7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)

Test Overview

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

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

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

Test Procedure Used

KDB 971168 v02r02 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 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 for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

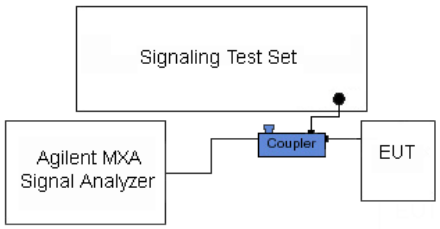

Figure 7-3. Test Instrument & Measurement Setup

Test Notes

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

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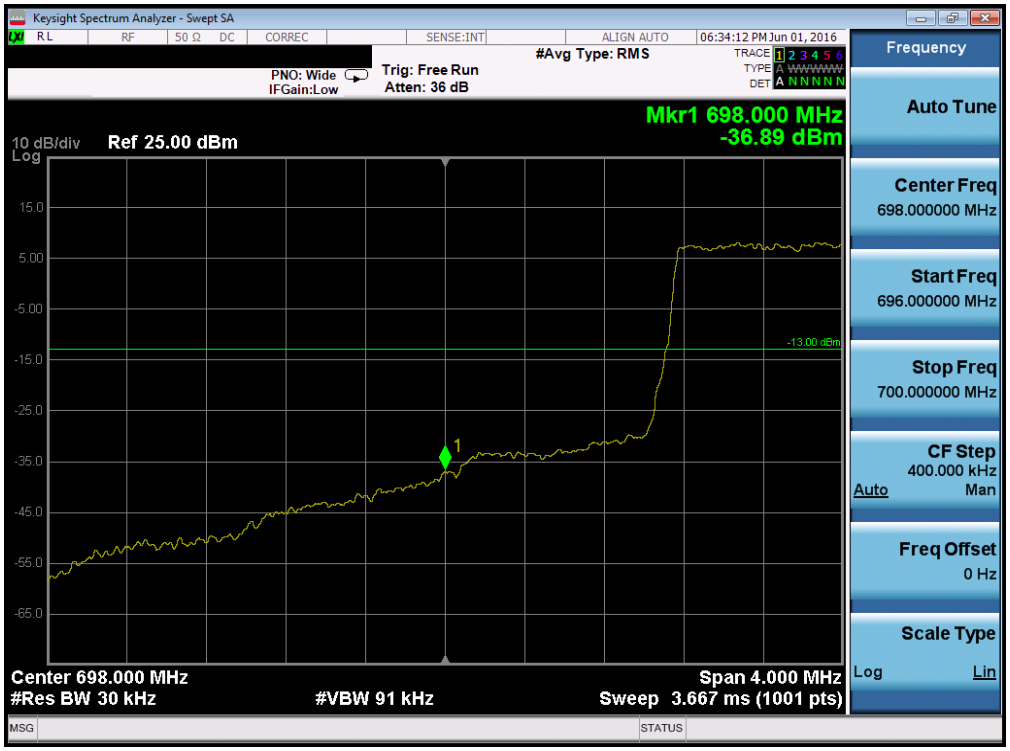
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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



Plot 7-96. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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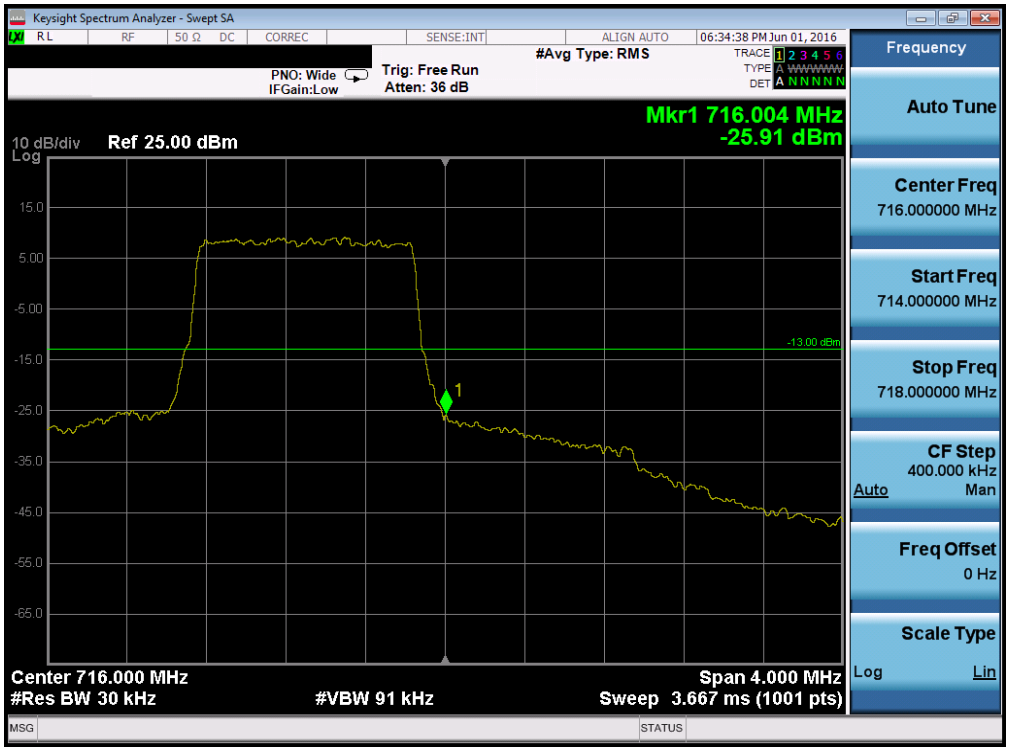
Plot 7-97. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-98. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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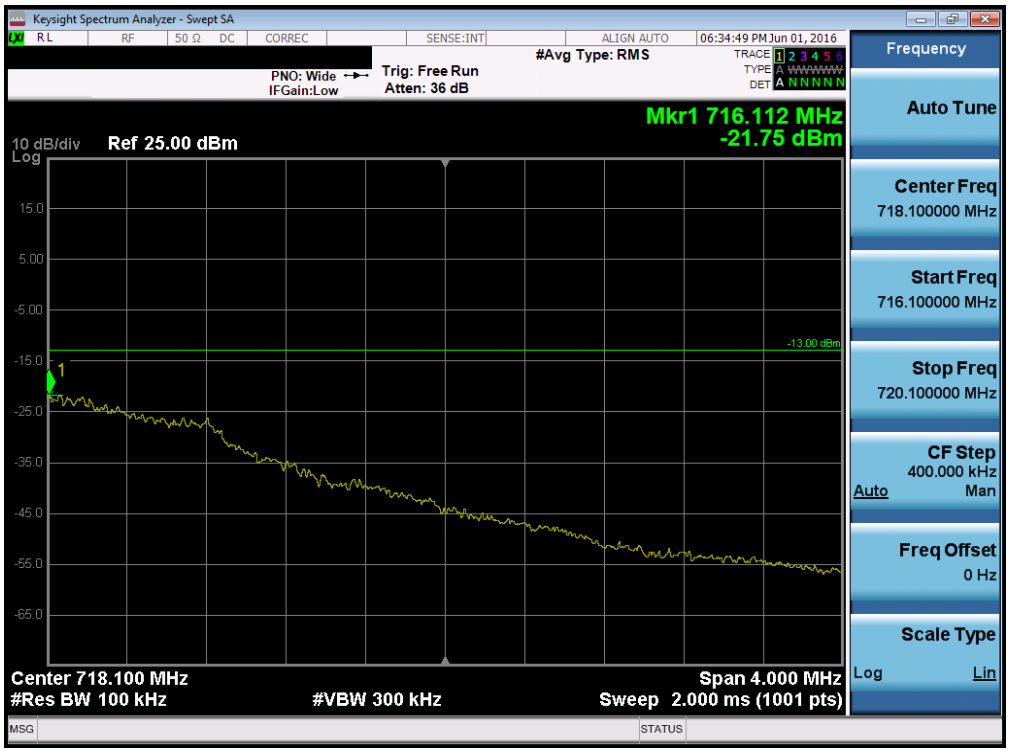
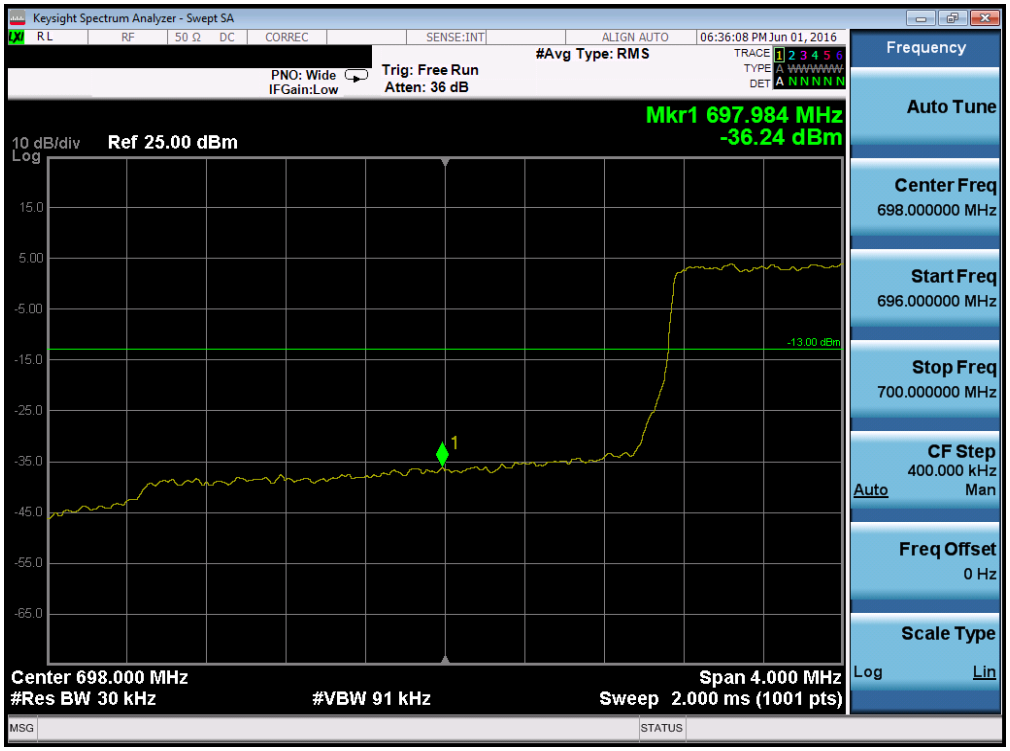


Plot 7-99. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-100. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

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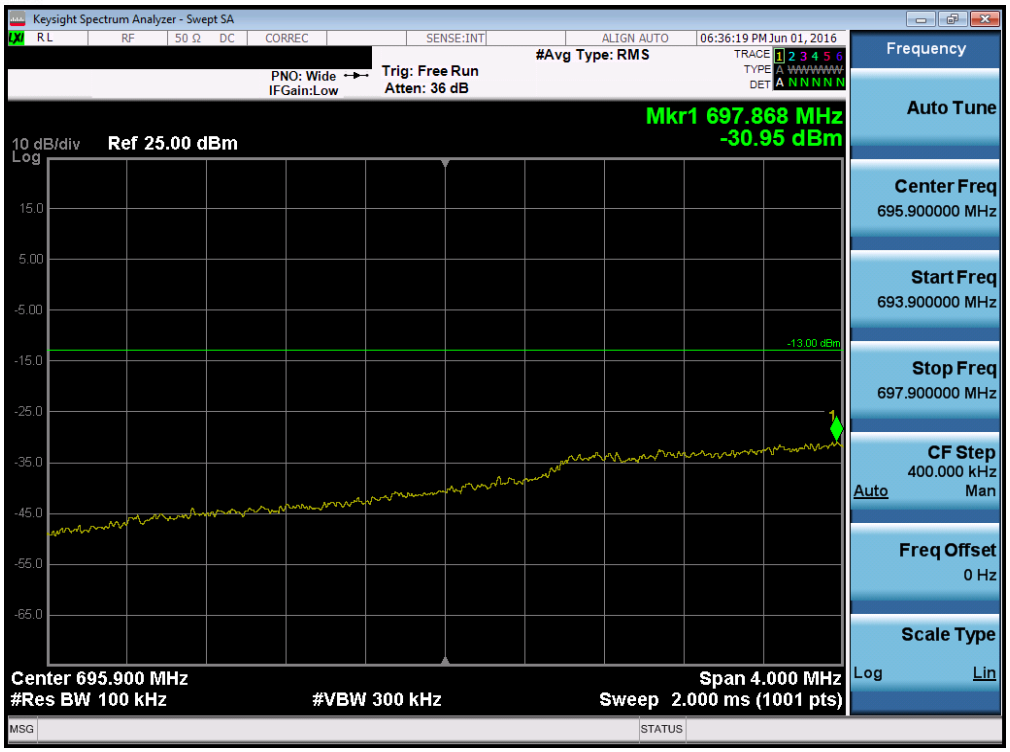
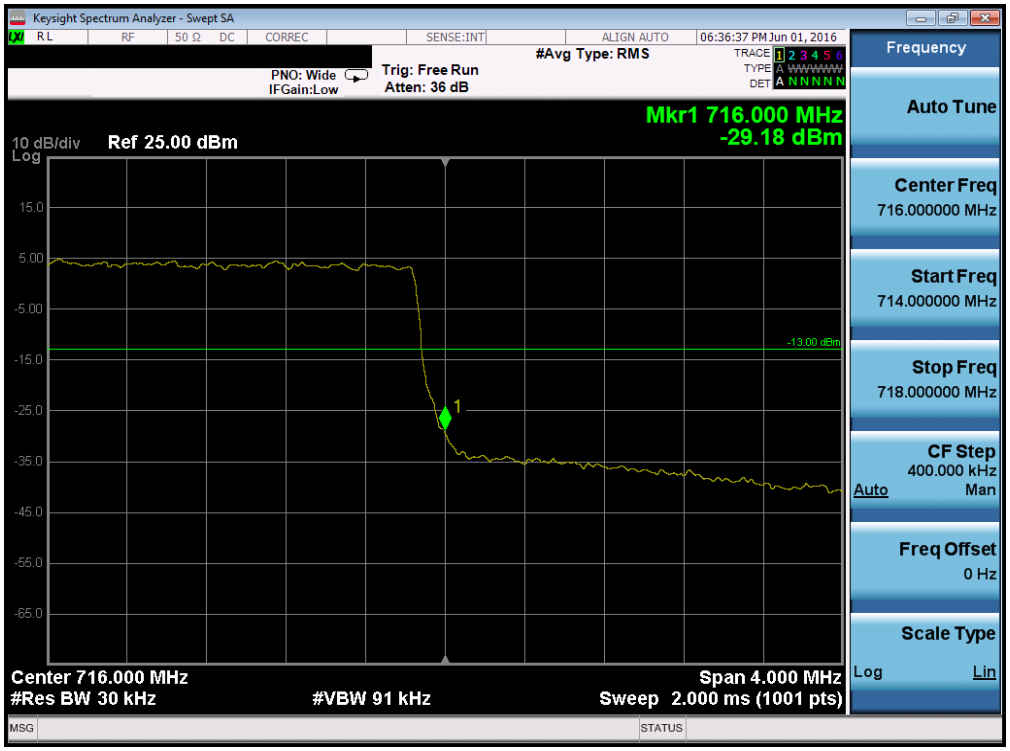


Plot 7-101. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-102. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

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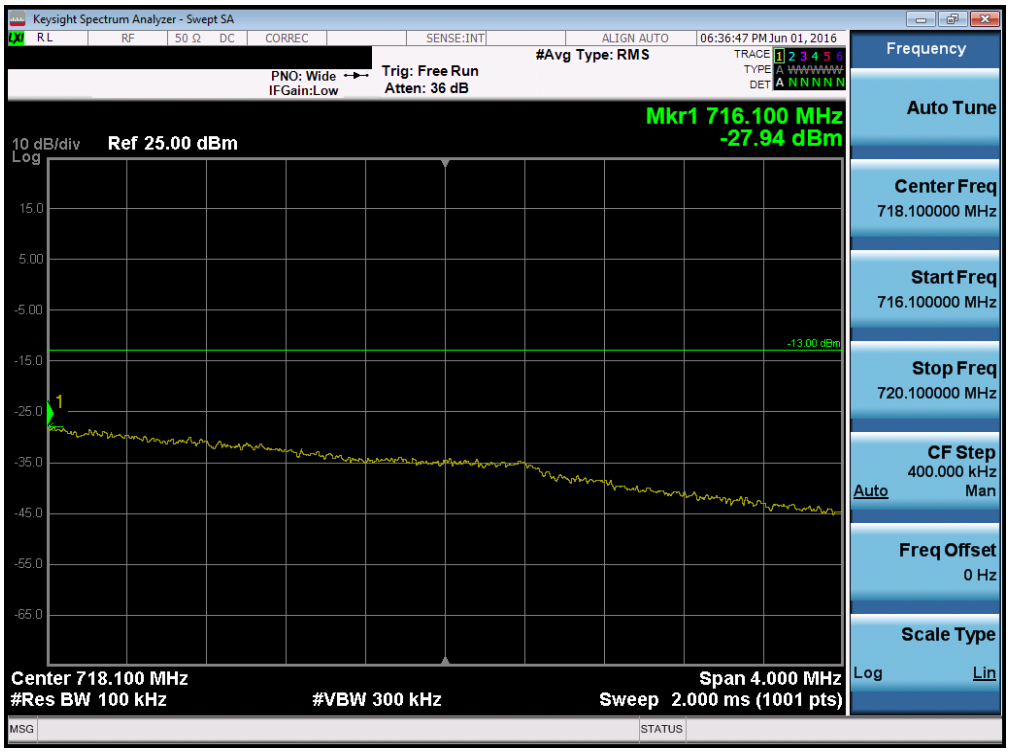
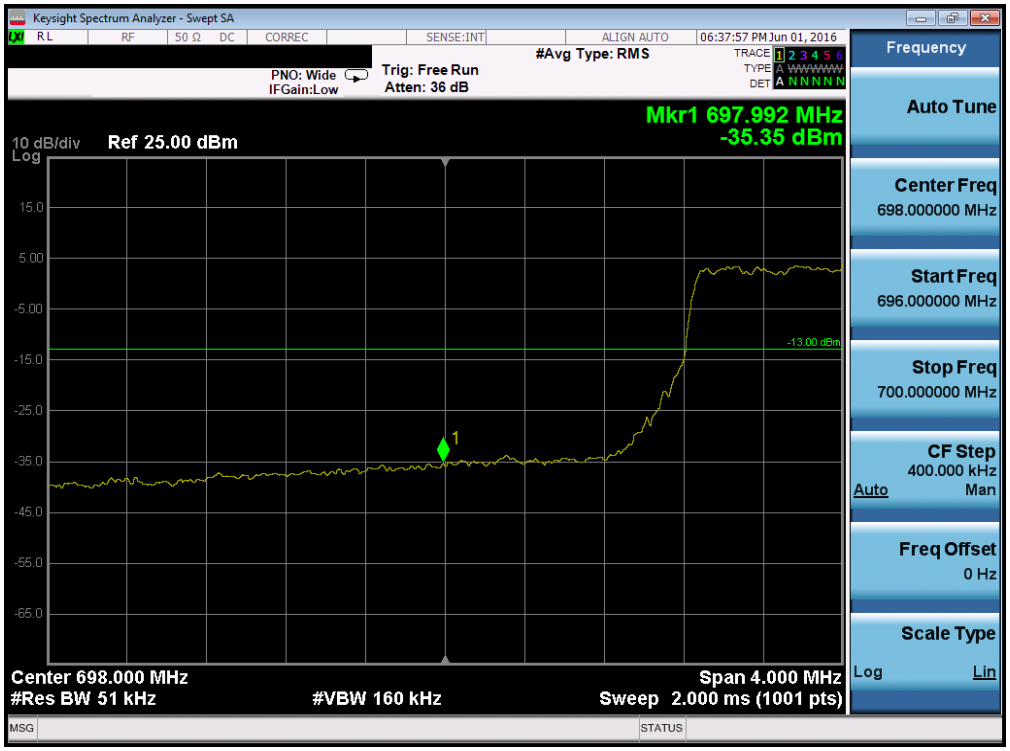


Plot 7-103. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-104. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

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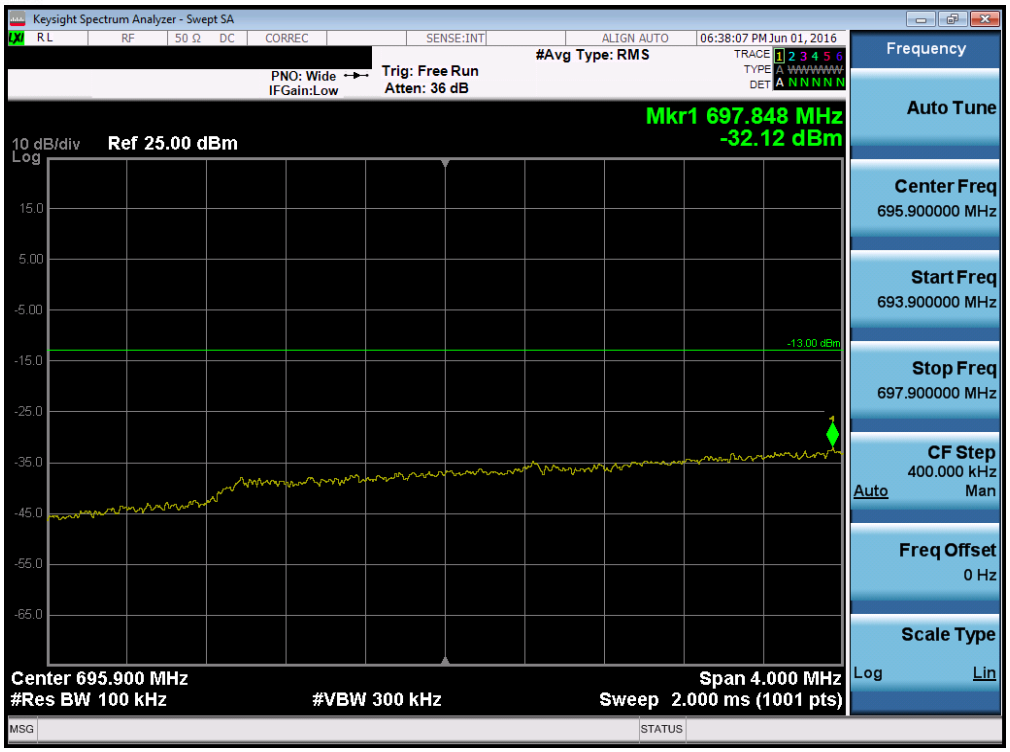
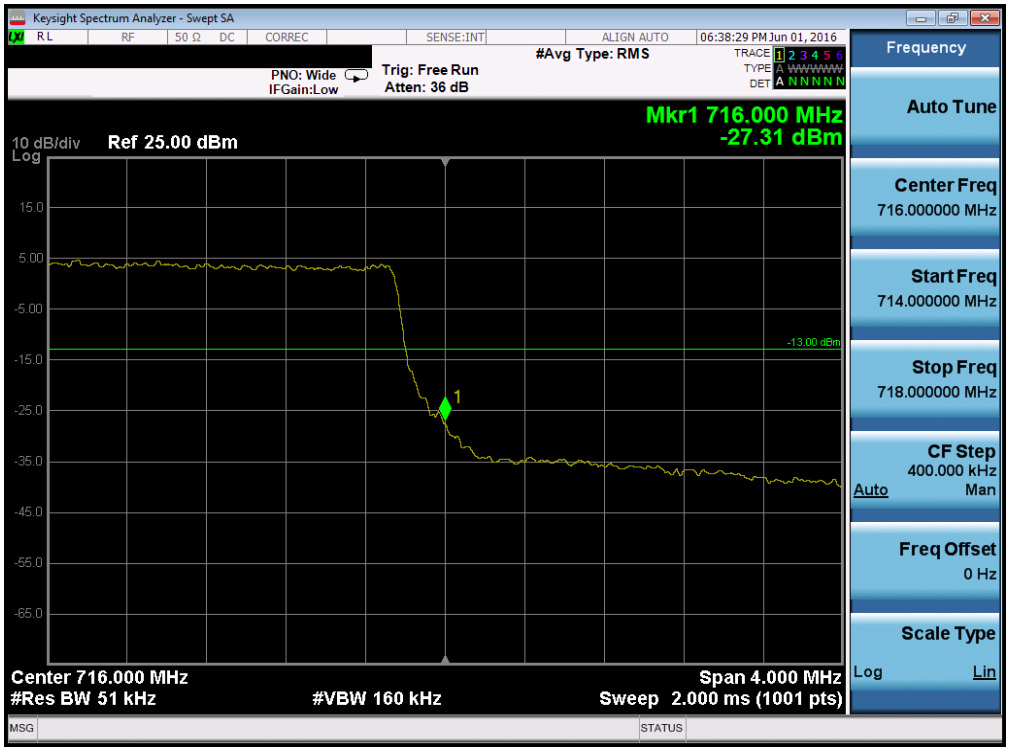


Plot 7-105. Lower Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-106. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

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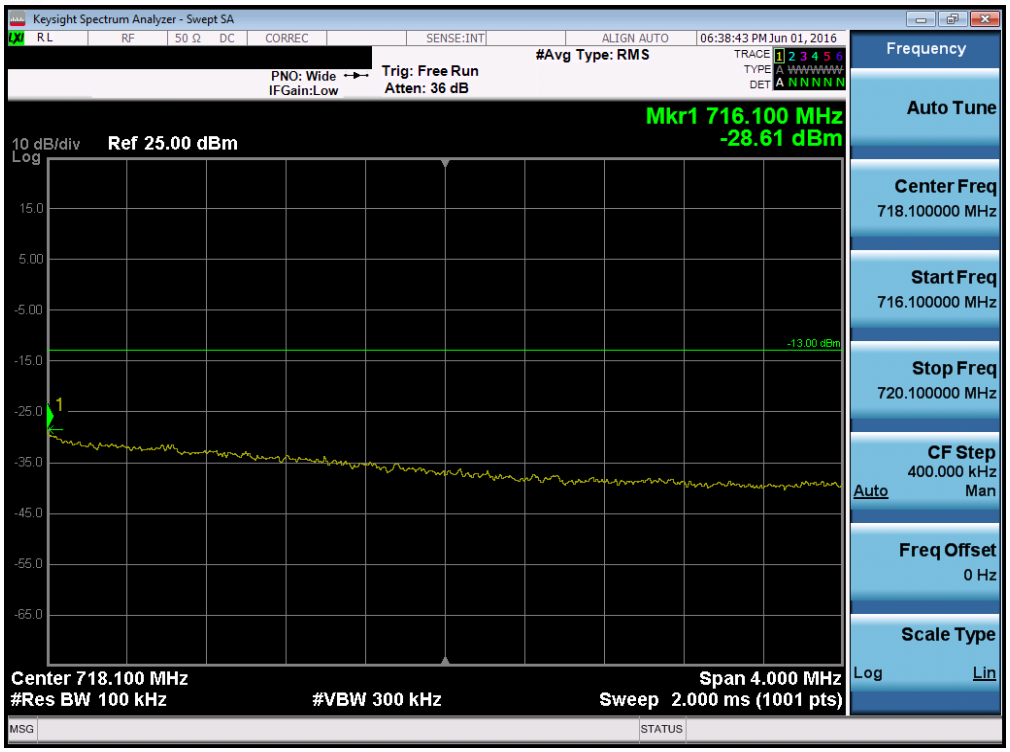
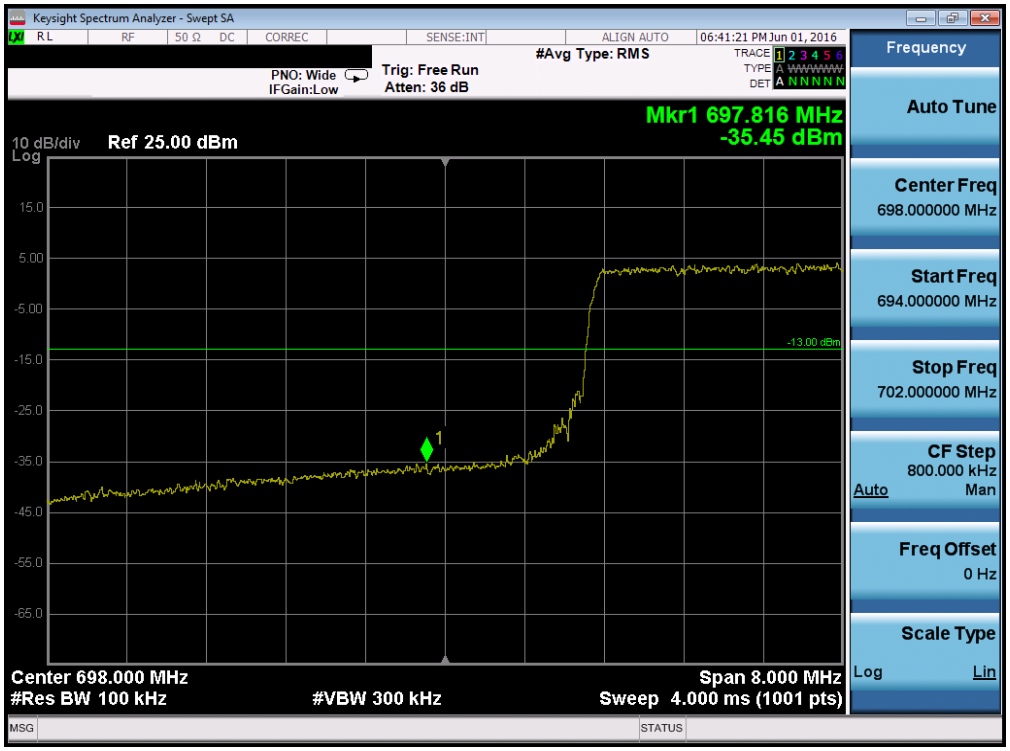


Plot 7-107. Upper Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-108. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

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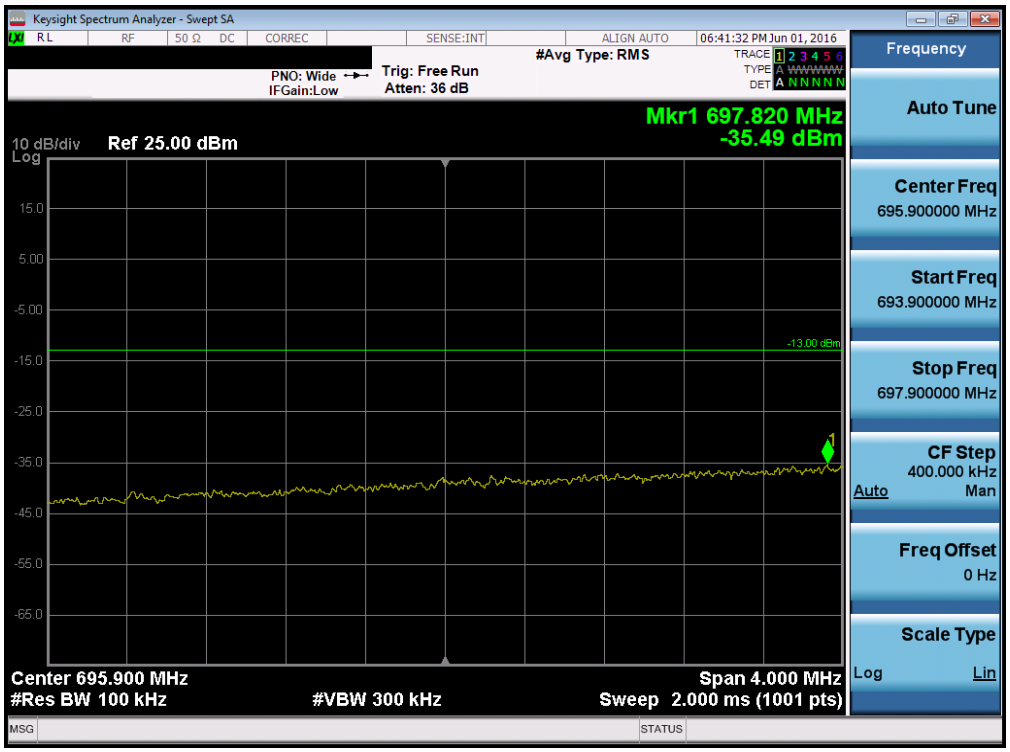
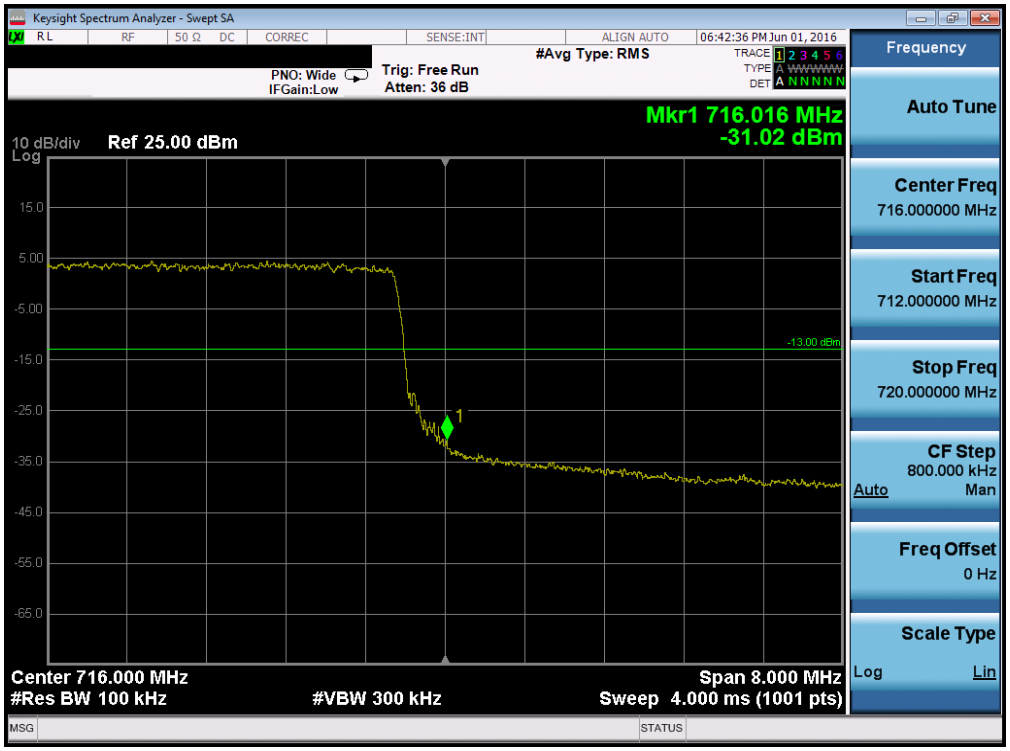


