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 D01 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.

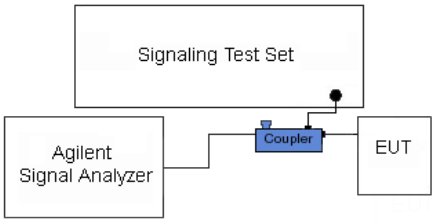

Figure 7-3. Test Instrument & Measurement Setup

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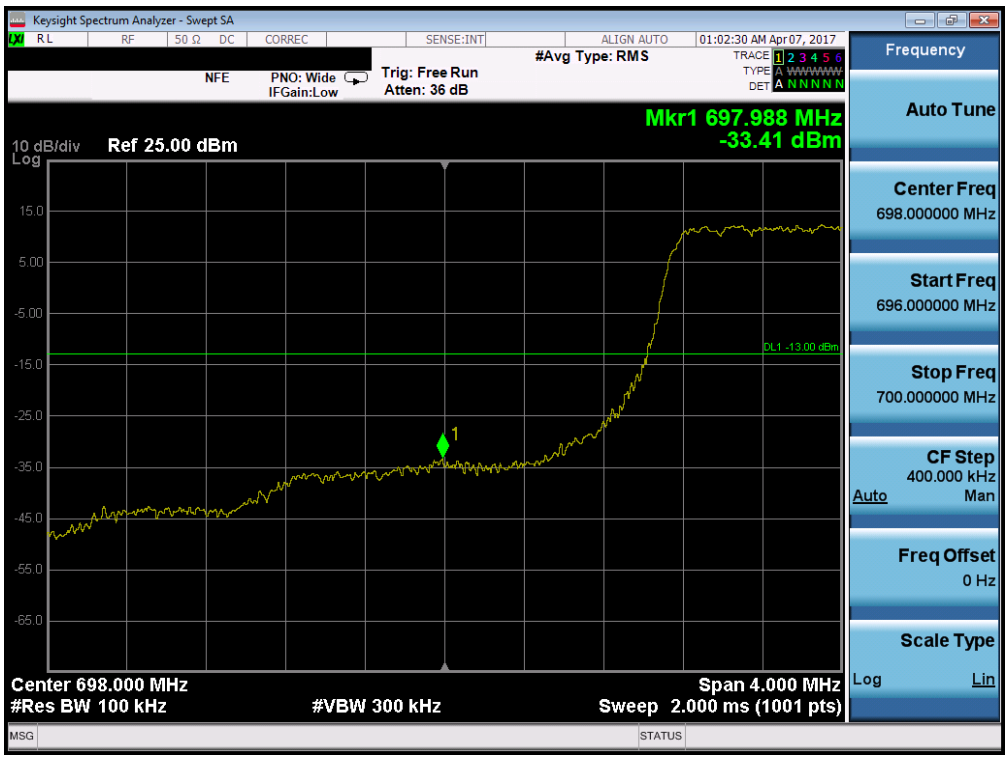
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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 7-94. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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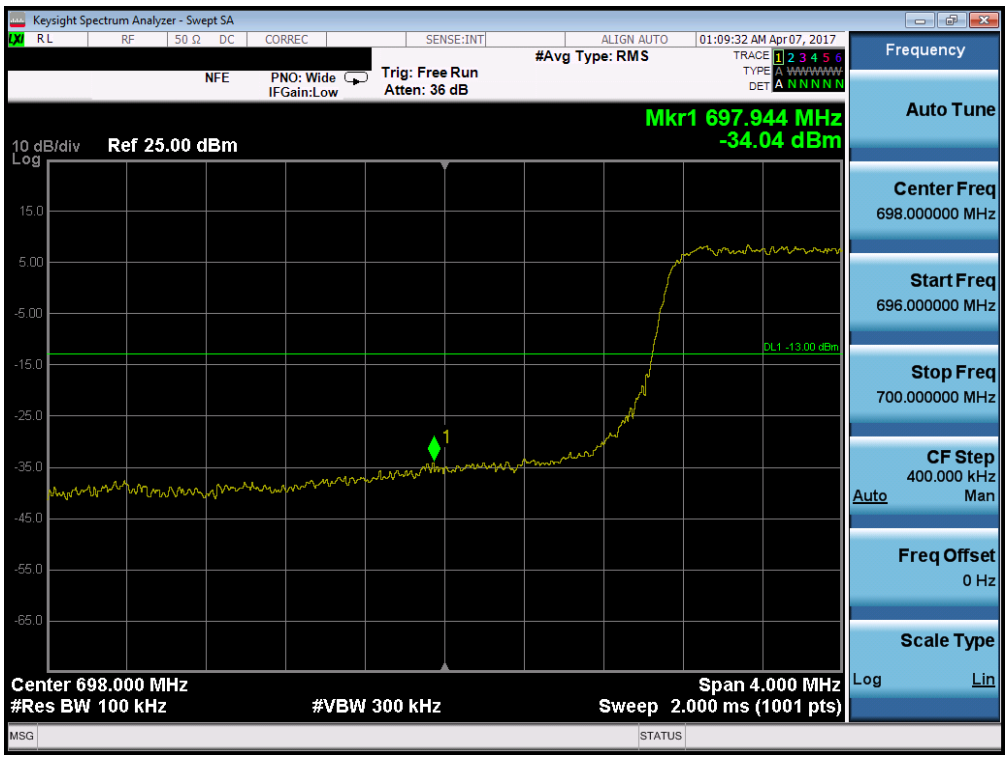
Plot 7-95. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-96. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

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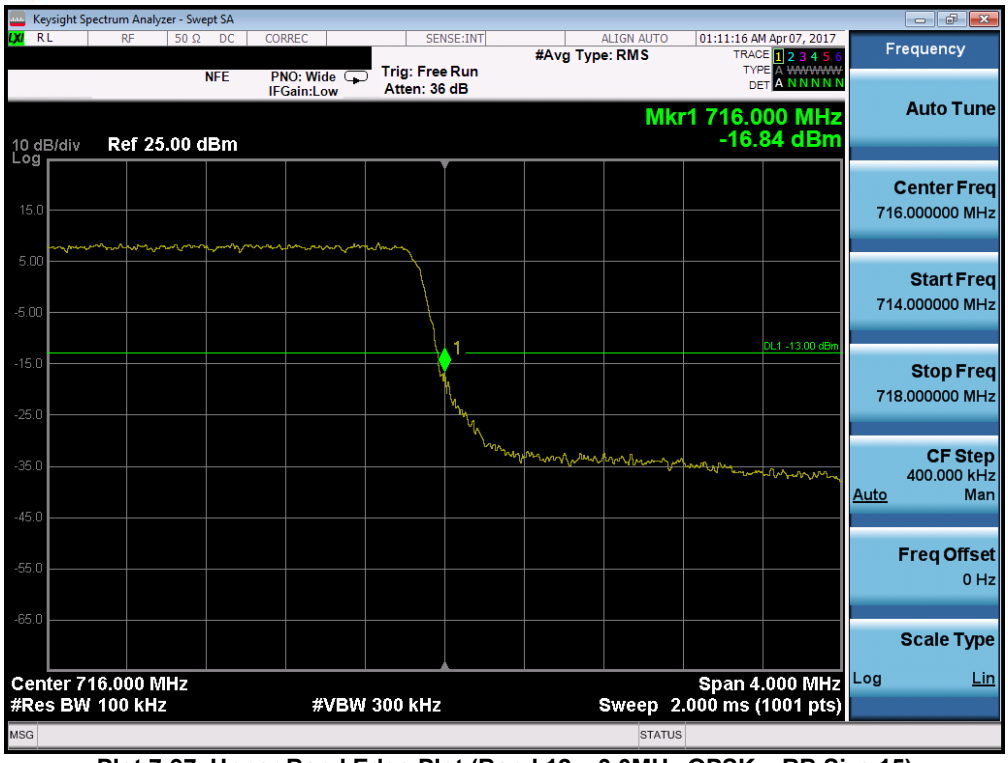
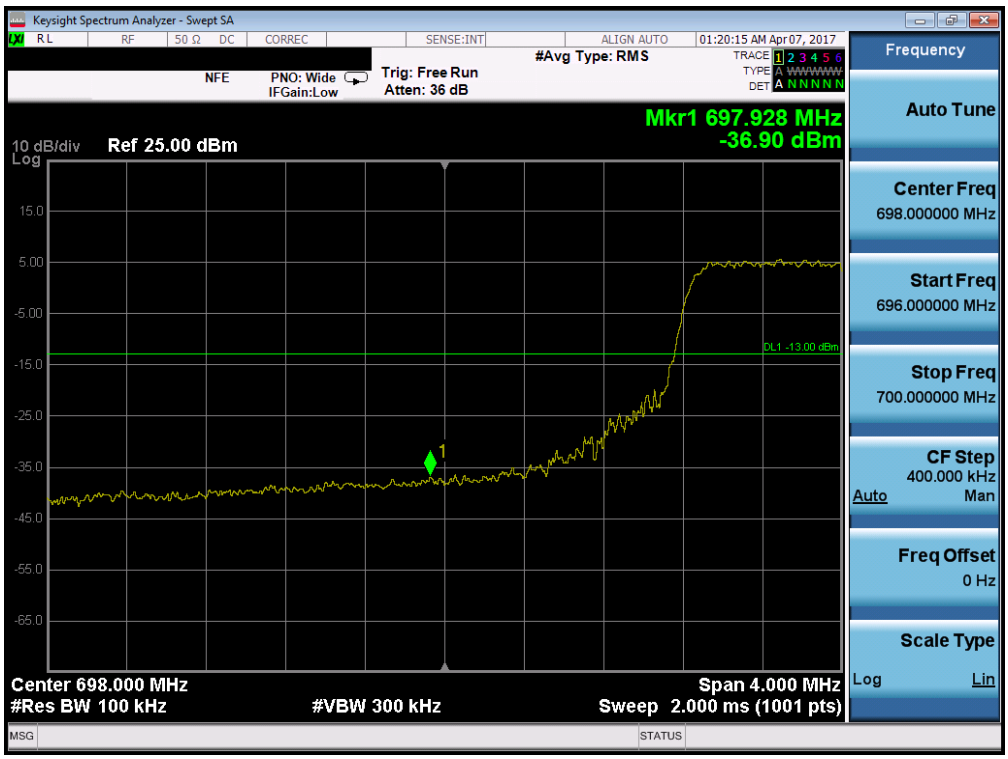


