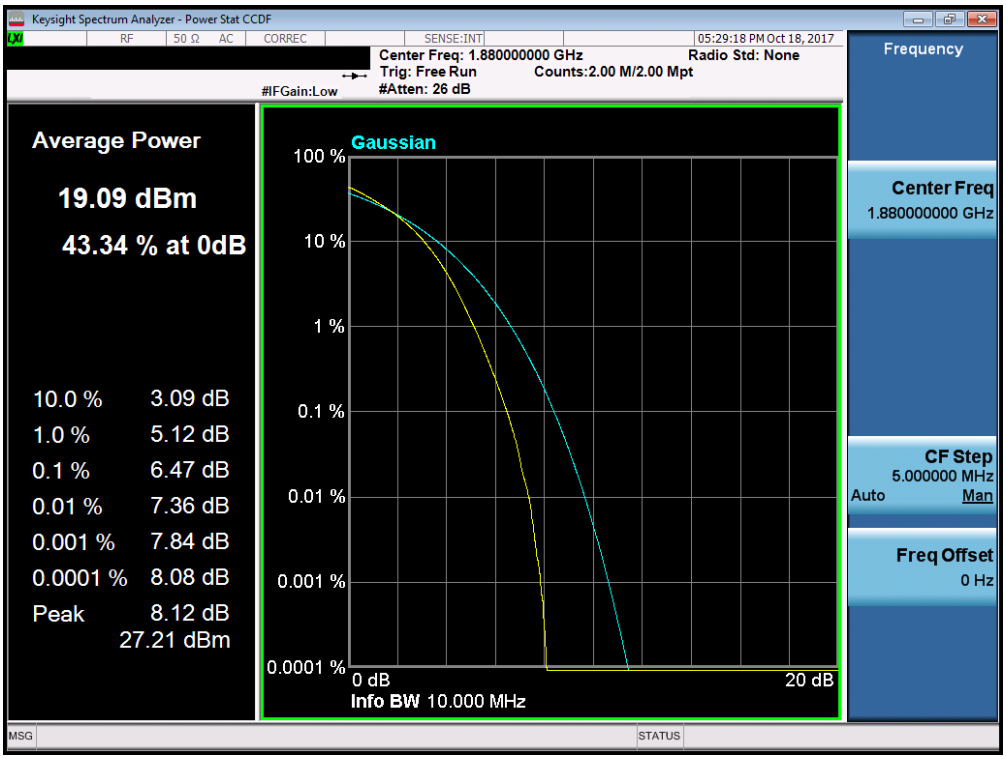
Band 2



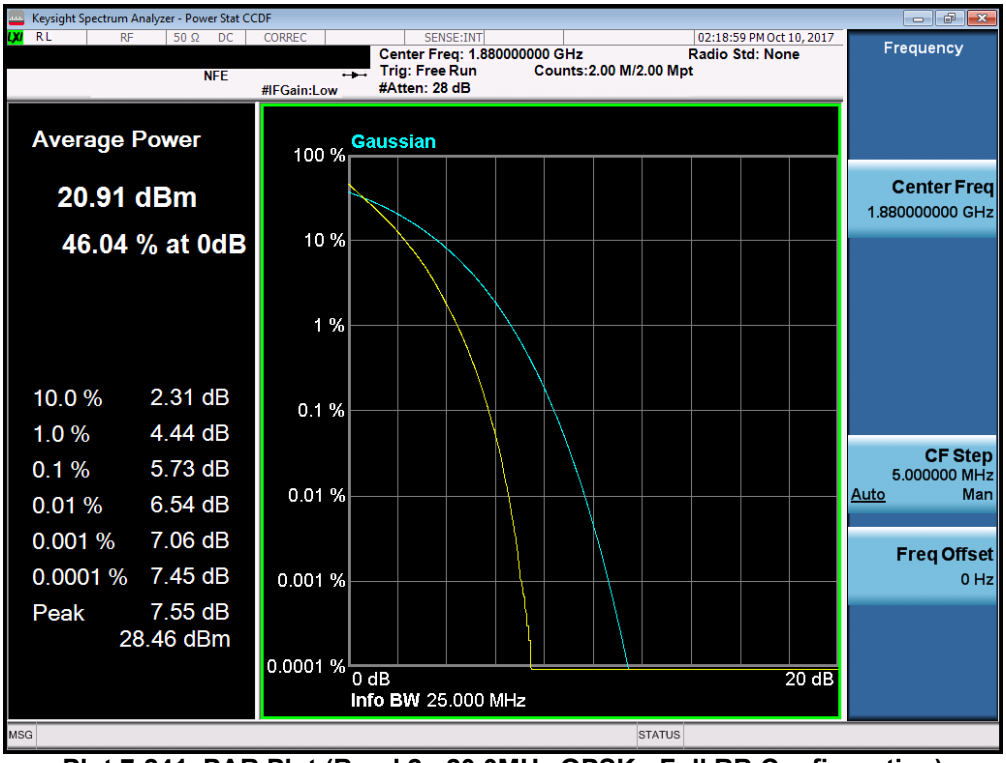
Plot 7-238. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



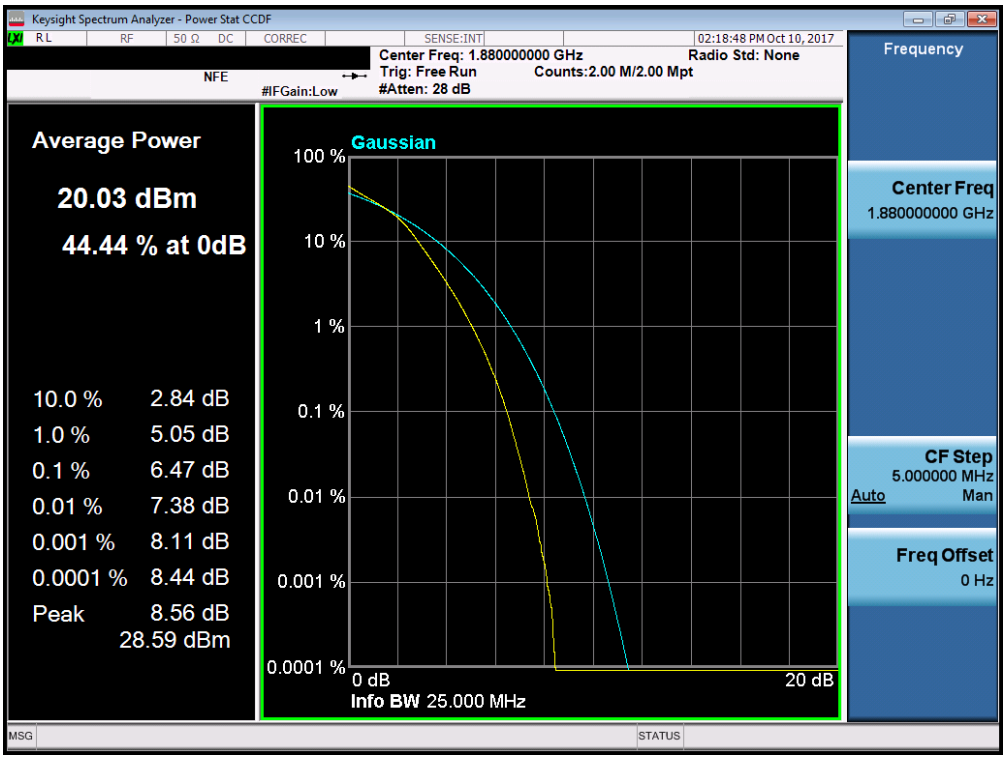
Plot 7-239. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)