Plot 7-109. Lower Extended Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



Plot 7-110. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

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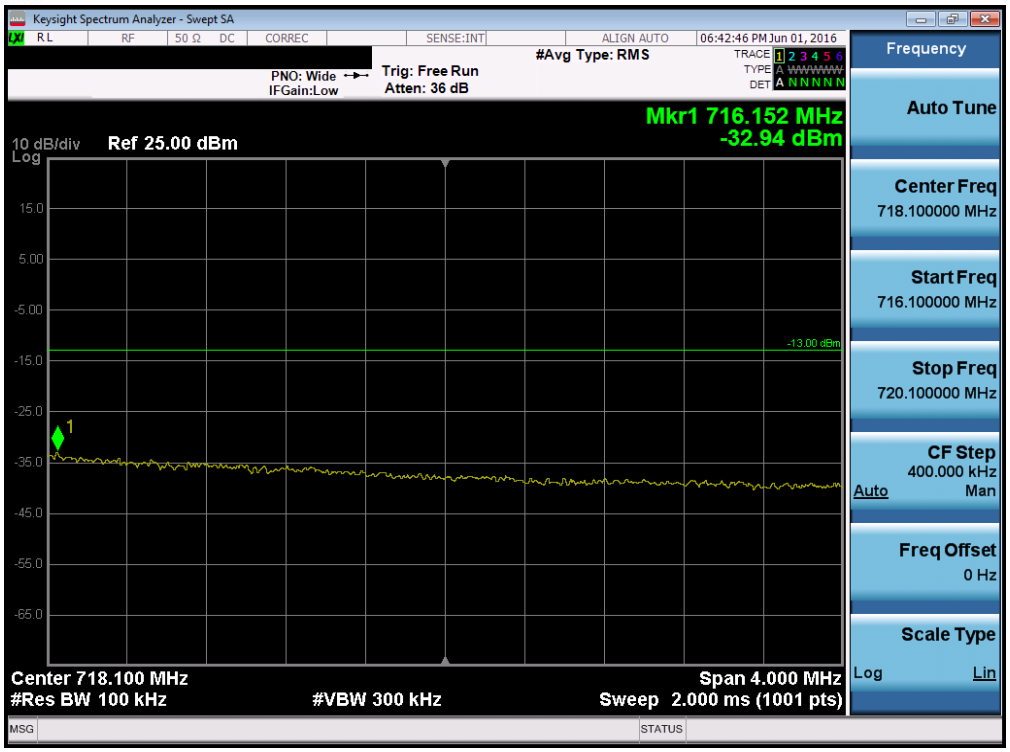
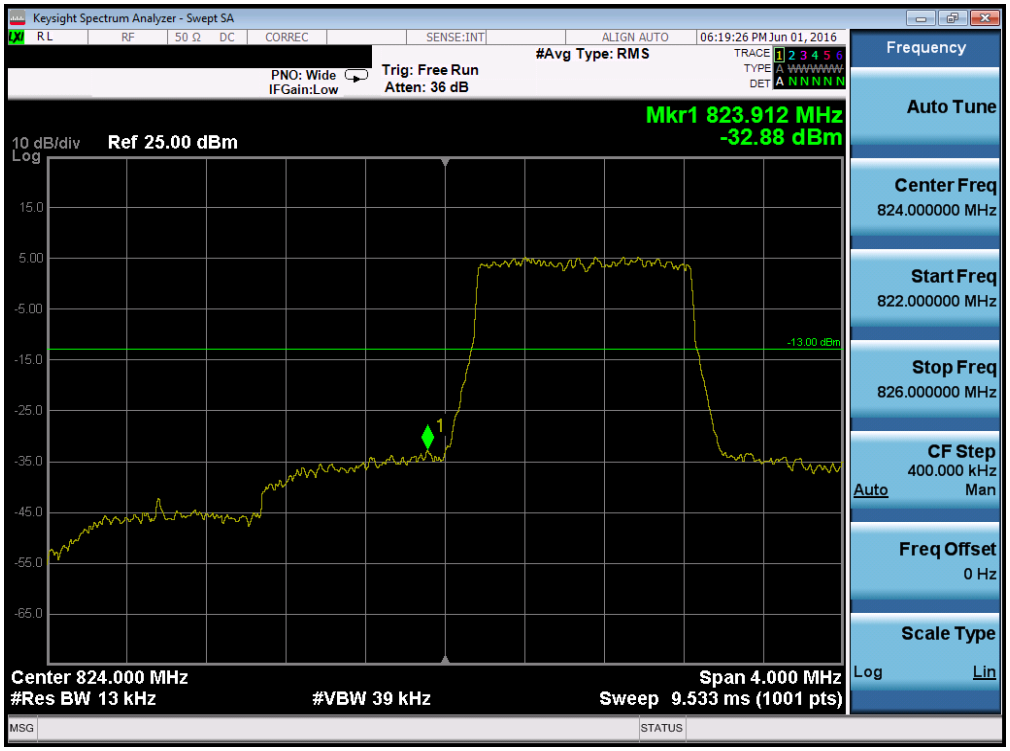


Plot 7-111. Upper Extended Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



Plot 7-112. Lower Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

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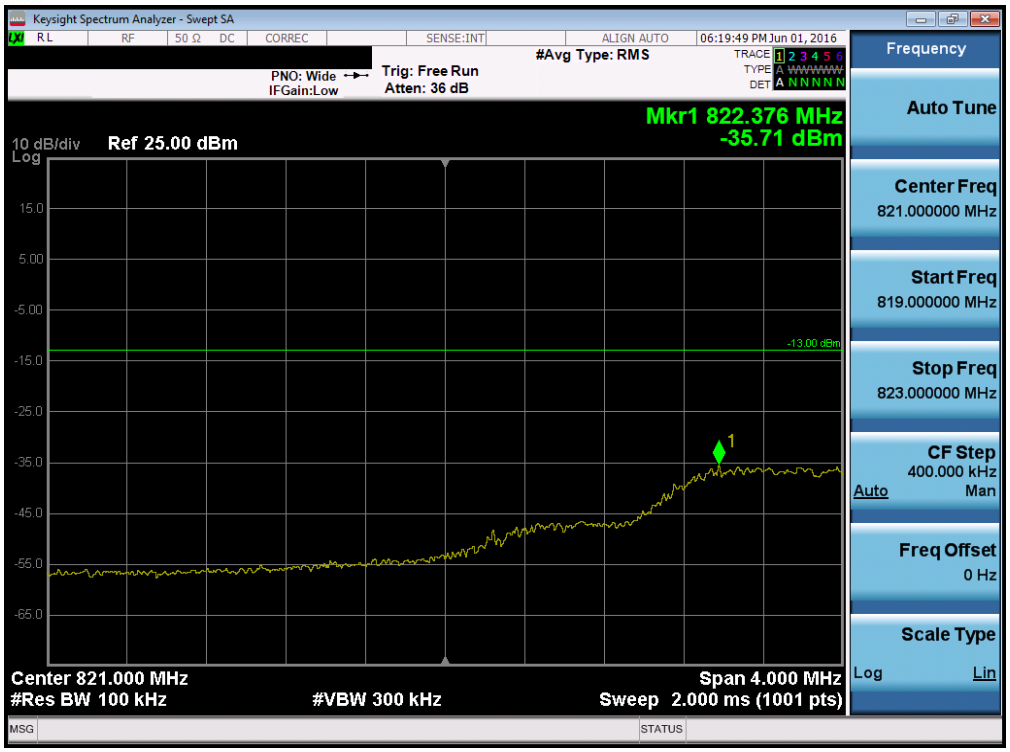
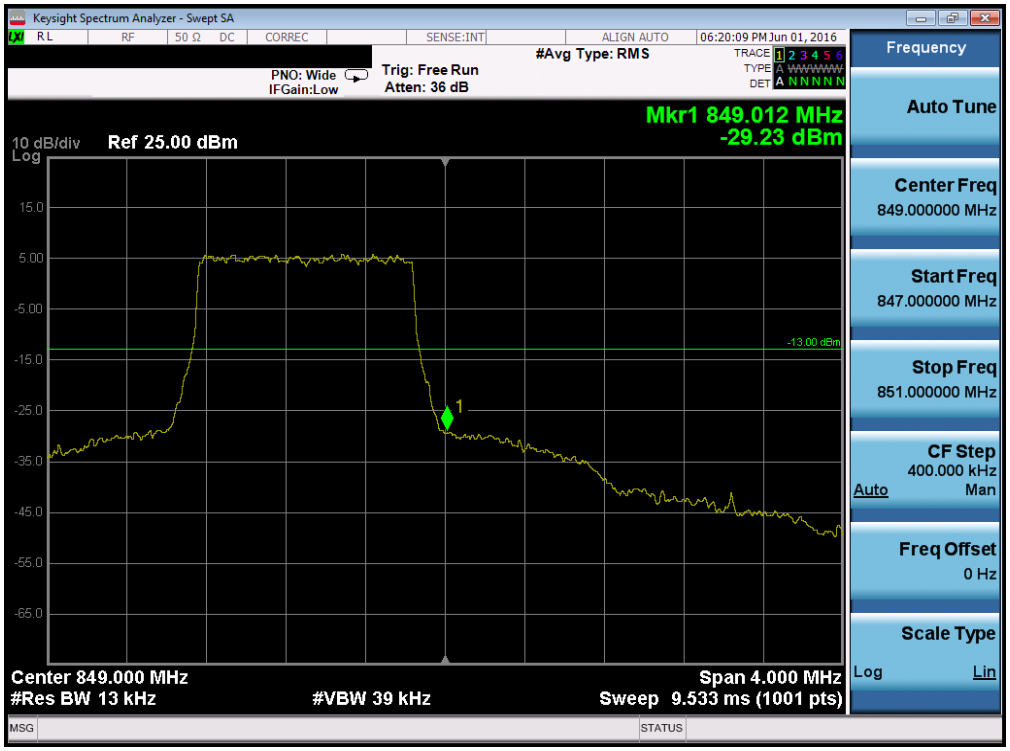


Plot 7-113. Lower Extended Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)



Plot 7-114. Upper Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

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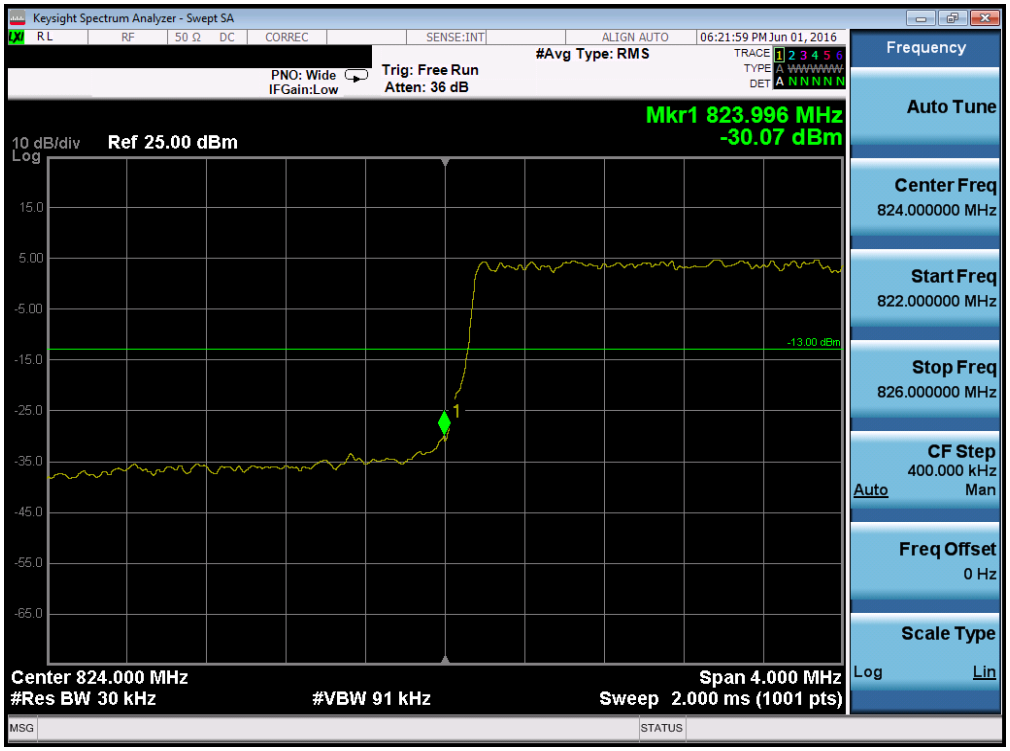
Plot 7-115. Upper Extended Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)



Plot 7-116. Lower Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

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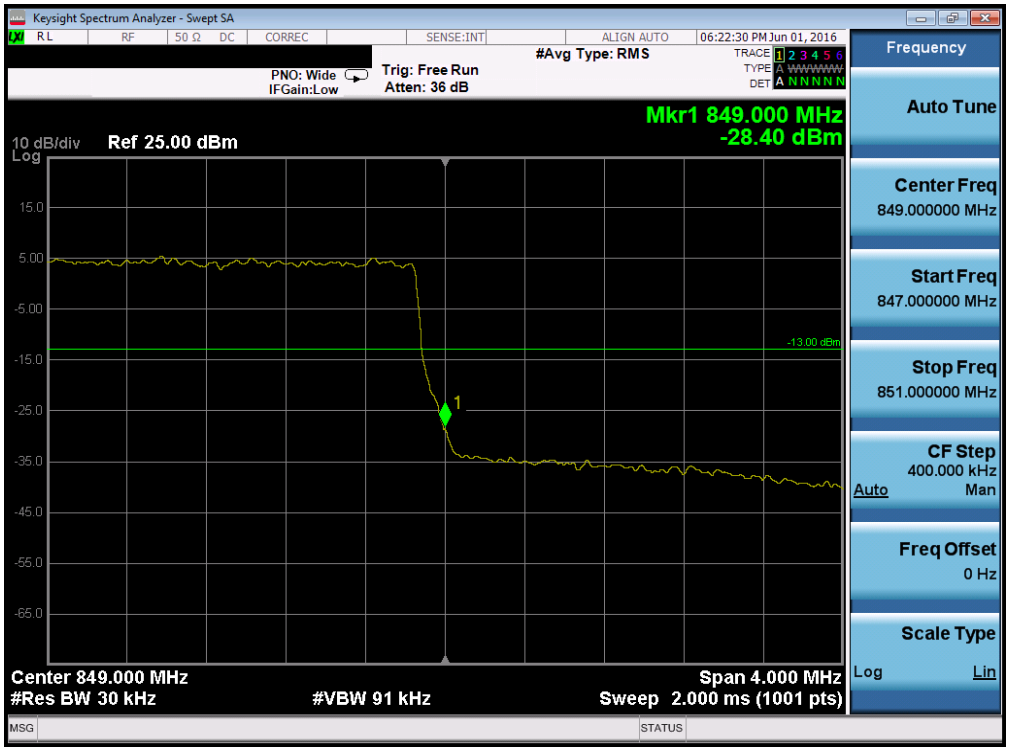
Plot 7-117. Lower Extended Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)



Plot 7-118. Upper Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

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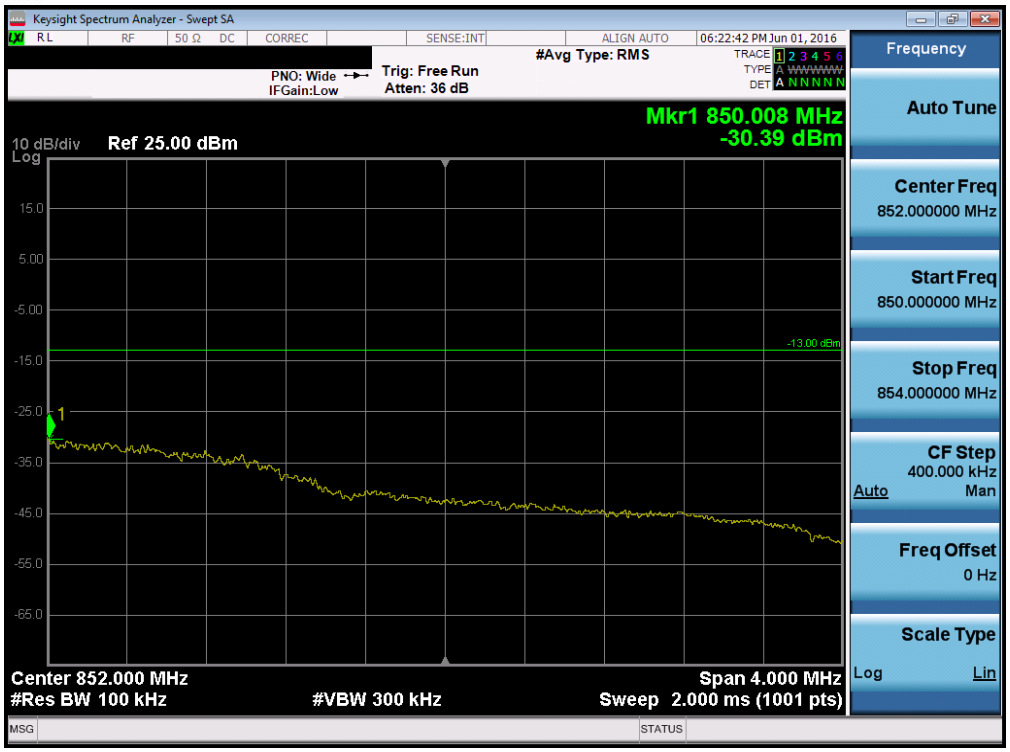
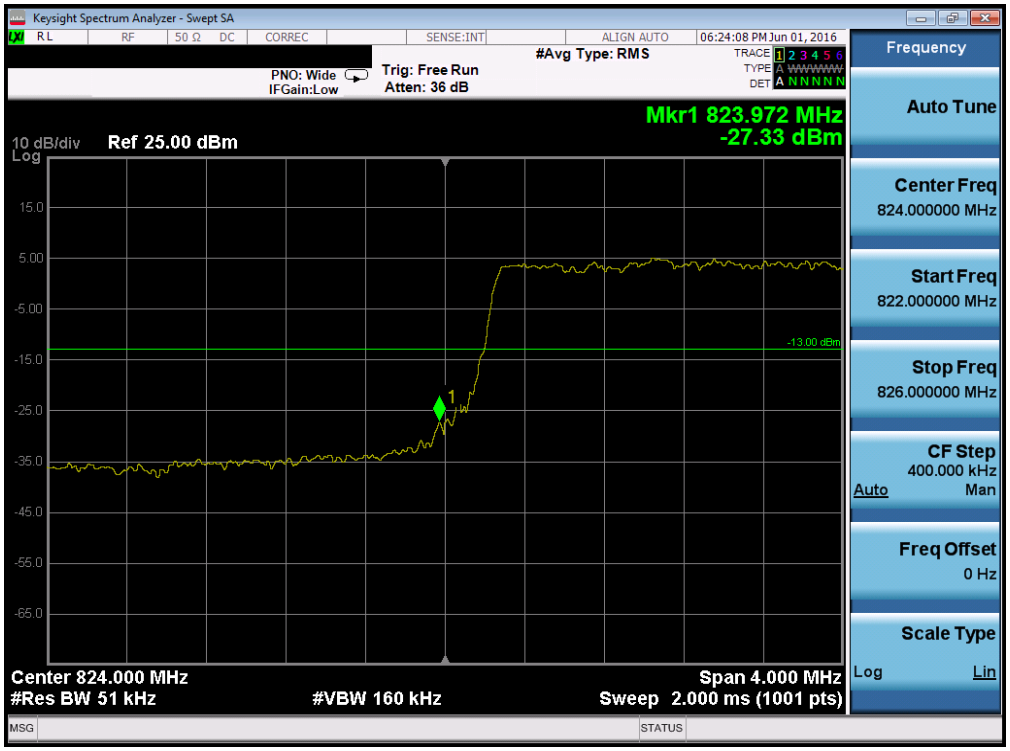


Plot 7-119. Upper Extended Band Edge Plot (Band 5/26 – Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-120. Lower Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

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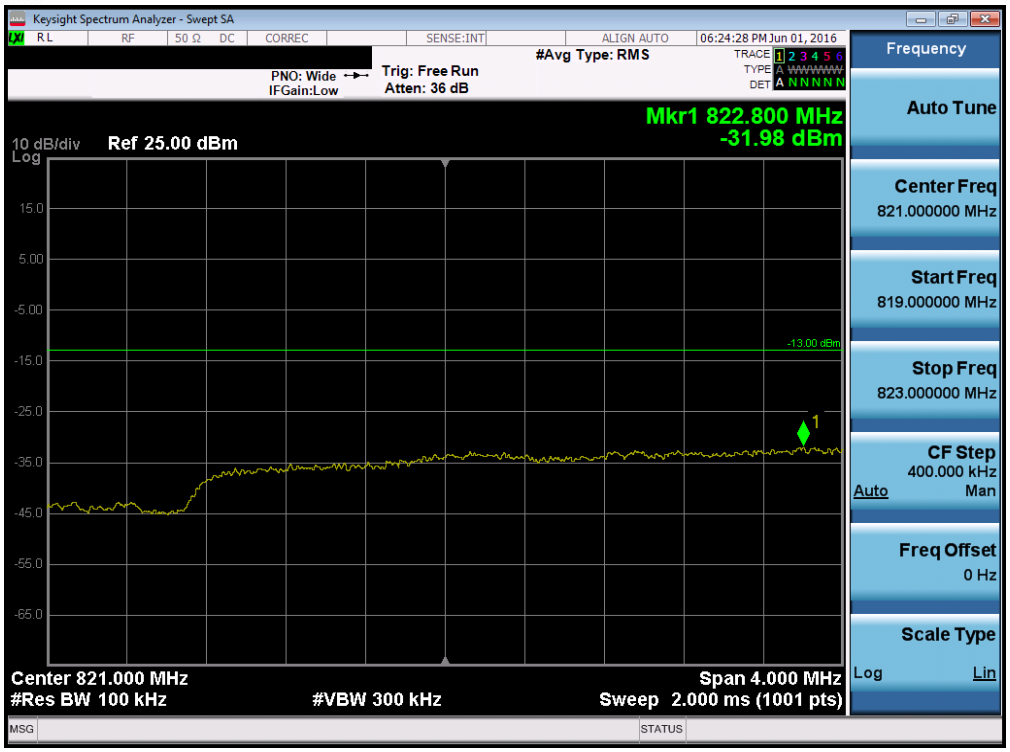
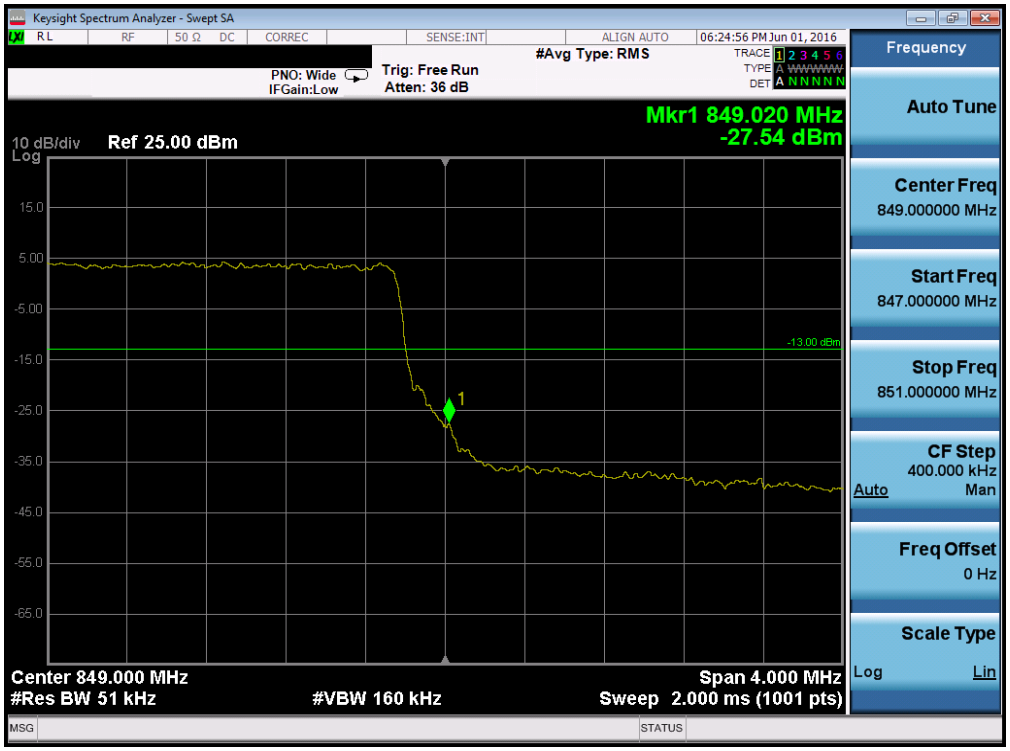


Plot 7-121. Lower Extended Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)



Plot 7-122. Upper Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

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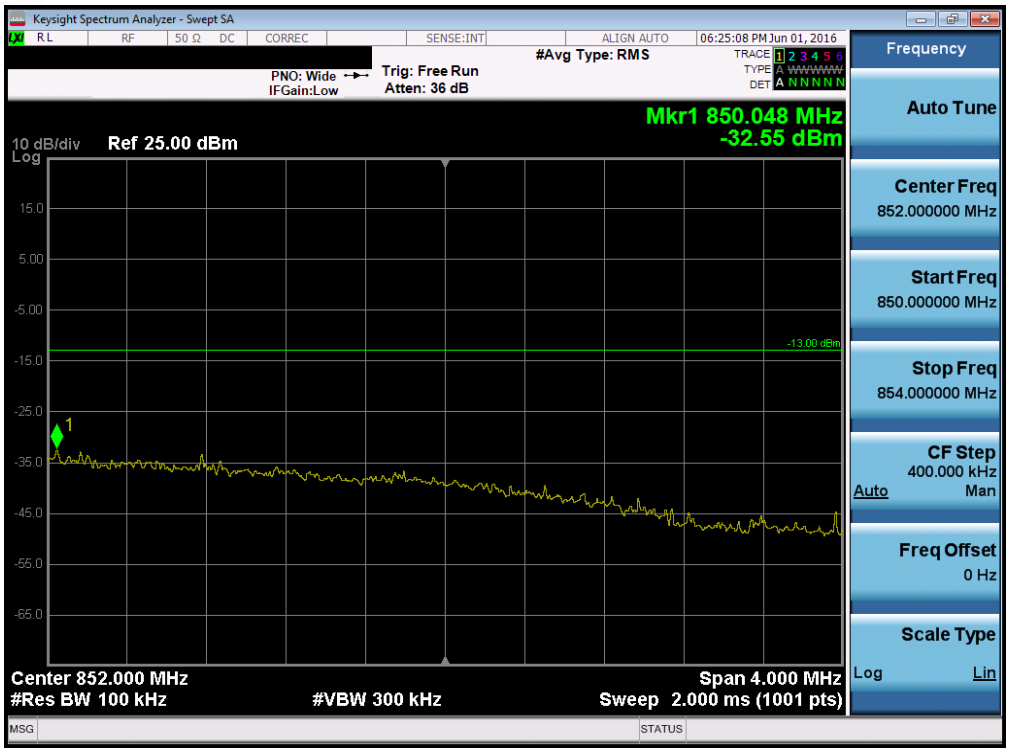
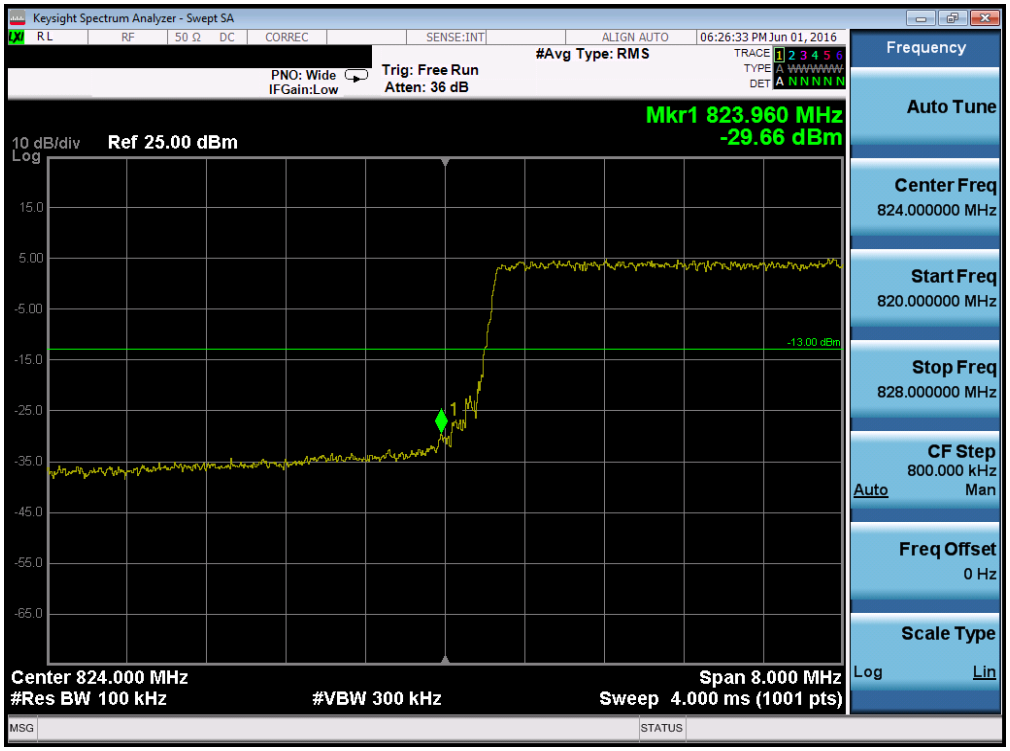


Plot 7-123. Upper Extended Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)



Plot 7-124. Lower Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

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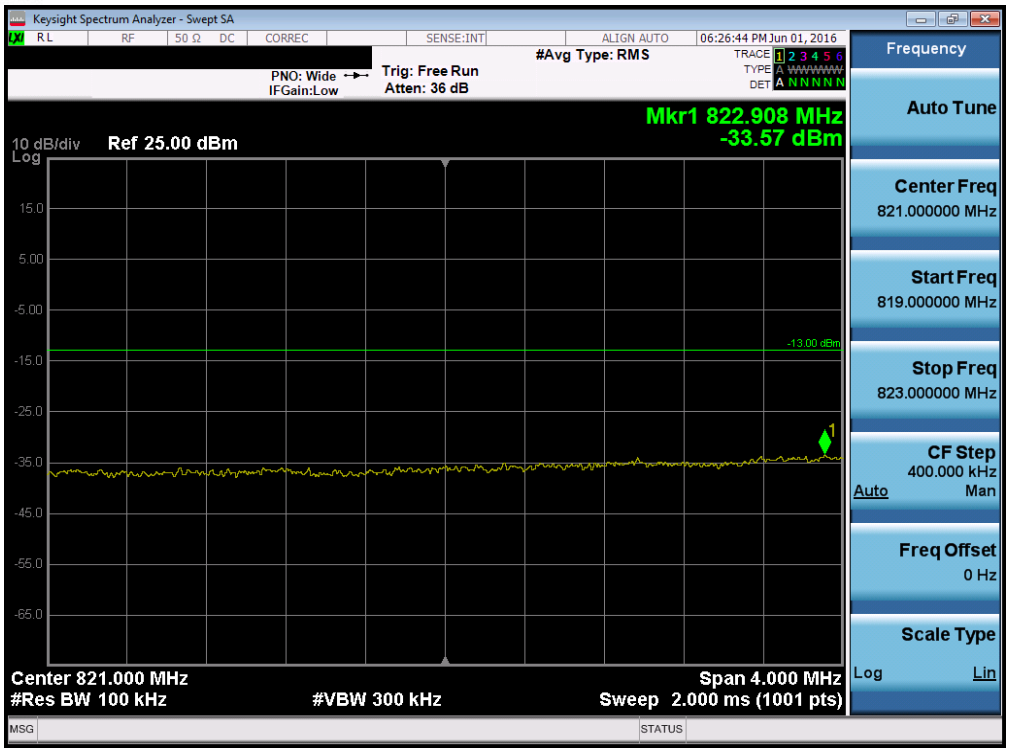
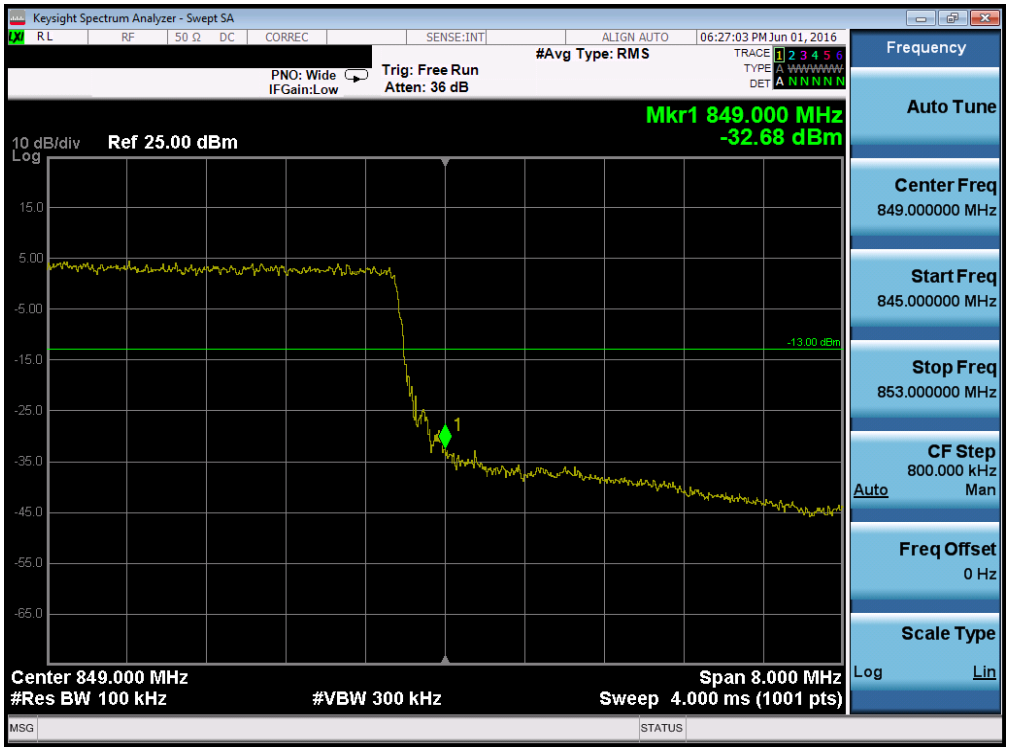


Plot 7-125. Lower Extended Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)



Plot 7-126. Upper Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

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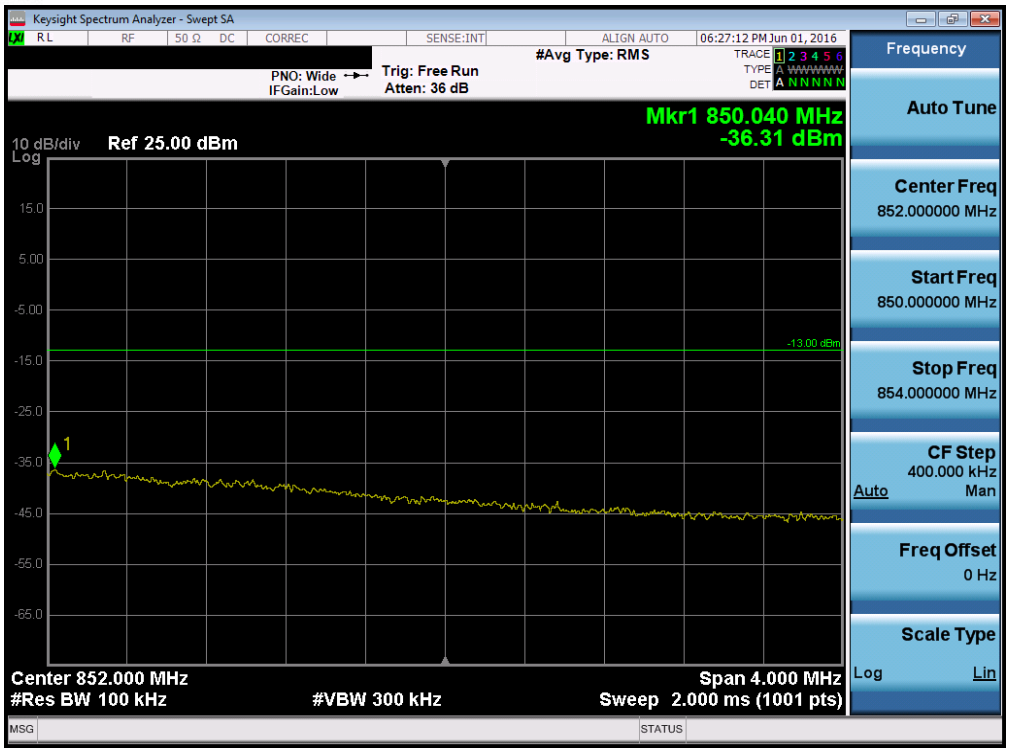
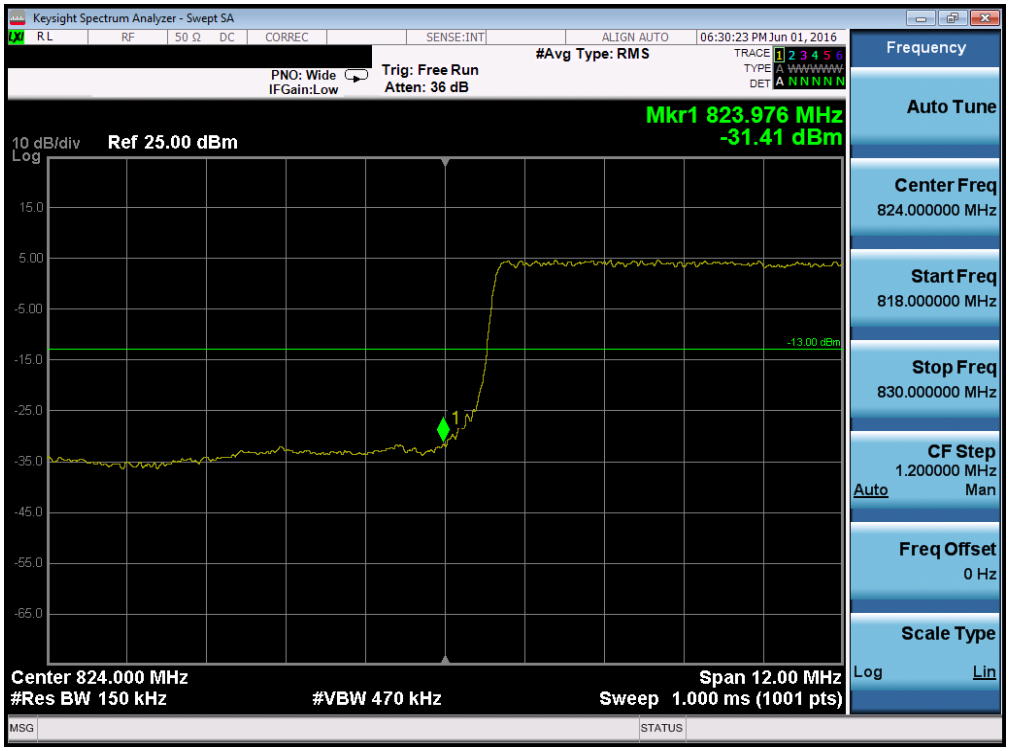