Plot 7-97. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-98. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

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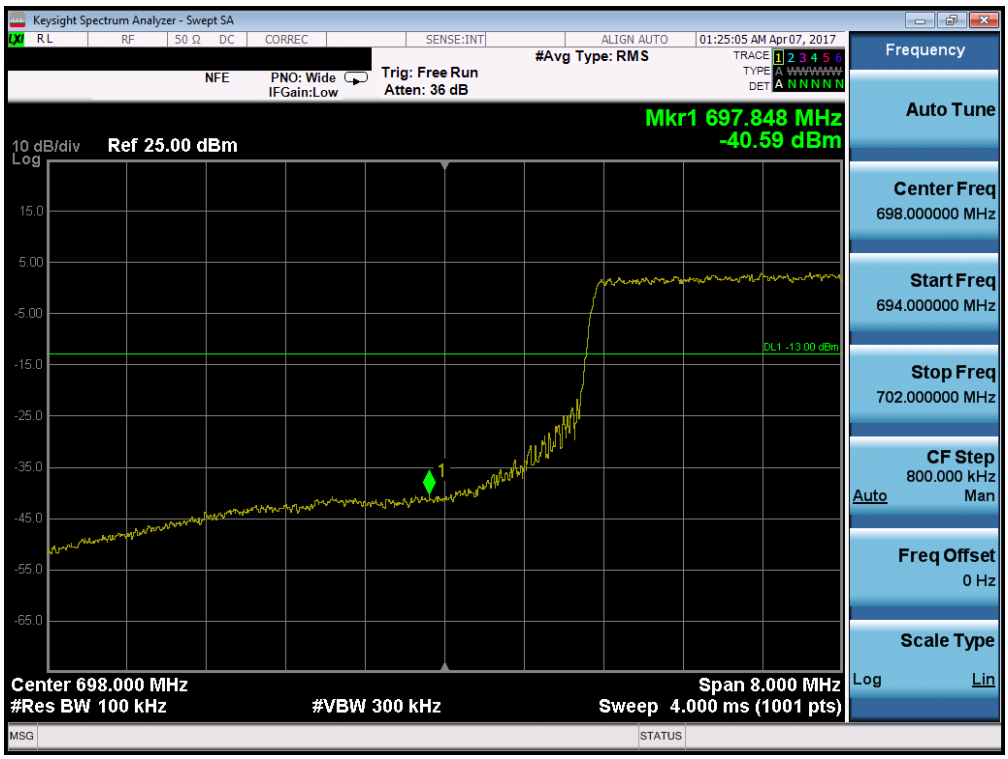
Plot 7-99. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



Plot 7-100. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

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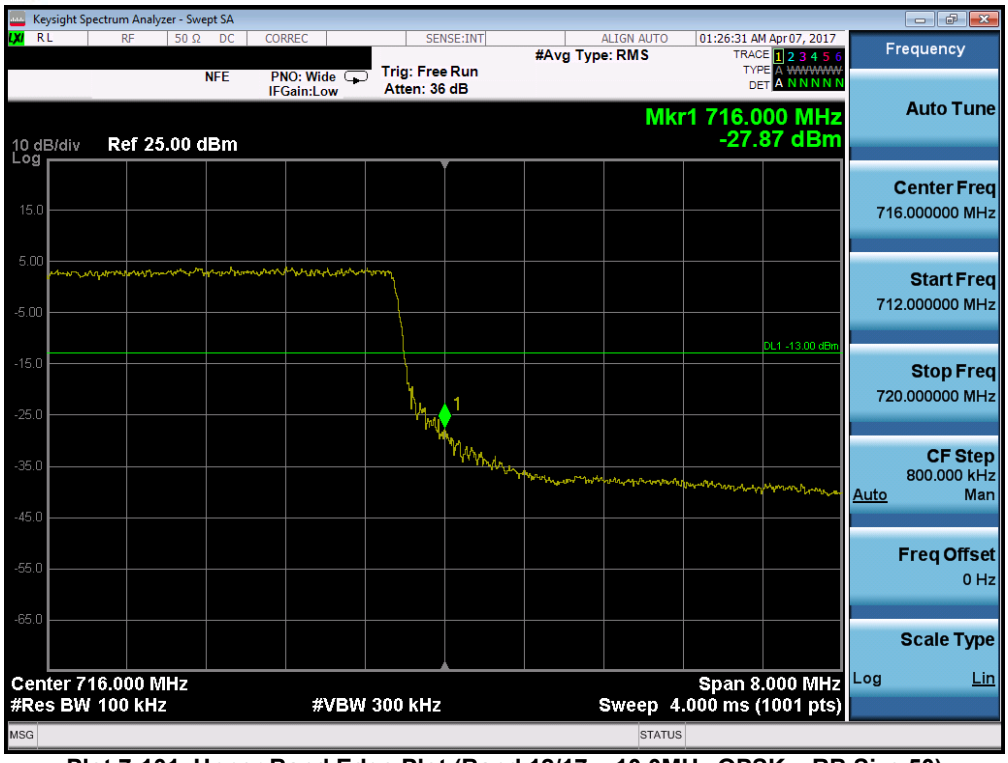
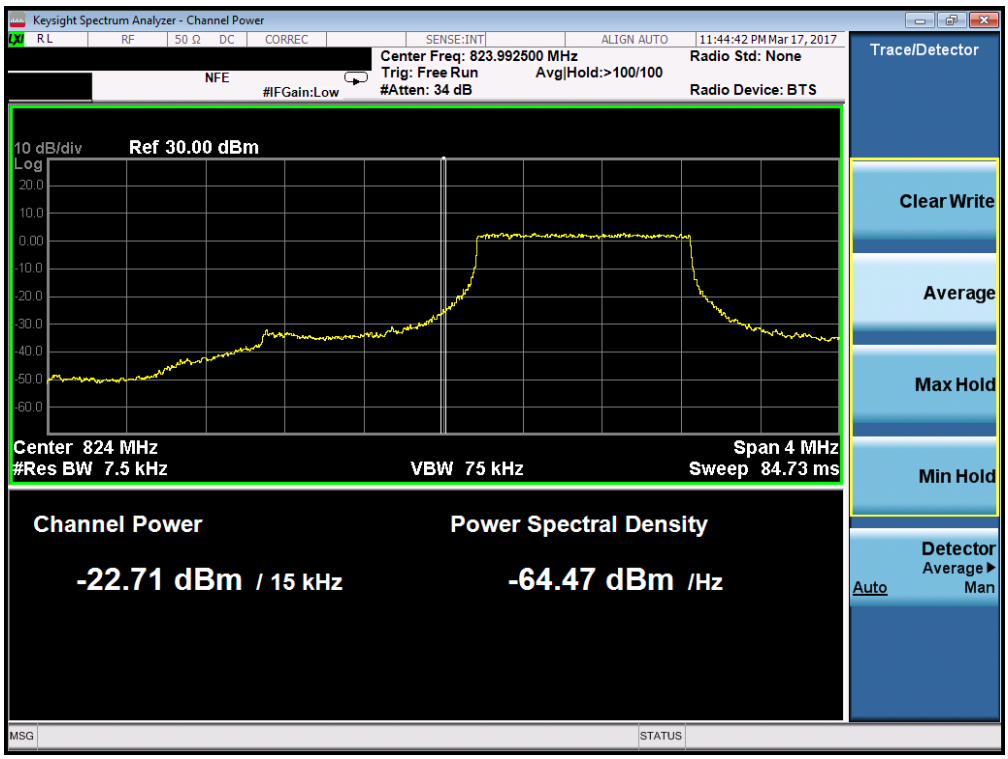