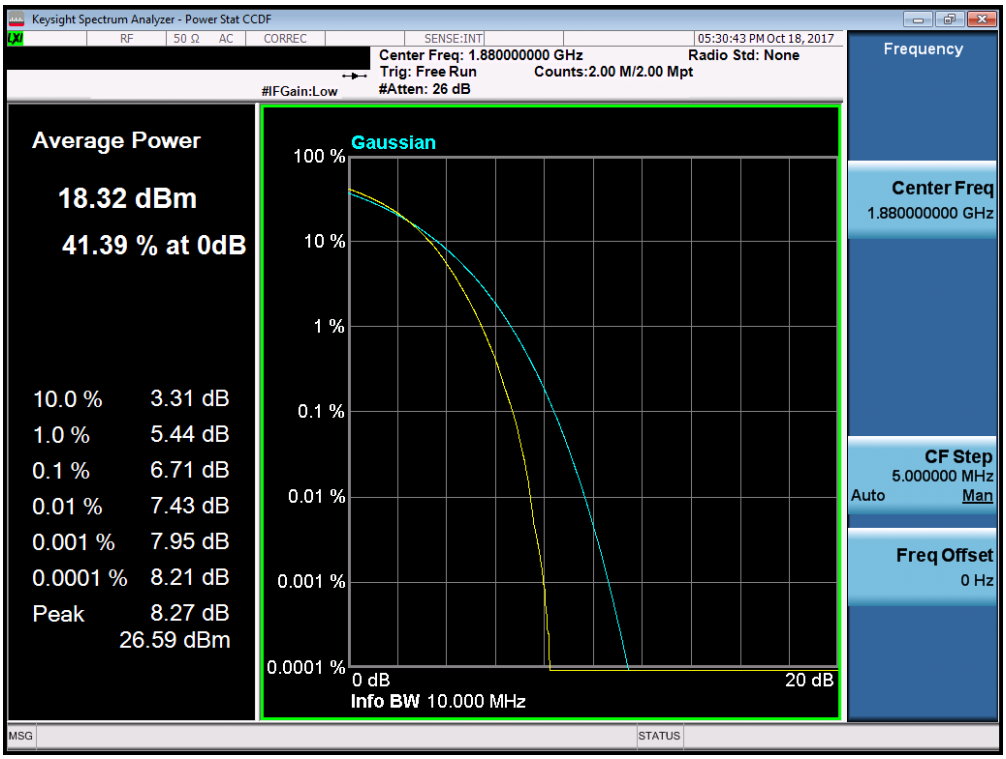
Plot 7-240. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-241. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-242. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-243. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

7.6 Radiated Power (ERP/EIRP)

§22.913(a)(2) §24.232(c.2) §27.50(b)(10) §27.50(c)(10) §27.50(d)(4) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

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 v03 – 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

Test Setup

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

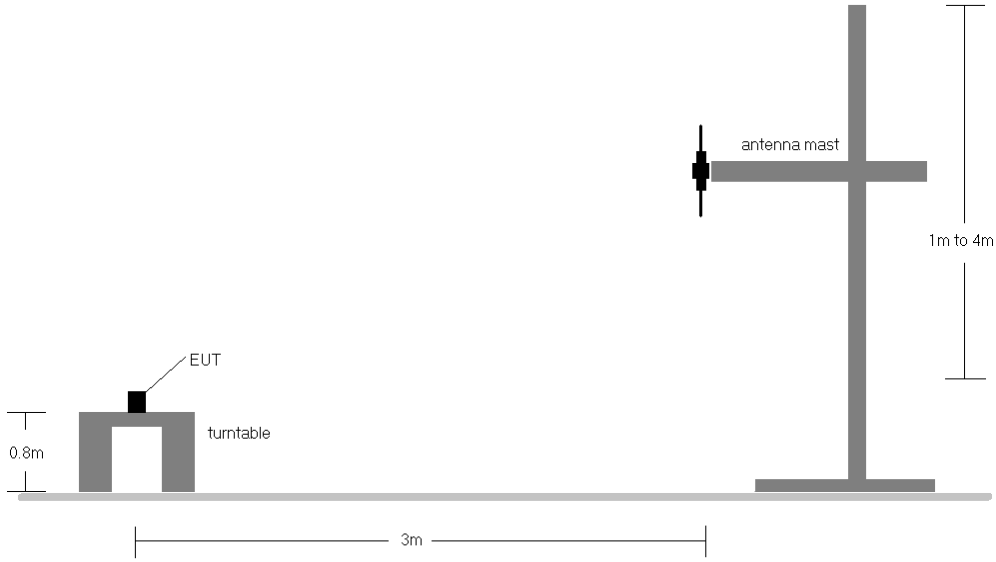


Figure 7-5. Radiated Test Setup <1GHz

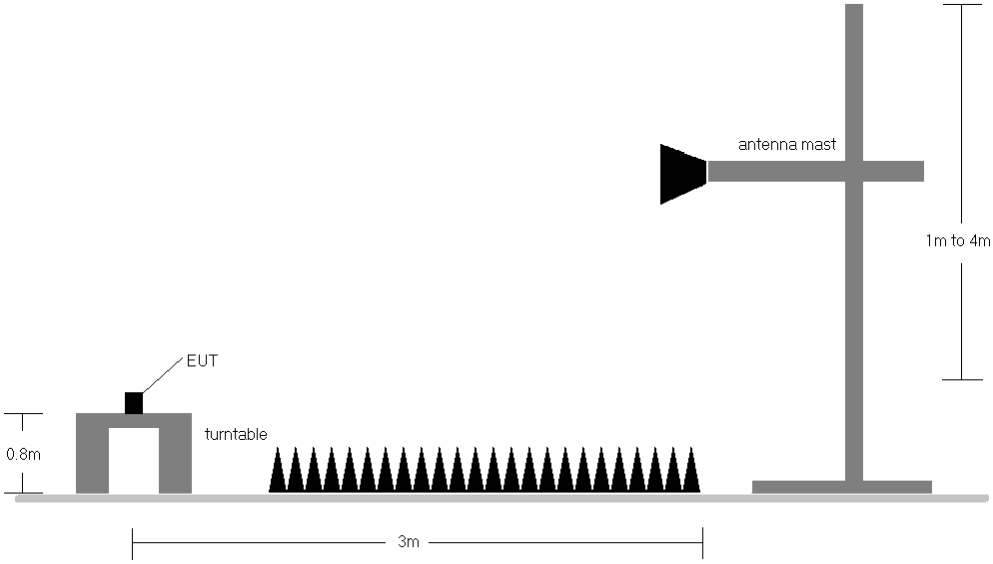


Figure 7-6. Radiated Test Setup >1GHz

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.

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	V	185	292	1 / 5	15.04	5.14	18.03	0.064	34.77	-16.74	20.18	0.104	36.99	-16.81
707.50	1.4	QPSK	V	185	292	1 / 5	15.01	5.14	18.00	0.063	34.77	-16.77	20.15	0.103	36.99	-16.84
715.30	1.4	QPSK	V	185	292	1 / 0	14.97	5.21	18.03	0.064	34.77	-16.74	20.18	0.104	36.99	-16.81
707.50	1.4	16-QAM	V	185	292	1 / 5	13.97	5.14	16.96	0.050	34.77	-17.81	19.11	0.081	36.99	-17.88
707.50	1.4	64-QAM	V	185	292	1 / 5	13.04	5.14	16.03	0.040	34.77	-18.74	18.18	0.066	36.99	-18.81
700.50	3	QPSK	V	185	292	1 / 14	15.06	5.00	17.91	0.062	34.77	-16.86	20.06	0.101	36.99	-16.93
707.50	3	QPSK	V	185	292	1 / 14	15.16	5.14	18.15	0.065	34.77	-16.62	20.30	0.107	36.99	-16.69
714.50	3	QPSK	V	185	292	1 / 0	15.08	5.20	18.13	0.065	34.77	-16.64	20.28	0.107	36.99	-16.71
714.50	3	16-QAM	V	185	292	1 / 0	14.08	5.20	17.13	0.052	34.77	-17.64	19.28	0.085	36.99	-17.71
707.50	3	64-QAM	V	185	292	1 / 14	13.14	5.14	16.13	0.041	34.77	-18.64	18.28	0.067	36.99	-18.71