Plot 7-127. Upper Extended Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)



Plot 7-128. Lower Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

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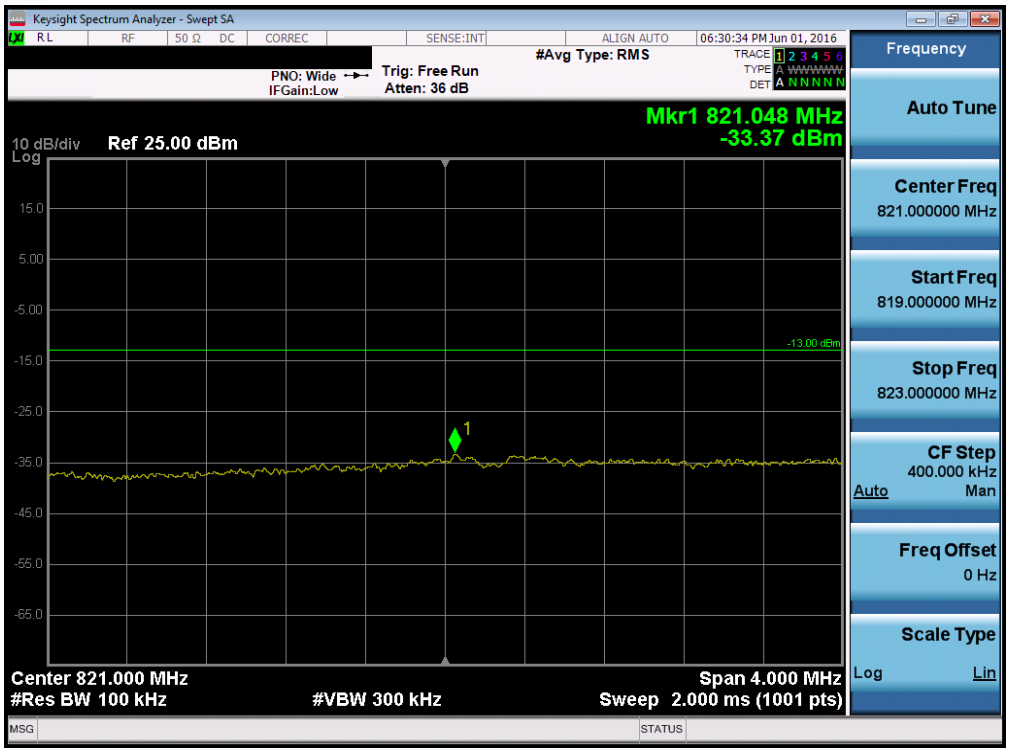
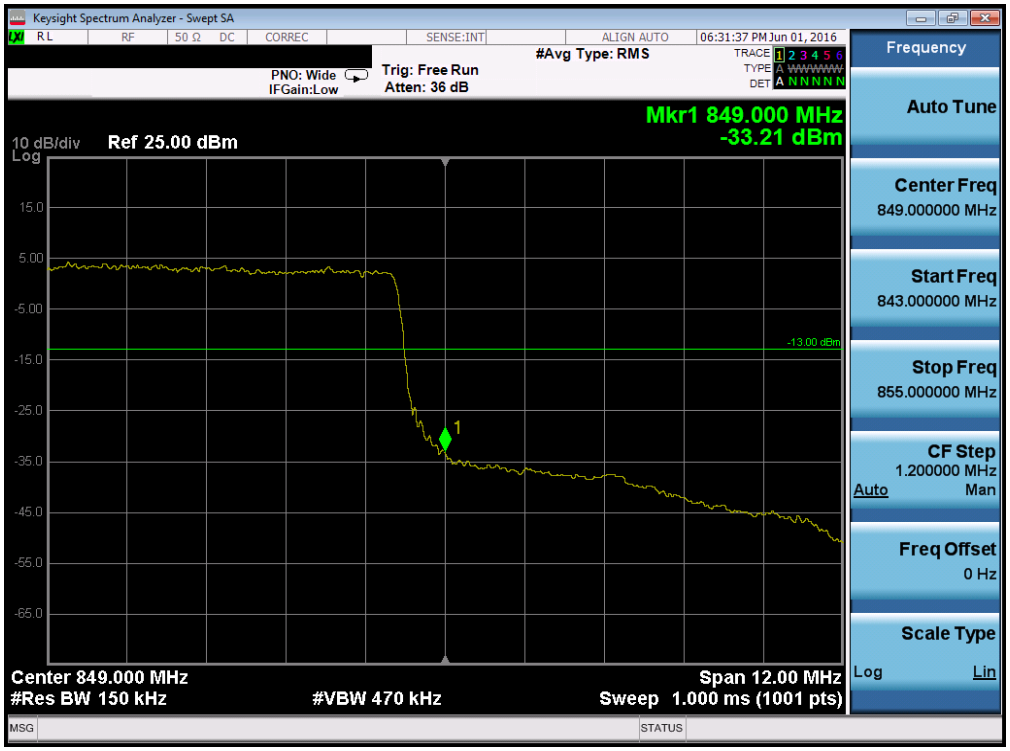


Plot 7-129. Lower Extended Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)



Plot 7-130. Upper Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

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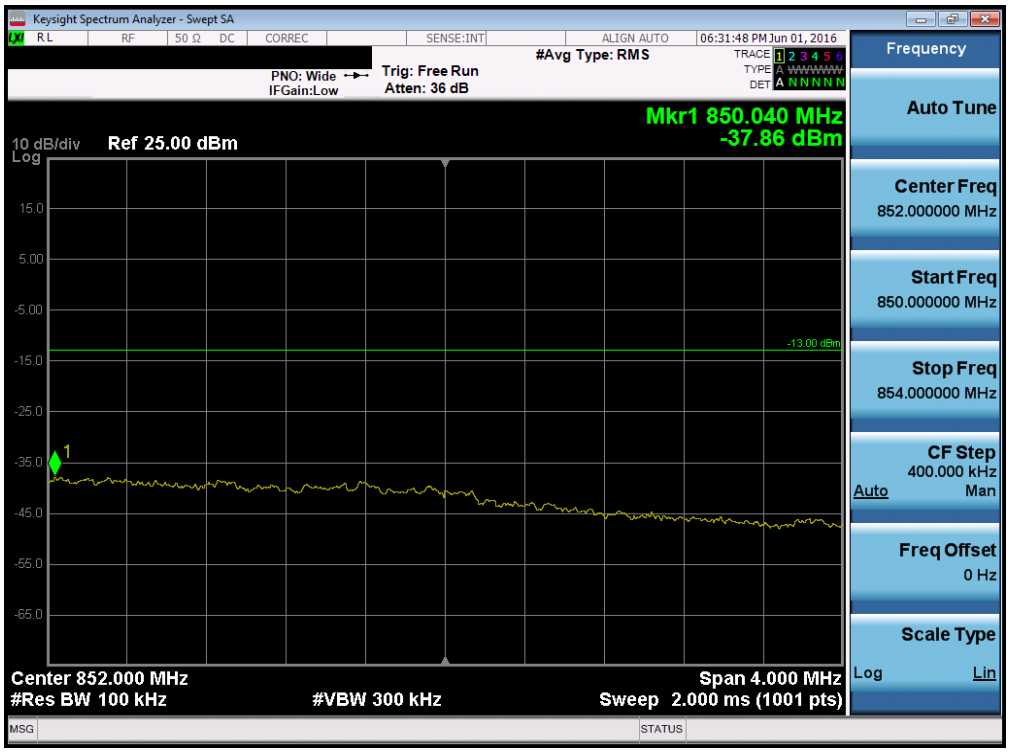
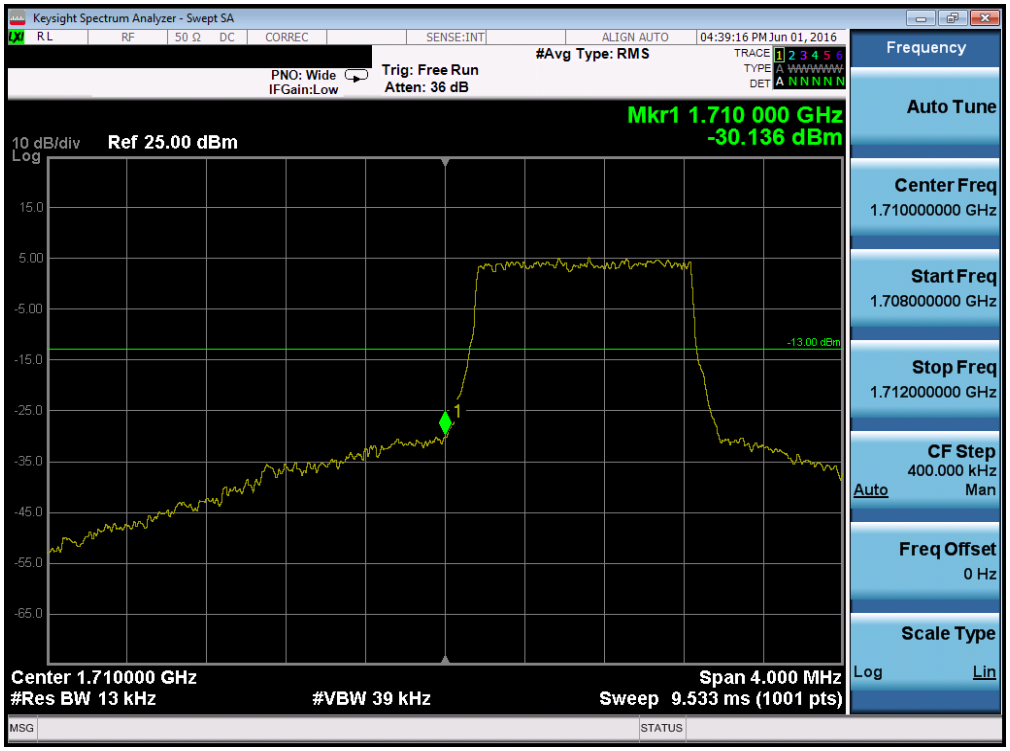


Plot 7-131. Upper Extended Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)



Plot 7-132. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

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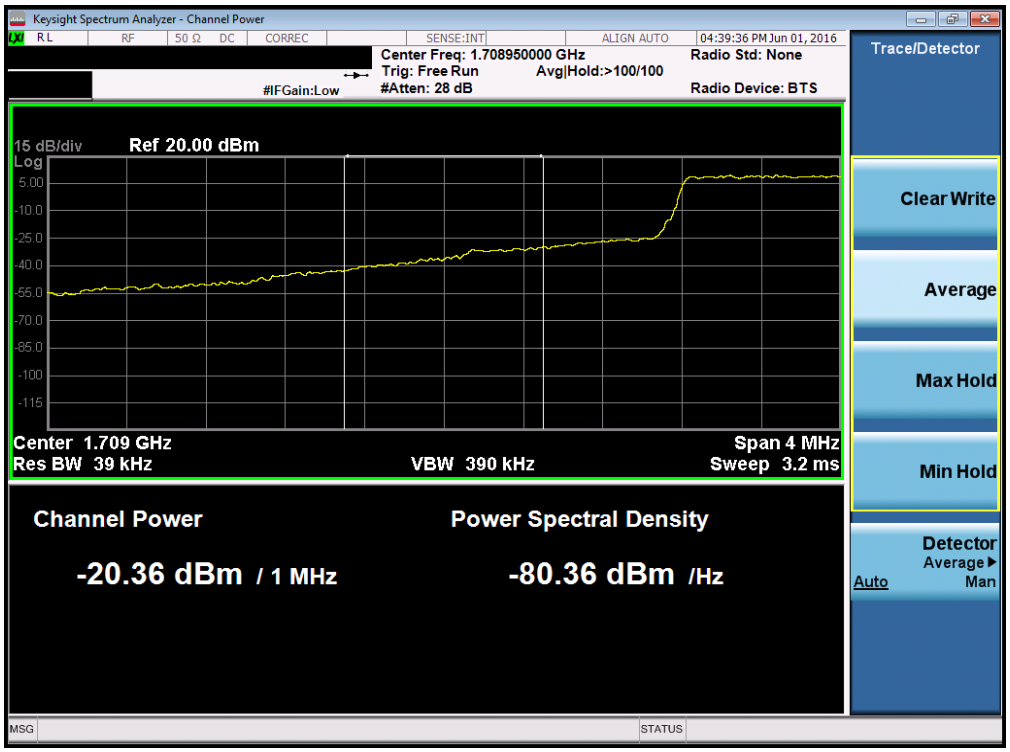
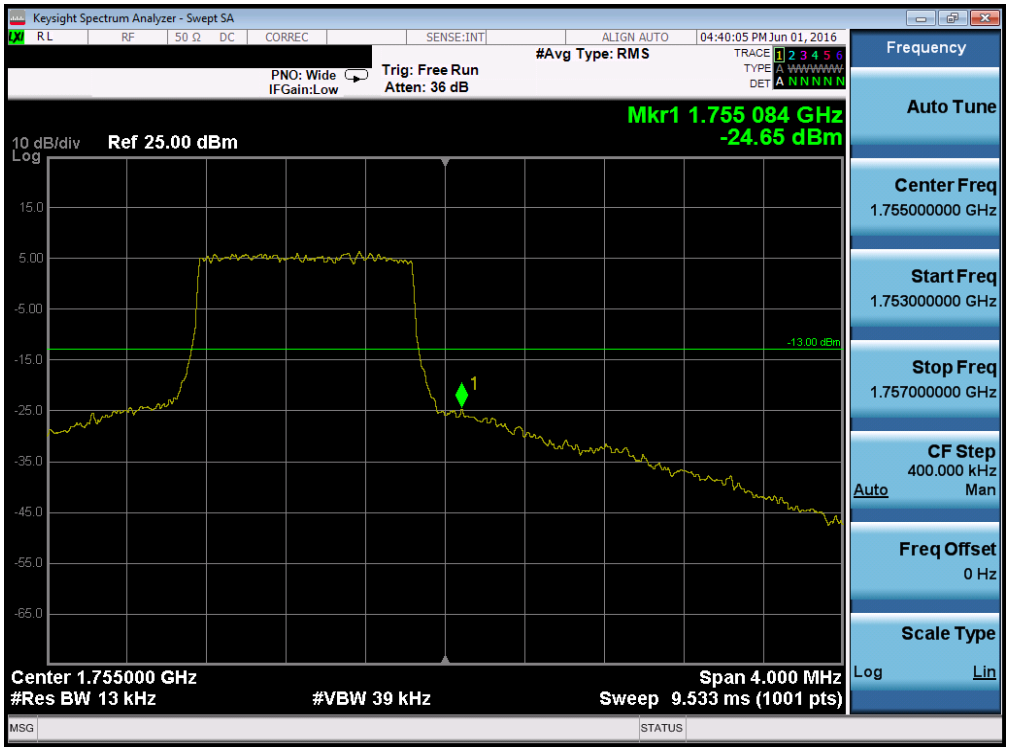


Plot 7-133. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



Plot 7-134. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

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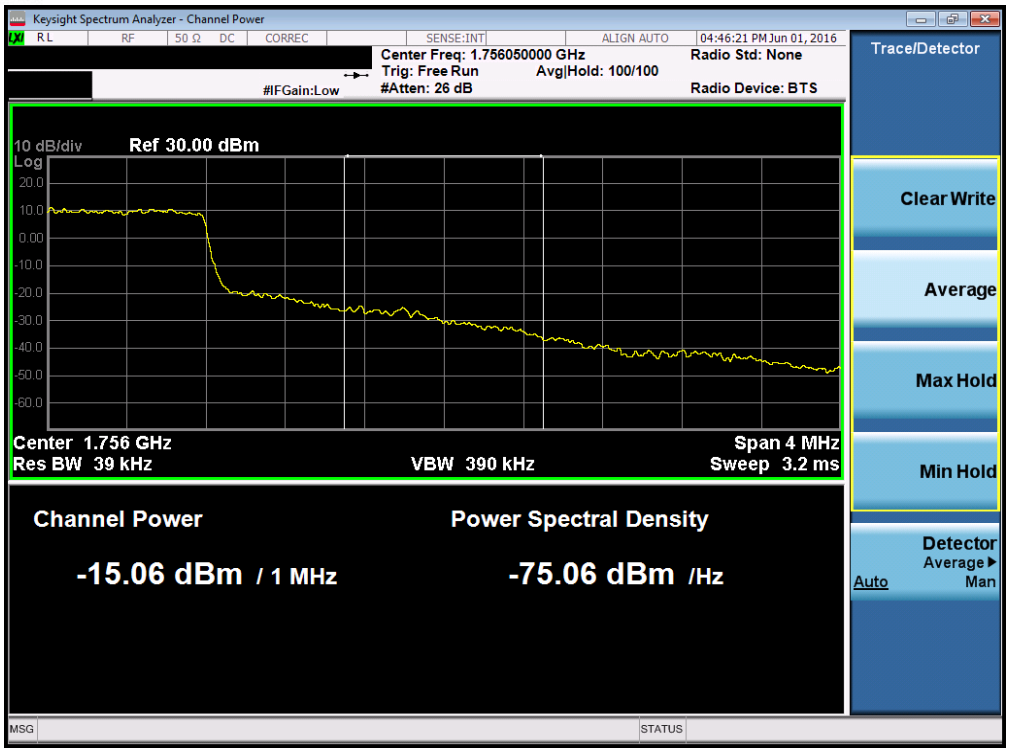
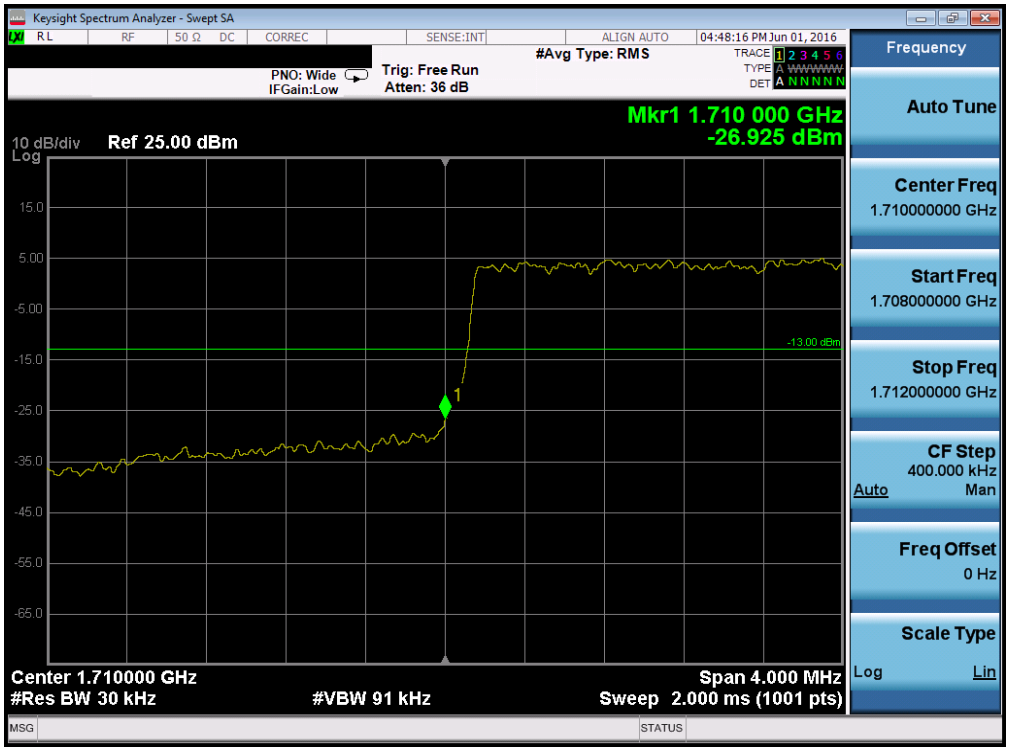


Plot 7-135. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



Plot 7-136. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

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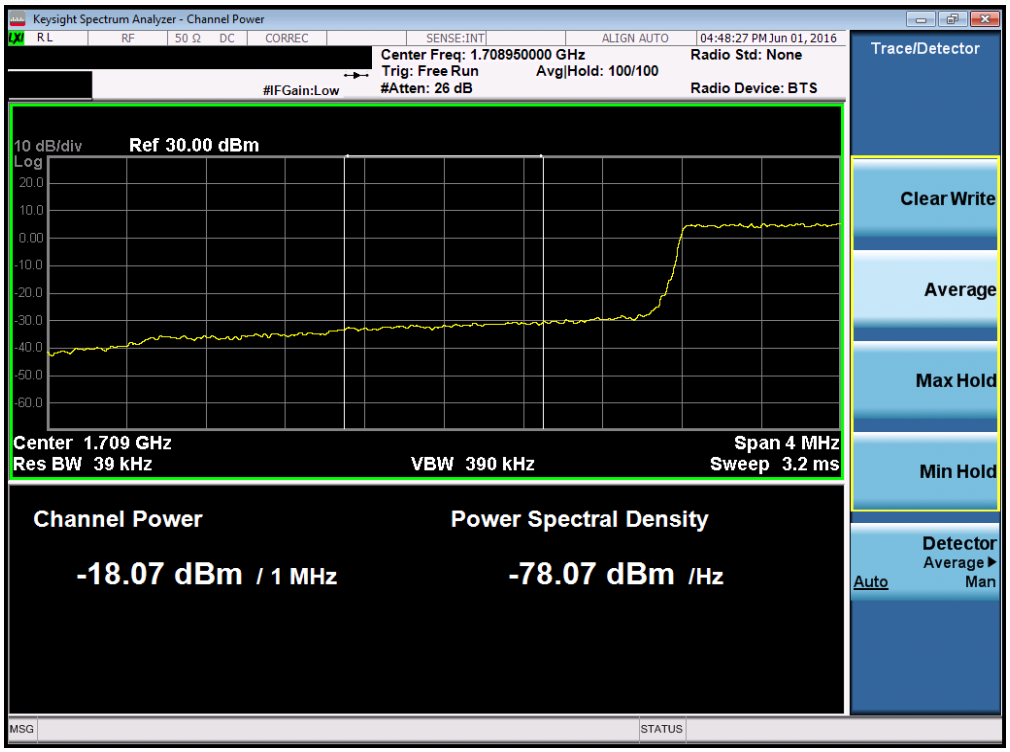
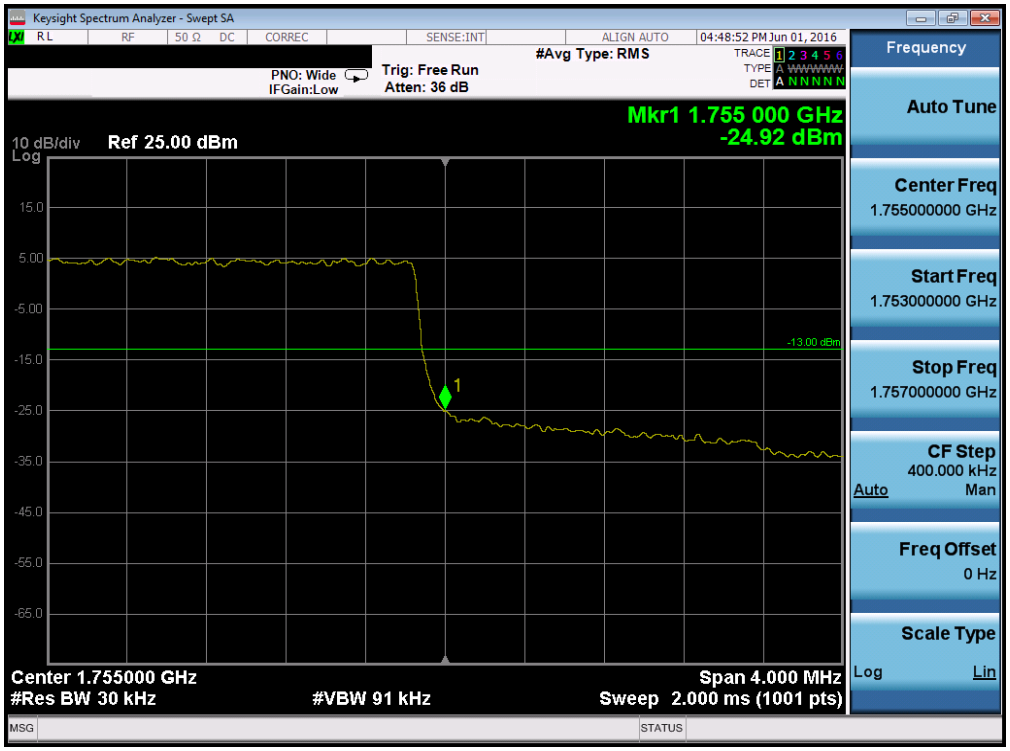


Plot 7-137. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 7-138. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

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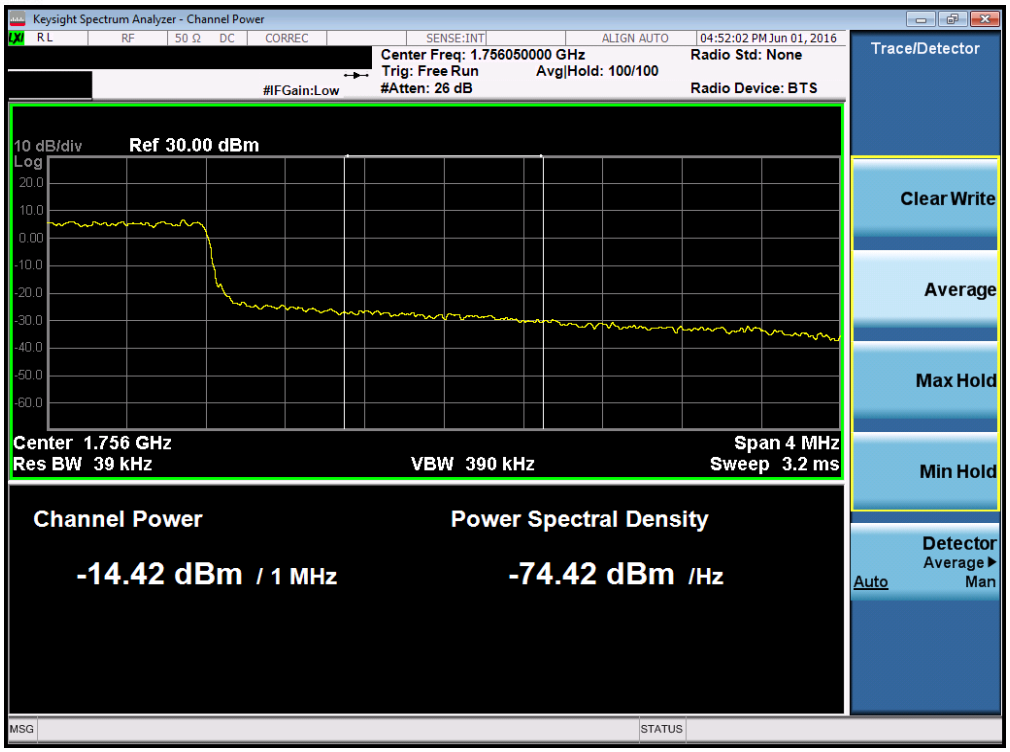
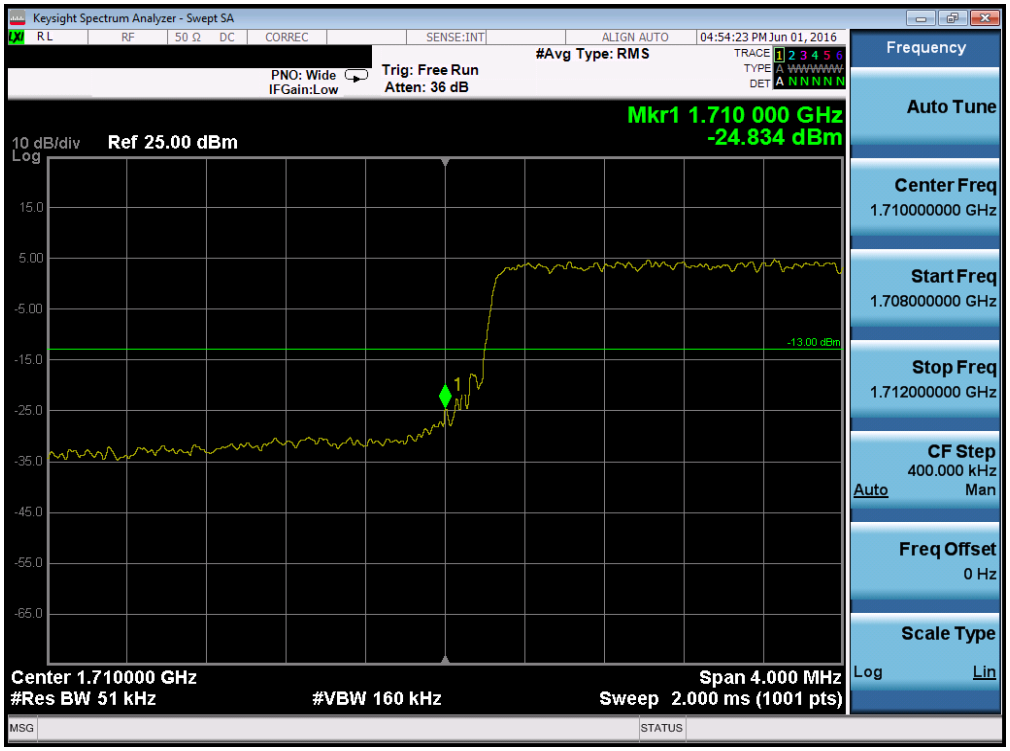


Plot 7-139. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 7-140. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

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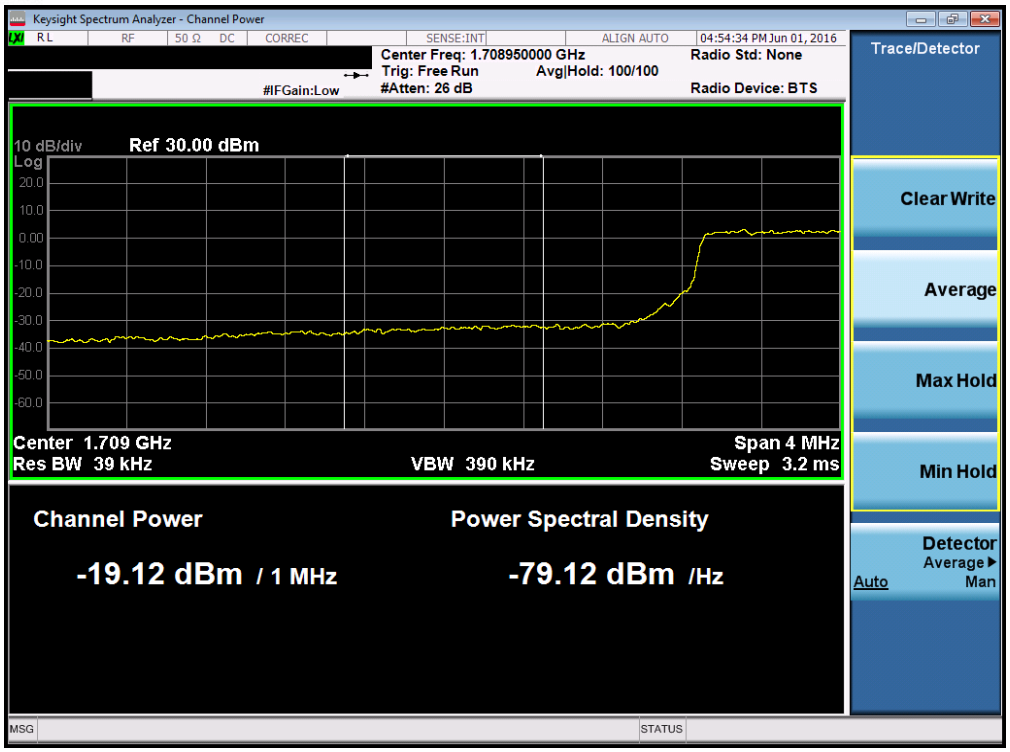
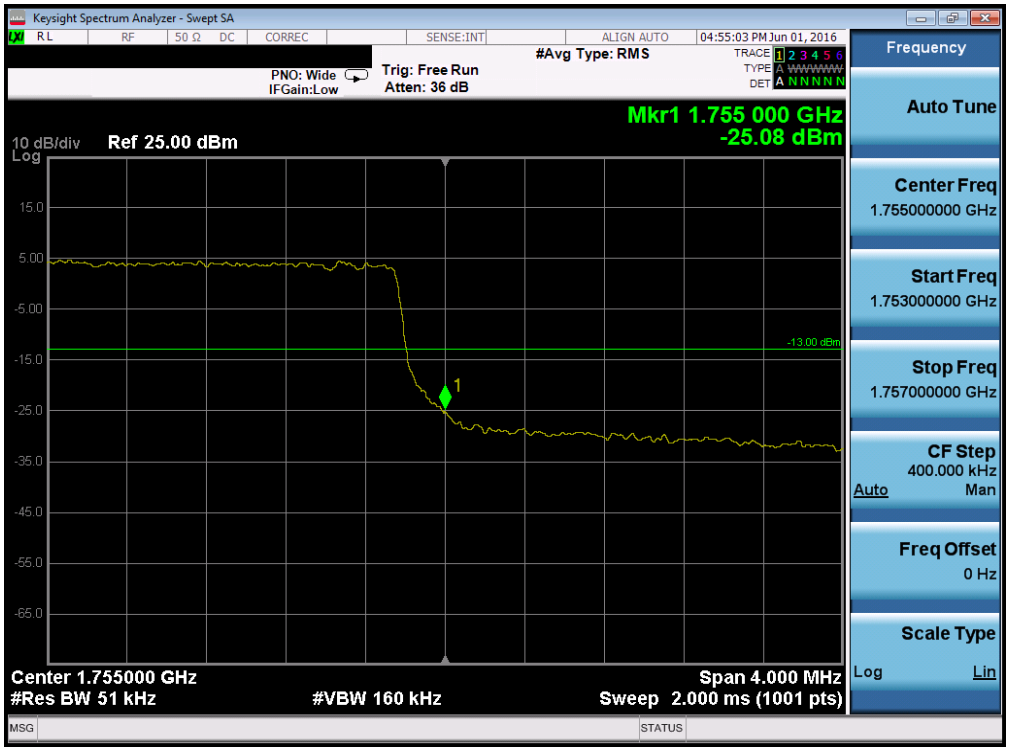