Plot 7-101. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)



Plot 7-102. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

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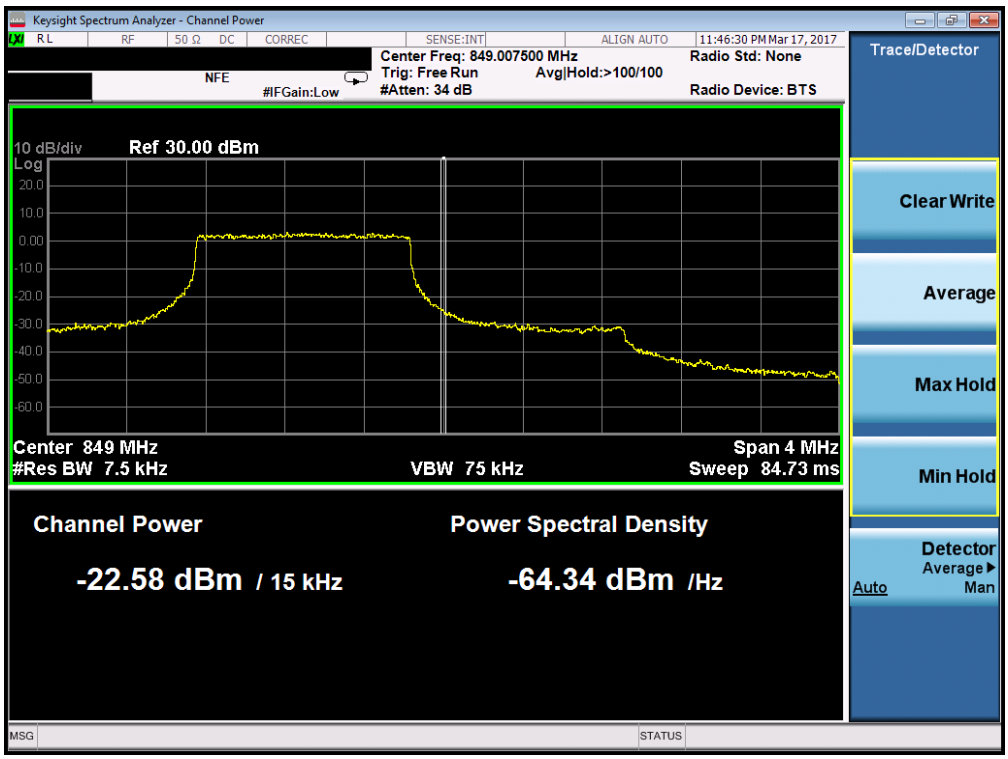
Plot 7-103. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-104. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

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Plot 7-105. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

Plot 7-106. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

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Plot 7-107. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

Plot 7-108. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

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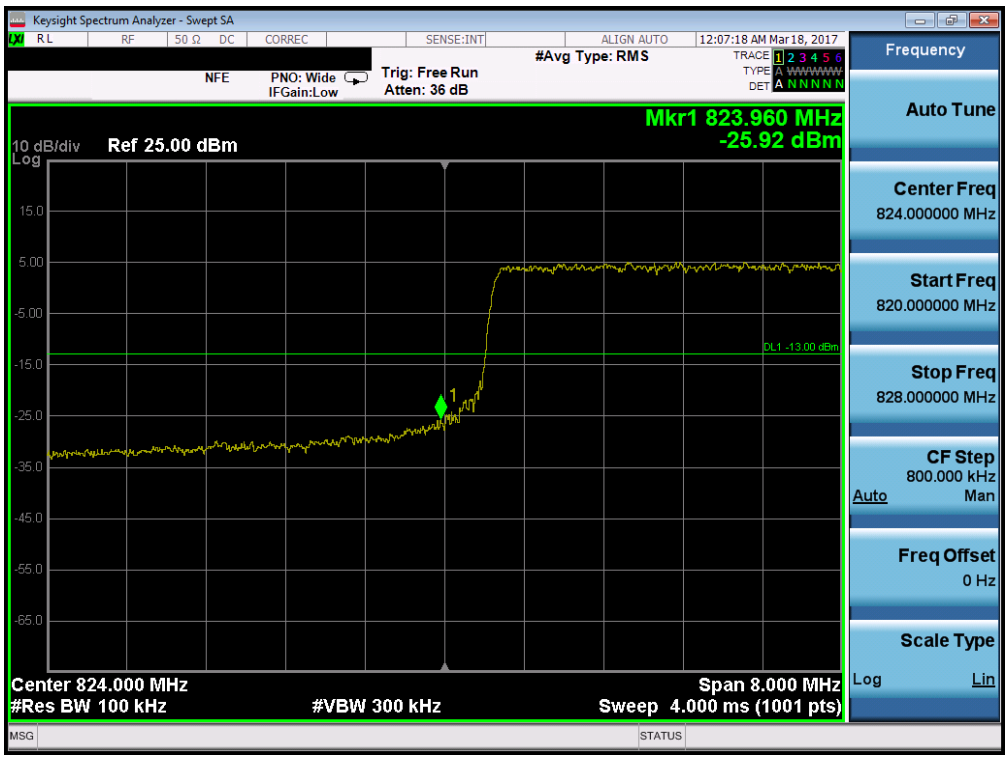
Plot 7-109. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-110. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