Table 7-244. ERP/EIRP 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	V	168	293	1 / 0	15.54	5.03	18.42	0.069	34.77	-16.36	20.57	0.114	36.99	-16.42
707.50	5	QPSK	V	168	293	1 / 24	15.34	5.14	18.33	0.068	34.77	-16.44	20.48	0.112	36.99	-16.51
713.50	5	QPSK	V	183	287	1 / 24	15.28	5.19	18.32	0.068	34.77	-16.45	20.47	0.112	36.99	-16.52
701.50	5	16-QAM	V	168	293	1 / 0	14.34	5.03	17.22	0.053	34.77	-17.56	19.37	0.086	36.99	-17.62
701.50	5	64-QAM	V	168	293	1 / 0	13.43	5.03	16.31	0.043	34.77	-18.47	18.46	0.070	36.99	-18.53
704.00	10	QPSK	V	180	288	1 / 0	15.23	5.09	18.17	0.066	34.77	-16.61	20.32	0.108	36.99	-16.67
707.50	10	QPSK	V	184	293	1 / 0	15.03	5.14	18.02	0.063	34.77	-16.75	20.17	0.104	36.99	-16.82
711.00	10	QPSK	V	180	288	1 / 0	15.33	5.17	18.35	0.068	34.77	-16.42	20.50	0.112	36.99	-16.49
711.00	10	16-QAM	V	180	288	1 / 0	14.11	5.17	17.13	0.052	34.77	-17.64	19.28	0.085	36.99	-17.71
711.00	10	64-QAM	V	180	288	1 / 0	13.12	5.17	16.14	0.041	34.77	-18.63	18.29	0.067	36.99	-18.70
701.50	5	QPSK	H	326	284	1 / 74	15.28	4.64	17.77	0.060	34.77	-17.00	19.92	0.098	36.99	-17.07

Table 7-245. ERP/EIRP 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	282	67	1 / 0	14.05	6.00	17.90	0.062	34.77	-16.87	20.05	0.101	36.99	-16.94
782.00	5	QPSK	V	282	67	1 / 0	13.47	6.07	17.39	0.055	34.77	-17.38	19.54	0.090	36.99	-17.45
784.50	5	QPSK	V	282	67	1 / 0	12.83	6.17	16.85	0.048	34.77	-17.92	19.00	0.079	36.99	-17.99
779.50	5	16-QAM	V	282	67	1 / 0	12.95	6.00	16.80	0.048	34.77	-17.97	18.95	0.079	36.99	-18.04
779.50	5	64-QAM	V	282	67	1 / 0	11.82	6.00	15.67	0.037	34.77	-19.10	17.82	0.061	36.99	-19.17
782.00	10	QPSK	V	280	65	1 / 0	14.22	6.07	18.14	0.065	34.77	-16.63	20.29	0.107	36.99	-16.70
782.00	10	16-QAM	V	280	65	1 / 0	13.49	6.07	17.41	0.055	34.77	-17.36	19.56	0.090	36.99	-17.43
782.00	10	64-QAM	V	280	65	1 / 0	12.65	6.07	16.57	0.045	34.77	-18.20	18.72	0.075	36.99	-18.27
782.00	10	QPSK	H	149	279	1 / 0	11.76	4.69	14.30	0.027	34.77	-20.47	16.45	0.044	36.99	-20.54

Table 7-246. ERP/EIRP Data (Band 13)

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	143	293	1 / 0	12.54	7.51	17.90	0.062	38.46	-20.56	20.05	0.101	40.61	-20.56
836.50	1.4	QPSK	V	141	270	1 / 0	12.83	7.30	17.98	0.063	38.46	-20.48	20.13	0.103	40.61	-20.48
848.30	1.4	QPSK	V	135	279	1 / 0	13.25	7.31	18.41	0.069	38.46	-20.05	20.56	0.114	40.61	-20.05
848.30	1.4	16-QAM	V	135	279	1 / 0	13.07	7.31	18.23	0.066	38.46	-20.23	20.38	0.109	40.61	-20.23
848.30	1.4	64-QAM	V	135	279	1 / 0	12.10	7.31	17.26	0.053	38.46	-21.20	19.41	0.087	40.61	-21.20
825.50	3	QPSK	V	218	299	1 / 0	14.70	7.50	20.05	0.101	38.46	-18.41	22.20	0.166	40.61	-18.41
836.50	3	QPSK	V	217	283	1 / 0	14.30	7.30	19.45	0.088	38.46	-19.01	21.60	0.145	40.61	-19.01
847.50	3	QPSK	V	206	286	1 / 0	14.21	7.29	19.35	0.086	38.46	-19.11	21.50	0.141	40.61	-19.11
825.50	3	16-QAM	V	218	299	1 / 0	13.54	7.50	18.89	0.077	38.46	-19.57	21.04	0.127	40.61	-19.57
825.50	3	64-QAM	V	218	299	1 / 0	12.52	7.50	17.87	0.061	38.46	-20.59	20.02	0.101	40.61	-20.59
826.50	5	QPSK	V	219	278	1 / 0	14.12	7.49	19.46	0.088	38.46	-19.00	21.61	0.145	40.61	-19.00
836.50	5	QPSK	V	219	297	1 / 0	14.78	7.30	19.93	0.098	38.46	-18.53	22.08	0.161	40.61	-18.53
846.50	5	QPSK	V	215	283	1 / 0	14.30	7.28	19.43	0.088	38.46	-19.03	21.58	0.144	40.61	-19.03
836.50	5	16-QAM	V	219	297	1 / 0	13.66	7.30	18.81	0.076	38.46	-19.65	20.96	0.125	40.61	-19.65
836.50	5	64-QAM	V	219	297	1 / 0	12.67	7.30	17.82	0.061	38.46	-20.64	19.97	0.099	40.61	-20.64
829.00	10	QPSK	V	133	275	50 / 0	13.69	7.45	18.99	0.079	38.46	-19.47	21.14	0.130	40.61	-19.47
836.50	10	QPSK	V	133	263	50 / 0	13.64	7.30	18.79	0.076	38.46	-19.67	20.94	0.124	40.61	-19.67
844.00	10	QPSK	V	132	286	1 / 0	13.78	7.26	18.89	0.077	38.46	-19.57	21.04	0.127	40.61	-19.57
829.00	10	16-QAM	V	133	275	1 / 49	12.46	7.45	17.76	0.060	38.46	-20.70	19.91	0.098	40.61	-20.70
829.00	10	64-QAM	V	133	275	1 / 49	11.52	7.45	16.82	0.048	38.46	-21.64	18.97	0.079	40.61	-21.64
836.50	10	64-QAM	V	133	263	1 / 49	11.61	7.30	16.76	0.047	38.46	-21.70	18.91	0.078	40.61	-21.70
844.00	10	64-QAM	V	132	286	1 / 0	11.74	7.26	16.85	0.048	38.46	-21.61	19.00	0.079	40.61	-21.61
825.50	3	QPSK	H	218	299	1 / 0	13.61	7.67	19.13	0.082	38.46	-19.33	21.28	0.134	40.61	-19.33

Table 7-247. ERP/EIRP Data (Band 5/26)

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]
831.50	15	QPSK	V	140	229	1 / 0	11.53	7.40	16.78	0.048	38.45	-21.68	18.93	0.078	40.61	-21.68
836.50	15	QPSK	V	140	229	1 / 0	11.75	7.30	16.90	0.049	38.45	-21.55	19.05	0.080	40.61	-21.56
841.50	15	QPSK	V	149	223	1 / 0	11.12	7.26	16.23	0.042	38.45	-22.22	18.38	0.069	40.61	-22.23
831.50	15	16-QAM	V	140	229	1 / 0	10.51	7.40	15.76	0.038	38.45	-22.70	17.91	0.062	40.61	-22.70
841.50	15	64-QAM	V	149	223	1 / 0	11.09	7.26	16.20	0.042	38.45	-22.25	18.35	0.068	40.61	-22.26