Plot 7-141. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



Plot 7-142. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

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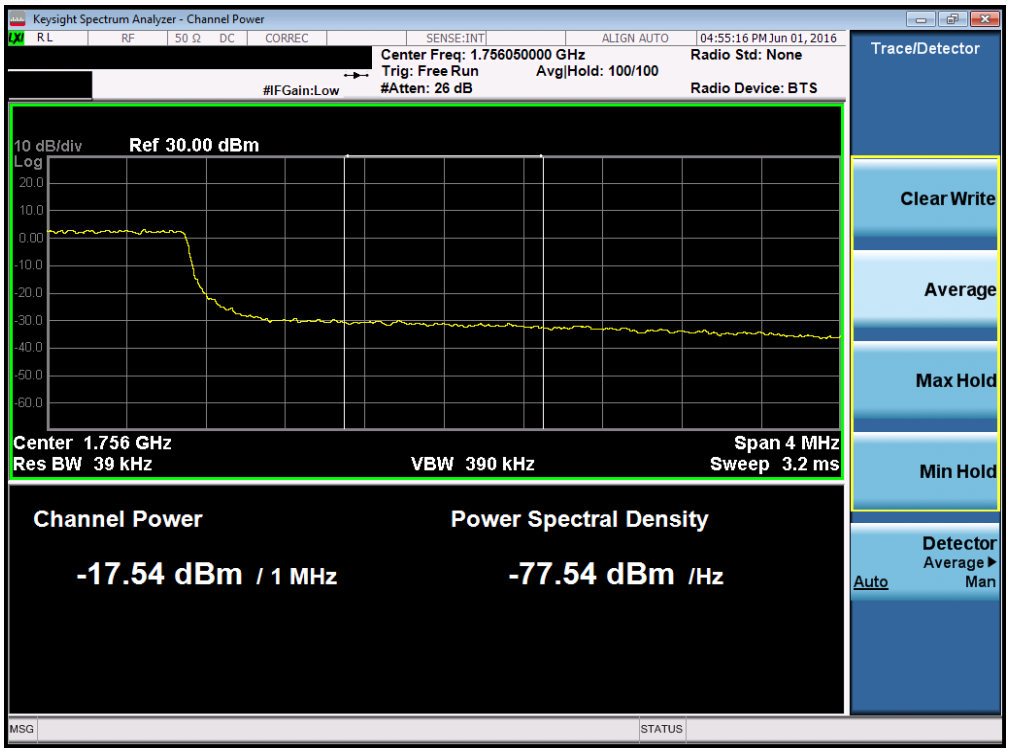
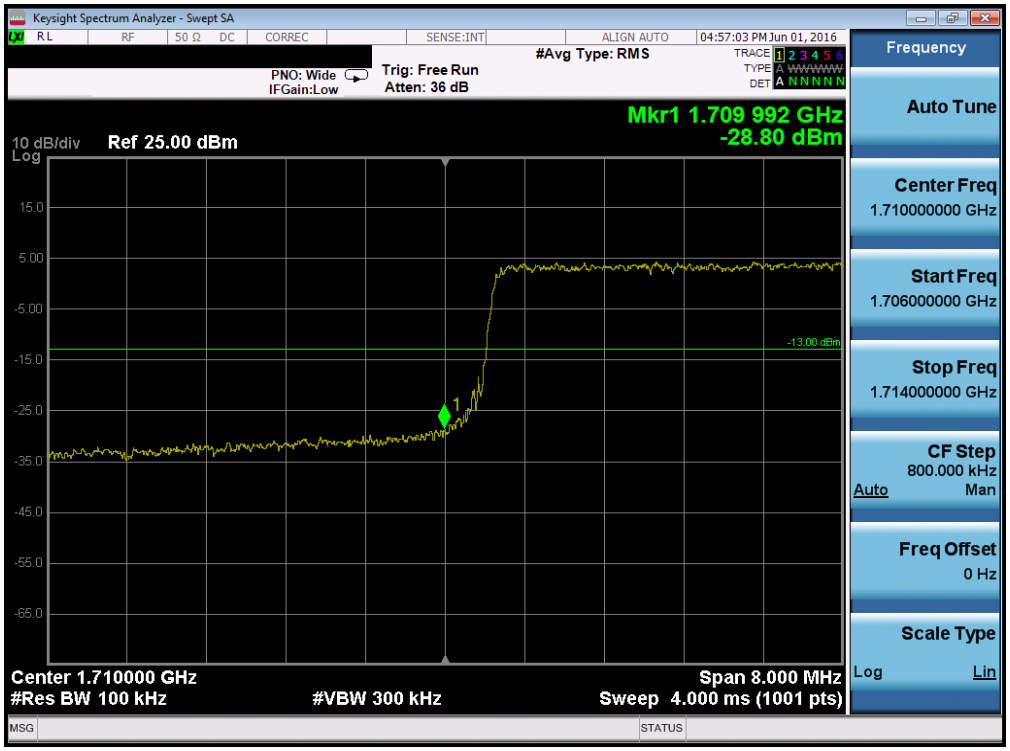


Plot 7-143. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



Plot 7-144. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

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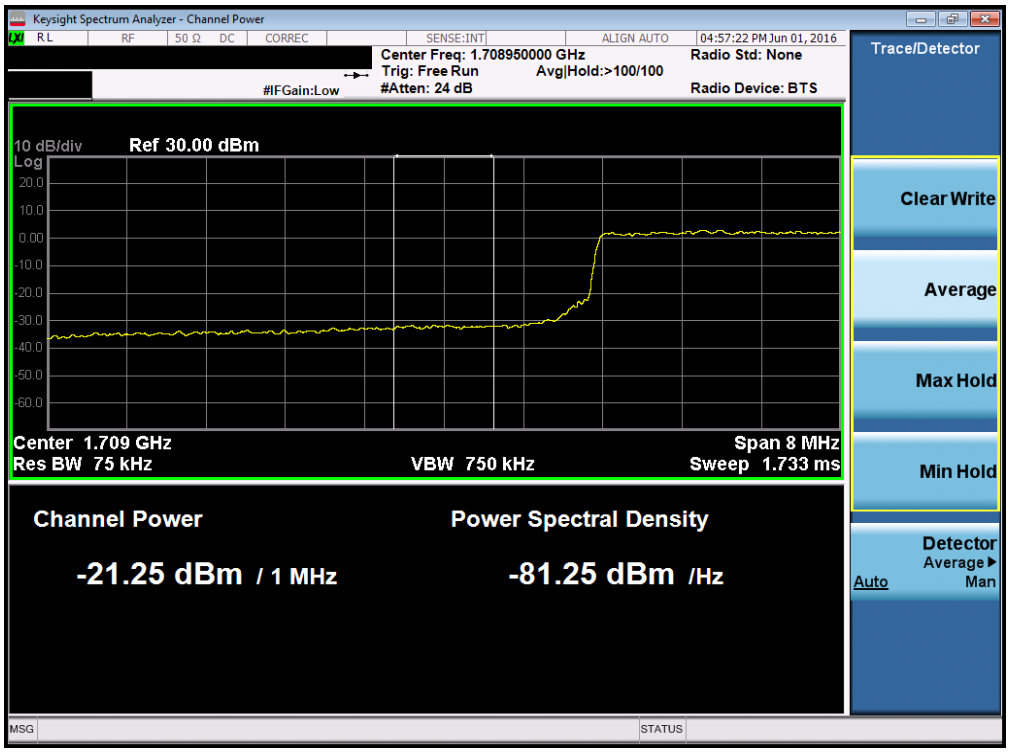
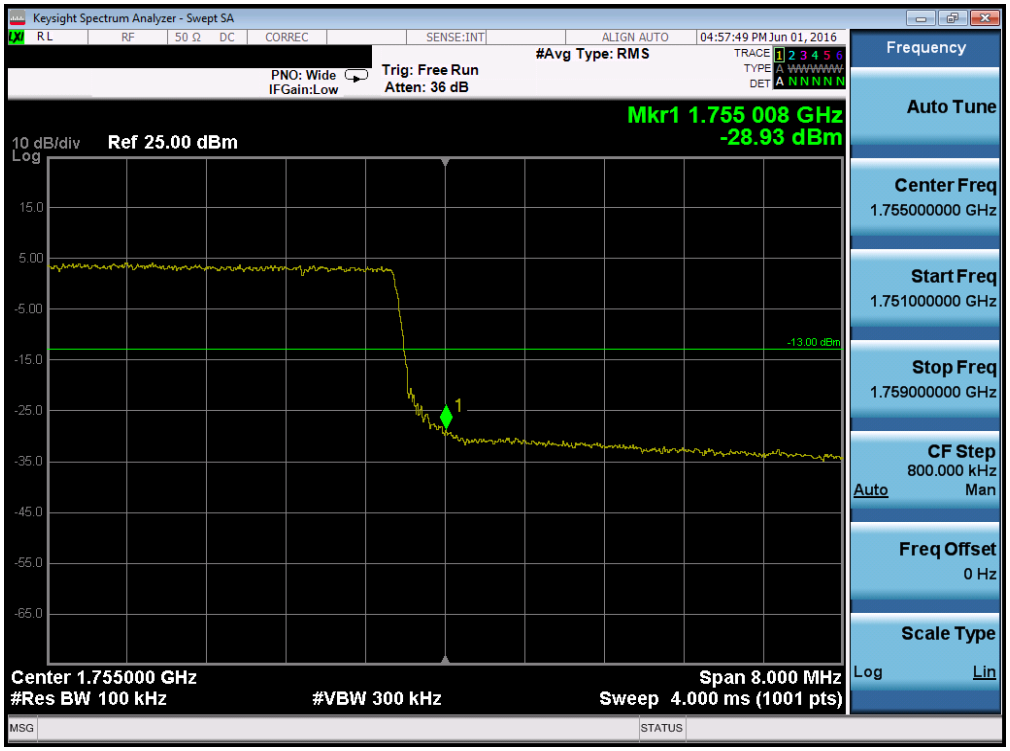


Plot 7-145. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



Plot 7-146. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

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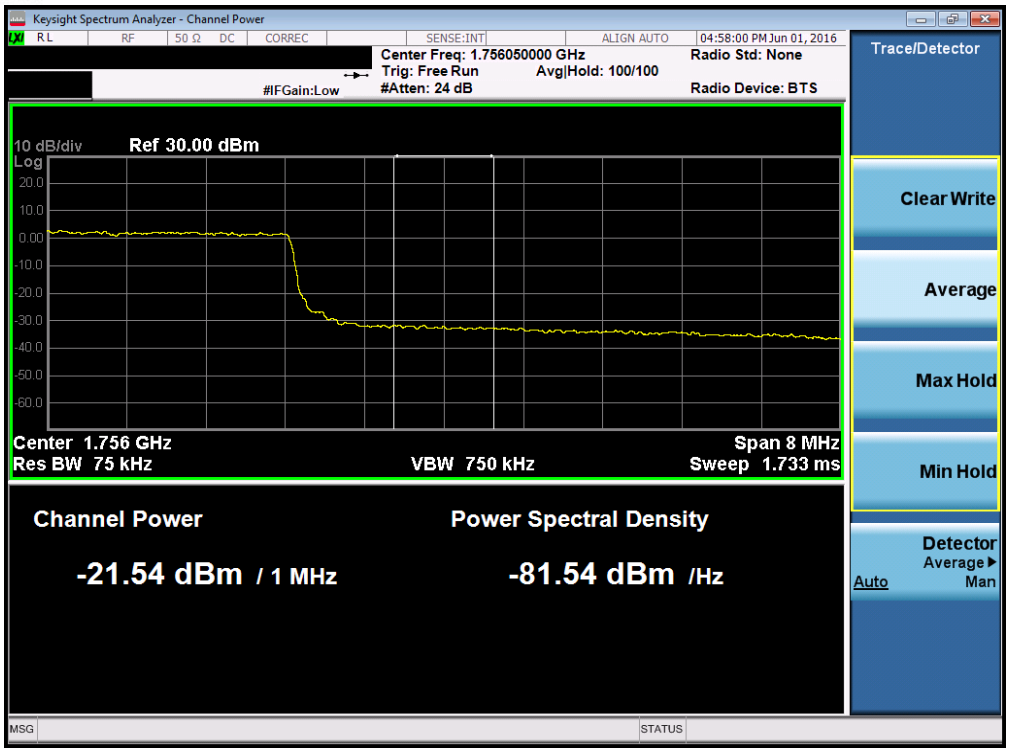
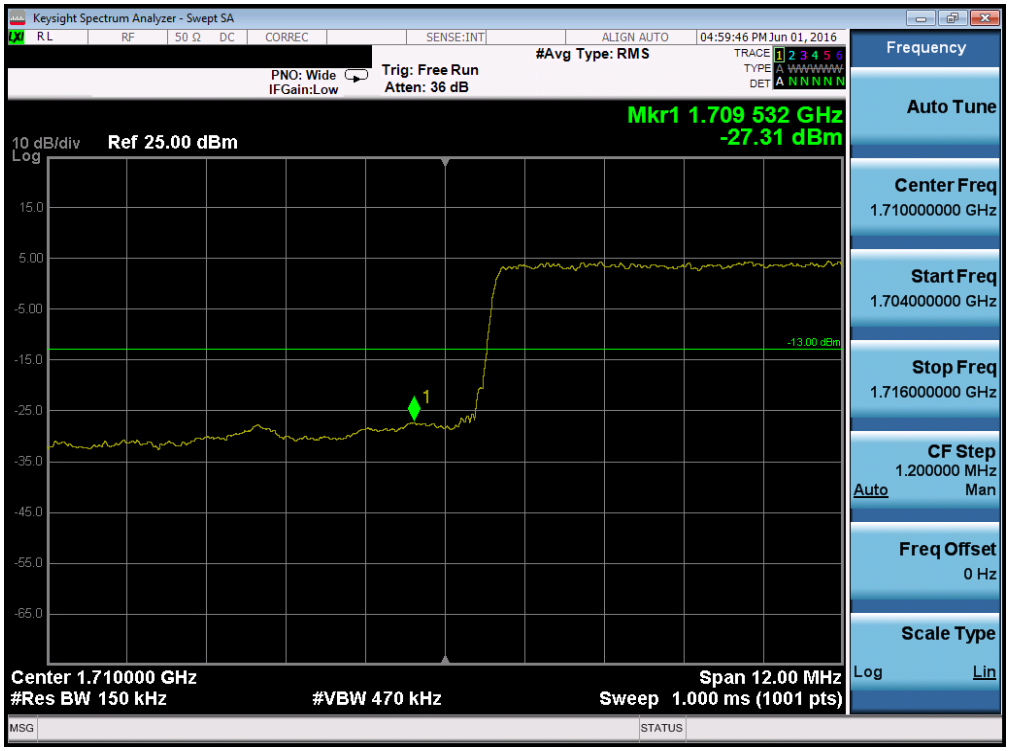


Plot 7-147. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



Plot 7-148. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

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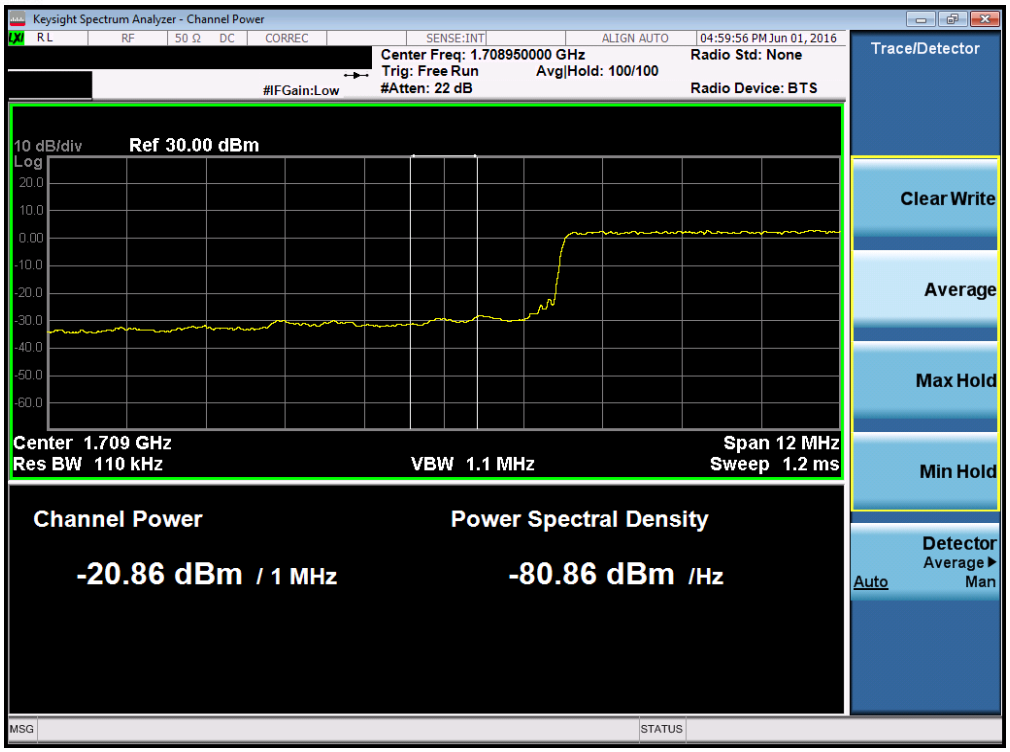
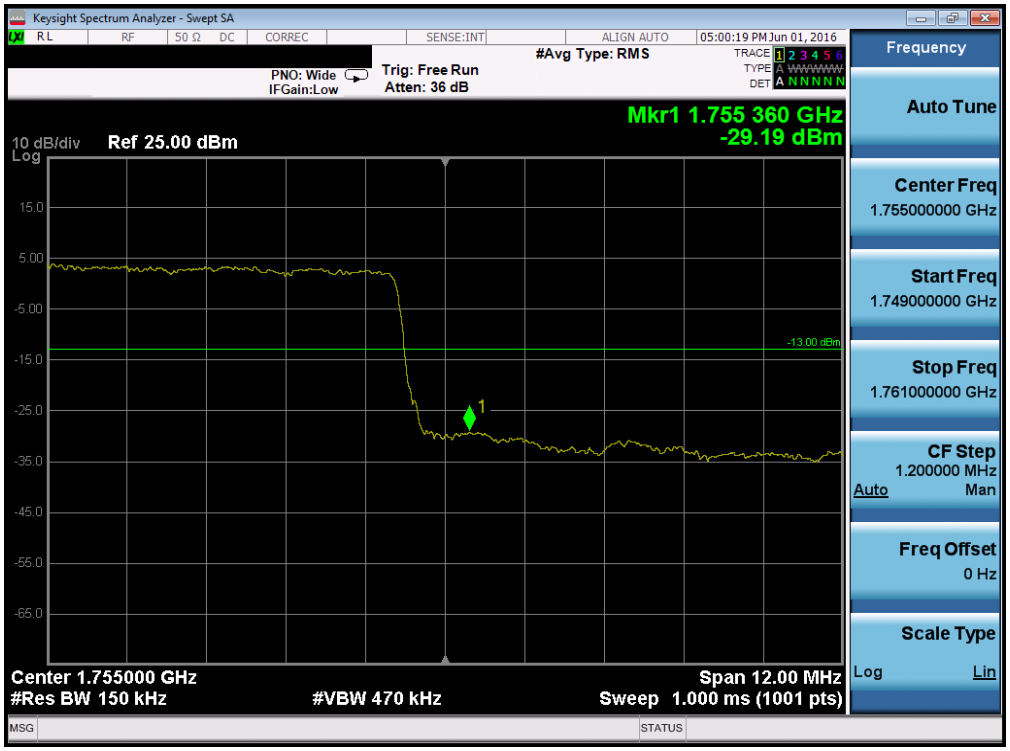


Plot 7-149. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 7-150. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

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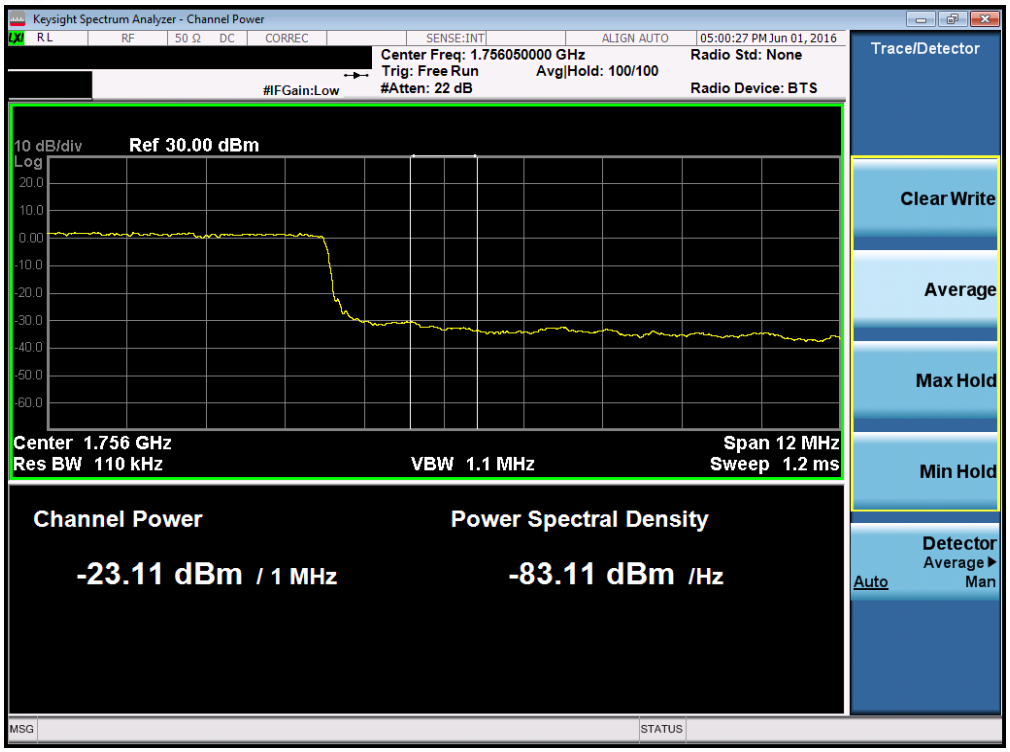
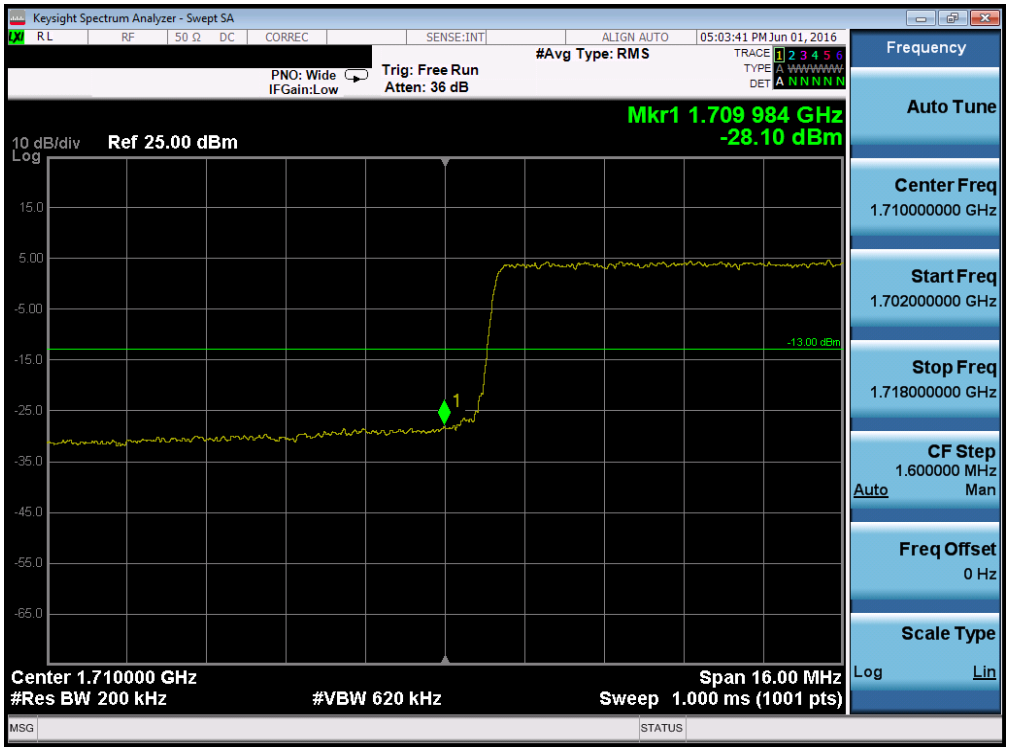


Plot 7-151. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 7-152. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

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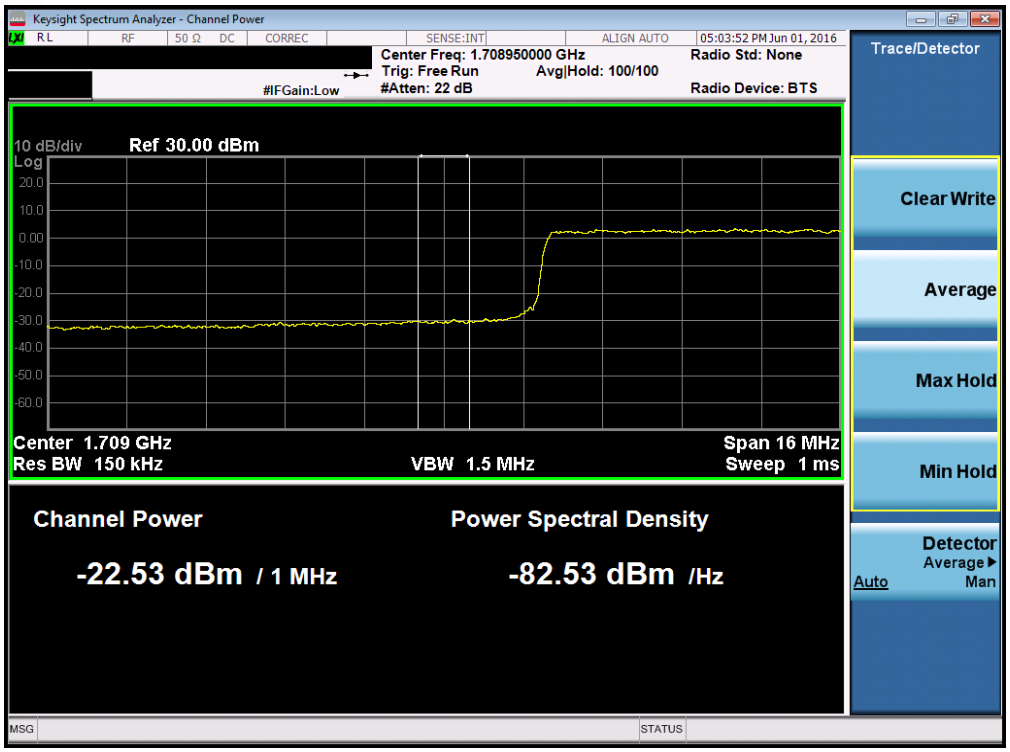
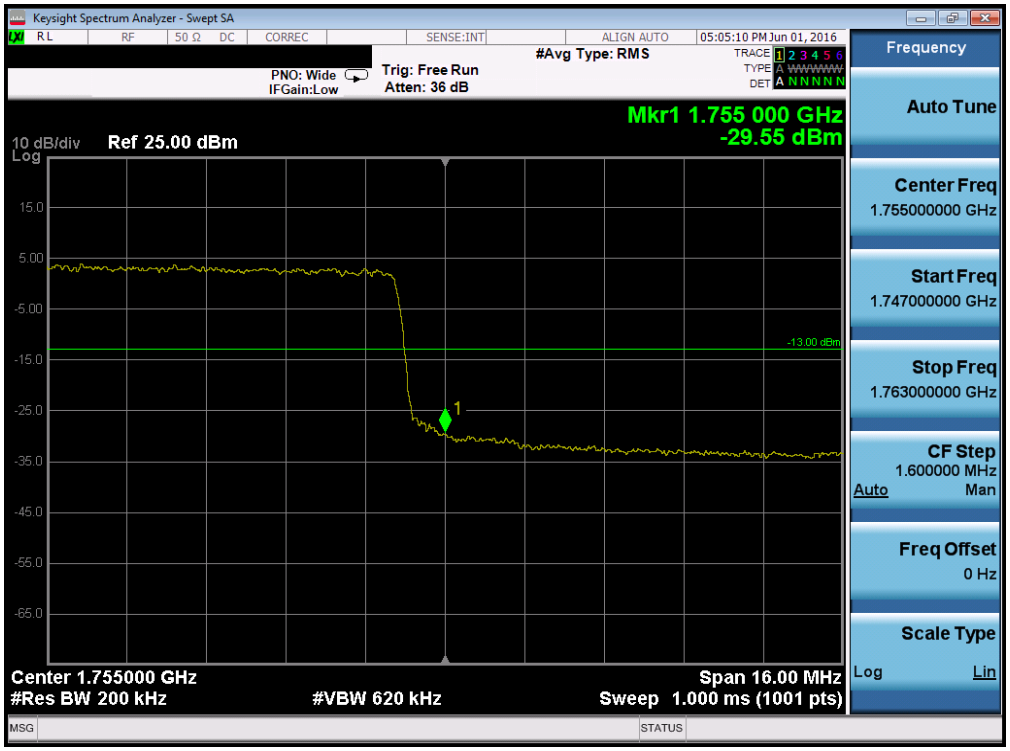


Plot 7-153. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-154. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

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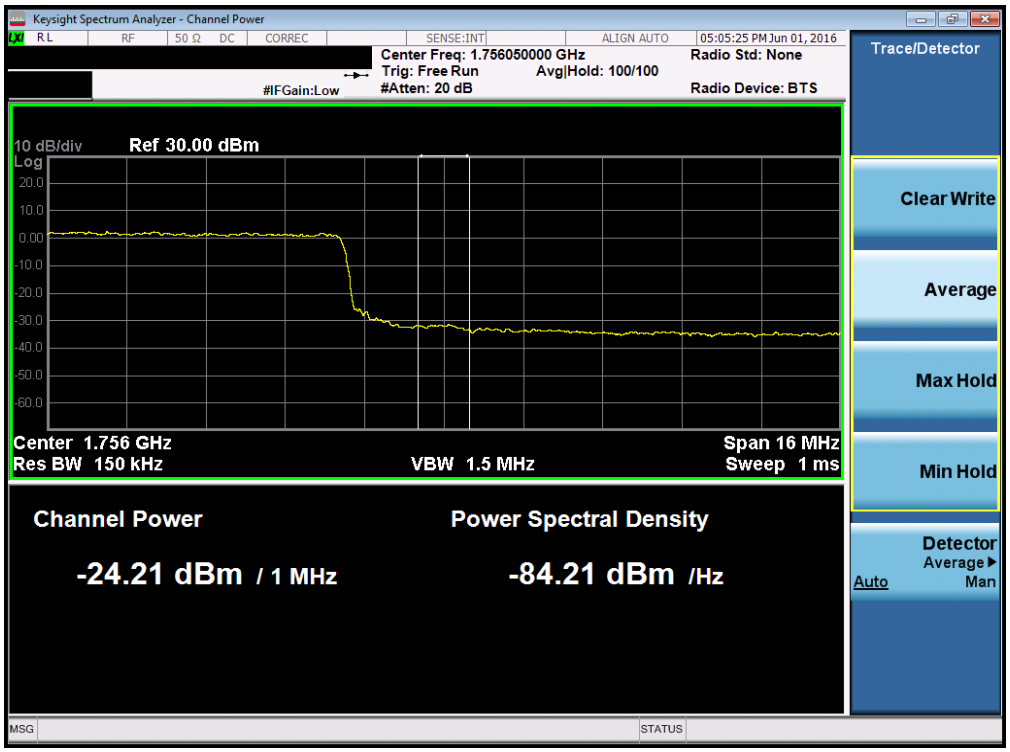
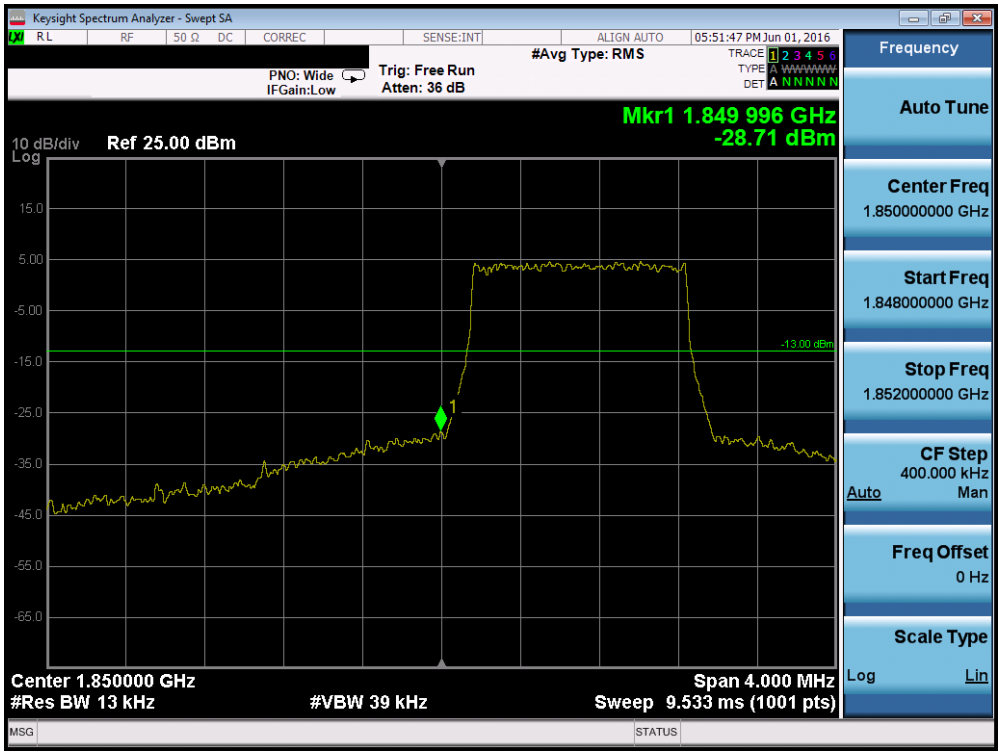


Plot 7-155. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-156. Lower Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

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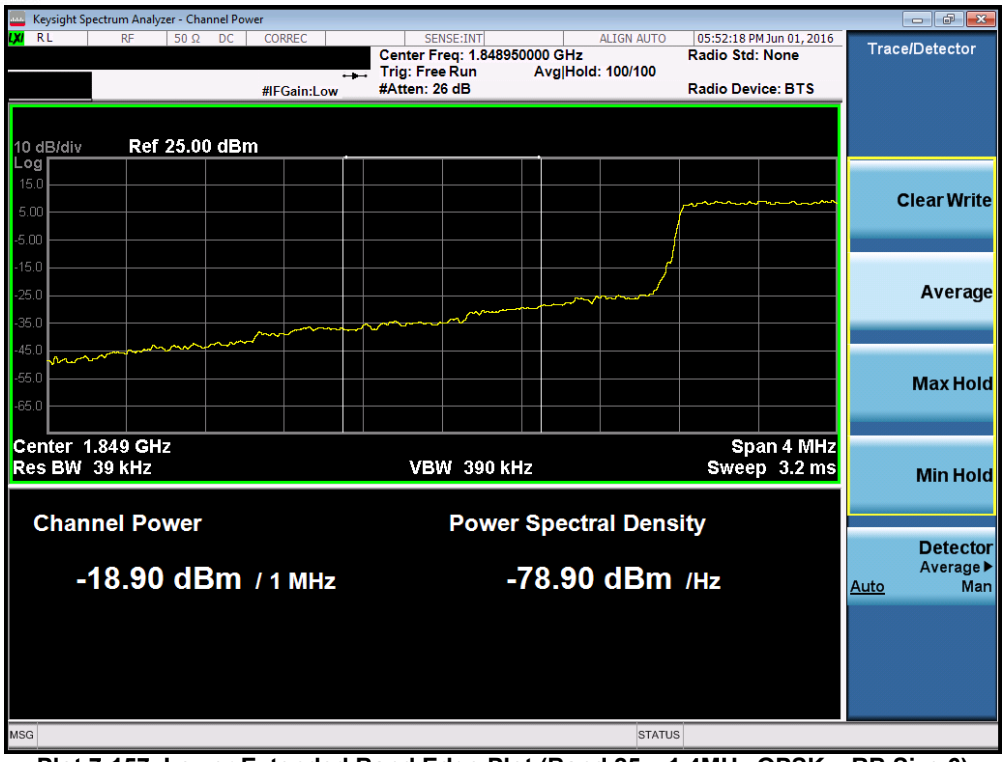