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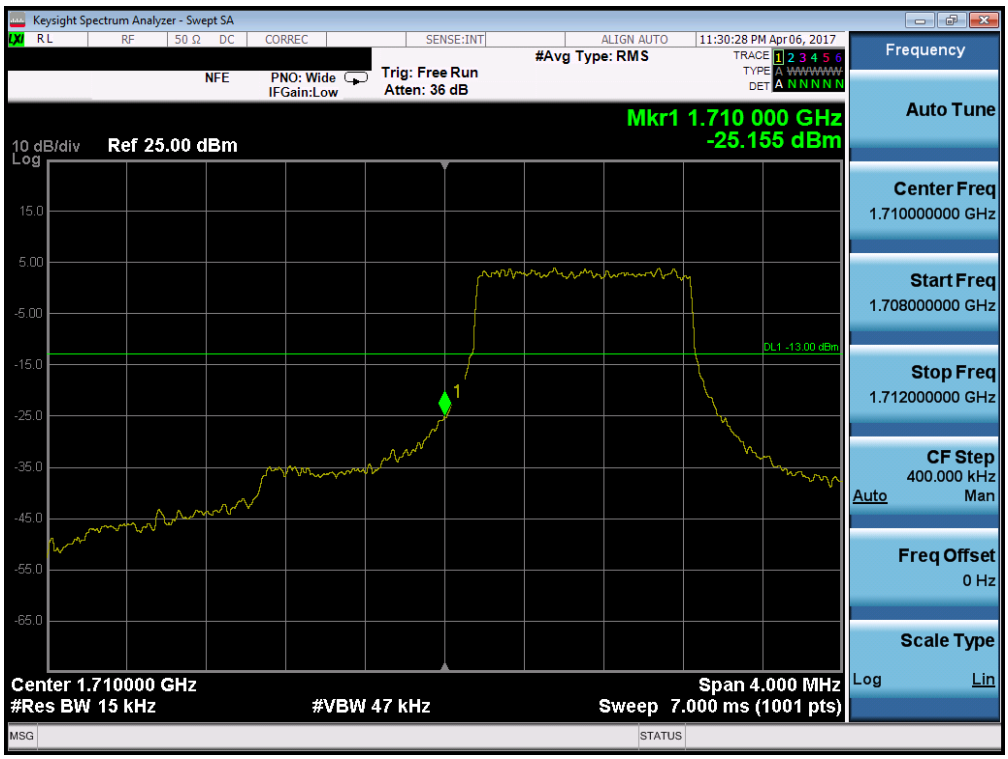
Plot 7-111. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



Plot 7-112. Lower Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

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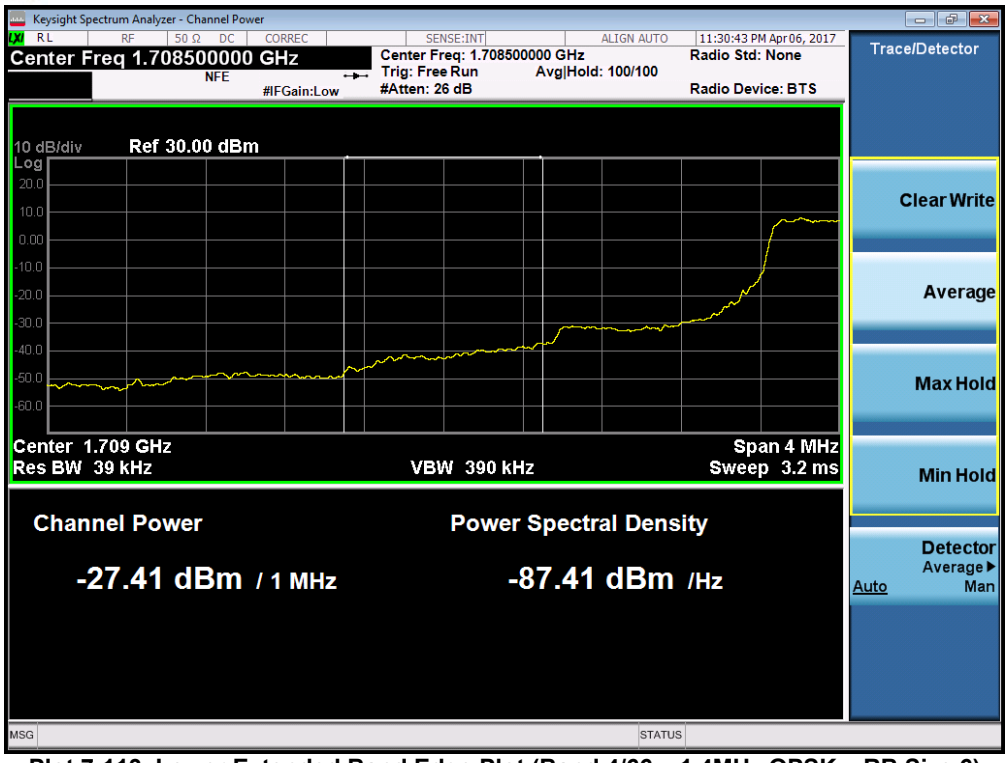
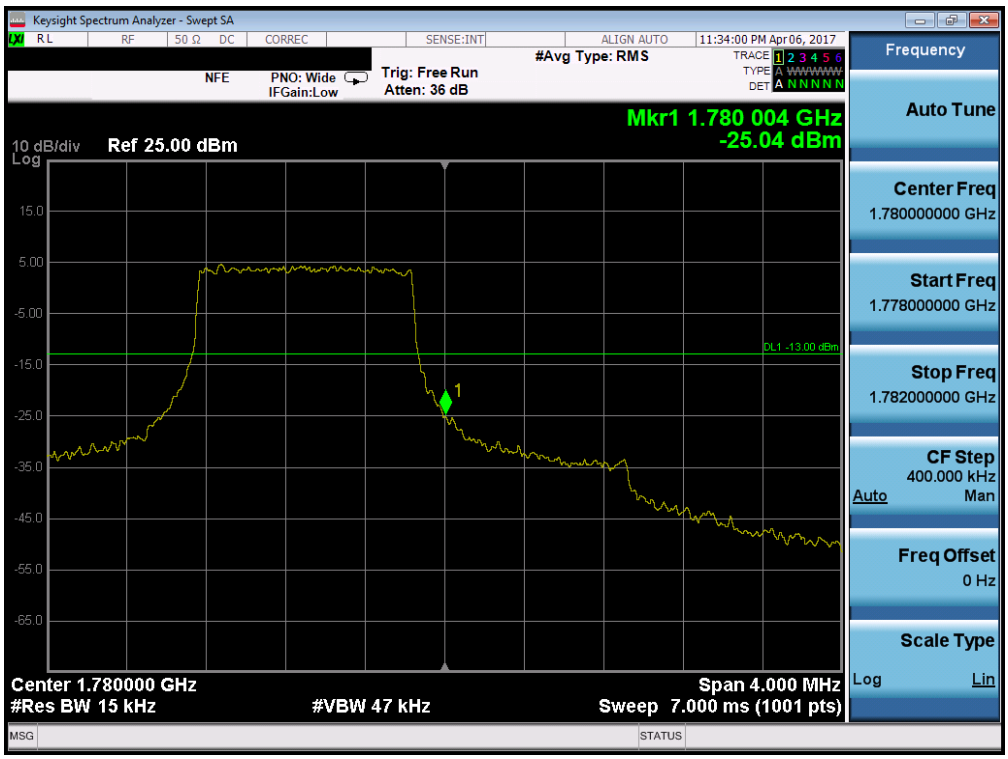


Plot 7-113. Lower Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)