Table 7-248. ERP/EIRP Data (Band 26)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Positioner Azimuth [degree]	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	345	358	1 / 0	20.12	5.56	25.68	0.370	30.00	-4.32
1745.00	1.4	QPSK	H	10	347	1 / 0	20.05	5.32	25.37	0.345	30.00	-4.63
1779.30	1.4	QPSK	H	345	359	1 / 3	20.50	5.09	25.59	0.362	30.00	-4.41
1710.70	1.4	16-QAM	H	345	358	1 / 0	18.93	5.56	24.49	0.281	30.00	-5.51
1710.70	1.4	64-QAM	H	345	358	1 / 0	17.78	5.56	23.34	0.216	30.00	-6.66
1711.50	3	QPSK	H	355	353	1 / 7	20.23	5.55	25.78	0.379	30.00	-4.22
1745.00	3	QPSK	H	350	356	1 / 14	19.77	5.32	25.09	0.323	30.00	-4.91
1778.50	3	QPSK	H	352	356	1 / 14	20.33	5.10	25.43	0.349	30.00	-4.57
1711.50	3	16-QAM	H	355	353	1 / 7	19.07	5.55	24.62	0.290	30.00	-5.38
1711.50	3	64-QAM	H	355	353	1 / 0	17.94	5.55	23.49	0.223	30.00	-6.51
1712.50	5	QPSK	H	341	357	1 / 0	20.04	5.55	25.59	0.362	30.00	-4.41
1745.00	5	QPSK	H	346	359	1 / 0	19.69	5.32	25.01	0.317	30.00	-4.99
1777.50	5	QPSK	H	335	3	1 / 12	20.47	5.10	25.57	0.361	30.00	-4.43
1712.50	5	16-QAM	H	341	357	1 / 0	18.67	5.55	24.22	0.264	30.00	-5.78
1712.50	5	64-QAM	H	341	357	1 / 0	17.34	5.55	22.89	0.194	30.00	-7.11
1715.00	10	QPSK	H	349	3	1 / 0	20.18	5.53	25.71	0.372	30.00	-4.29
1745.00	10	QPSK	H	346	6	1 / 25	19.33	5.32	24.65	0.292	30.00	-5.35
1775.00	10	QPSK	H	335	0	1 / 49	20.53	5.12	25.65	0.367	30.00	-4.35
1715.00	10	16-QAM	H	349	3	1 / 0	18.85	5.53	24.38	0.274	30.00	-5.62
1715.00	10	64-QAM	H	349	3	1 / 0	17.55	5.53	23.08	0.203	30.00	-6.92
1717.50	15	QPSK	H	328	7	1 / 0	19.75	5.51	25.26	0.336	30.00	-4.74
1745.00	15	QPSK	H	343	358	1 / 36	19.62	5.32	24.94	0.312	30.00	-5.06
1772.50	15	QPSK	H	340	0	1 / 74	20.26	5.14	25.40	0.347	30.00	-4.60
1772.50	15	16-QAM	H	340	0	1 / 74	19.13	5.14	24.27	0.267	30.00	-5.73
1772.50	15	64-QAM	H	340	0	1 / 74	18.03	5.14	23.17	0.207	30.00	-6.83
1720.00	20	QPSK	H	333	3	1 / 0	19.83	5.49	25.32	0.341	30.00	-4.68
1745.00	20	QPSK	H	342	359	1 / 0	19.59	5.32	24.91	0.310	30.00	-5.09
1770.00	20	QPSK	H	341	3	1 / 99	20.25	5.15	25.40	0.347	30.00	-4.60
1770.00	20	16-QAM	H	341	3	1 / 99	19.28	5.15	24.43	0.278	30.00	-5.57
1770.00	20	64-QAM	H	341	3	1 / 99	18.34	5.15	23.49	0.224	30.00	-6.51
1711.50	3	QPSK	V	250	284	1 / 14	17.07	5.64	22.71	0.187	30.00	-7.29

Table 7-249. EIRP Data (Band 4/66)

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	301	241	1 / 0	18.06	4.79	22.85	0.193	33.01	-10.16
1880.00	1.4	QPSK	V	271	260	1 / 0	17.38	4.84	22.22	0.167	33.01	-10.79
1909.30	1.4	QPSK	V	243	270	1 / 0	17.61	4.86	22.47	0.177	33.01	-10.54
1850.70	1.4	16-QAM	V	301	241	1 / 0	16.54	4.79	21.33	0.136	33.01	-11.68
1850.70	1.4	64-QAM	V	301	241	1 / 0	15.56	4.79	20.35	0.108	33.01	-12.66
1851.50	3	QPSK	V	257	341	1 / 0	19.50	4.79	24.29	0.268	33.01	-8.72
1880.00	3	QPSK	V	262	344	1 / 0	18.14	4.84	22.98	0.199	33.01	-10.03
1908.50	3	QPSK	V	242	347	1 / 0	18.49	4.86	23.35	0.216	33.01	-9.66
1851.50	3	16-QAM	V	257	341	1 / 0	18.35	4.79	23.14	0.206	33.01	-9.87
1851.50	3	64-QAM	V	257	341	1 / 0	17.14	4.79	21.93	0.156	33.01	-11.08
1852.50	5	QPSK	V	156	90	1 / 0	19.73	4.79	24.52	0.283	33.01	-8.49
1880.00	5	QPSK	V	156	90	1 / 0	18.85	4.84	23.69	0.234	33.01	-9.32
1907.50	5	QPSK	V	156	90	1 / 24	19.00	4.87	23.87	0.244	33.01	-9.14
1852.50	5	16-QAM	V	156	90	1 / 0	18.58	4.79	23.37	0.217	33.01	-9.64
1852.50	5	64-QAM	V	156	90	1 / 0	17.30	4.79	22.09	0.162	33.01	-10.92
1855.00	10	QPSK	V	158	87	1 / 0	19.70	4.80	24.50	0.282	33.01	-8.51
1880.00	10	QPSK	V	158	87	1 / 0	18.92	4.84	23.76	0.238	33.01	-9.25
1905.00	10	QPSK	V	158	87	1 / 0	19.69	4.87	24.56	0.286	33.01	-8.45
1905.00	10	16-QAM	V	158	87	1 / 0	18.30	4.87	23.17	0.208	33.01	-9.84
1905.00	10	64-QAM	V	158	87	1 / 0	17.63	4.87	22.50	0.178	33.01	-10.51
1857.50	15	QPSK	V	270	263	1 / 0	18.55	4.80	23.35	0.216	33.01	-9.66
1880.00	15	QPSK	V	267	292	1 / 0	18.29	4.84	23.13	0.206	33.01	-9.88
1902.50	15	QPSK	V	278	299	1 / 0	18.30	4.88	23.18	0.208	33.01	-9.83
1857.50	15	16-QAM	V	270	263	1 / 0	17.07	4.80	21.87	0.154	33.01	-11.14
1857.50	15	64-QAM	V	270	263	1 / 0	16.42	4.80	21.22	0.132	33.01	-11.79
1860.00	20	QPSK	V	255	292	1 / 0	18.05	4.81	22.86	0.193	33.01	-10.16
1880.00	20	QPSK	V	255	292	1 / 0	17.97	4.84	22.81	0.191	33.01	-10.20
1900.00	20	QPSK	V	255	292	1 / 0	18.00	4.88	22.88	0.194	33.01	-10.13
1900.00	20	16-QAM	V	255	292	1 / 0	17.00	4.88	21.88	0.154	33.01	-11.13
1900.00	20	64-QAM	V	255	292	1 / 0	15.85	4.88	20.73	0.118	33.01	-12.28
1905.00	10	QPSK	H	278	300	1 / 0	16.19	4.81	21.00	0.126	33.01	-12.01

Table 7-250. EIRP Data (Band 2)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Positioner Azimuth [degree]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	V	337	282	1 / 12	15.19	5.59	20.78	0.120	33.01	-12.23
2593.00	5	QPSK	V	296	274	1 / 0	15.27	6.27	21.54	0.143	33.01	-11.47
2687.50	5	QPSK	V	113	71	1 / 0	13.08	6.47	19.55	0.090	33.01	-13.46
2593.00	5	16-QAM	V	296	274	1 / 0	14.29	6.27	20.56	0.114	33.01	-12.45
2593.00	5	64-QAM	V	296	274	1 / 0	13.34	6.27	19.61	0.091	33.01	-13.40
2501.00	10	QPSK	V	298	254	1 / 0	14.32	5.60	19.92	0.098	33.01	-13.09
2593.00	10	QPSK	V	303	277	1 / 25	13.83	6.27	20.10	0.102	33.01	-12.91
2685.00	10	QPSK	V	121	72	1 / 0	14.08	6.46	20.54	0.113	33.01	-12.47
2593.00	10	16-QAM	V	303	277	1 / 25	13.32	6.27	19.59	0.091	33.01	-13.42
2593.00	10	64-QAM	V	303	277	1 / 0	12.39	6.27	18.66	0.074	33.01	-14.35
2503.50	15	QPSK	V	287	253	1 / 0	13.82	5.61	19.43	0.088	33.01	-13.58
2593.00	15	QPSK	V	286	277	1 / 0	14.68	6.27	20.95	0.125	33.01	-12.06
2682.50	15	QPSK	V	121	89	1 / 0	13.40	6.46	19.86	0.097	33.01	-13.15
2593.00	15	16-QAM	V	286	277	1 / 0	14.49	6.27	20.76	0.119	33.01	-12.25
2503.50	15	64-QAM	V	287	253	1 / 0	13.72	5.61	19.33	0.086	33.01	-13.68
2506.00	20	QPSK	V	303	252	1 / 0	14.45	5.63	20.08	0.102	33.01	-12.93
2593.00	20	QPSK	V	288	261	1 / 0	14.88	6.27	21.15	0.130	33.01	-11.86
2680.00	20	QPSK	V	116	95	1 / 0	12.68	6.46	19.14	0.082	33.01	-13.87
2593.00	20	16-QAM	V	288	261	1 / 0	14.55	6.27	20.82	0.121	33.01	-12.19
2593.00	20	64-QAM	V	288	261	1 / 0	12.61	6.27	18.88	0.077	33.01	-14.13
2593.00	5	QPSK	H	353	212	1 / 99	15.29	6.07	21.36	0.137	33.01	-11.65