Plot 7-157. Lower Extended Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

Plot 7-158. Upper Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)

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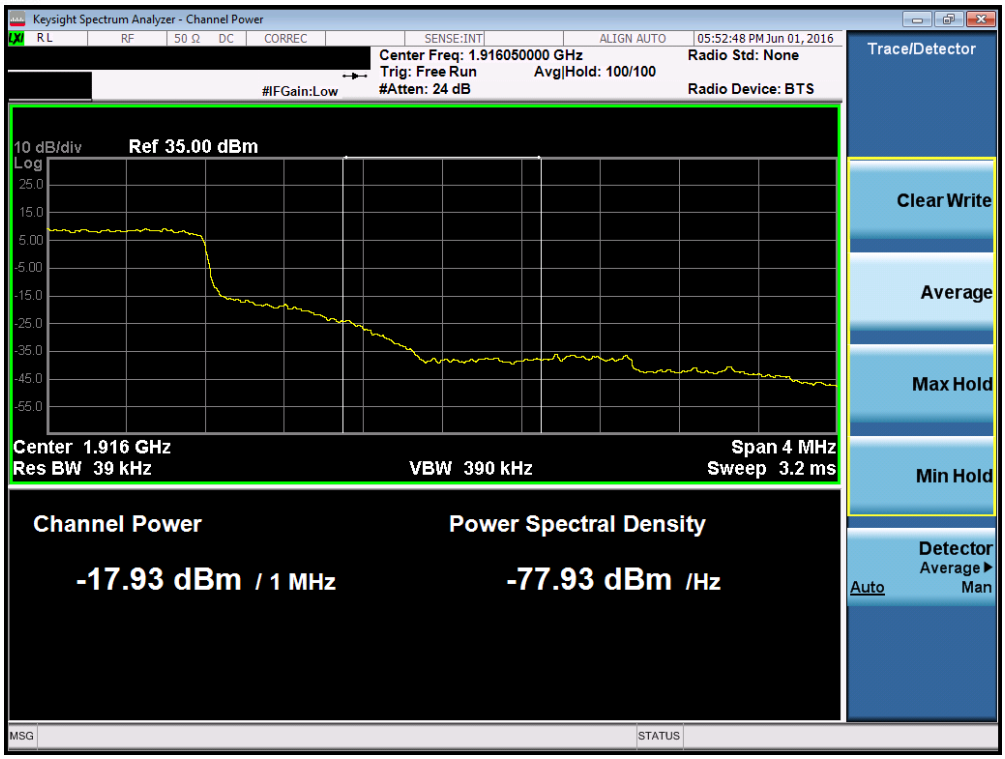
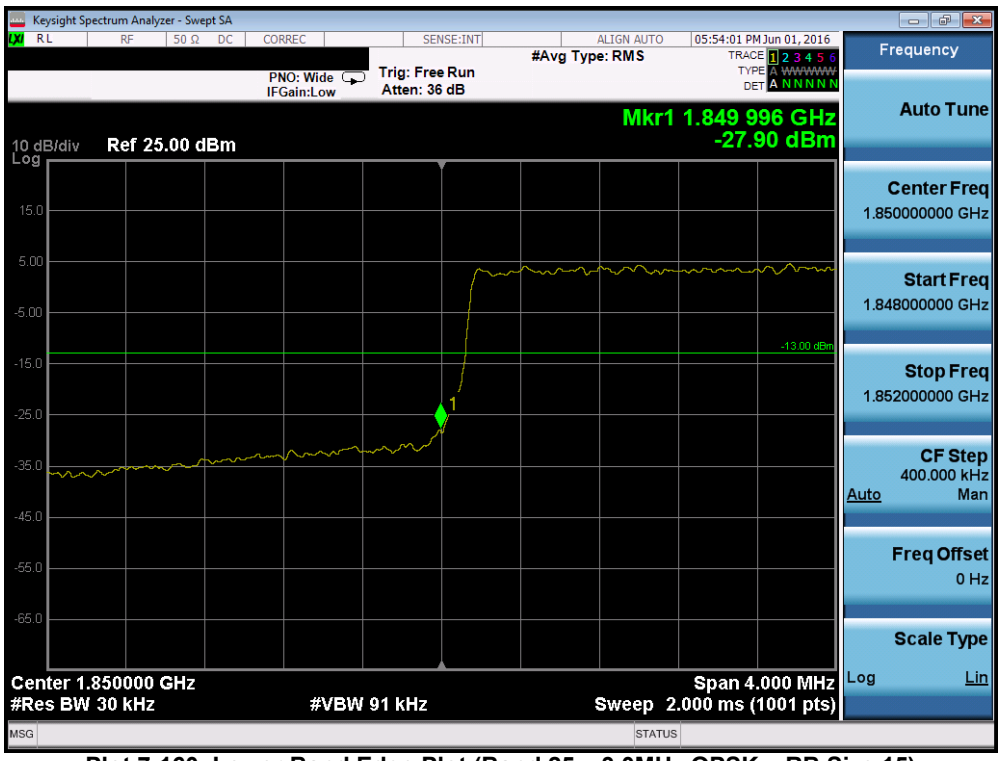


Plot 7-159. Upper Extended Band Edge Plot (Band 25 – 1.4MHz QPSK – RB Size 6)



Plot 7-160. Lower Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

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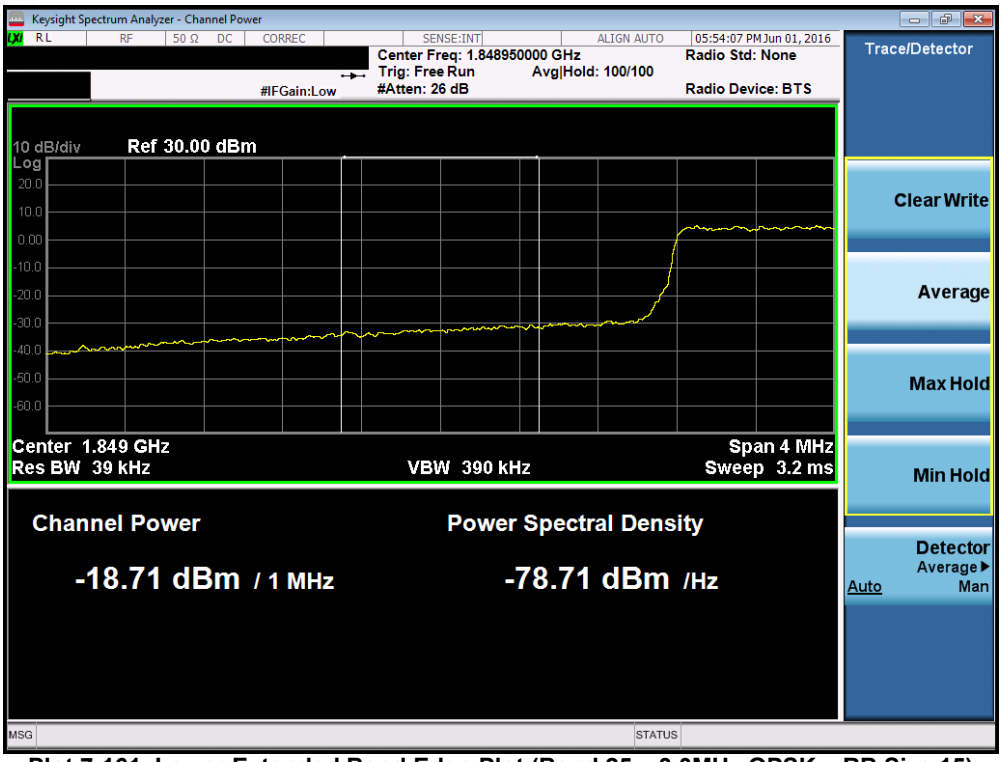

Plot 7-161. Lower Extended Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

Plot 7-162. Upper Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)

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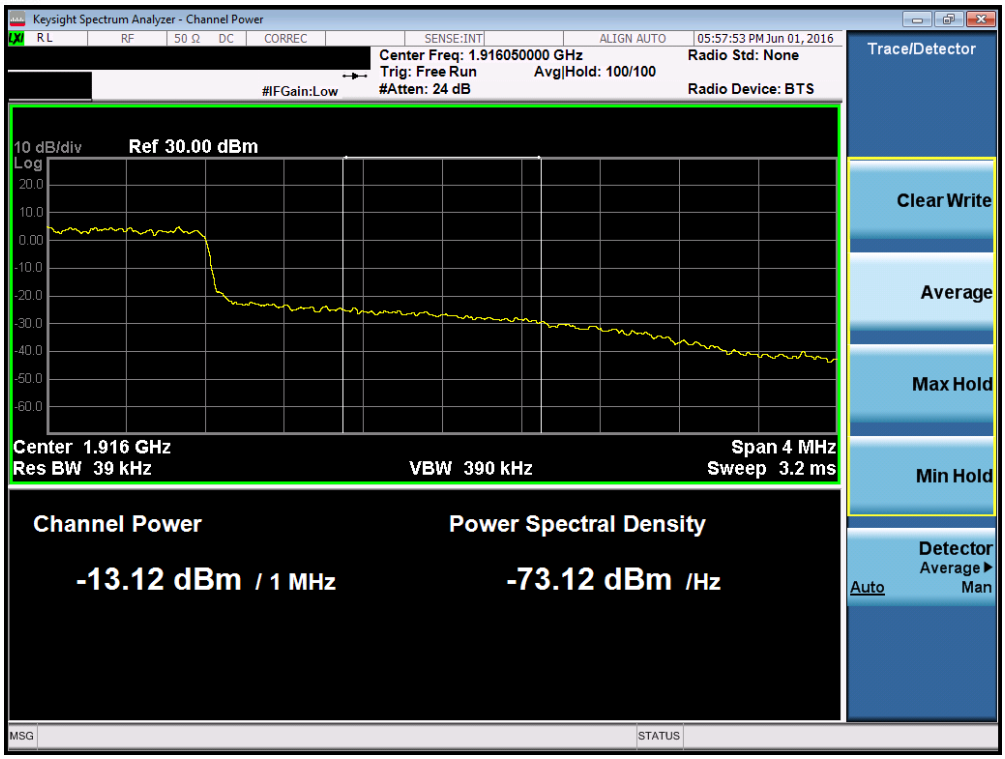
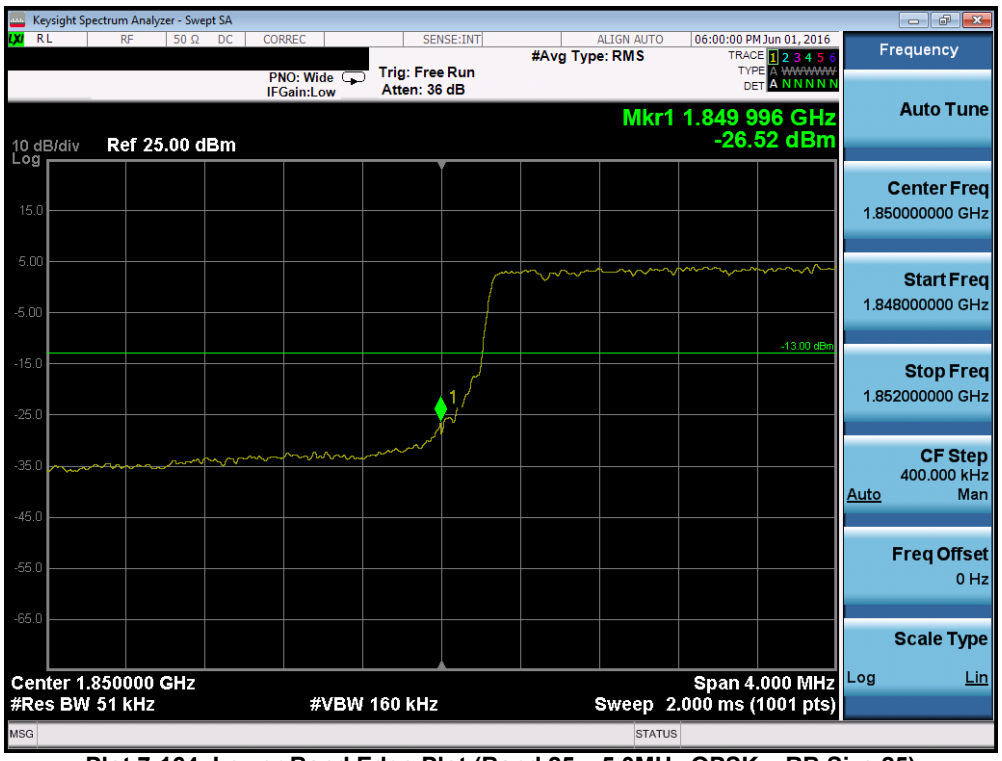


Plot 7-163. Upper Extended Band Edge Plot (Band 25 – 3.0MHz QPSK – RB Size 15)



Plot 7-164. Lower Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

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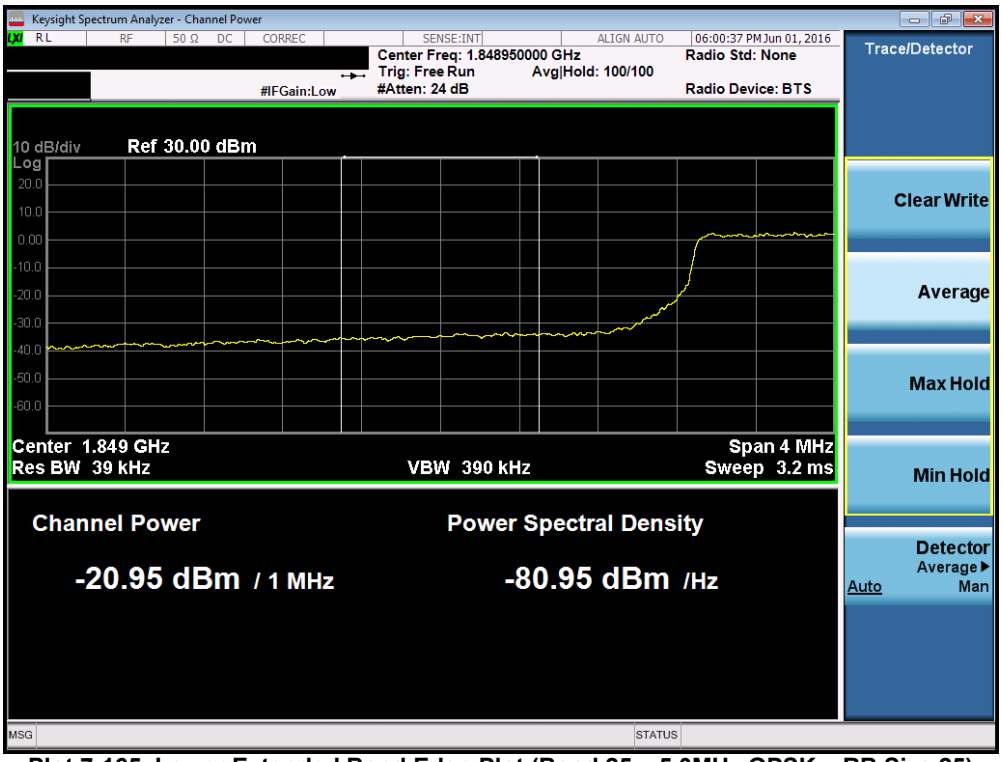

Plot 7-165. Lower Extended Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

Plot 7-166. Upper Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)

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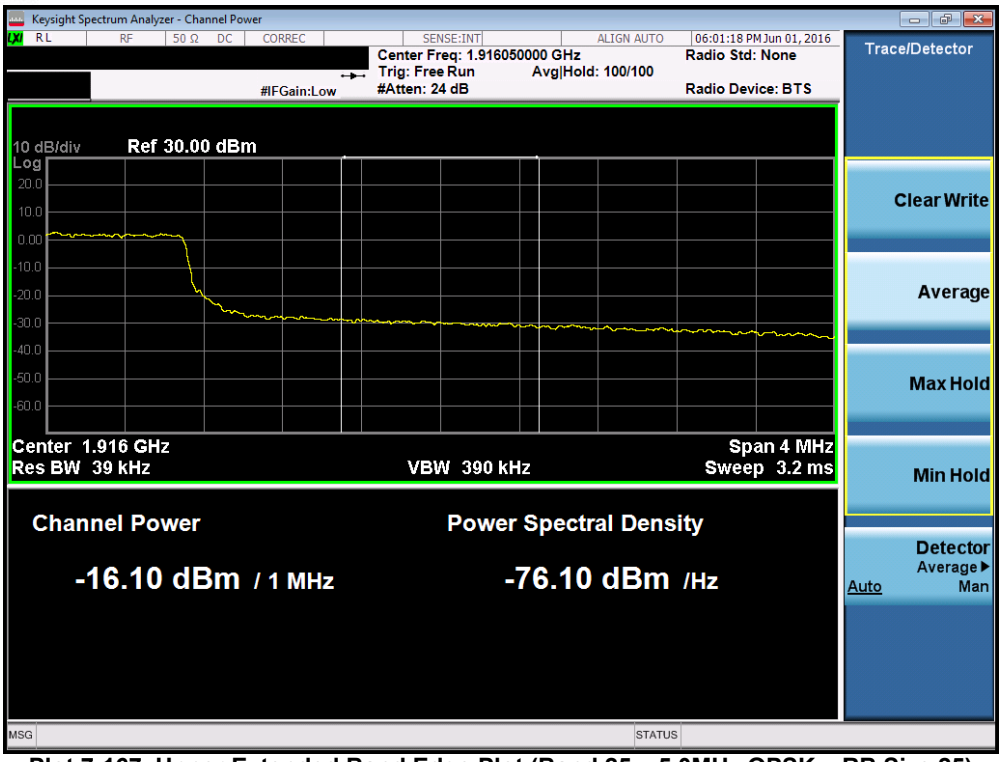
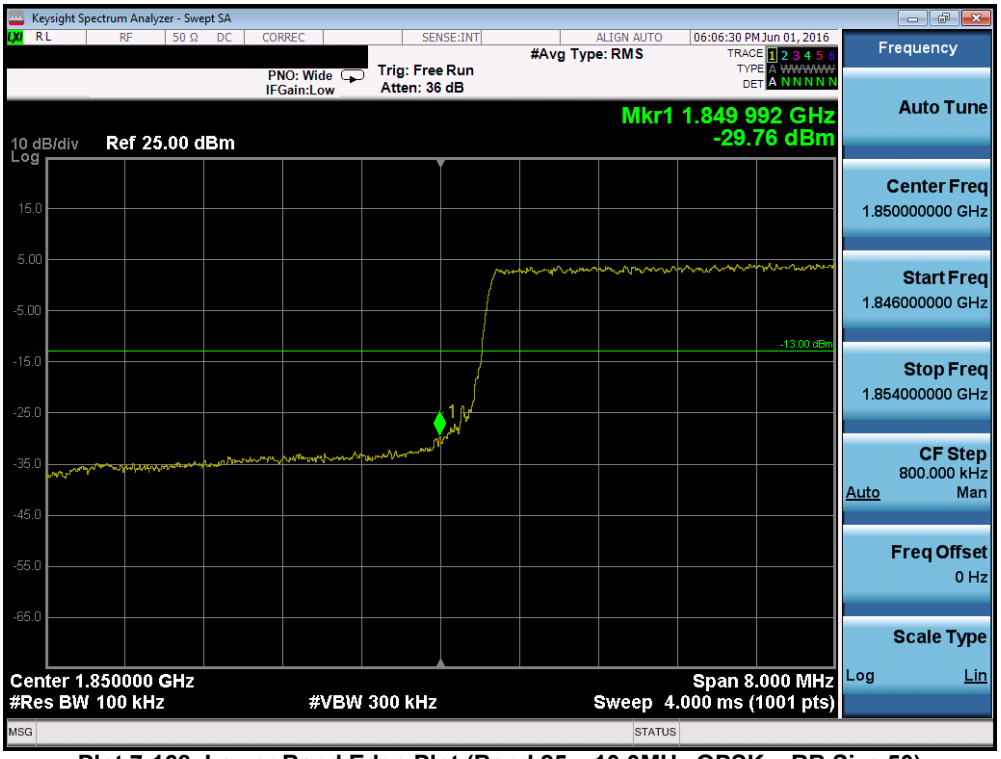


Plot 7-167. Upper Extended Band Edge Plot (Band 25 – 5.0MHz QPSK – RB Size 25)



Plot 7-168. Lower Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

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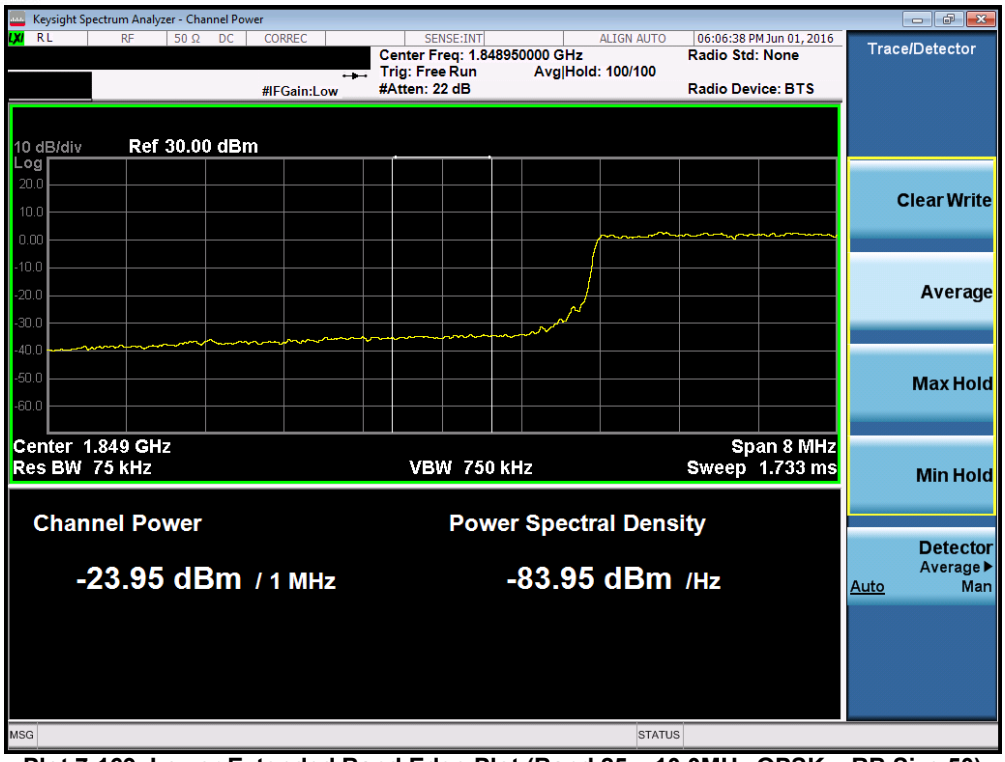
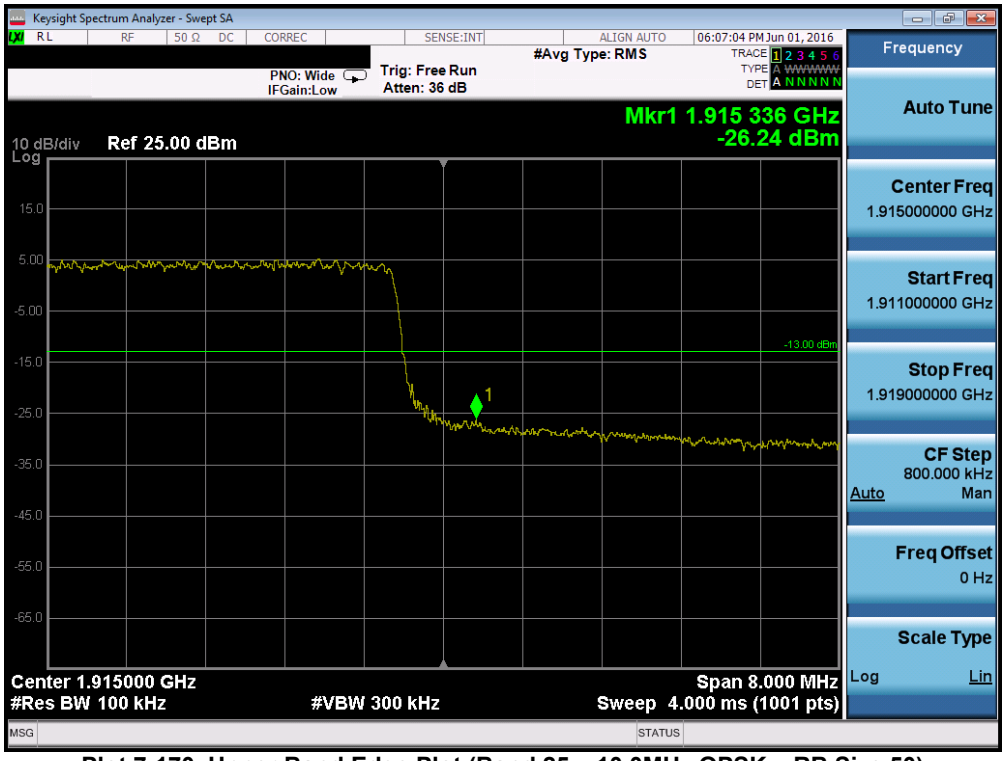


Plot 7-169. Lower Extended Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)



Plot 7-170. Upper Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)

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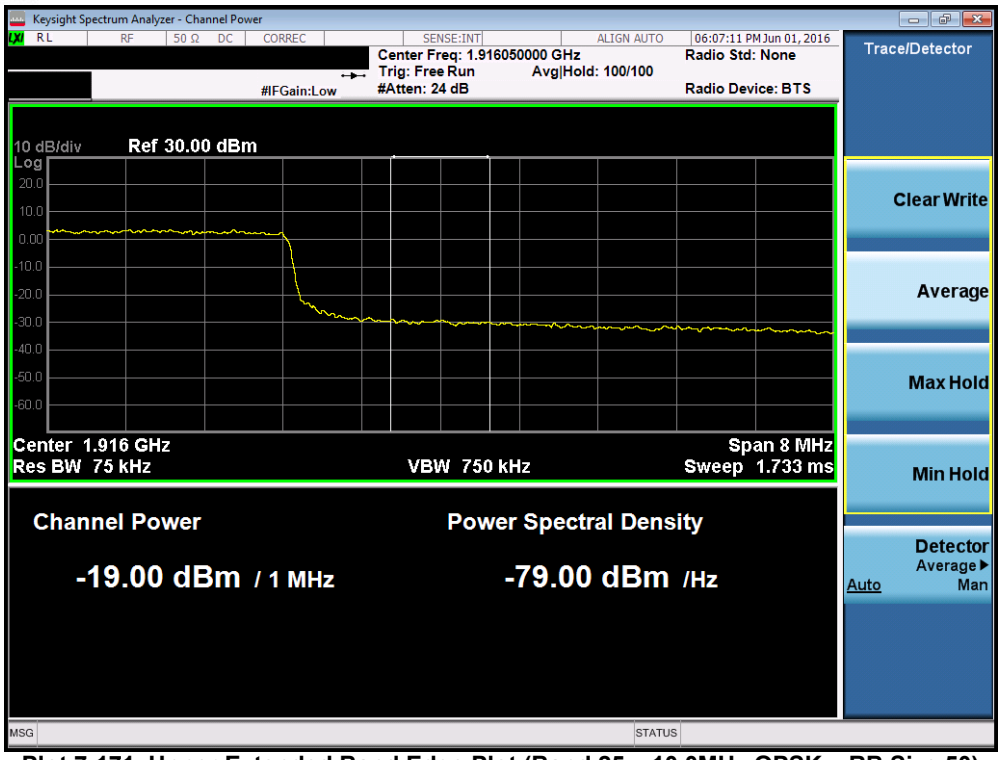
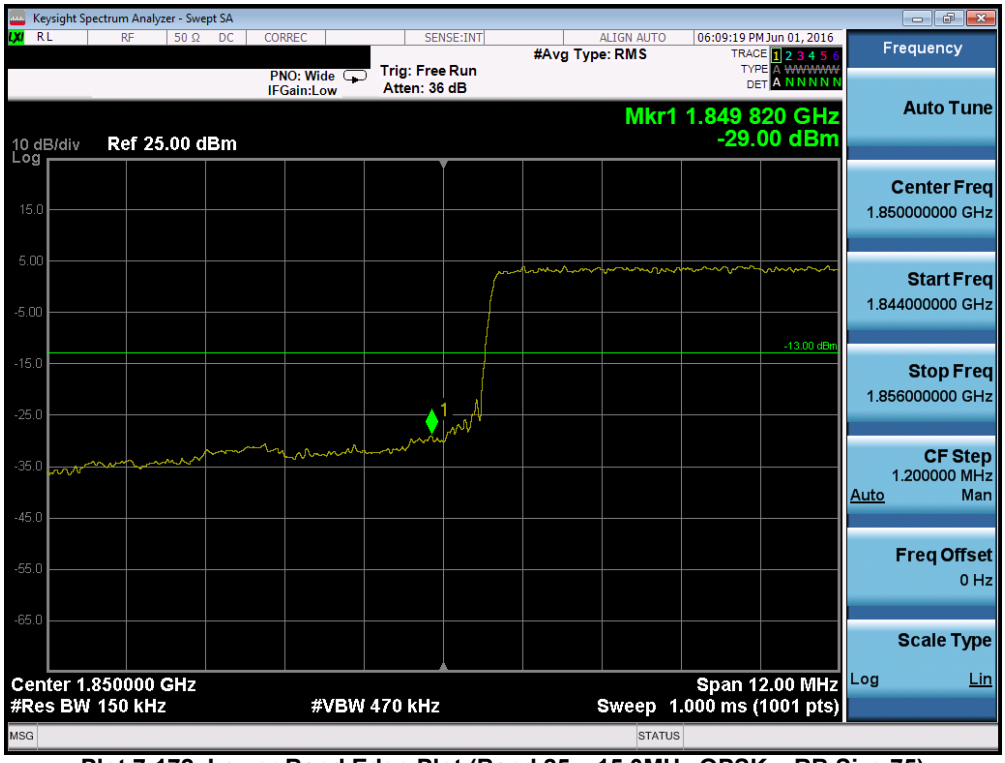


Plot 7-171. Upper Extended Band Edge Plot (Band 25 – 10.0MHz QPSK – RB Size 50)



Plot 7-172. Lower Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

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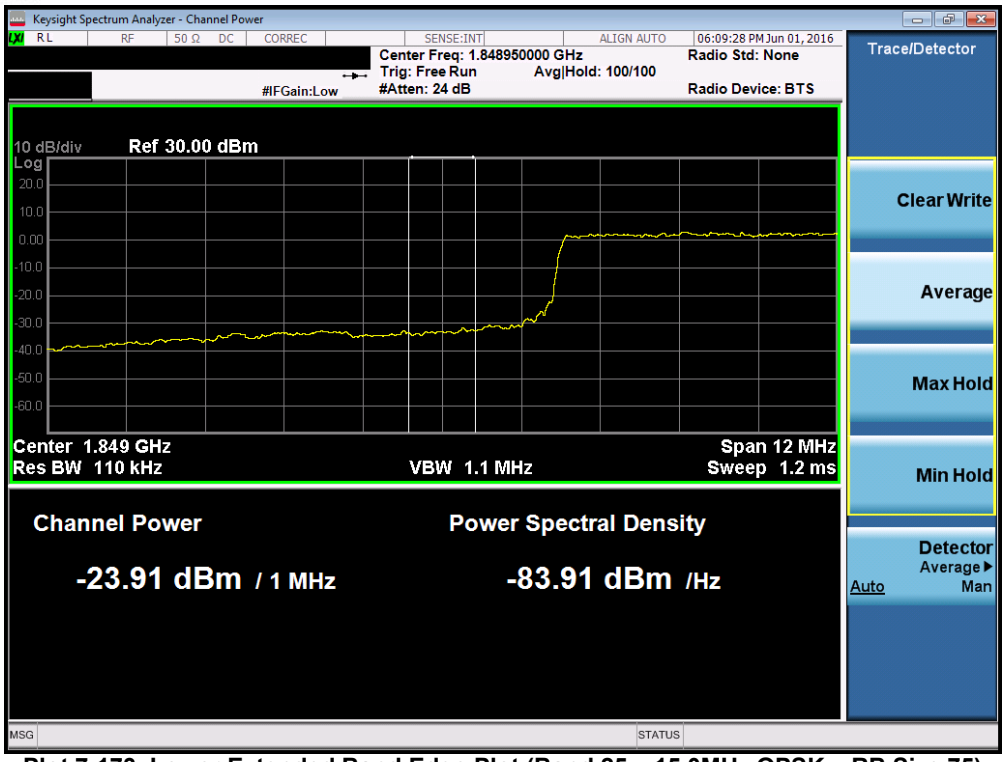

Plot 7-173. Lower Extended Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

Plot 7-174. Upper Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)

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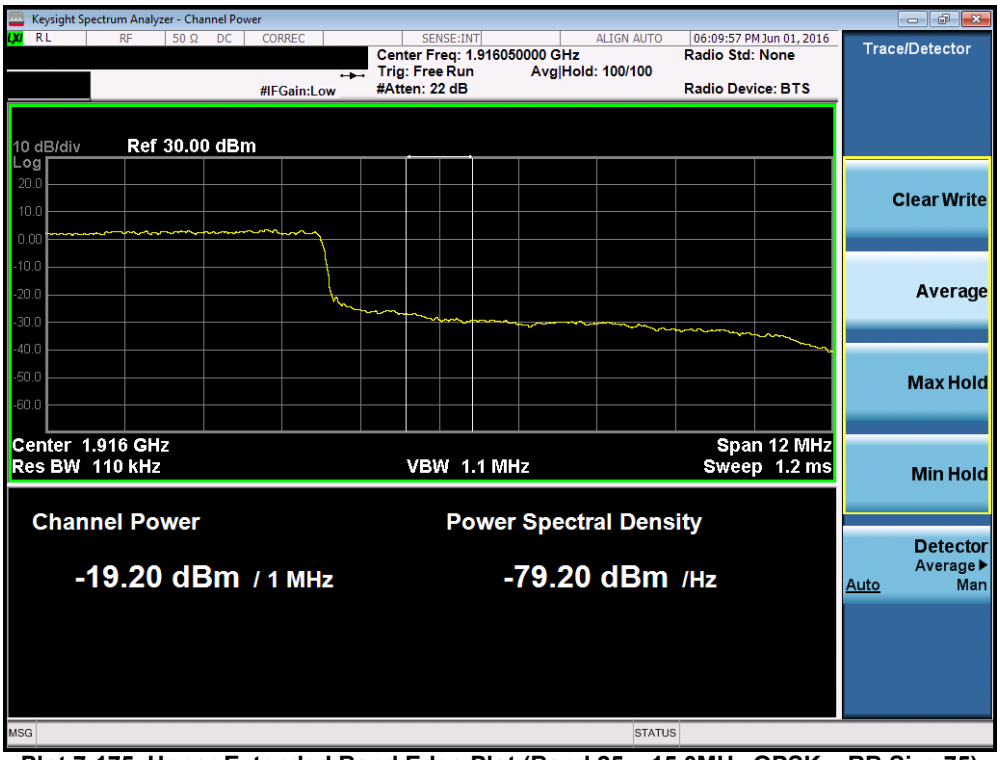
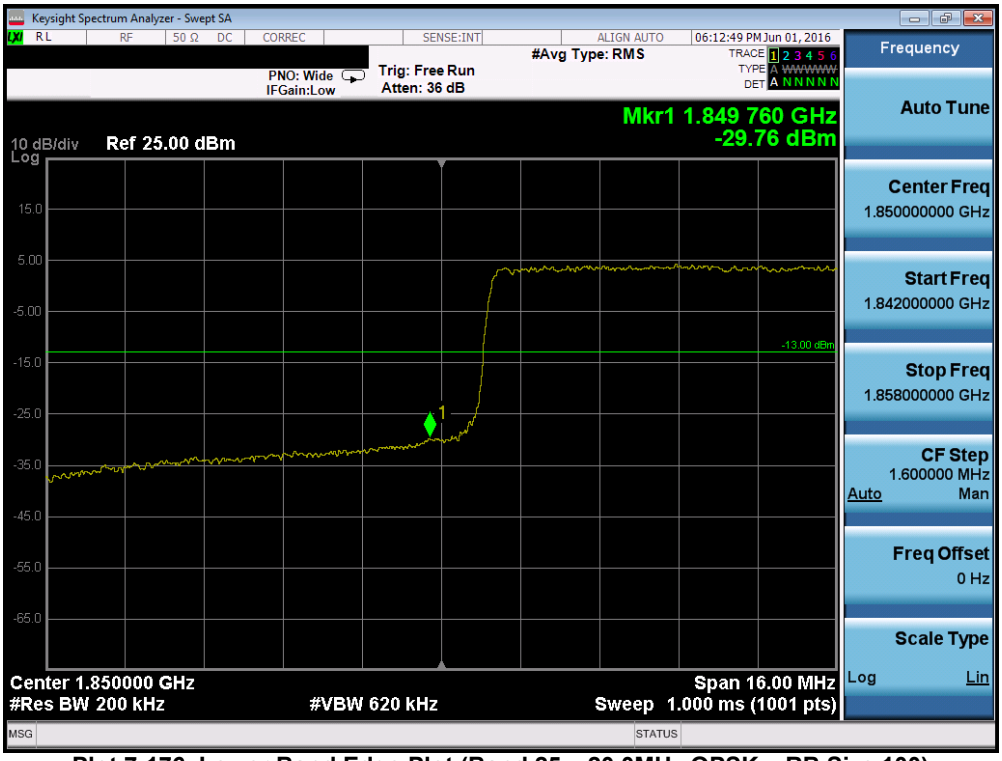