Plot 7-114. Upper Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

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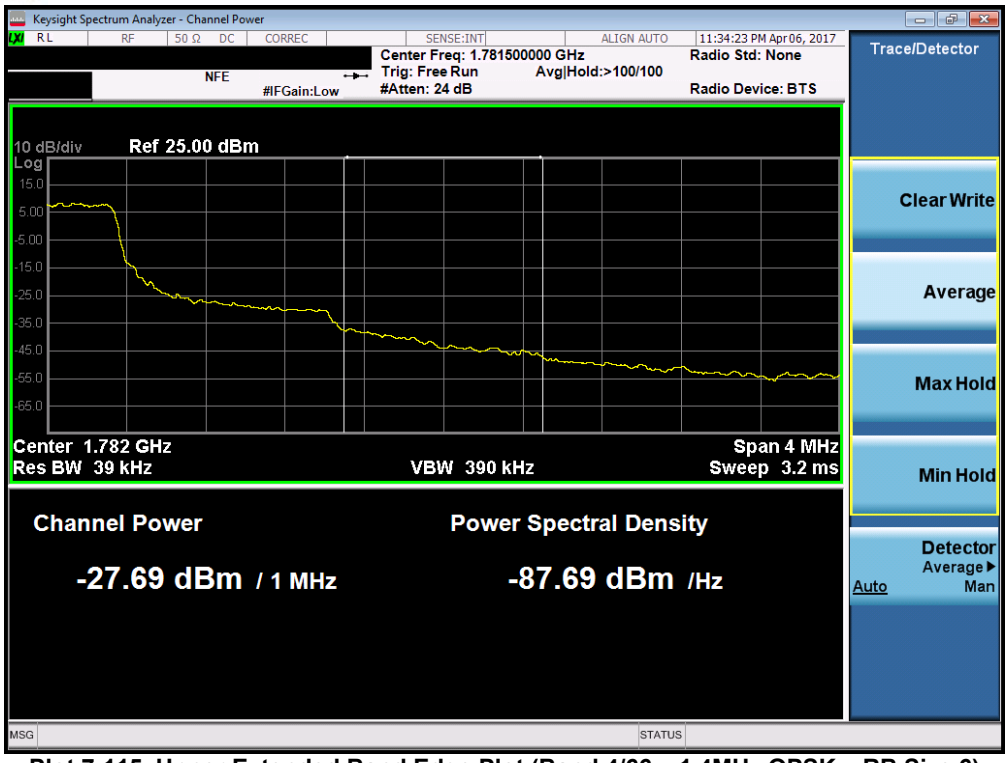
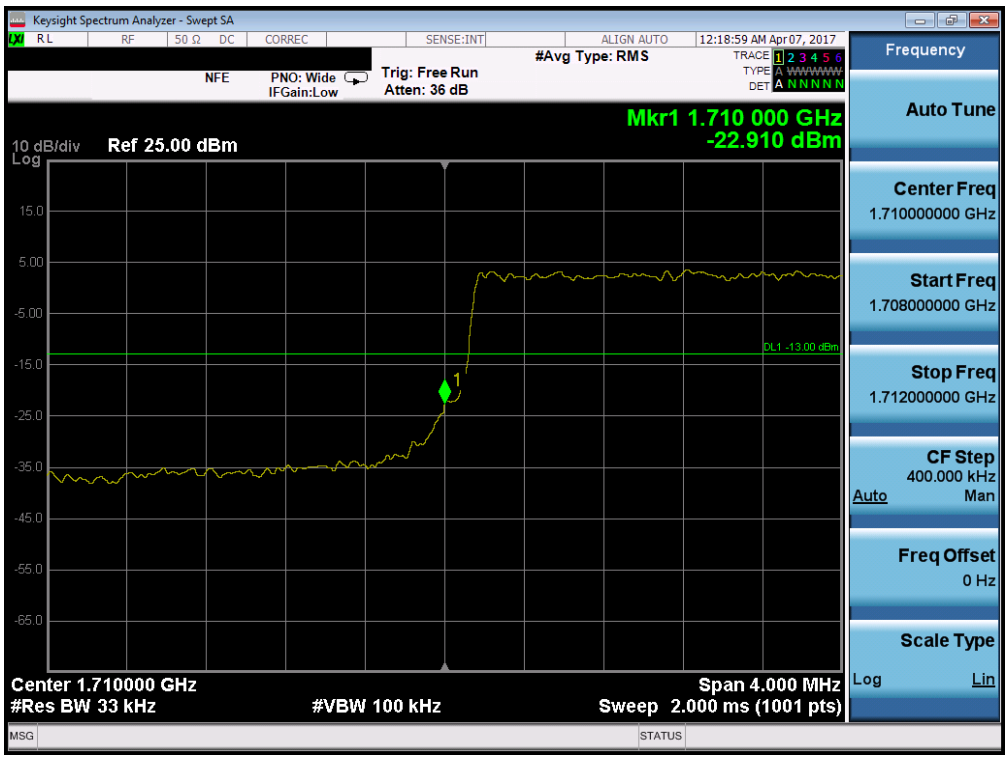


Plot 7-115. Upper Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)



Plot 7-116. Lower Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

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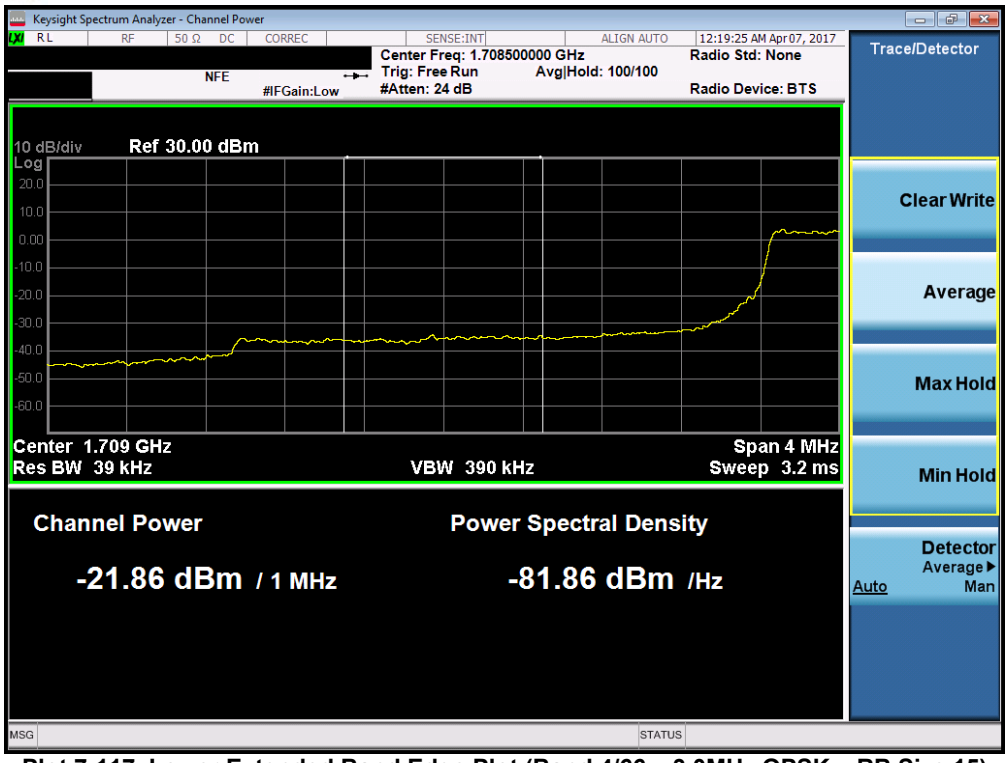
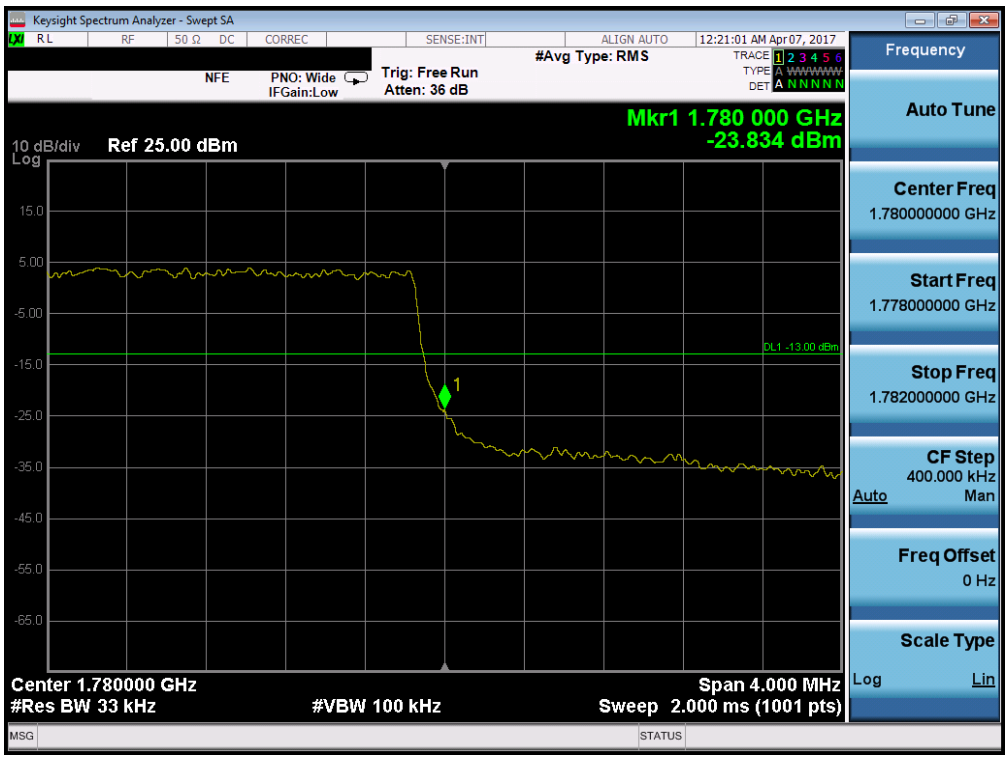