Table 7-251. EIRP Data (Band 41)

7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

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 v03 – 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

Test Setup

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

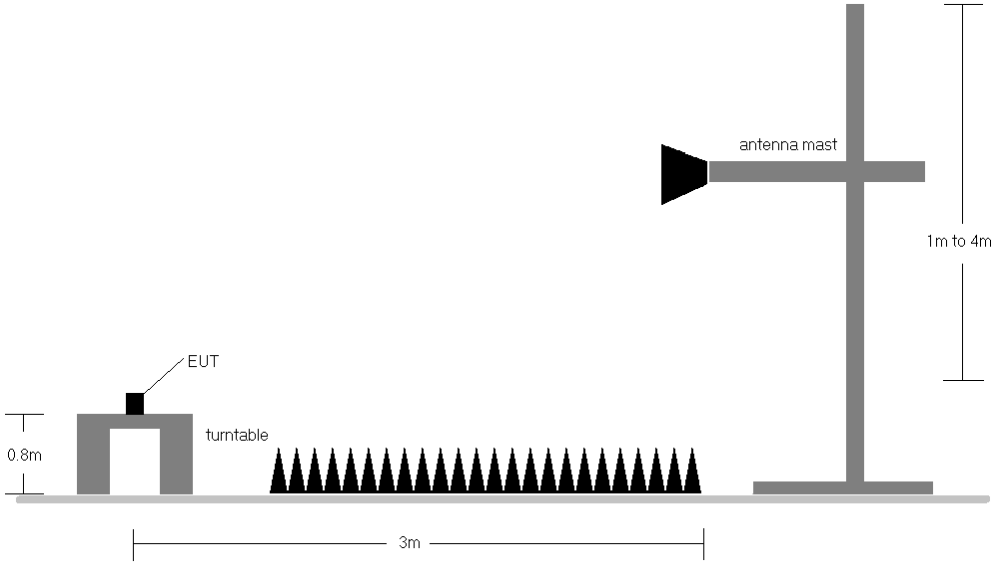


Figure 7-7. Test Instrument & Measurement Setup

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.

Band 12/17

OPERATING FREQUENCY:	701.50	MHz
CHANNEL:	23035	
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]
1403.00	V	107	97	-62.54	7.75	-54.79	-41.8
2104.50	V	-	-	-68.55	8.82	-59.73	-46.7

Table 7-252. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz
CHANNEL:	23095	
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]
1415.00	V	125	96	-65.53	7.84	-57.69	-44.7
2122.50	V	-	-	-68.10	8.90	-59.20	-46.2

Table 7-253. Radiated Spurious Data (Band 12/17 – Mid Channel)

OPERATING FREQUENCY:	713.50	MHz
CHANNEL:	23155	
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]
1427.00	V	100	314	-70.28	7.94	-62.35	-49.3
2140.50	V	-	-	-68.25	8.97	-59.28	-46.3

Table 7-254. Radiated Spurious Data (Band 12/17 – High Channel)

Band 13

OPERATING FREQUENCY:	782.00	MHz
CHANNEL:	23230	
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]
1564.00	H	100	194	-69.58	8.72	-60.86	-47.9
2346.00	H	-	-	-68.77	9.48	-59.29	-46.3

Table 7-255. Radiated Spurious Data (Band 13 – Mid Channel)

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.00	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]
1564.00	H	100	194	-69.58	8.72	-60.86	-20.9

Table 7-256. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

Band 5/26

OPERATING FREQUENCY:	825.50	MHz
CHANNEL:	20415	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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]
1651.00	V	-	-	-77.21	8.89	-68.32	-55.3
2476.50	V	-	-	-75.38	9.67	-65.71	-52.7

Table 7-257. Radiated Spurious Data (Band 5/26 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
CHANNEL:	20525	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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	V	-	-	-77.29	8.92	-68.37	-55.4
2509.50	V	-	-	-75.00	9.80	-65.19	-52.2

Table 7-258. Radiated Spurious Data (Band 5/26 – Mid Channel)

OPERATING FREQUENCY:	847.50	MHz
CHANNEL:	20635	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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]
1695.00	V	-	-	-77.27	8.95	-68.32	-55.3
2542.50	V	-	-	-74.30	9.77	-64.54	-51.5

Table 7-259. Radiated Spurious Data (Band 5/26 – High Channel)

Band 4/66

OPERATING FREQUENCY:	1711.50	MHz
CHANNEL:	131987	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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]
3423.00	V	167	187	-59.79	9.87	-49.92	-36.9
5134.50	V	-	-	-67.35	10.76	-56.59	-43.6

Table 7-260. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
CHANNEL:	132322	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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	V	262	190	-62.17	9.94	-52.23	-39.2
5235.00	V	-	-	-65.28	10.72	-54.56	-41.6

Table 7-261. Radiated Spurious Data (Band 4/66 – Mid Channel)

OPERATING FREQUENCY:	1778.50	MHz
CHANNEL:	132657	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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]
3557.00	V	100	200	-62.58	9.96	-52.62	-39.6
5335.50	V	-	-	-63.20	10.72	-52.48	-39.5

Table 7-262. Radiated Spurious Data (Band 4/66 – High Channel)

Band 2

OPERATING FREQUENCY:	1855.00	MHz
CHANNEL:	18650	
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]
3710.00	V	-	-	-66.23	9.51	-56.72	-43.7
5565.00	V	-	-	-65.13	11.06	-54.07	-41.1

Table 7-263. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	18900	
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]
3760.00	V	-	-	-65.01	9.39	-55.62	-42.6
5640.00	V	-	-	-66.26	11.22	-55.04	-42.0

Table 7-264. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1905.00	MHz
CHANNEL:	19150	
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]
3810.00	V	-	-	-65.77	9.31	-56.46	-43.5
5715.00	V	-	-	-65.44	11.33	-54.12	-41.1

Table 7-265. Radiated Spurious Data (Band 2 – High Channel)

Band 41

OPERATING FREQUENCY:	2498.50	MHz
CHANNEL:	39675	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
4997.00	V	146	147	-55.80	11.16	-44.64	-19.6
7495.50	V	197	193	-48.05	10.96	-37.09	-12.1
9994.00	V	192	129	-48.90	12.11	-36.79	-11.8
12492.50	V	127	197	-51.27	12.68	-38.58	-13.6
14991.00	V	141	148	-54.54	11.57	-42.97	-18.0
17489.50	V	-	-	-53.57	11.75	-41.82	-16.8

Table 7-266. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz
CHANNEL:	40620	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
5186.00	V	193	151	-51.26	10.77	-40.49	-15.5
7779.00	V	215	192	-49.41	11.43	-37.98	-13.0
10372.00	V	141	176	-43.96	12.53	-31.43	-6.4
12965.00	V	164	183	-53.60	12.70	-40.90	-15.9
15558.00	V	-	-	-61.74	15.07	-46.68	-21.7

Table 7-267. Radiated Spurious Data (Band 41 – Mid Channel)