Plot 7-175. Upper Extended Band Edge Plot (Band 25 – 15.0MHz QPSK – RB Size 75)



Plot 7-176. Lower Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)

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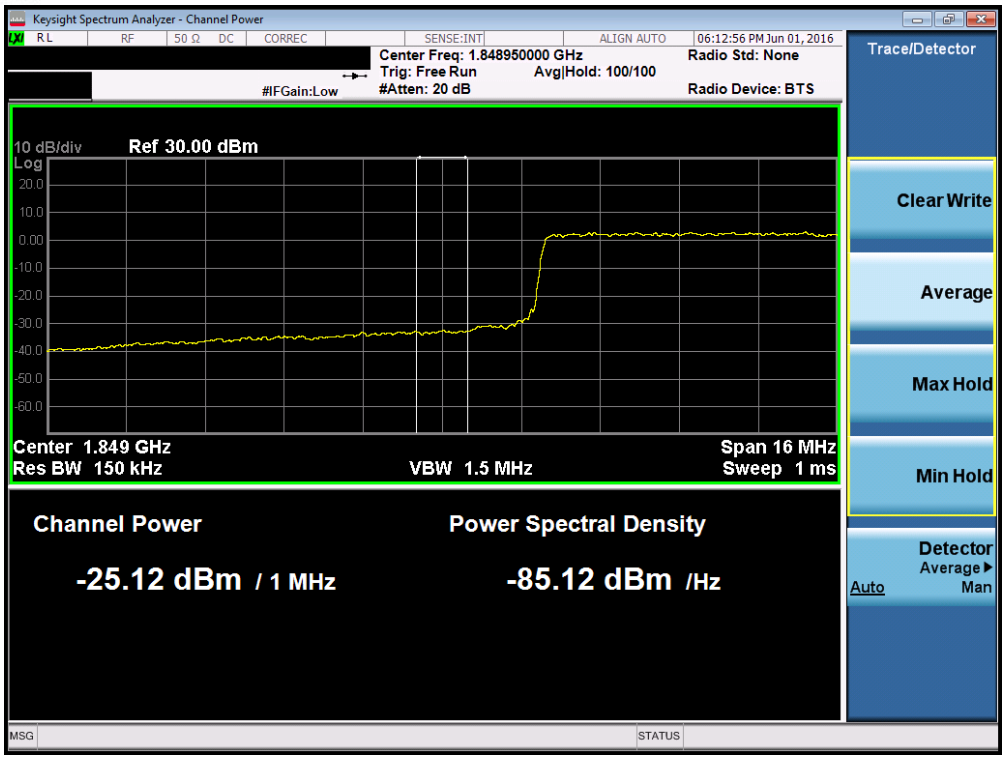

Plot 7-177. Lower Extended Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)

Plot 7-178. Upper Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)

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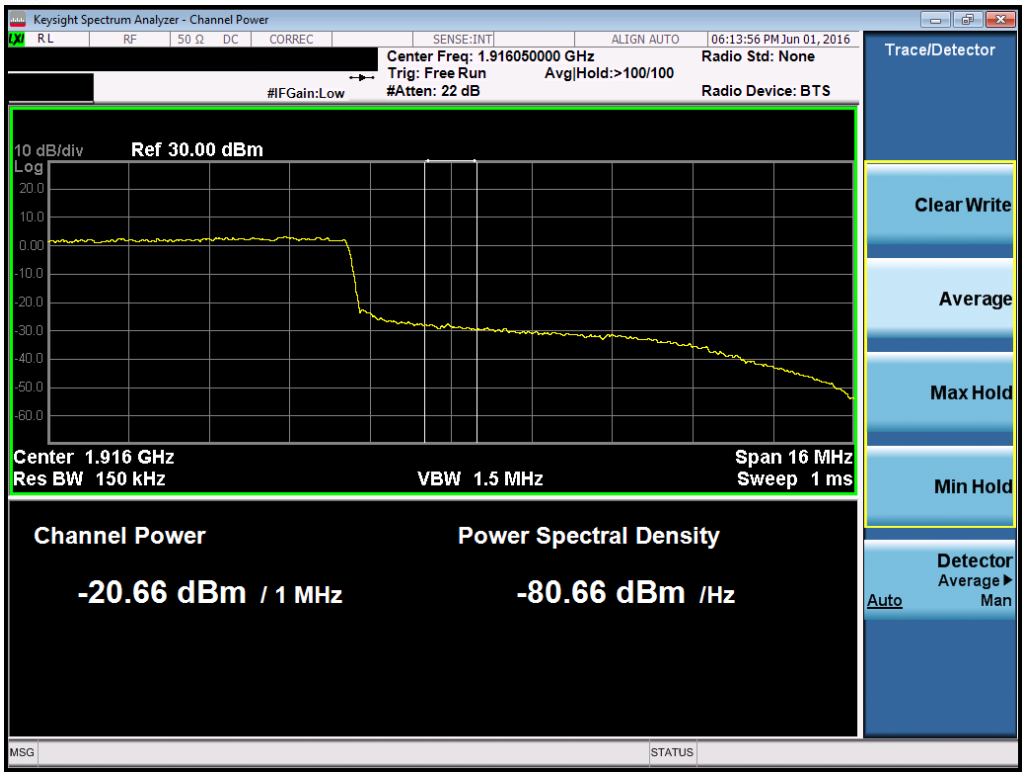
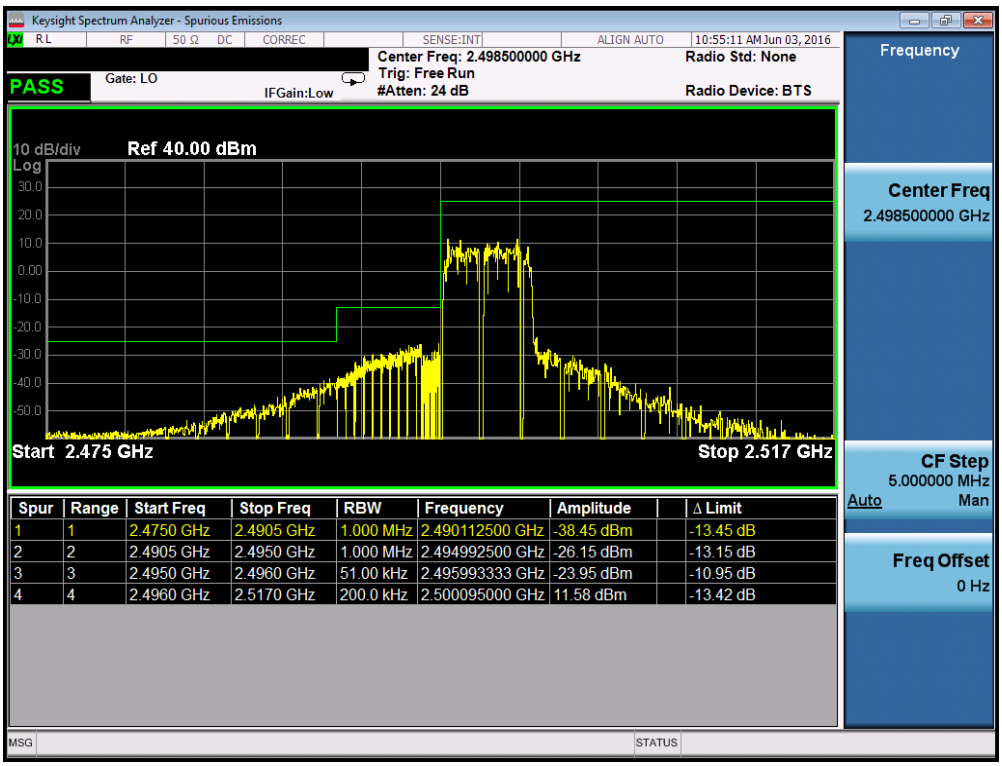


Plot 7-179. Upper Extended Band Edge Plot (Band 25 – 20.0MHz QPSK – RB Size 100)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490112500 GHz	-38.45 dBm		-13.45 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494992500 GHz	-26.15 dBm		-13.15 dB
3	3	2.4950 GHz	2.4960 GHz	51.00 kHz	2.495993333 GHz	-23.95 dBm		-10.95 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.500095000 GHz	11.58 dBm		-13.42 dB

Plot 7-180. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

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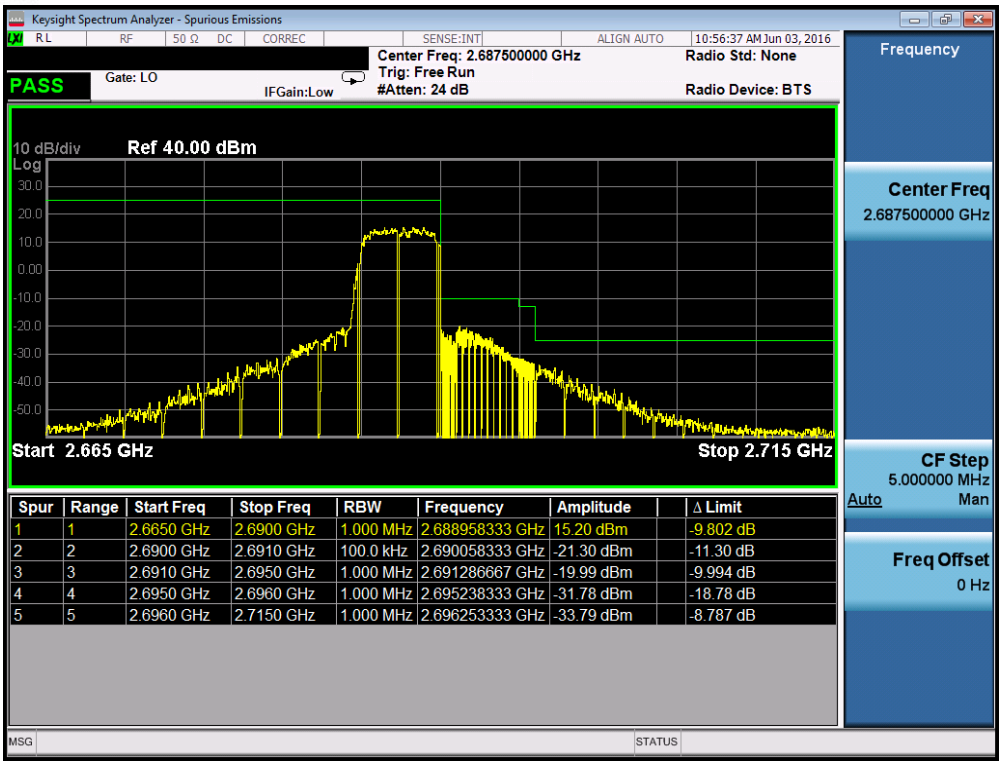
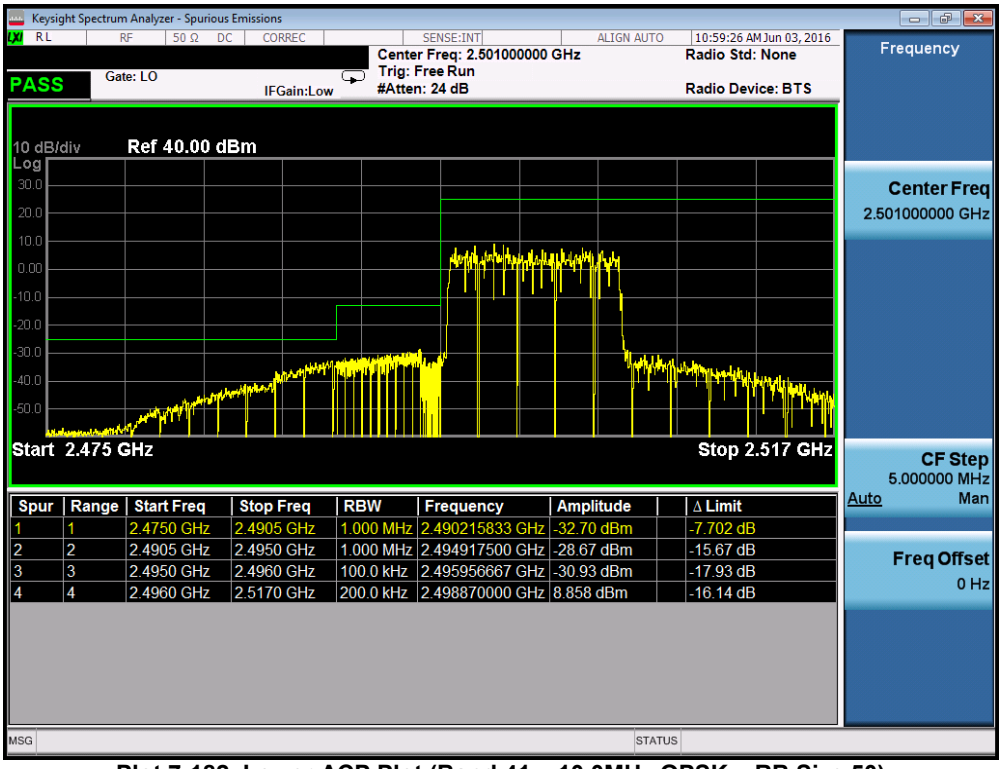


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.688958333 GHz	15.20 dBm	-9.802 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690058333 GHz	-21.30 dBm	-11.30 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691286667 GHz	-19.99 dBm	-9.994 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695238333 GHz	-31.78 dBm	-18.78 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696253333 GHz	-33.79 dBm	-8.787 dB

Plot 7-181. Upper ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490215833 GHz	-32.70 dBm	-7.702 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494917500 GHz	-28.67 dBm	-15.67 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495956667 GHz	-30.93 dBm	-17.93 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.498870000 GHz	8.858 dBm	-16.14 dB

Plot 7-182. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

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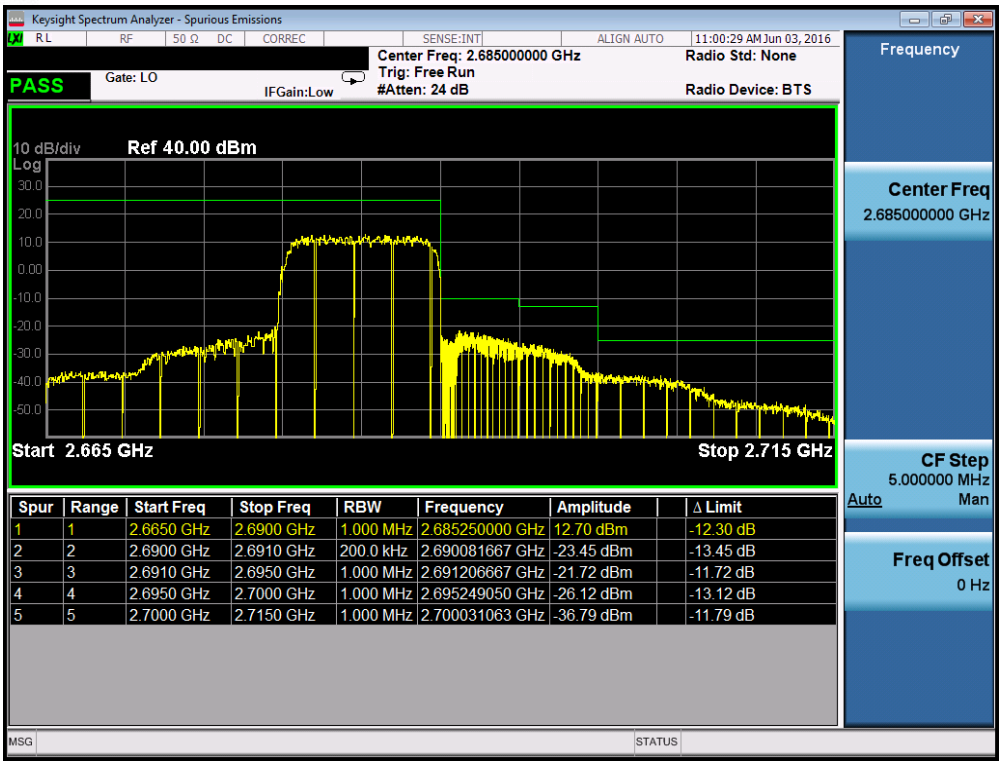
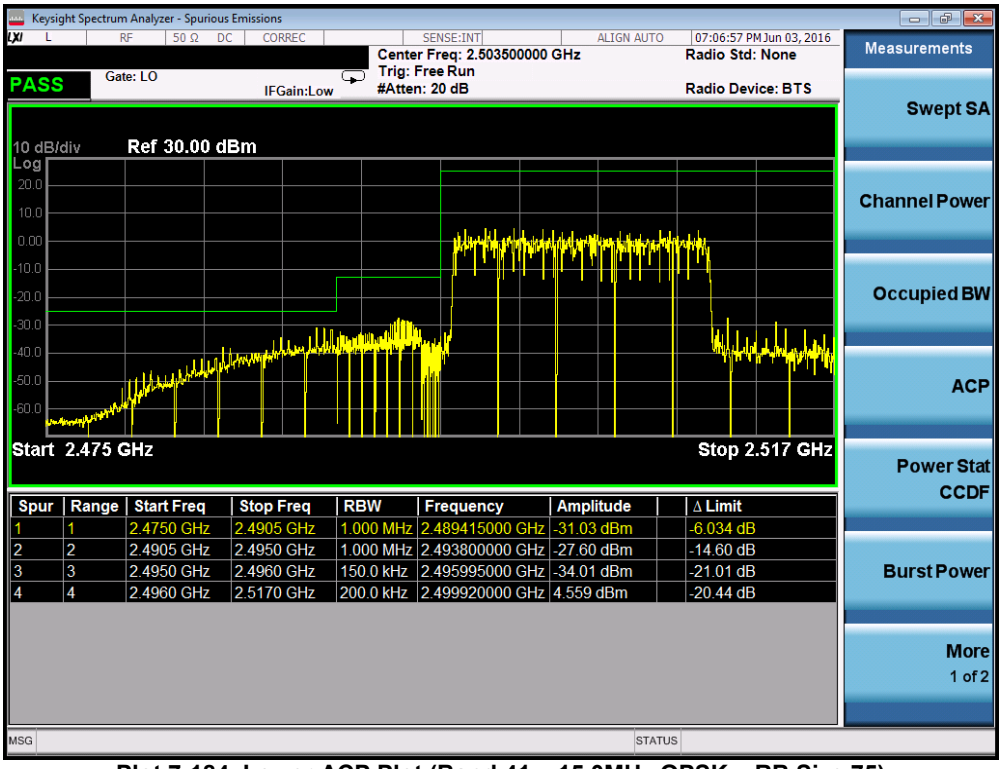


Plot 7-183. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



Plot 7-184. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)

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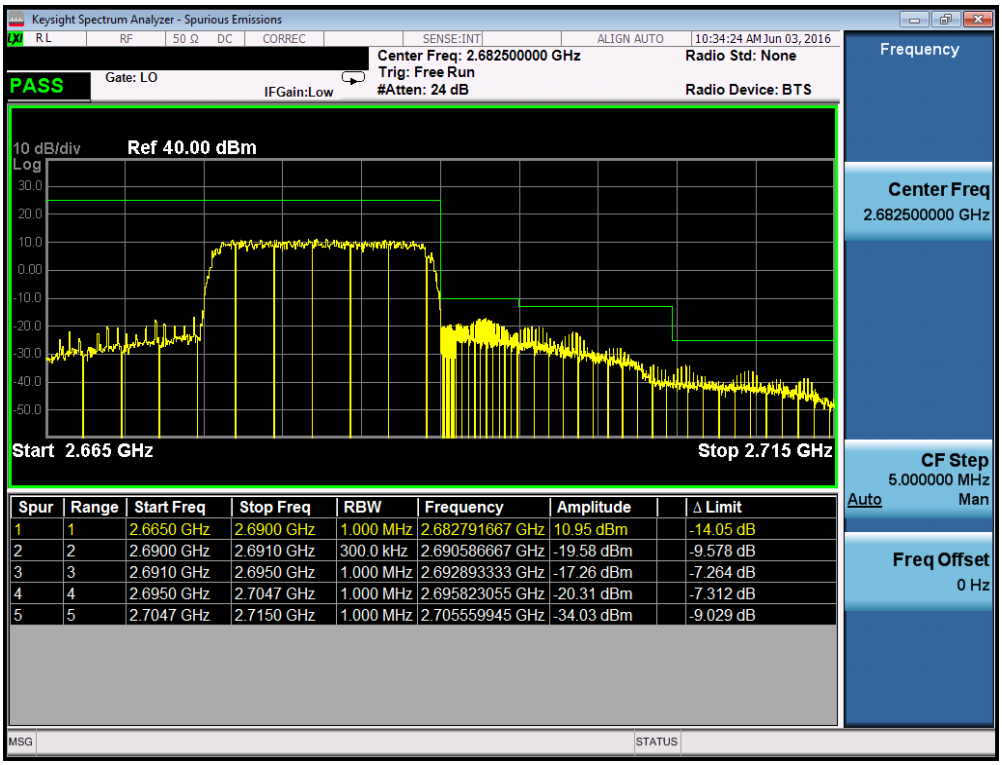
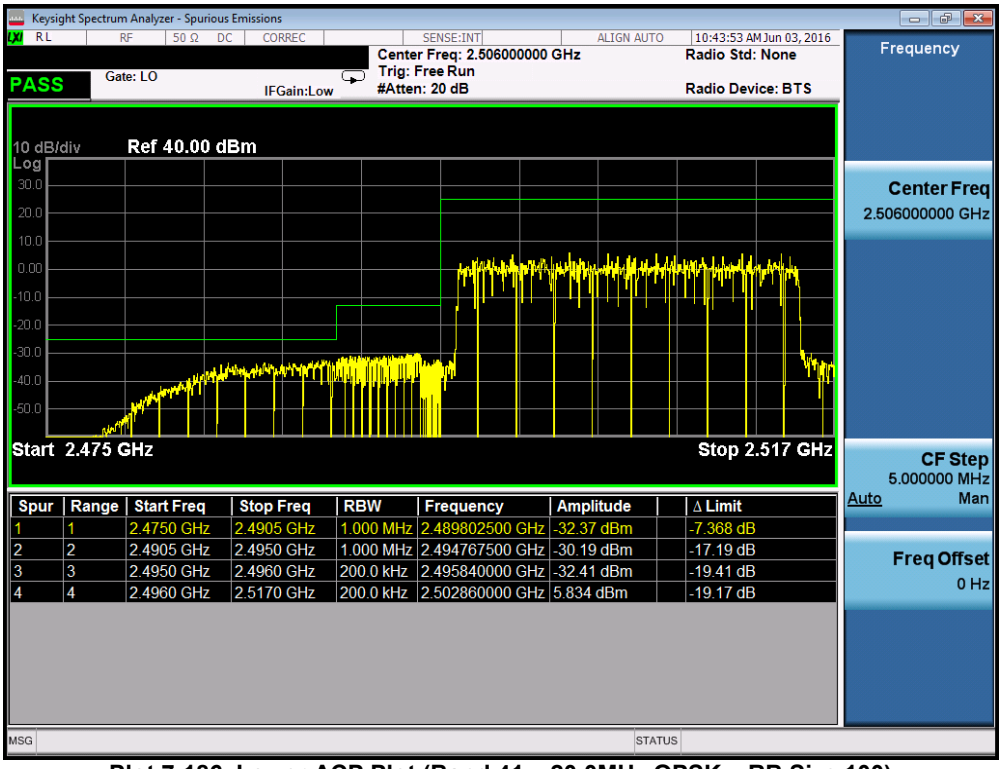


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.682791667 GHz	10.95 dBm	-14.05 dB
2	2	2.6900 GHz	2.6910 GHz	300.0 kHz	2.690586667 GHz	-19.58 dBm	-9.578 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692893333 GHz	-17.26 dBm	-7.264 dB
4	4	2.6950 GHz	2.7047 GHz	1.000 MHz	2.695823055 GHz	-20.31 dBm	-7.312 dB
5	5	2.7047 GHz	2.7150 GHz	1.000 MHz	2.705559945 GHz	-34.03 dBm	-9.029 dB

Plot 7-185. Upper ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489802500 GHz	-32.37 dBm	-7.368 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494767500 GHz	-30.19 dBm	-17.19 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495840000 GHz	-32.41 dBm	-19.41 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.502860000 GHz	5.834 dBm	-19.17 dB

Plot 7-186. Lower ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

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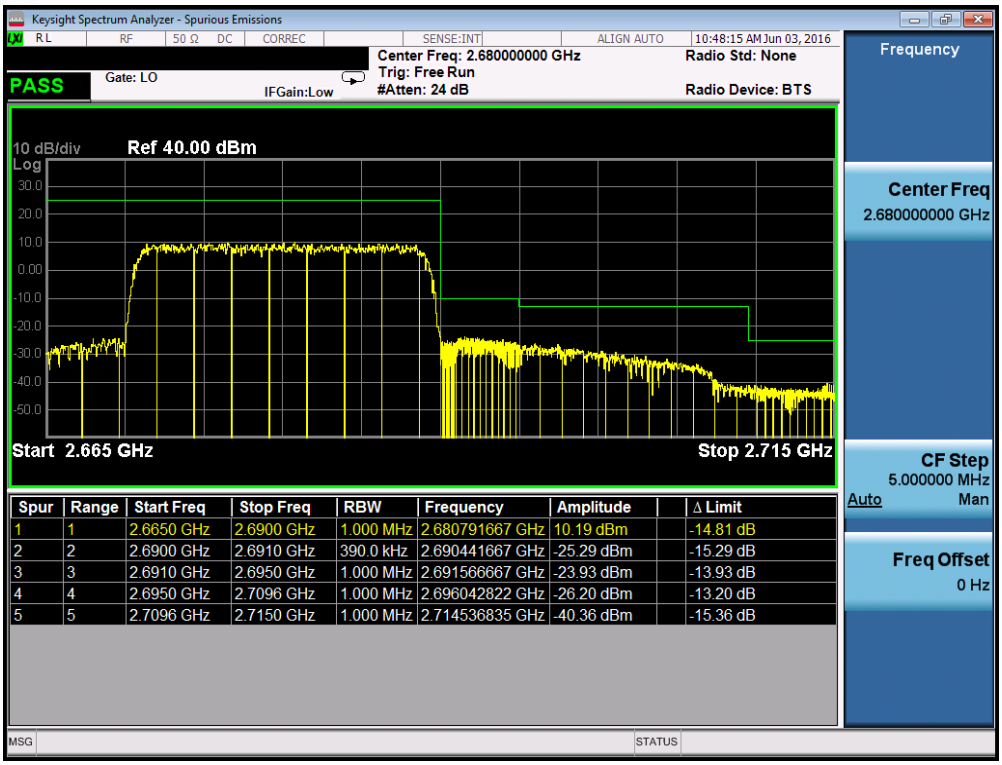

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.680791667 GHz	10.19 dBm		-14.81 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690441667 GHz	-25.29 dBm		-15.29 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691566667 GHz	-23.93 dBm		-13.93 dB
4	4	2.6950 GHz	2.7096 GHz	1.000 MHz	2.696042822 GHz	-26.20 dBm		-13.20 dB
5	5	2.7096 GHz	2.7150 GHz	1.000 MHz	2.714536835 GHz	-40.36 dBm		-15.36 dB

Plot 7-187. Upper ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

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7.5 Peak-Average Ratio

§24.232(d)

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 v02r02 – 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. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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

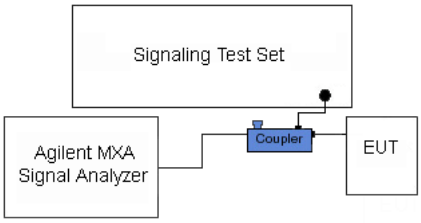

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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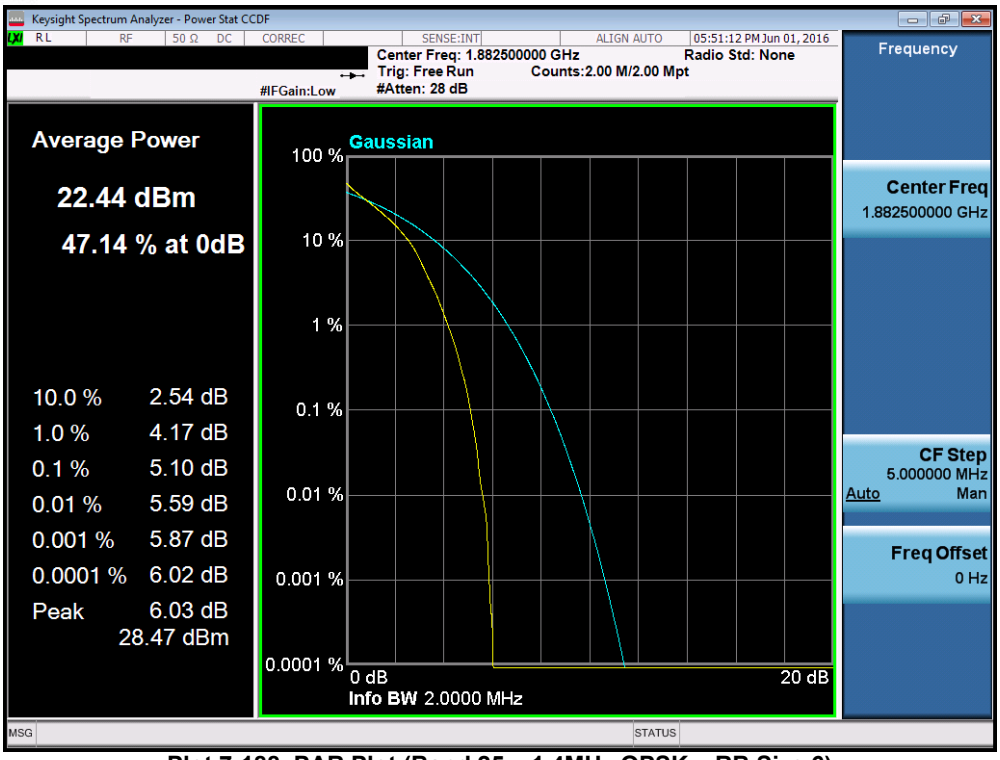
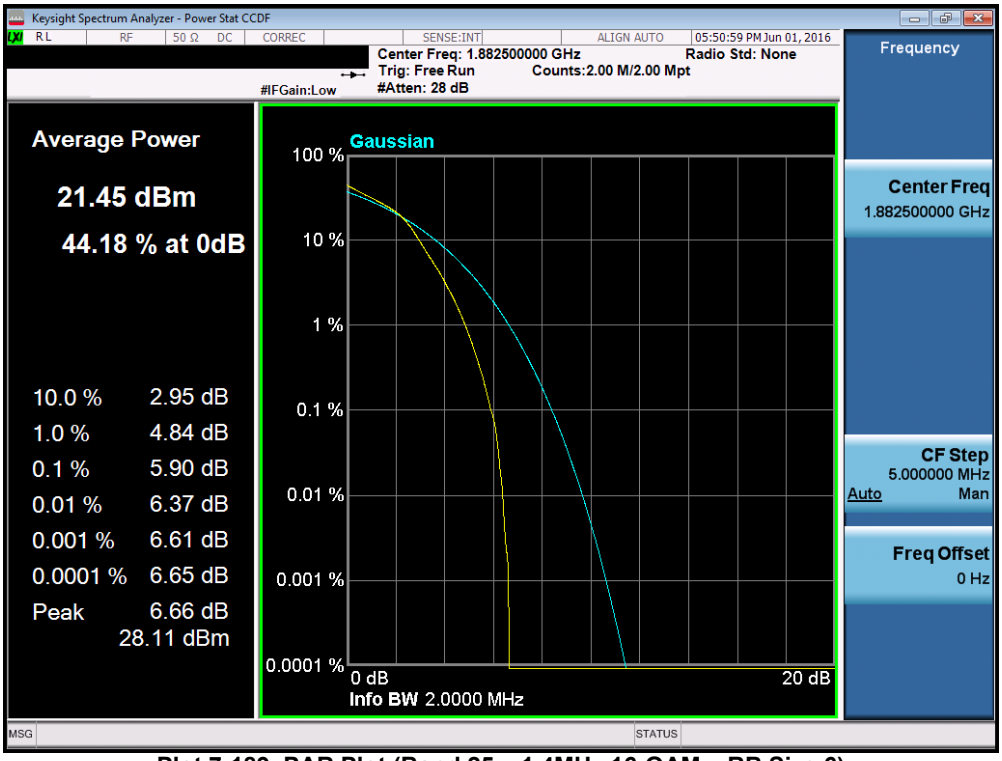


Plot 7-188. PAR Plot (Band 25 – 1.4MHz QPSK – RB Size 6)



Plot 7-189. PAR Plot (Band 25 – 1.4MHz 16-QAM – RB Size 6)