Plot 7-117. Lower Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



Plot 7-118. Upper Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

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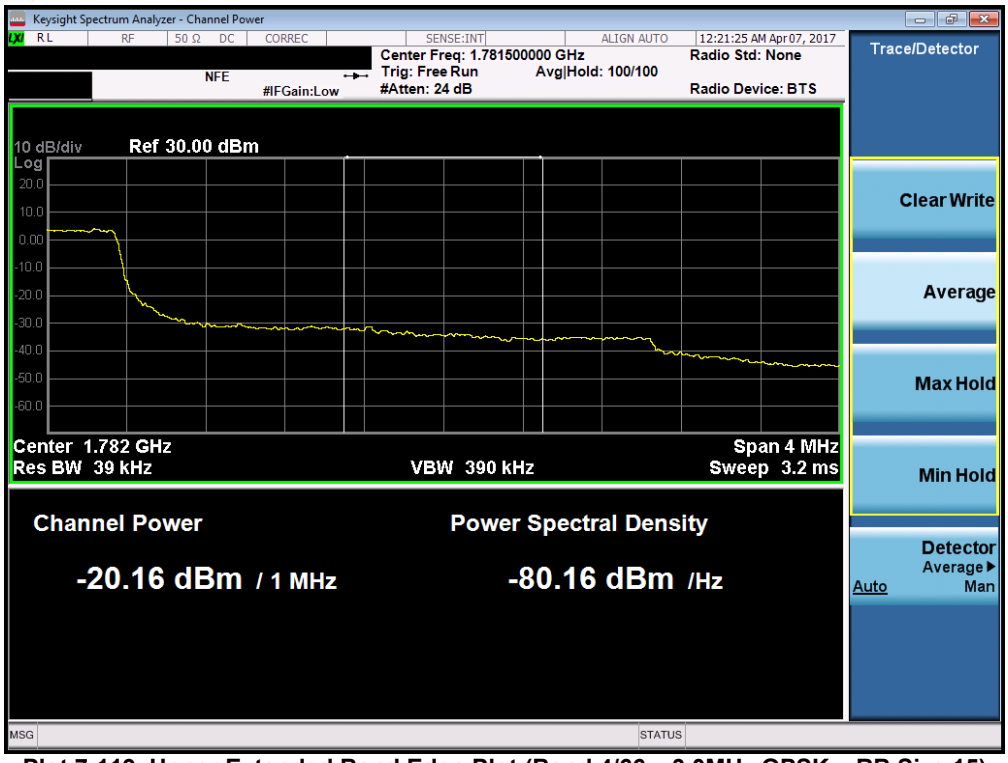
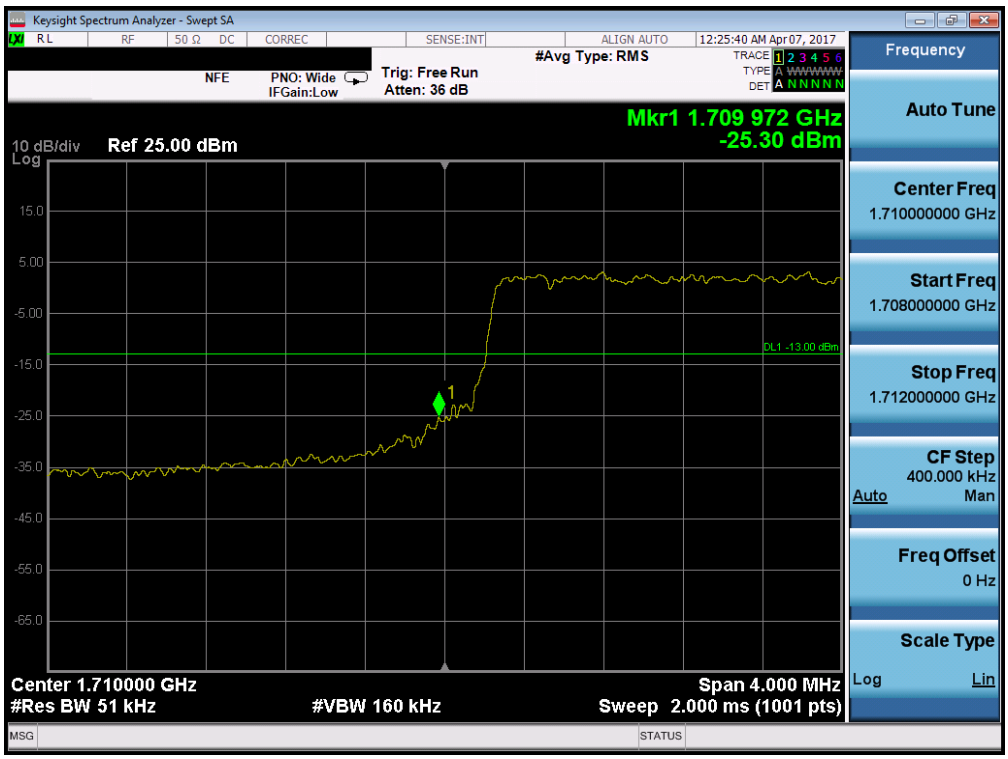