OPERATING FREQUENCY:	2687.50	MHz
CHANNEL:	41565	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
5375.00	V	179	139	-50.26	11.04	-39.21	-14.2
8062.50	V	165	215	-50.35	11.40	-38.95	-14.0
10750.00	V	187	247	-49.79	12.85	-36.94	-11.9
13437.50	V	150	195	-57.99	12.72	-45.27	-20.3
16125.00	V	-	-	-63.75	16.40	-47.35	-22.3

Table 7-268. Radiated Spurious Data (Band 41 – High Channel)

7.8 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54 RSS-130(4.3) RSS-132(5.3) RSS-133(6.3) RSS-139(6.3) RSS-195(5.4)

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, RSS-132 and RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, RSS-130, RSS-139 and RSS-199, 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

Band 12/17 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	4.40	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	707,500,164	164	0.0000232
100 %		- 30	707,500,037	37	0.0000052
100 %		- 20	707,500,366	366	0.0000517
100 %		- 10	707,499,991	-9	-0.0000013
100 %		0	707,500,088	88	0.0000124
100 %		+ 10	707,500,057	57	0.0000081
100 %		+ 20	707,500,286	286	0.0000404
100 %		+ 30	707,499,881	-119	-0.0000168
100 %		+ 40	707,499,747	-253	-0.0000358
100 %		+ 50	707,500,208	208	0.0000294
BATT. ENDPOINT	3.67	+ 20	707,500,261	261	0.0000369

Table 7-269. 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.

Band 12/17 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

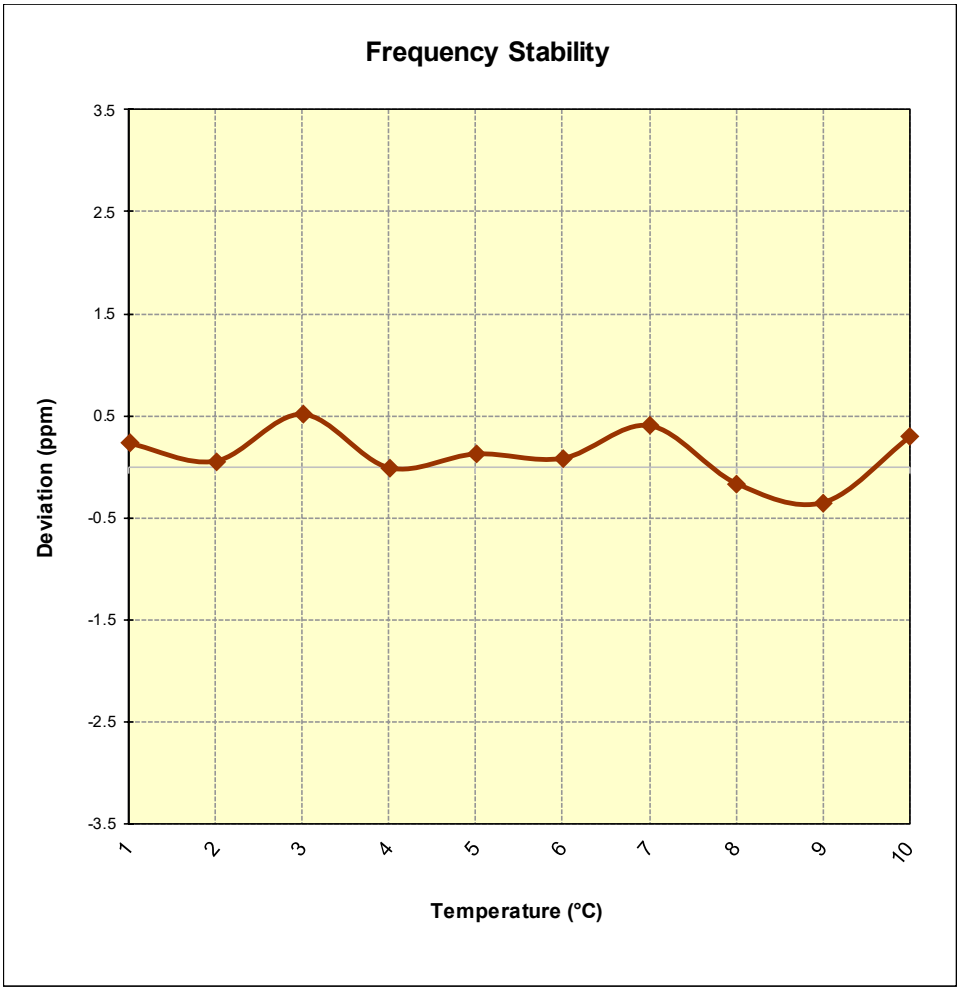


Figure 7-8. Frequency Stability Graph (Band 12/17)

Band 13 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	4.40	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	781,999,934	-66	-0.0000084
100 %		- 30	782,000,333	333	0.0000426
100 %		- 20	782,000,349	349	0.0000446
100 %		- 10	782,000,085	85	0.0000109
100 %		0	781,999,895	-105	-0.0000134
100 %		+ 10	782,000,008	8	0.0000010
100 %		+ 20	781,999,855	-145	-0.0000185
100 %		+ 30	781,999,834	-166	-0.0000212
100 %		+ 40	781,999,929	-71	-0.0000091
100 %		+ 50	782,000,052	52	0.0000066
BATT. ENDPOINT	3.67	+ 20	781,999,887	-113	-0.0000145

Table 7-270. 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.

Band 13 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

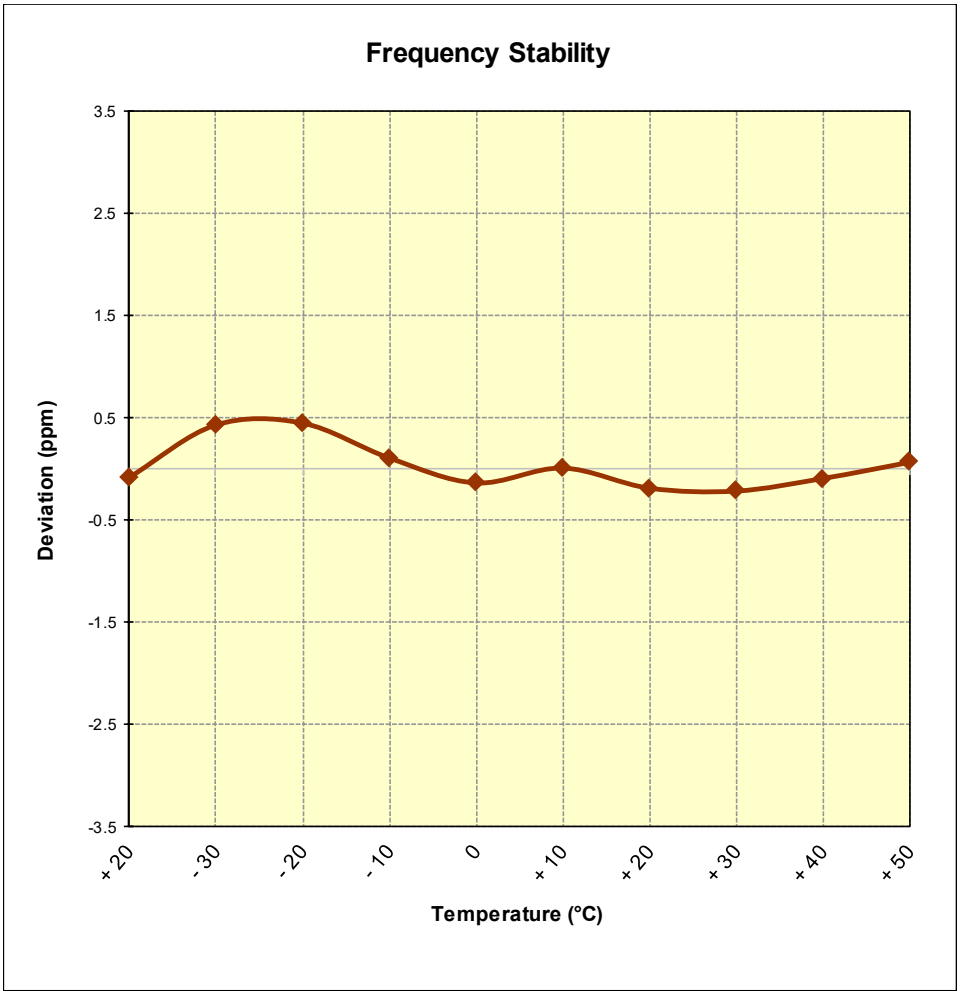


Figure 7-9. Frequency Stability Graph (Band 13)