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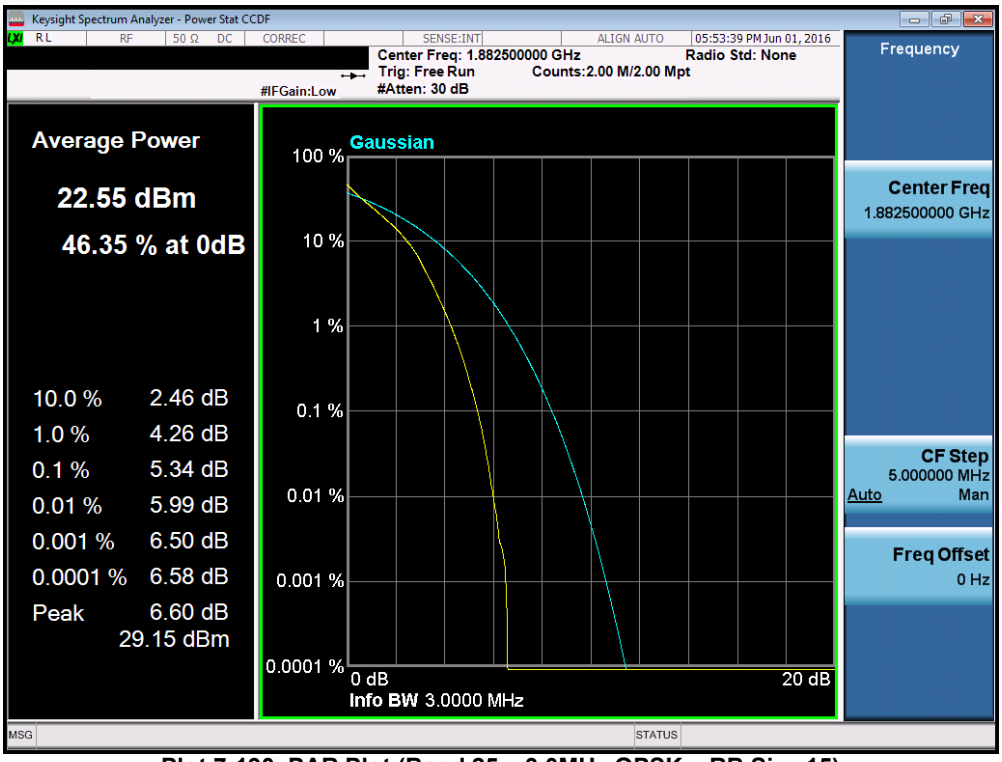
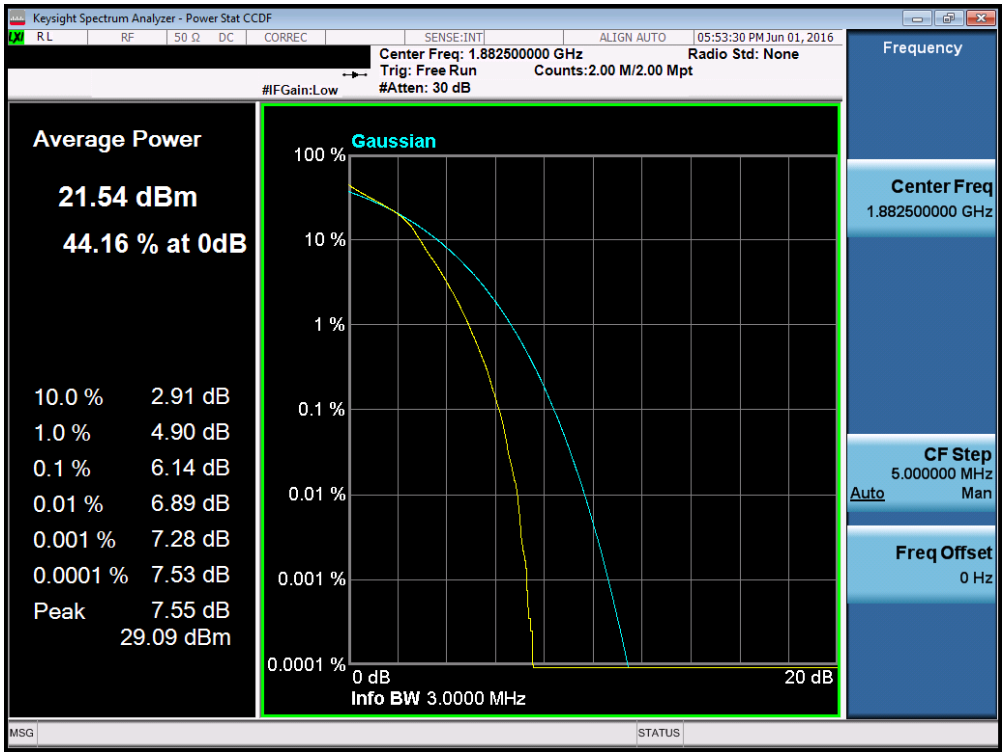


Plot 7-190. PAR Plot (Band 25 – 3.0MHz QPSK – RB Size 15)



Plot 7-191. PAR Plot (Band 25 – 3.0MHz 16-QAM – RB Size 15)

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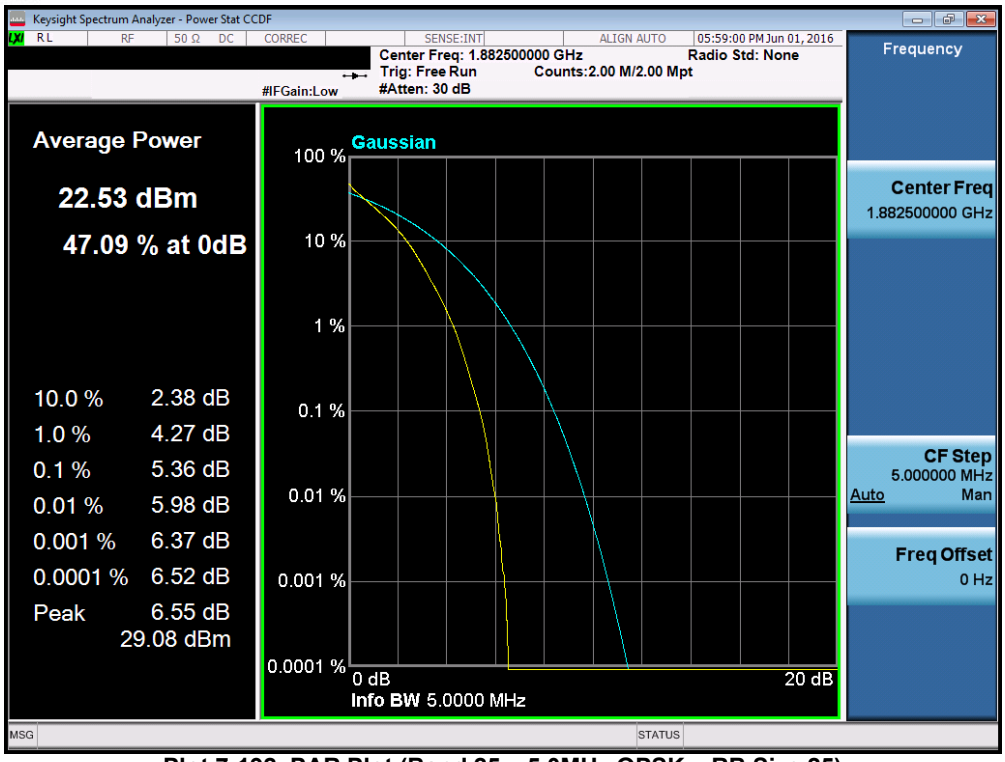
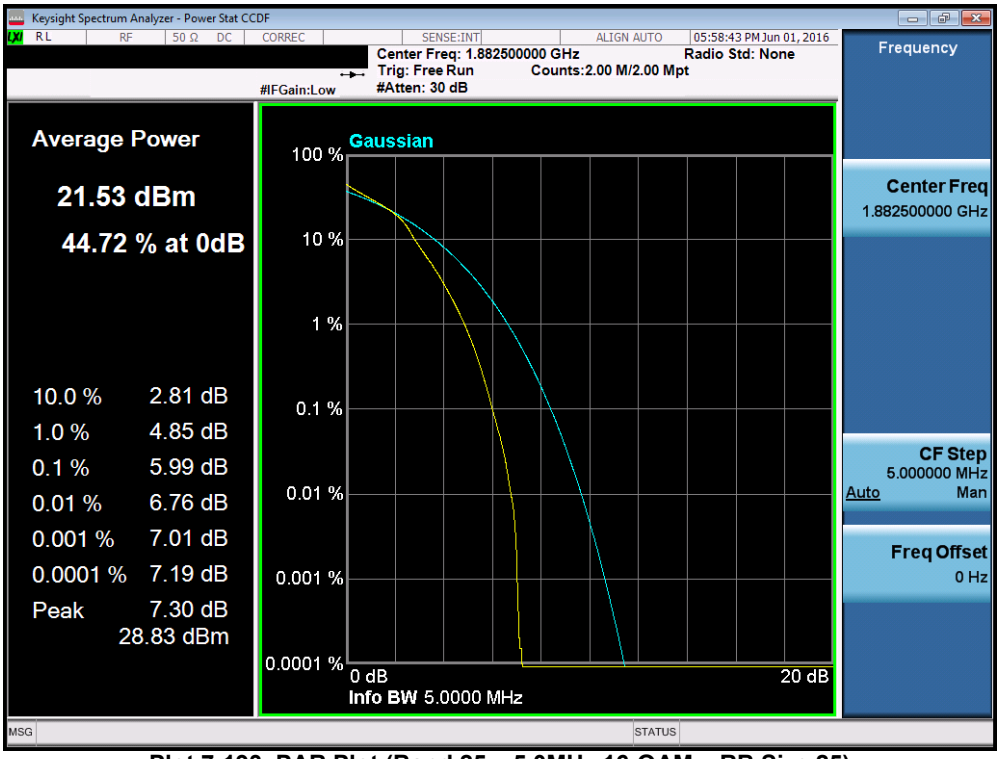


Plot 7-192. PAR Plot (Band 25 – 5.0MHz QPSK – RB Size 25)



Plot 7-193. PAR Plot (Band 25 – 5.0MHz 16-QAM – RB Size 25)

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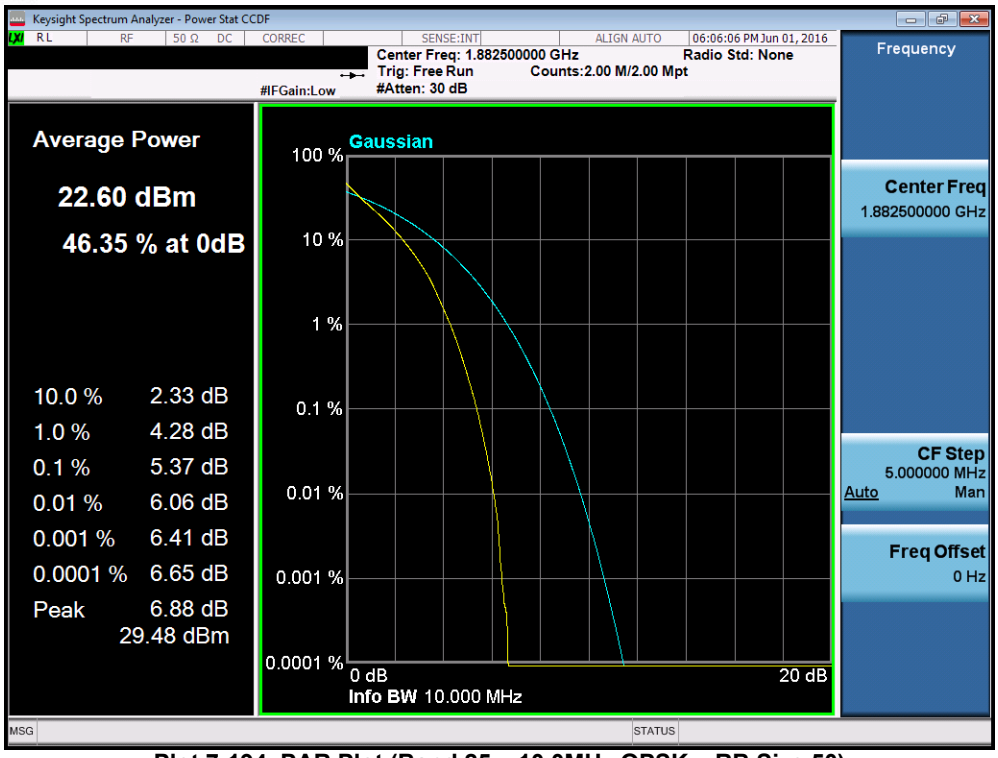
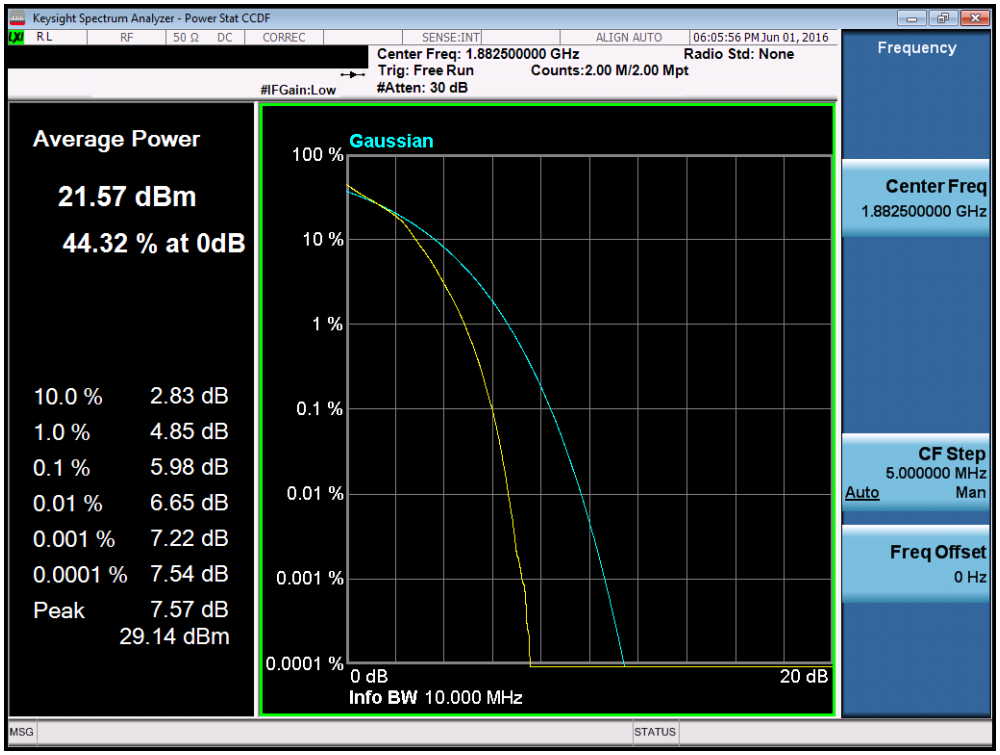


Plot 7-194. PAR Plot (Band 25 – 10.0MHz QPSK – RB Size 50)



Plot 7-195. PAR Plot (Band 25 – 10.0MHz 16-QAM – RB Size 50)

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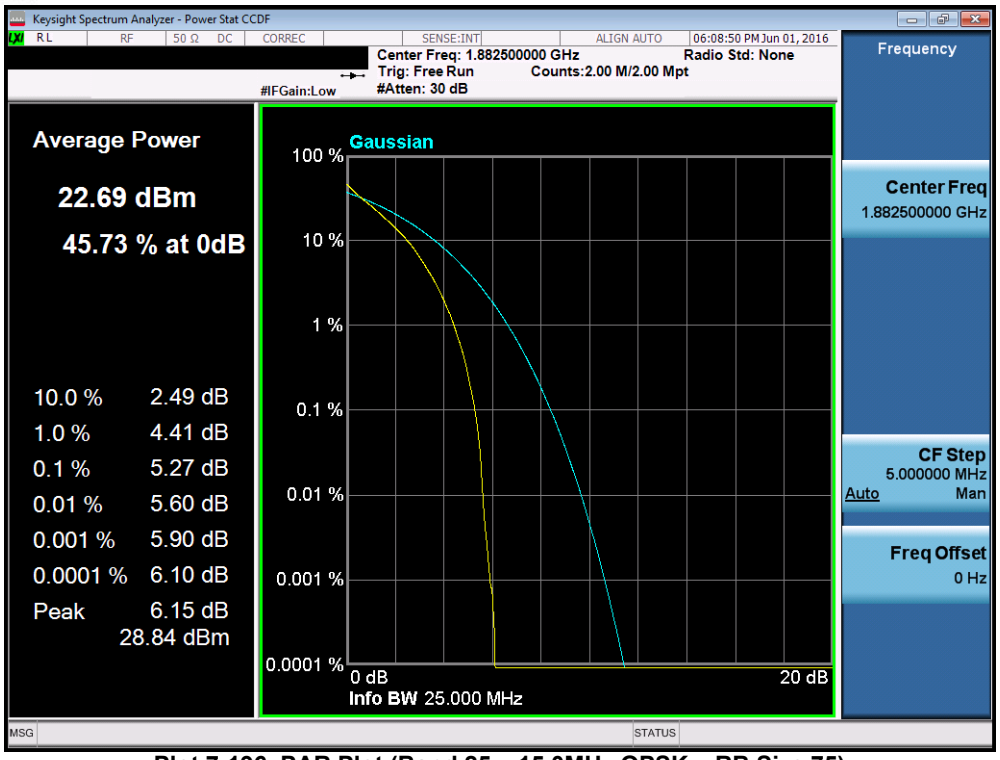
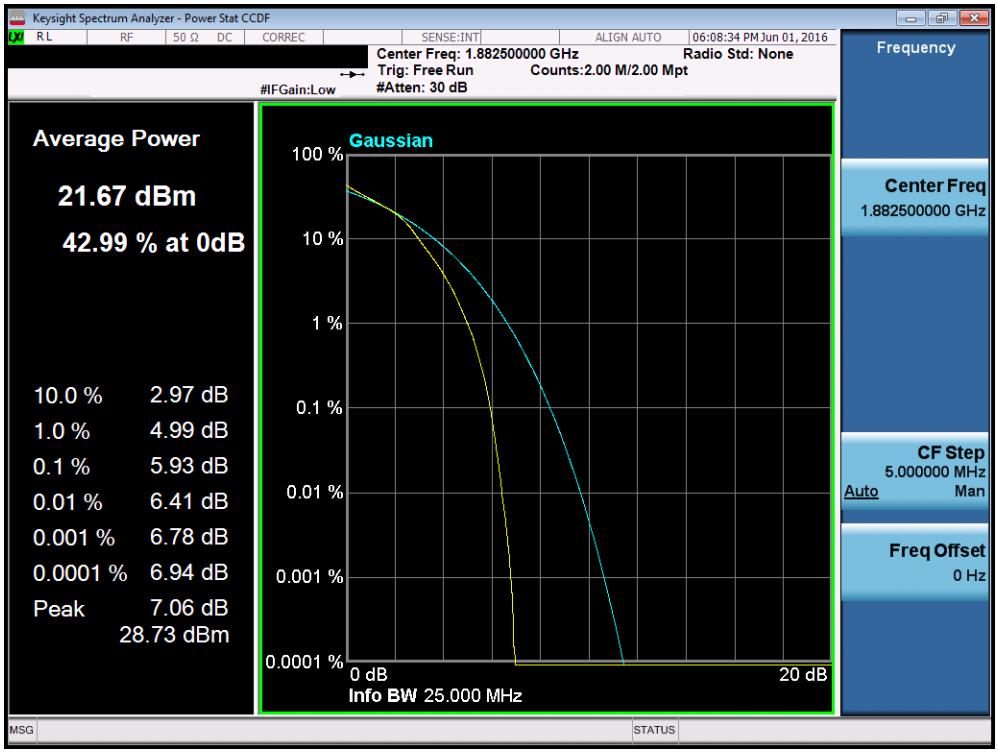


Plot 7-196. PAR Plot (Band 25 – 15.0MHz QPSK – RB Size 75)



Plot 7-197. PAR Plot (Band 25 – 15.0MHz 16-QAM – RB Size 75)

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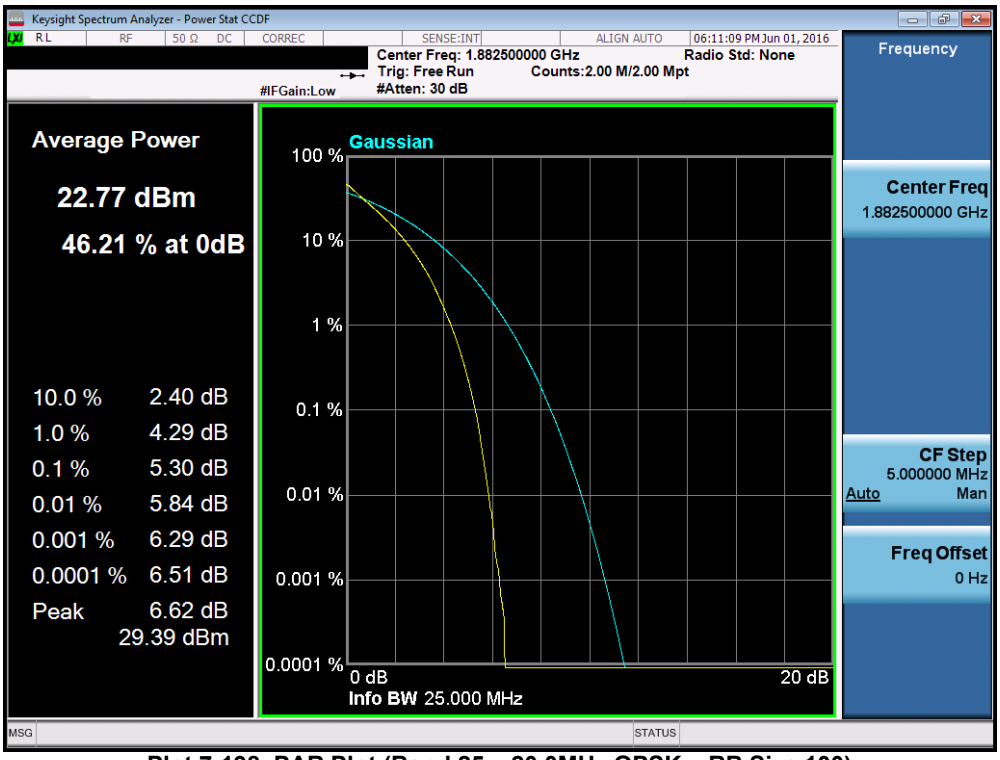
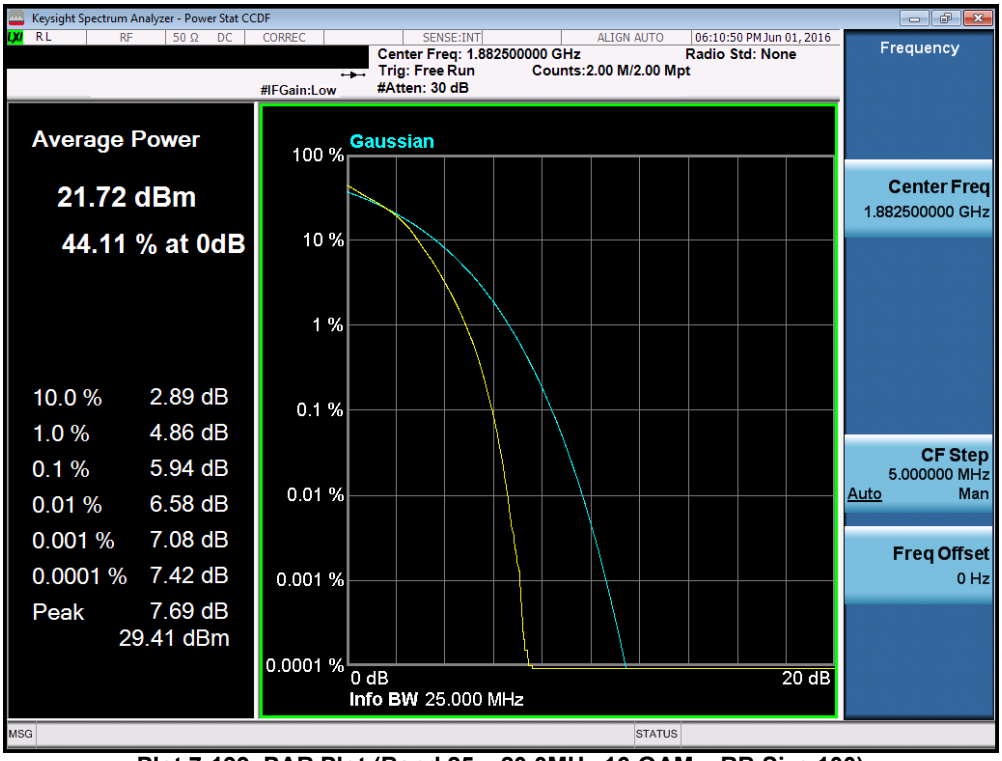


Plot 7-198. PAR Plot (Band 25 – 20.0MHz QPSK – RB Size 100)



Plot 7-199. PAR Plot (Band 25 – 20.0MHz 16-QAM – RB Size 100)

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7.6 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(c.10) §27.50(d.4)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – 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. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
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". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
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.

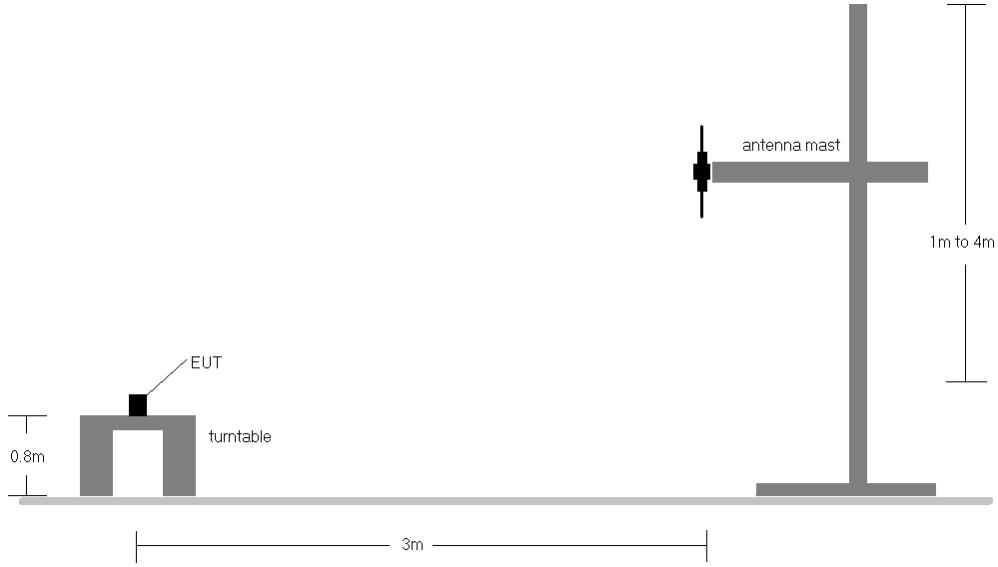

Figure 7-5. Radiated Test Setup <1GHz

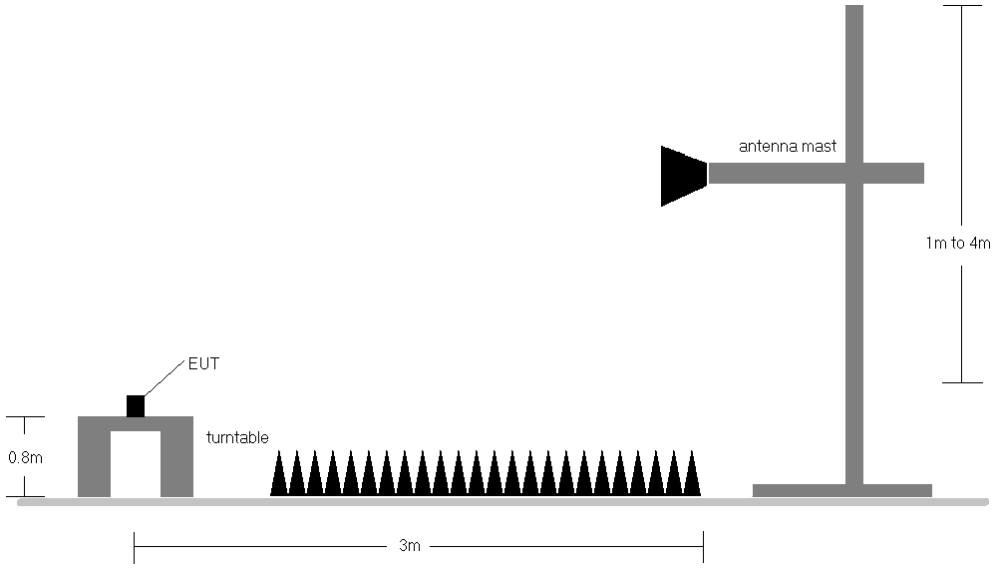

Figure 7-6. Radiated Test Setup >1GHz

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 [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	201	5	1 / 0	17.86	-0.25	17.61	34.77	-17.16
707.50	1.4	QPSK	H	202	3	1 / 0	18.32	-0.28	18.04	34.77	-16.73
715.30	1.4	QPSK	H	202	5	1 / 0	18.73	-0.31	18.42	34.77	-16.35
699.70	1.4	16-QAM	H	201	5	1 / 0	17.06	-0.25	16.81	34.77	-17.96
707.50	1.4	16-QAM	H	202	3	1 / 0	17.48	-0.28	17.20	34.77	-17.57
715.30	1.4	16-QAM	H	202	5	1 / 0	17.96	-0.31	17.65	34.77	-17.12
700.50	3	QPSK	H	202	5	1 / 0	17.98	-0.25	17.73	34.77	-17.04
707.50	3	QPSK	H	202	355	1 / 0	18.41	-0.28	18.13	34.77	-16.64
714.50	3	QPSK	H	202	358	1 / 0	18.87	-0.31	18.56	34.77	-16.21
700.50	3	16-QAM	H	202	5	1 / 0	17.12	-0.25	16.87	34.77	-17.90
707.50	3	16-QAM	H	202	355	1 / 0	17.58	-0.28	17.30	34.77	-17.47
714.50	3	16-QAM	H	202	358	1 / 0	18.15	-0.31	17.84	34.77	-16.93
701.50	5	QPSK	H	203	358	1 / 0	17.85	-0.26	17.59	34.77	-17.18
707.50	5	QPSK	H	202	5	1 / 0	18.33	-0.28	18.05	34.77	-16.72
713.50	5	QPSK	H	203	5	1 / 0	18.75	-0.30	18.45	34.77	-16.33
701.50	5	16-QAM	H	203	358	1 / 0	17.15	-0.26	16.89	34.77	-17.88
707.50	5	16-QAM	H	202	5	1 / 0	17.64	-0.28	17.36	34.77	-17.41
713.50	5	16-QAM	H	203	5	1 / 0	17.98	-0.30	17.68	34.77	-17.10
704.00	10	QPSK	H	202	5	1 / 0	18.01	-0.27	17.74	34.77	-17.03
707.50	10	QPSK	H	203	355	1 / 0	18.38	-0.28	18.10	34.77	-16.67
711.00	10	QPSK	H	202	5	1 / 0	18.57	-0.29	18.28	34.77	-16.50
704.00	10	16-QAM	H	202	5	1 / 0	17.18	-0.27	16.91	34.77	-17.86
707.50	10	16-QAM	H	203	355	1 / 0	17.68	-0.28	17.40	34.77	-17.37
711.00	10	16-QAM	H	202	5	1 / 0	17.67	-0.29	17.38	34.77	-17.40

Table 7-2. ERP Data (Band 12)

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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 [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	100	209	1 / 5	16.45	-0.75	15.70	38.45	-22.75
836.50	1.4	QPSK	H	100	212	1 / 5	18.32	-0.84	17.48	38.45	-20.98
848.30	1.4	QPSK	H	100	220	1 / 5	19.28	-0.94	18.34	38.45	-20.11
824.70	1.4	16-QAM	H	100	209	1 / 5	15.67	-0.75	14.92	38.45	-23.53
836.50	1.4	16-QAM	H	100	212	1 / 5	17.52	-0.84	16.68	38.45	-21.78
848.30	1.4	16-QAM	H	100	220	1 / 5	18.52	-0.94	17.58	38.45	-20.87
825.50	3	QPSK	H	100	215	1 / 14	16.98	-0.75	16.22	38.45	-22.23
836.50	3	QPSK	H	100	216	1 / 14	18.46	-0.84	17.62	38.45	-20.84
847.50	3	QPSK	H	100	214	1 / 14	19.10	-0.93	18.17	38.45	-20.28
825.50	3	16-QAM	H	100	215	1 / 14	16.12	-0.75	15.36	38.45	-23.09
836.50	3	16-QAM	H	100	216	1 / 14	17.65	-0.84	16.81	38.45	-21.65
847.50	3	16-QAM	H	100	214	1 / 14	18.46	-0.93	17.53	38.45	-20.92
826.50	5	QPSK	H	100	205	1 / 24	17.20	-0.76	16.44	38.45	-22.02
836.50	5	QPSK	H	100	209	1 / 24	18.33	-0.84	17.49	38.45	-20.97
846.50	5	QPSK	H	100	223	1 / 24	18.98	-0.92	18.06	38.45	-20.40
826.50	5	16-QAM	H	100	205	1 / 24	16.50	-0.76	15.74	38.45	-22.72
836.50	5	16-QAM	H	100	209	1 / 24	17.57	-0.84	16.73	38.45	-21.73
846.50	5	16-QAM	H	100	223	1 / 24	18.34	-0.92	17.42	38.45	-21.04
829.00	10	QPSK	H	100	220	1 / 49	18.40	-0.78	17.62	38.45	-20.84
836.50	10	QPSK	H	101	217	1 / 49	18.81	-0.84	17.97	38.45	-20.49
844.00	10	QPSK	H	100	219	1 / 49	19.32	-0.90	18.42	38.45	-20.04
829.00	10	16-QAM	H	100	220	1 / 49	17.56	-0.78	16.78	38.45	-21.68
836.50	10	16-QAM	H	101	217	1 / 49	18.01	-0.84	17.17	38.45	-21.29
844.00	10	16-QAM	H	100	219	1 / 49	18.49	-0.90	17.59	38.45	-20.87
831.50	15	QPSK	H	100	215	1 / 74	18.61	-0.80	17.81	38.45	-20.65
836.50	15	QPSK	H	100	37	1 / 74	18.52	-0.84	17.68	38.45	-20.78
841.50	15	QPSK	H	101	219	1 / 74	19.42	-0.88	18.54	38.45	-19.92
831.50	15	16-QAM	H	100	215	1 / 74	17.75	-0.80	16.95	38.45	-21.51
836.50	15	16-QAM	H	100	37	1 / 74	17.53	-0.84	16.69	38.45	-21.77
841.50	15	16-QAM	H	101	219	1 / 74	18.34	-0.88	17.46	38.45	-21.00

Table 7-3. ERP Data (Band 5/26)

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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 Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	103	287	1 / 5	15.66	8.23	23.89	30.00	-6.11
1732.50	1.4	QPSK	H	103	287	1 / 5	17.73	8.18	25.90	30.00	-4.10
1754.30	1.4	QPSK	H	103	287	1 / 5	18.64	8.12	26.76	30.00	-3.24
1710.70	1.4	16-QAM	H	103	287	1 / 5	14.93	8.23	23.16	30.00	-6.84
1732.50	1.4	16-QAM	H	103	287	1 / 5	16.86	8.18	25.03	30.00	-4.97
1754.30	1.4	16-QAM	H	103	287	1 / 5	17.43	8.12	25.55	30.00	-4.45
1711.50	3	QPSK	H	103	287	1 / 14	15.50	8.23	23.73	30.00	-6.27
1732.50	3	QPSK	H	103	287	1 / 14	17.84	8.18	26.01	30.00	-3.99
1753.50	3	QPSK	H	103	287	1 / 14	18.86	8.12	26.98	30.00	-3.02
1711.50	3	16-QAM	H	103	287	1 / 14	14.70	8.23	22.93	30.00	-7.07
1732.50	3	16-QAM	H	103	287	1 / 14	17.03	8.18	25.20	30.00	-4.80
1753.50	3	16-QAM	H	103	287	1 / 14	17.46	8.12	25.58	30.00	-4.42
1712.50	5	QPSK	H	130	285	1 / 24	15.03	8.23	23.25	30.00	-6.75
1732.50	5	QPSK	H	130	285	1 / 24	17.82	8.18	25.99	30.00	-4.01
1752.50	5	QPSK	H	130	285	1 / 24	18.60	8.13	26.72	30.00	-3.28
1712.50	5	16-QAM	H	130	285	1 / 24	14.35	8.23	22.57	30.00	-7.43
1732.50	5	16-QAM	H	130	285	1 / 24	17.02	8.18	25.19	30.00	-4.81
1752.50	5	16-QAM	H	130	285	1 / 24	17.37	8.13	25.49	30.00	-4.51
1715.00	10	QPSK	H	105	297	1 / 49	14.59	8.22	22.81	30.00	-7.19
1732.50	10	QPSK	H	105	297	1 / 49	18.06	8.18	26.23	30.00	-3.77
1750.00	10	QPSK	H	105	297	1 / 49	18.56	8.13	26.69	30.00	-3.31
1715.00	10	16-QAM	H	105	297	1 / 49	13.74	8.22	21.96	30.00	-8.04
1732.50	10	16-QAM	H	105	297	1 / 49	17.30	8.18	25.47	30.00	-4.53
1750.00	10	16-QAM	H	105	297	1 / 49	17.43	8.13	25.56	30.00	-4.44
1717.50	15	QPSK	H	101	282	1 / 74	16.08	8.22	24.29	30.00	-5.71
1732.50	15	QPSK	H	101	282	1 / 74	18.13	8.18	26.30	30.00	-3.70
1747.50	15	QPSK	H	101	282	1 / 74	18.31	8.14	26.44	30.00	-3.56
1717.50	15	16-QAM	H	101	282	1 / 74	15.14	8.22	23.35	30.00	-6.65
1732.50	15	16-QAM	H	101	282	1 / 74	17.31	8.18	25.48	30.00	-4.52
1747.50	15	16-QAM	H	101	282	1 / 74	17.19	8.14	25.32	30.00	-4.68
1720.00	20	QPSK	H	103	283	1 / 99	17.57	8.21	25.77	30.00	-4.23
1732.50	20	QPSK	H	103	283	1 / 99	18.28	8.18	26.45	30.00	-3.55
1745.00	20	QPSK	H	103	283	1 / 99	18.32	8.15	26.46	30.00	-3.54
1720.00	20	16-QAM	H	103	283	1 / 99	16.67	8.21	24.87	30.00	-5.13
1732.50	20	16-QAM	H	103	283	1 / 99	17.64	8.18	25.81	30.00	-4.19
1745.00	20	16-QAM	H	103	283	1 / 99	17.42	8.15	25.56	30.00	-4.44