Plot 7-119. Upper Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



Plot 7-120. Lower Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

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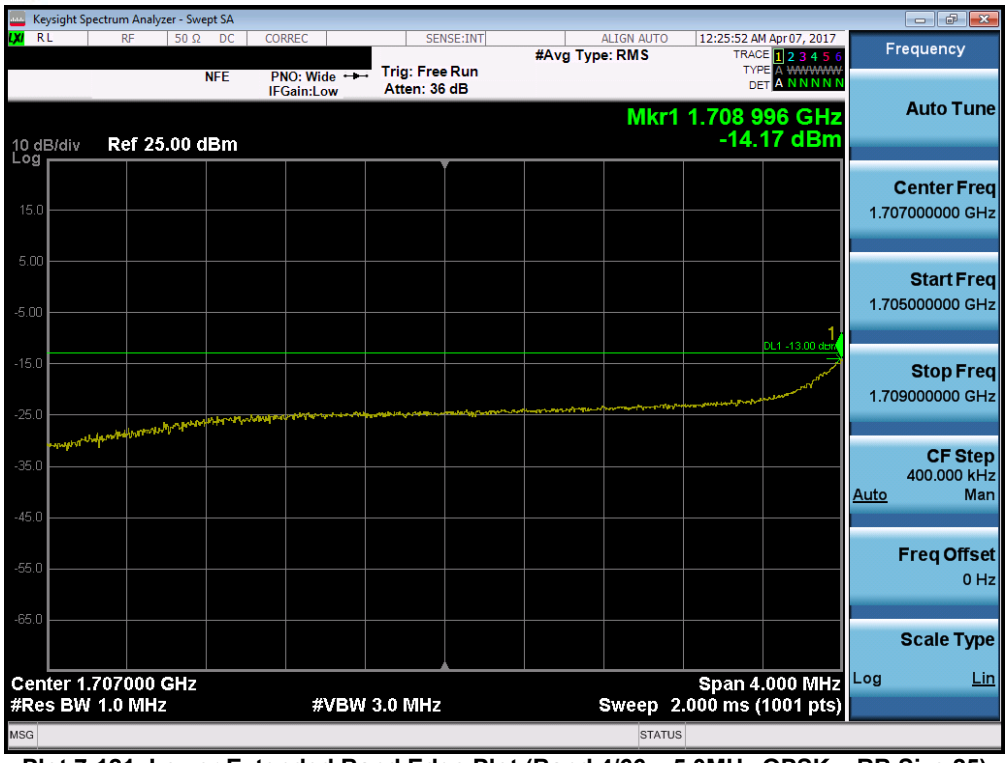
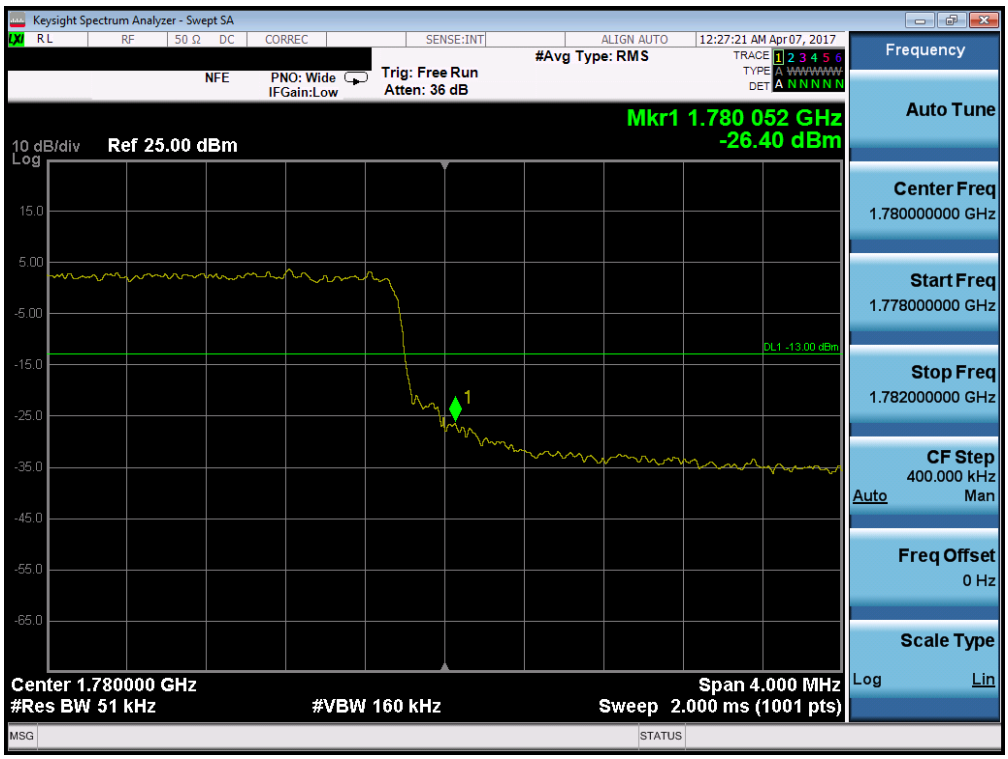


Plot 7-121. Lower Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-122. Upper Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

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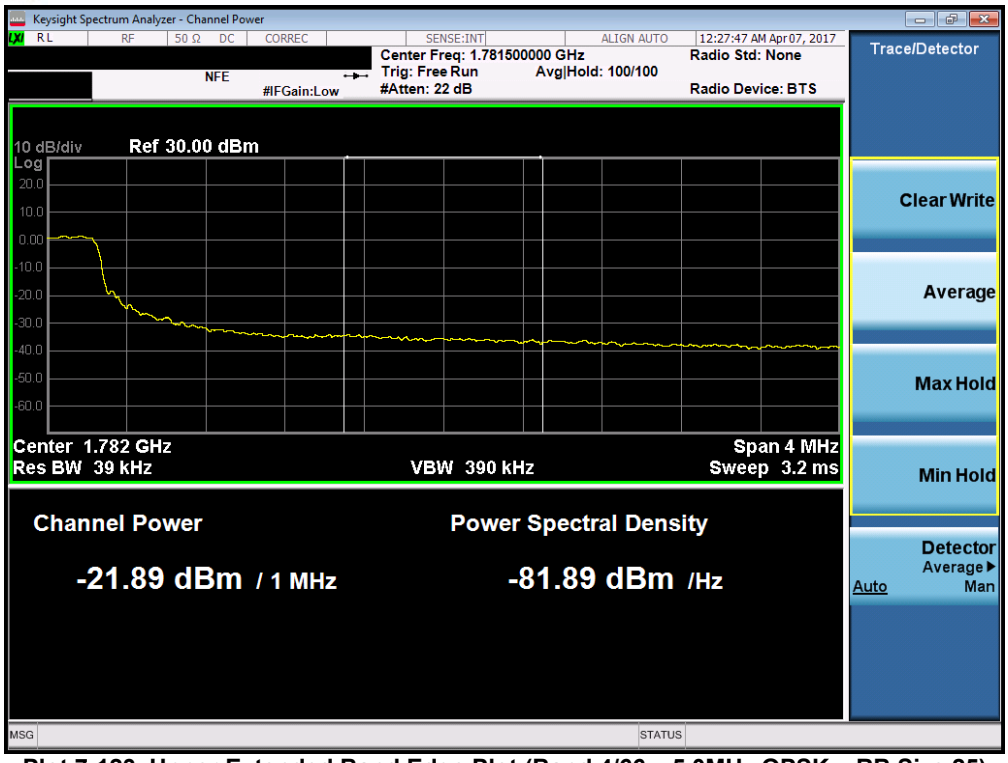
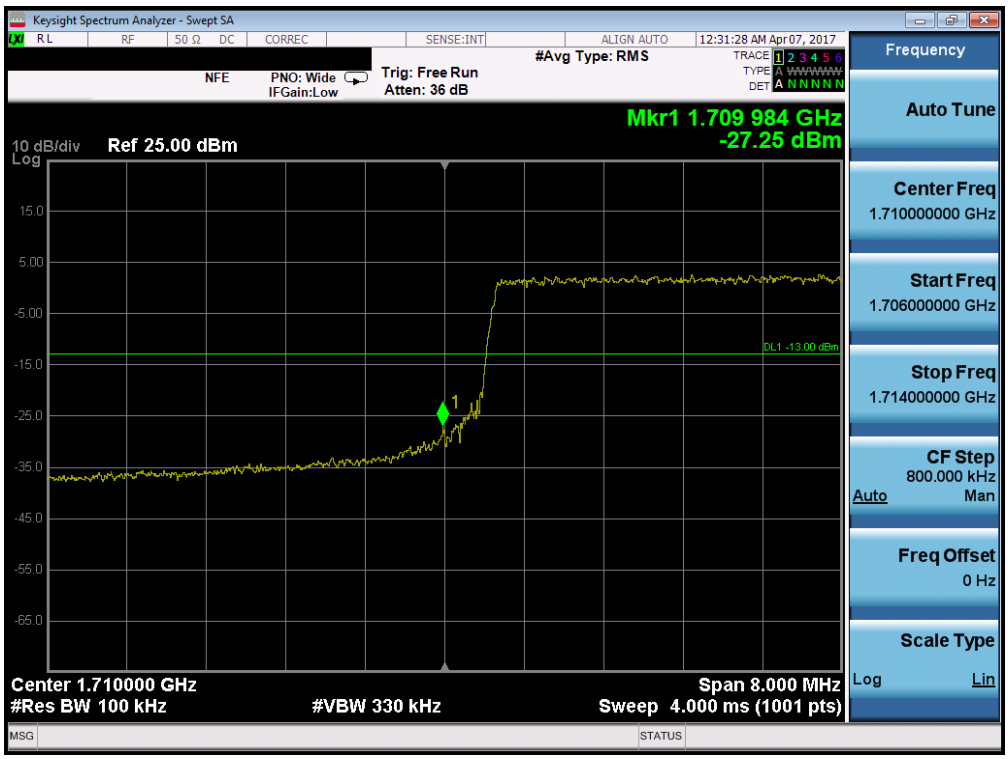