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	836,500,204	204	0.0000244
100 %		- 30	836,500,064	64	0.0000077
100 %		- 20	836,500,221	221	0.0000264
100 %		- 10	836,500,046	46	0.0000055
100 %		0	836,500,082	82	0.0000098
100 %		+ 10	836,500,100	100	0.0000120
100 %		+ 20	836,500,054	54	0.0000065
100 %		+ 30	836,499,773	-227	-0.0000271
100 %		+ 40	836,500,111	111	0.0000133
100 %		+ 50	836,499,873	-127	-0.0000152
BATT. ENDPOINT	3.67	+ 20	836,499,834	-166	-0.0000198

Table 7-271. Frequency Stability Data (Band 5/26)

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

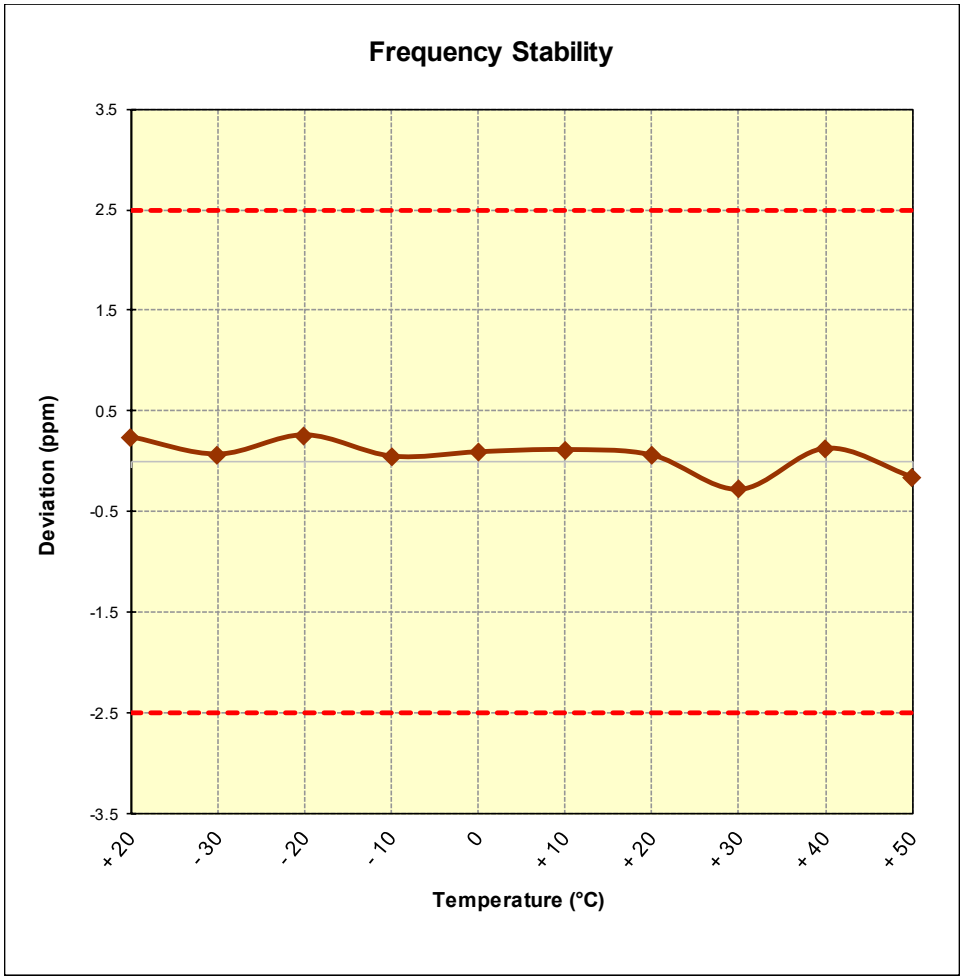


Figure 7-10. Frequency Stability Graph (Band 5/26)

Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54 RSS-139(6.4)

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	4.40	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	1,745,000,077	77	0.0000044
100 %		- 30	1,744,999,808	-192	-0.0000110
100 %		- 20	1,744,999,827	-173	-0.0000099
100 %		- 10	1,744,999,705	-295	-0.0000169
100 %		0	1,745,000,067	67	0.0000038
100 %		+ 10	1,745,000,189	189	0.0000108
100 %		+ 20	1,745,000,221	221	0.0000127
100 %		+ 30	1,745,000,012	12	0.0000007
100 %		+ 40	1,745,000,055	55	0.0000032
100 %		+ 50	1,745,000,246	246	0.0000141
BATT. ENDPOINT	3.67	+ 20	1,744,999,879	-121	-0.0000069

Table 7-272. Frequency Stability Data (Band 4/66)

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.

Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54 RSS-139(6.4)

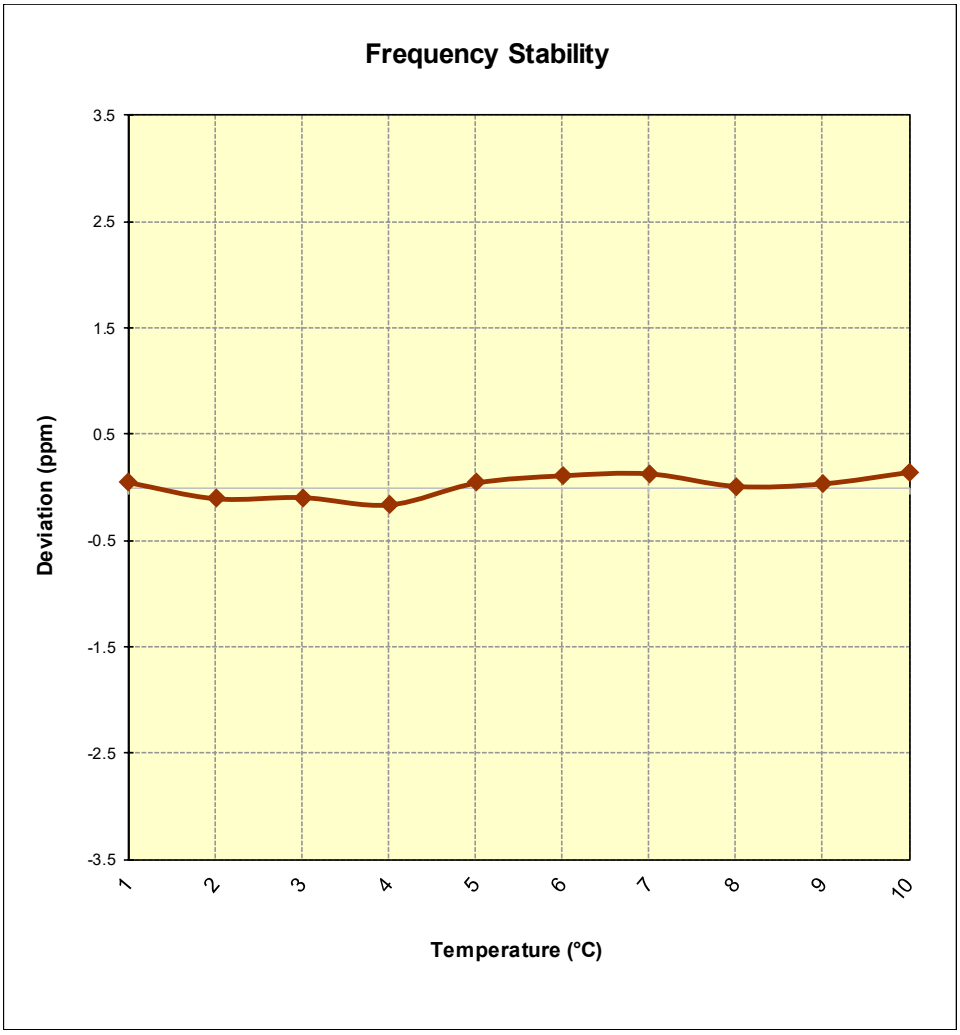


Figure 7-11. Frequency Stability Graph (Band 4/66)