Table 7-4. EIRP Data (Band 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 Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	132	301	1 / 5	17.27	7.99	25.26	33.01	-7.75
1882.50	1.4	QPSK	H	133	294	1 / 5	17.71	7.97	25.69	33.01	-7.32
1914.30	1.4	QPSK	H	166	287	1 / 5	16.93	8.07	25.00	33.01	-8.01
1850.70	1.4	16-QAM	H	132	301	1 / 5	16.37	7.99	24.36	33.01	-8.65
1882.50	1.4	16-QAM	H	133	294	1 / 5	16.80	7.97	24.78	33.01	-8.23
1914.30	1.4	16-QAM	H	166	287	1 / 5	16.05	8.07	24.12	33.01	-8.89
1851.50	3	QPSK	H	132	295	1 / 14	17.13	7.99	25.12	33.01	-7.89
1882.50	3	QPSK	H	132	299	1 / 14	16.99	7.97	24.97	33.01	-8.04
1913.50	3	QPSK	H	164	289	1 / 14	16.53	8.07	24.60	33.01	-8.41
1851.50	3	16-QAM	H	132	295	1 / 14	16.16	7.99	24.15	33.01	-8.86
1882.50	3	16-QAM	H	132	299	1 / 14	16.15	7.97	24.13	33.01	-8.88
1913.50	3	16-QAM	H	164	289	1 / 14	15.57	8.07	23.64	33.01	-9.37
1852.50	5	QPSK	H	132	297	1 / 24	17.23	7.99	25.22	33.01	-7.79
1882.50	5	QPSK	H	129	295	1 / 24	16.80	7.97	24.78	33.01	-8.23
1912.50	5	QPSK	H	165	280	1 / 24	16.05	8.06	24.11	33.01	-8.90
1852.50	5	16-QAM	H	132	297	1 / 24	16.41	7.99	24.40	33.01	-8.61
1882.50	5	16-QAM	H	129	295	1 / 24	15.99	7.97	23.97	33.01	-9.04
1912.50	5	16-QAM	H	165	280	1 / 24	15.16	8.06	23.22	33.01	-9.79
1855.00	10	QPSK	H	134	299	1 / 49	17.17	7.99	25.16	33.01	-7.85
1882.50	10	QPSK	H	130	294	1 / 49	16.50	7.97	24.48	33.01	-8.53
1910.00	10	QPSK	H	167	292	1 / 49	17.33	8.04	25.37	33.01	-7.64
1855.00	10	16-QAM	H	134	299	1 / 49	16.31	7.99	24.30	33.01	-8.71
1882.50	10	16-QAM	H	130	294	1 / 49	15.66	7.97	23.64	33.01	-9.37
1910.00	10	16-QAM	H	167	292	1 / 49	16.39	8.04	24.43	33.01	-8.58
1857.50	15	QPSK	H	133	296	1 / 74	17.80	7.98	25.79	33.01	-7.22
1882.50	15	QPSK	H	134	286	1 / 74	16.03	7.97	24.01	33.01	-9.00
1907.50	15	QPSK	H	168	291	1 / 74	16.96	8.02	24.99	33.01	-8.03
1857.50	15	16-QAM	H	133	296	1 / 74	16.95	7.98	24.94	33.01	-8.07
1882.50	15	16-QAM	H	134	286	1 / 74	15.20	7.97	23.18	33.01	-9.83
1907.50	15	16-QAM	H	168	291	1 / 74	15.99	8.02	24.02	33.01	-9.00
1860.00	20	QPSK	H	164	298	1 / 99	16.48	7.98	24.47	33.01	-8.54
1882.50	20	QPSK	H	201	130	1 / 99	15.87	7.97	23.85	33.01	-9.16
1905.00	20	QPSK	H	164	297	1 / 99	16.50	8.00	24.51	33.01	-8.50
1860.00	20	16-QAM	H	164	298	1 / 99	15.59	7.98	23.58	33.01	-9.43
1882.50	20	16-QAM	H	164	297	1 / 99	15.06	7.97	23.04	33.01	-9.97
1905.00	20	16-QAM	H	201	130	1 / 99	15.64	8.00	23.65	33.01	-9.36

Table 7-5. EIRP Data (Band 25)

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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 Limit [dBm]	Margin [dB]
2498.50	5	QPSK	V	122	145	1 / 24	12.17	8.98	21.15	33.01	-11.86
2593.00	5	QPSK	V	120	55	1 / 24	11.54	9.26	20.80	33.01	-12.21
2687.50	5	QPSK	V	119	49	1 / 24	13.86	9.66	23.52	33.01	-9.49
2498.50	5	16-QAM	V	122	145	1 / 24	11.07	8.98	20.05	33.01	-12.96
2593.00	5	16-QAM	V	120	55	1 / 24	10.72	9.26	19.98	33.01	-13.03
2687.50	5	16-QAM	V	119	49	1 / 24	13.16	9.66	22.82	33.01	-10.19
2501.00	10	QPSK	V	131	138	1 / 49	11.48	8.98	20.46	33.01	-12.55
2593.00	10	QPSK	V	150	17	1 / 49	11.52	9.26	20.78	33.01	-12.23
2685.00	10	QPSK	V	125	234	1 / 49	11.60	9.65	21.25	33.01	-11.76
2501.00	10	16-QAM	V	131	138	1 / 49	10.35	8.98	19.33	33.01	-13.68
2593.00	10	16-QAM	V	150	17	1 / 49	10.64	9.26	19.90	33.01	-13.11
2685.00	10	16-QAM	V	125	234	1 / 49	10.92	9.65	20.57	33.01	-12.44
2503.50	15	QPSK	V	153	67	1 / 74	12.85	8.99	21.84	33.01	-11.17
2593.00	15	QPSK	V	155	18	1 / 74	11.19	9.26	20.45	33.01	-12.56
2682.50	15	QPSK	V	164	339	1 / 74	11.73	9.64	21.37	33.01	-11.64
2503.50	15	16-QAM	V	153	67	1 / 74	11.54	8.99	20.53	33.01	-12.48
2593.00	15	16-QAM	V	155	18	1 / 74	10.25	9.26	19.51	33.01	-13.50
2682.50	15	16-QAM	V	164	339	1 / 74	10.98	9.64	20.62	33.01	-12.39
2506.00	20	QPSK	V	107	195	1 / 99	10.11	9.00	19.11	33.01	-13.90
2593.00	20	QPSK	V	100	6	1 / 99	11.25	9.26	20.51	33.01	-12.50
2680.00	20	QPSK	V	150	328	1 / 99	11.96	9.63	21.59	33.01	-11.42
2506.00	20	16-QAM	V	107	195	1 / 99	9.07	9.00	18.07	33.01	-14.94
2593.00	20	16-QAM	V	100	6	1 / 99	10.34	9.26	19.60	33.01	-13.41
2680.00	20	16-QAM	V	150	328	1 / 99	11.13	9.63	20.76	33.01	-12.25

Table 7-6. EIRP Data (Band 41)

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7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – 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 = Peak
6. Trace mode = max hold
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.

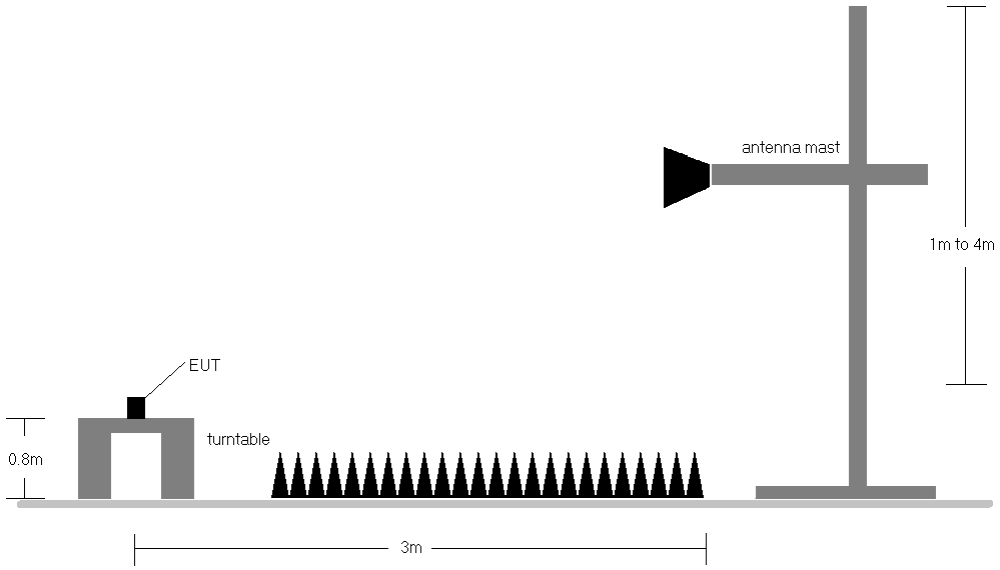

Figure 7-7. Test Instrument & Measurement Setup

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) Data cells with "-" indicate that only noise floor was measured.

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OPERATING FREQUENCY:	700.50	MHz		
CHANNEL:	23025			
MEASURED OUTPUT POWER:	17.73	dBm	=	0.059 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.73	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1401.00	H	175	292	-59.55	6.19	-53.37	71.1
2101.50	H	111	64	-50.89	6.76	-44.13	61.9
2802.00	H	-	-	-62.72	8.03	-54.69	72.4

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

OPERATING FREQUENCY:	707.50	MHz		
CHANNEL:	23095			
MEASURED OUTPUT POWER:	18.13	dBm	=	0.065 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.13	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	132	198	-60.06	6.23	-53.83	72.0
2122.50	H	115	45	-49.91	6.80	-43.11	61.2
2830.00	H	-	-	-62.14	8.07	-54.07	72.2

Table 7-8. Radiated Spurious Data (Band 12 – Mid Channel)

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OPERATING FREQUENCY:	714.50	MHz		
CHANNEL:	23165			
MEASURED OUTPUT POWER:	18.56	dBm	=	0.072 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.56	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1429.00	H	100	215	-62.54	6.27	-56.27	74.8
2143.50	H	109	282	-49.45	6.84	-42.61	61.2
2858.00	H	-	-	-62.65	8.11	-54.54	73.1

Table 7-9. Radiated Spurious Data (Band 12 – High Channel)

OPERATING FREQUENCY:	831.50	MHz		
CHANNEL:	26865			
MEASURED OUTPUT POWER:	17.81	dBm	=	0.060 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.81	dBc	

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]	[dBc]
1663.00	H	189	118	-63.28	6.18	-57.10	74.9
2494.50	H	142	345	-50.59	6.61	-43.98	61.8
3326.00	H	-	-	-60.61	7.07	-53.54	71.3

Table 7-10. Radiated Spurious Data (Band 26 – Low Channel)

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OPERATING FREQUENCY:	836.50	MHz		
CHANNEL:	26915			
MEASURED OUTPUT POWER:	17.68	dBm	=	0.059 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.68	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	H	145	120	-64.95	6.13	-58.82	76.5
2509.50	H	140	325	-49.71	6.64	-43.08	60.8
3346.00	H	-	-	-61.04	7.14	-53.90	71.6

Table 7-11. Radiated Spurious Data (Band 26 – Mid Channel)

OPERATING FREQUENCY:	841.50	MHz		
CHANNEL:	26965			
MEASURED OUTPUT POWER:	18.54	dBm	=	0.071 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.54	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1683.00	H	196	125	-62.10	6.08	-56.02	74.6
2524.50	H	148	355	-48.98	6.68	-42.30	60.8
3366.00	H	-	-	-60.95	7.20	-53.74	72.3

Table 7-12. Radiated Spurious Data (Band 26 – High Channel)

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OPERATING FREQUENCY:	1711.50	MHz		
CHANNEL:	19965			
MEASURED OUTPUT POWER:	23.73	dBm	=	0.236 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.73	dBc	

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]	[dBc]
3423.00	H	138	326	-57.88	9.53	-48.35	72.1
5134.50	H	-	-	-55.05	11.03	-44.02	67.7

Table 7-13. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY:	1732.50	MHz		
CHANNEL:	20175			
MEASURED OUTPUT POWER:	26.01	dBm	=	0.399 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	39.01	dBc	

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]	[dBc]
3465.00	H	143	5	-56.35	9.64	-46.71	72.7
5197.50	H	138	235	-53.67	10.98	-42.69	68.7
6930.00	H	-	-	-51.70	10.85	-40.85	66.9

Table 7-14. Radiated Spurious Data (Band 4 – Mid Channel)

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OPERATING FREQUENCY:	1753.50	MHz		
CHANNEL:	20385			
MEASURED OUTPUT POWER:	26.98	dBm	=	0.499 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	39.98	dBc	

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]	[dBc]
3507.00	H	117	318	-58.15	9.75	-48.40	75.4
5260.50	H	-	-	-55.41	11.06	-44.35	71.3

Table 7-15. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY:	1857.50	MHz		
CHANNEL:	26115			
MEASURED OUTPUT POWER:	25.79	dBm	=	0.379 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.79	dBc	

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]	[dBc]
3715.00	H	158	134	-55.68	9.85	-45.83	71.6
5572.50	H	109	115	-50.75	11.19	-39.57	65.4
7430.00	H	-	-	-51.02	10.87	-40.15	65.9

Table 7-16. Radiated Spurious Data (Band 25 – Low Channel)

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OPERATING FREQUENCY:	1882.50	MHz		
CHANNEL:	26365			
MEASURED OUTPUT POWER:	24.01	dBm	=	0.252 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.01	dBc	

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]	[dBc]
3765.00	H	141	357	-52.41	9.61	-42.80	66.8
5647.50	H	150	46	-48.58	11.30	-37.28	61.3
7530.00	H	-	-	-51.14	11.15	-40.00	64.0

Table 7-17. Radiated Spurious Data (Band 25 – Mid Channel)

OPERATING FREQUENCY:	1907.50	MHz		
CHANNEL:	26615			
MEASURED OUTPUT POWER:	24.99	dBm	=	0.315 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.99	dBc	

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]	[dBc]
3815.00	H	127	18	-55.02	9.40	-45.62	70.6
5722.50	H	132	310	-54.01	11.37	-42.65	67.6
7630.00	H	-	-	-50.79	11.34	-39.45	64.4

Table 7-18. Radiated Spurious Data (Band 25 – High Channel)

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OPERATING FREQUENCY:	2498.50	MHz		
CHANNEL:	39675			
MEASURED OUTPUT POWER:	21.15	dBm	=	0.130 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	46.15	dBc	

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]	[dBc]
4997.00	V	100	35	-49.41	11.18	-38.24	59.4
7495.50	V	180	323	-43.03	11.06	-31.97	53.1
9994.00	V	105	355	-46.27	12.33	-33.94	55.1
12492.50	V	-	-	-47.92	13.11	-34.81	56.0

Table 7-19. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz		
CHANNEL:	40620			
MEASURED OUTPUT POWER:	20.80	dBm	=	0.120 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	45.80	dBc	

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]	[dBc]
5186.00	V	118	165	-42.05	10.99	-31.06	51.9
7779.00	V	108	45	-41.89	11.42	-30.46	51.3
10372.00	V	100	44	-45.57	12.57	-33.01	53.8
12965.00	V	-	-	-47.22	12.80	-34.42	55.2

Table 7-20. Radiated Spurious Data (Band 41 – Mid Channel)

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OPERATING FREQUENCY:	2687.50	MHz		
CHANNEL:	41565			
MEASURED OUTPUT POWER:	23.52	dBm	=	0.225 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	48.52	dBc	

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]	[dBc]
5375.00	V	120	46	-40.46	11.11	-29.35	52.9
8062.50	V	120	45	-40.92	11.21	-29.71	53.2
10750.00	V	122	42	-49.65	12.93	-36.72	60.2
13437.50	V	-	-	-50.33	12.80	-37.53	61.1

Table 7-21. Radiated Spurious Data (Band 41 – High Channel)

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7.8 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. 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 and 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-D-2010

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 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,500,168	168	0.0000237
100 %		- 30	707,500,147	147	0.0000208
100 %		- 20	707,500,190	190	0.0000269
100 %		- 10	707,500,201	201	0.0000284
100 %		0	707,500,155	155	0.0000219
100 %		+ 10	707,500,187	187	0.0000264
100 %		+ 20	707,500,168	168	0.0000237
100 %		+ 30	707,500,194	194	0.0000274
100 %		+ 40	707,500,210	210	0.0000297
100 %		+ 50	707,500,137	137	0.0000194
115 %	4.43	+ 20	707,500,220	220	0.0000311
BATT. ENDPOINT	3.45	+ 20	707,500,231	231	0.0000327

Table 7-22. Frequency Stability Data (Band 12)

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 Frequency Stability Measurements

§2.1055 §27.54

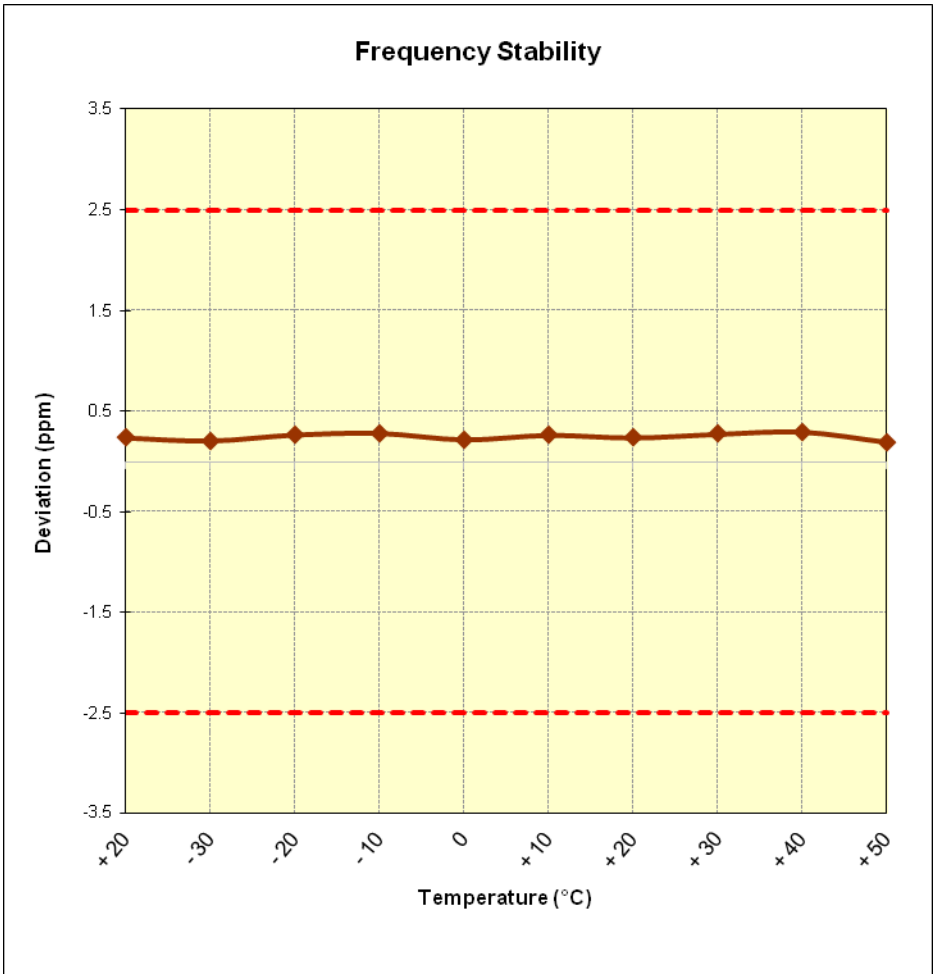

Figure 7-8. Frequency Stability Graph (Band 12)

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Band 26 Frequency Stability Measurements
§2.1055 §22.355

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	831,500,198	198	0.0000238
100 %		- 30	831,500,201	201	0.0000242
100 %		- 20	831,500,164	164	0.0000197
100 %		- 10	831,500,159	159	0.0000191
100 %		0	831,500,204	204	0.0000245
100 %		+ 10	831,500,145	145	0.0000174
100 %		+ 20	831,500,198	198	0.0000238
100 %		+ 30	831,500,204	204	0.0000245
100 %		+ 40	831,500,211	211	0.0000254
100 %		+ 50	831,500,196	196	0.0000236
115 %	4.43	+ 20	831,500,220	220	0.0000265
BATT. ENDPOINT	3.45	+ 20	831,500,229	229	0.0000275

Table 7-23. Frequency Stability Data (Band 26)

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Band 26 Frequency Stability Measurements

§2.1055 §22.355

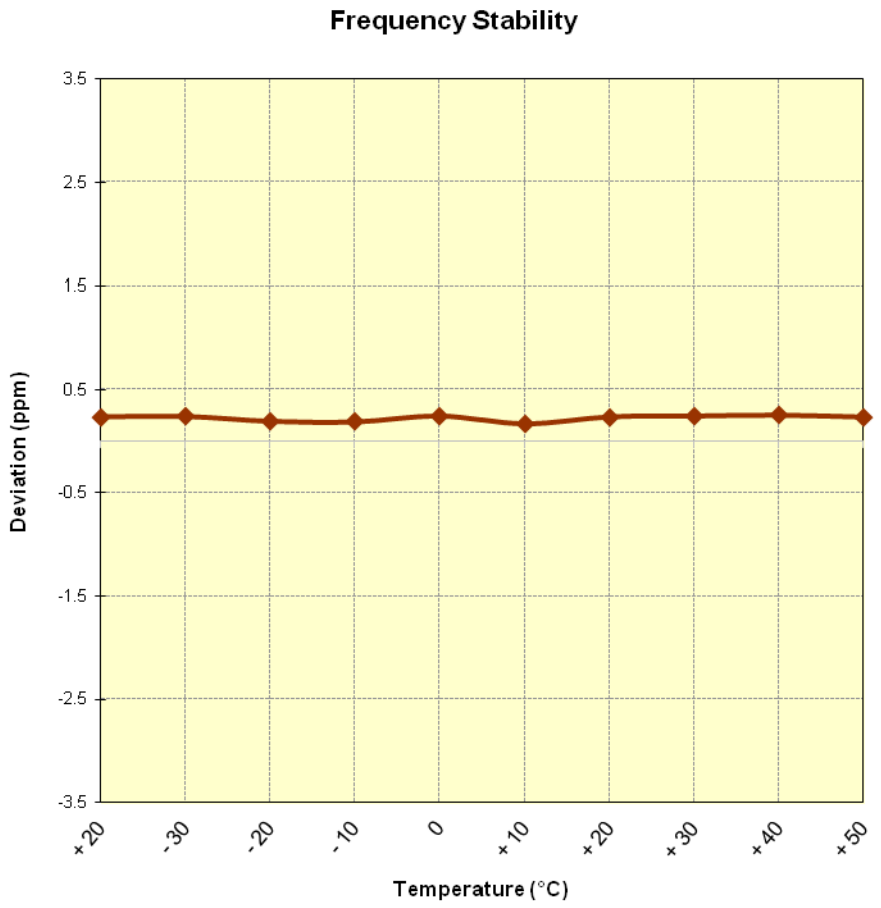

Figure 7-9. Frequency Stability Graph (Band 26)

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Band 4 Frequency Stability Measurements
§2.1055 §§27.54

OPERATING FREQUENCY: 1,732,500,000 Hz

CHANNEL: 20175

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,500,184	184	0.0000106
100 %		- 30	1,732,500,212	212	0.0000122
100 %		- 20	1,732,500,166	166	0.0000096
100 %		- 10	1,732,500,158	158	0.0000091
100 %		0	1,732,500,191	191	0.0000110
100 %		+ 10	1,732,500,181	181	0.0000104
100 %		+ 20	1,732,500,184	184	0.0000106
100 %		+ 30	1,732,500,154	154	0.0000089
100 %		+ 40	1,732,500,207	207	0.0000119
100 %		+ 50	1,732,500,192	192	0.0000111
115 %	4.43	+ 20	1,732,500,205	205	0.0000118
BATT. ENDPOINT	3.45	+ 20	1,732,500,211	211	0.0000122

Table 7-24. Frequency Stability Data (Band 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 4 Frequency Stability Measurements

§2.1055 §§27.54

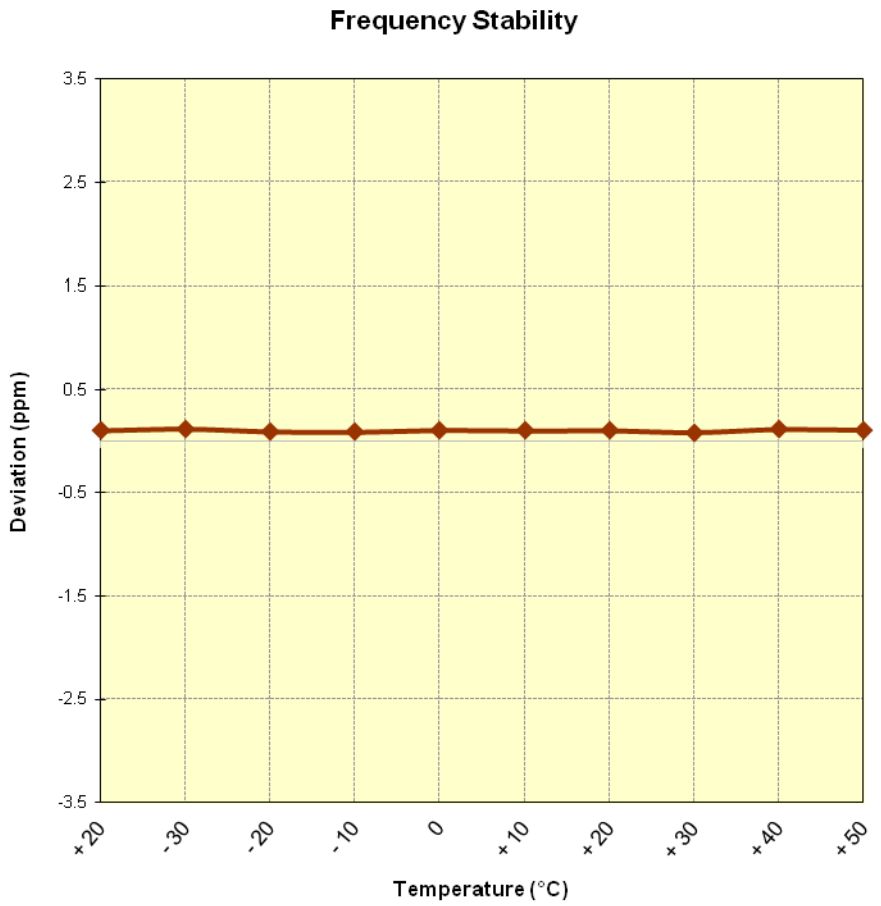

Figure 7-10. Frequency Stability Graph (Band 4)

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Band 25 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,882,500,179	179	0.0000095
100 %		- 30	1,882,500,201	201	0.0000107
100 %		- 20	1,882,500,164	164	0.0000087
100 %		- 10	1,882,500,182	182	0.0000097
100 %		0	1,882,500,207	207	0.0000110
100 %		+ 10	1,882,500,201	201	0.0000107
100 %		+ 20	1,882,500,179	179	0.0000095
100 %		+ 30	1,882,500,167	167	0.0000089
100 %		+ 40	1,882,500,212	212	0.0000113
100 %		+ 50	1,882,500,188	188	0.0000100
115 %	4.43	+ 20	1,882,500,201	201	0.0000107
BATT. ENDPOINT	3.45	+ 20	1,882,500,209	209	0.0000111

Table 7-25. Frequency Stability Data (Band 25)

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 25 Frequency Stability Measurements

§2.1055 §24.235

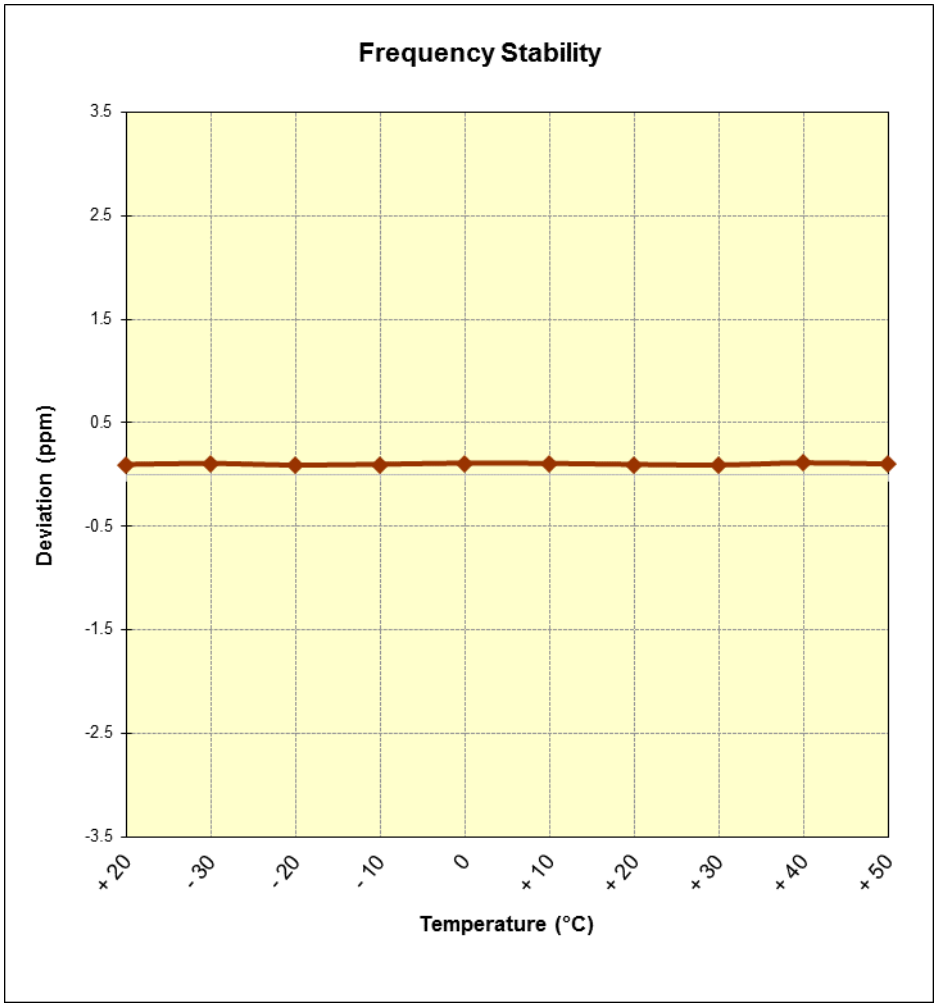

Figure 7-11. Frequency Stability Graph (Band 25)

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Band 41 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,593,000,197	197	0.0000076
100 %		- 30	2,593,000,200	200	0.0000077
100 %		- 20	2,593,000,181	181	0.0000070
100 %		- 10	2,593,000,213	213	0.0000082
100 %		0	2,593,000,201	201	0.0000078
100 %		+ 10	2,593,000,186	186	0.0000072
100 %		+ 20	2,593,000,197	197	0.0000076
100 %		+ 30	2,593,000,149	149	0.0000057
100 %		+ 40	2,593,000,155	155	0.0000060
100 %		+ 50	2,593,000,186	186	0.0000072
115 %	4.43	+ 20	2,593,000,204	204	0.0000079
BATT. ENDPOINT	3.45	+ 20	2,593,000,217	217	0.0000084

Table 7-26. Frequency Stability Data (Band 41)

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 41 Frequency Stability Measurements

§2.1055 §27.54

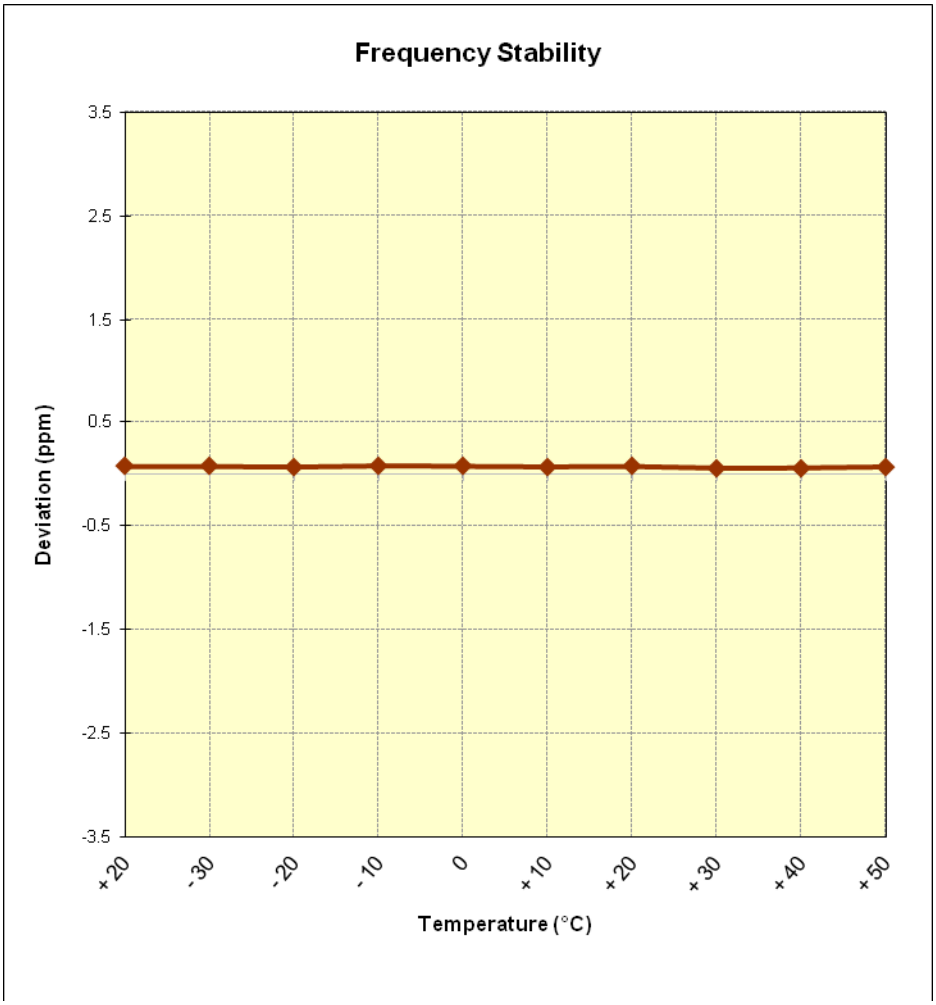

Figure 7-12. Frequency Stability Graph (Band 41)

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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: ZNFLS755** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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