Band 2 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	1,879,999,924	-76	-0.0000040
100 %		- 30	1,879,999,609	-391	-0.0000208
100 %		- 20	1,879,999,890	-110	-0.0000059
100 %		- 10	1,879,999,992	-8	-0.0000004
100 %		0	1,880,000,198	198	0.0000105
100 %		+ 10	1,880,000,235	235	0.0000125
100 %		+ 20	1,879,999,619	-381	-0.0000203
100 %		+ 30	1,880,000,055	55	0.0000029
100 %		+ 40	1,879,999,888	-112	-0.0000060
100 %		+ 50	1,879,999,836	-164	-0.0000087
BATT. ENDPOINT	3.67	+ 20	1,880,000,030	30	0.0000016

Table 7-273. Frequency Stability Data (Band 2)

Band 2 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

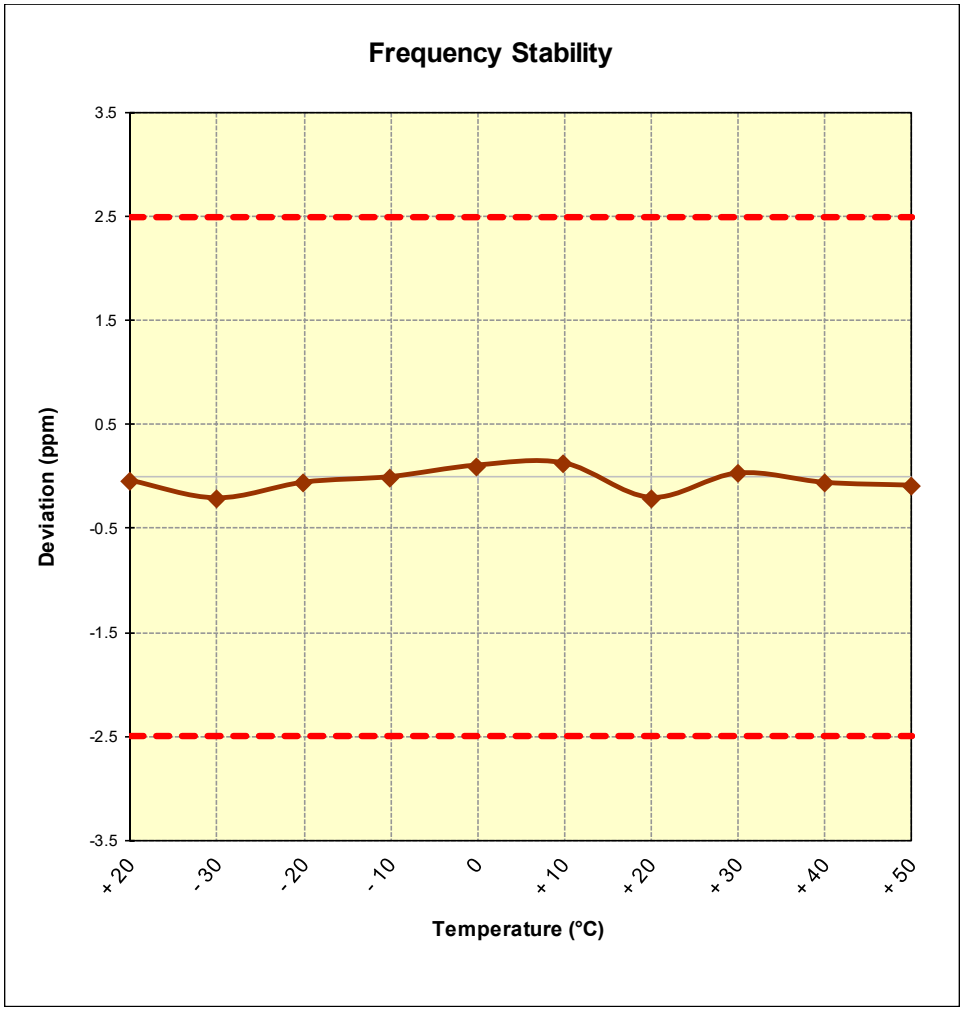


Figure 7-12. Frequency Stability Graph (Band 2)

Band 41 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	4.40	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	2,593,000,306	306	0.0000118
100 %		- 30	2,593,000,019	19	0.0000007
100 %		- 20	2,593,000,106	106	0.0000041
100 %		- 10	2,592,999,765	-235	-0.0000091
100 %		0	2,592,999,763	-237	-0.0000091
100 %		+ 10	2,592,999,901	-99	-0.0000038
100 %		+ 20	2,593,000,040	40	0.0000015
100 %		+ 30	2,592,999,614	-386	-0.0000149
100 %		+ 40	2,592,999,929	-71	-0.0000027
100 %		+ 50	2,593,000,055	55	0.0000021
BATT. ENDPOINT	3.67	+ 20	2,592,999,794	-206	-0.0000079

Table 7-274. Frequency Stability Data (Band 41)

Band 41 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

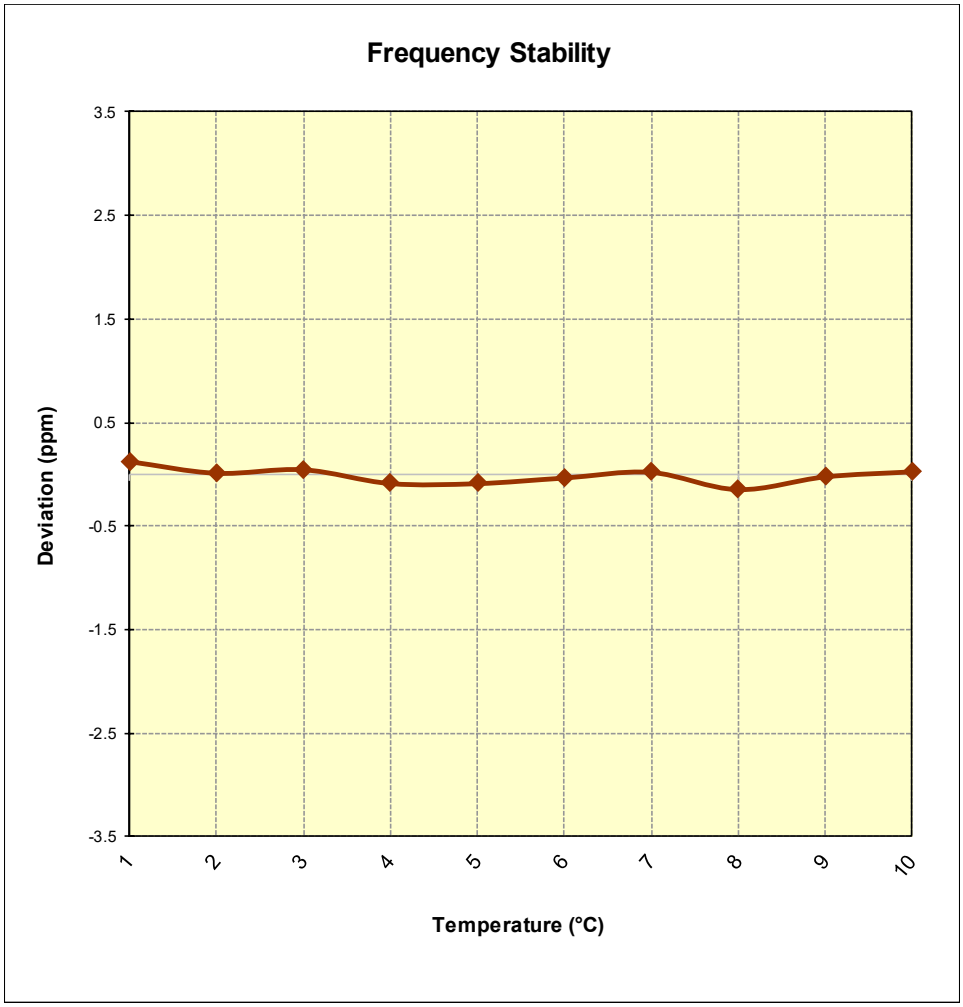


Figure 7-13. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset** **FCC ID: A3LSMA730F** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only and RSS-130, RSS-133, RSS-139, RSS-199 of the Industry Canada rules.