Plot 7-123. Upper Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-124. Lower Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

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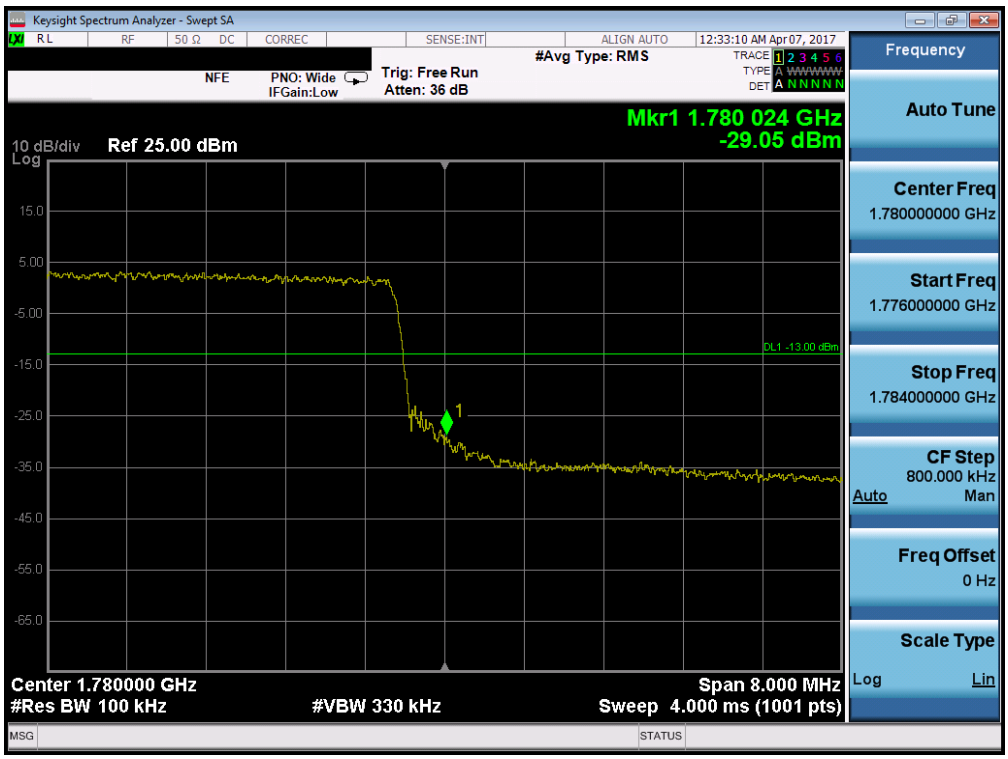
Plot 7-125. Lower Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



Plot 7-126. Upper Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

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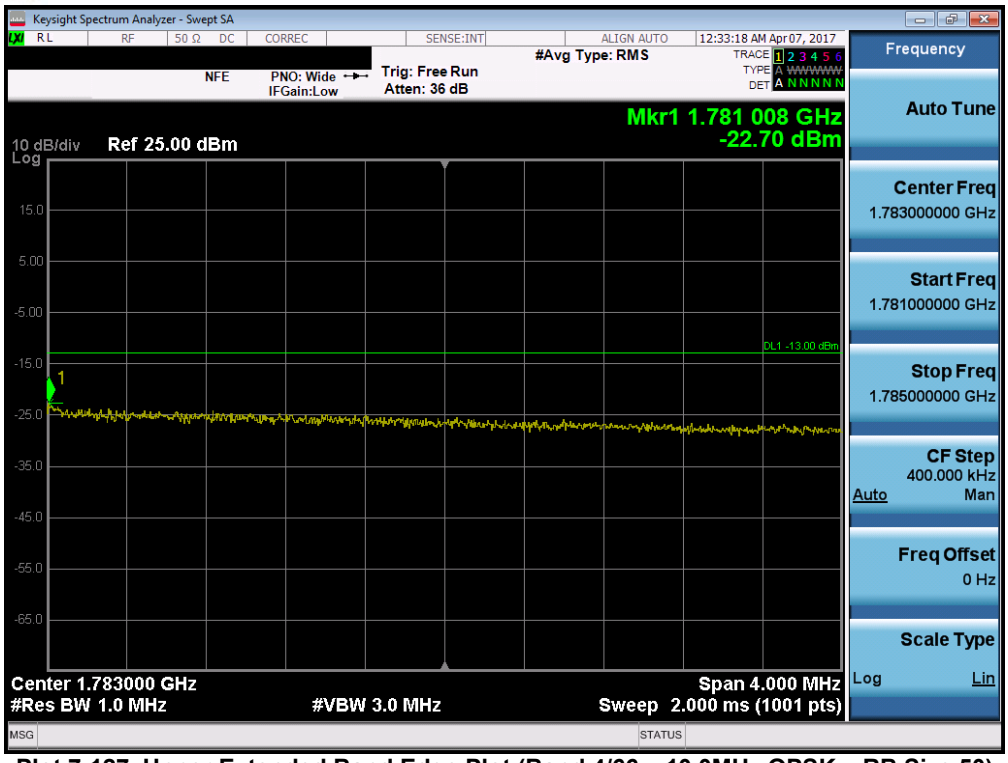
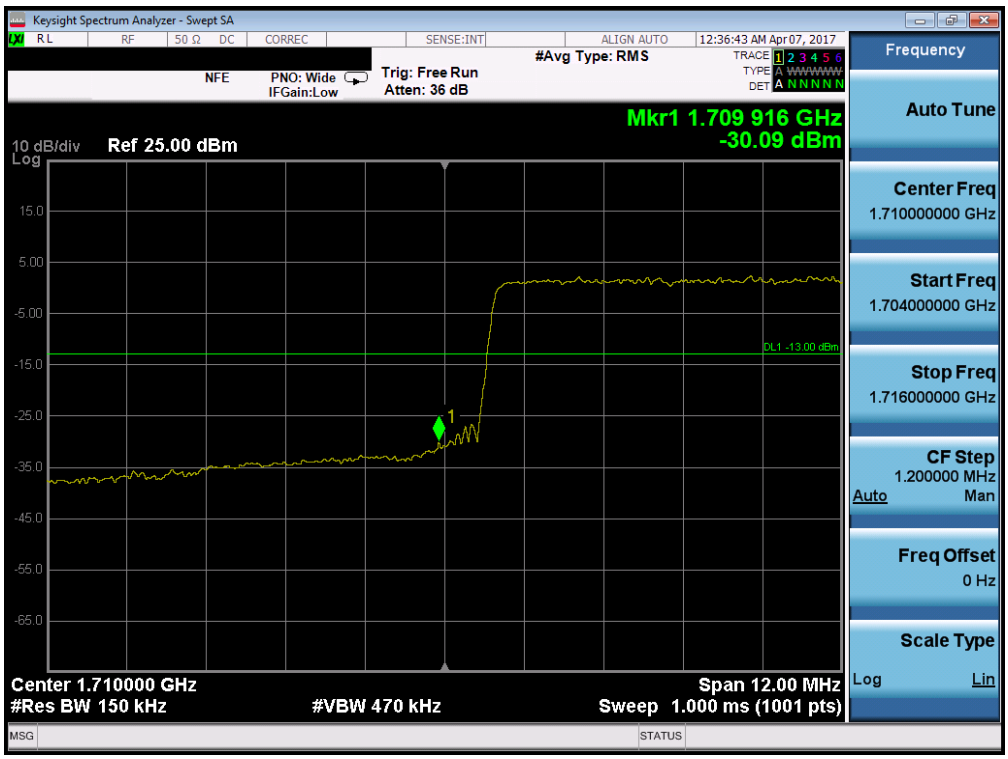


Plot 7-127. Upper Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



Plot 7-128. Lower Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

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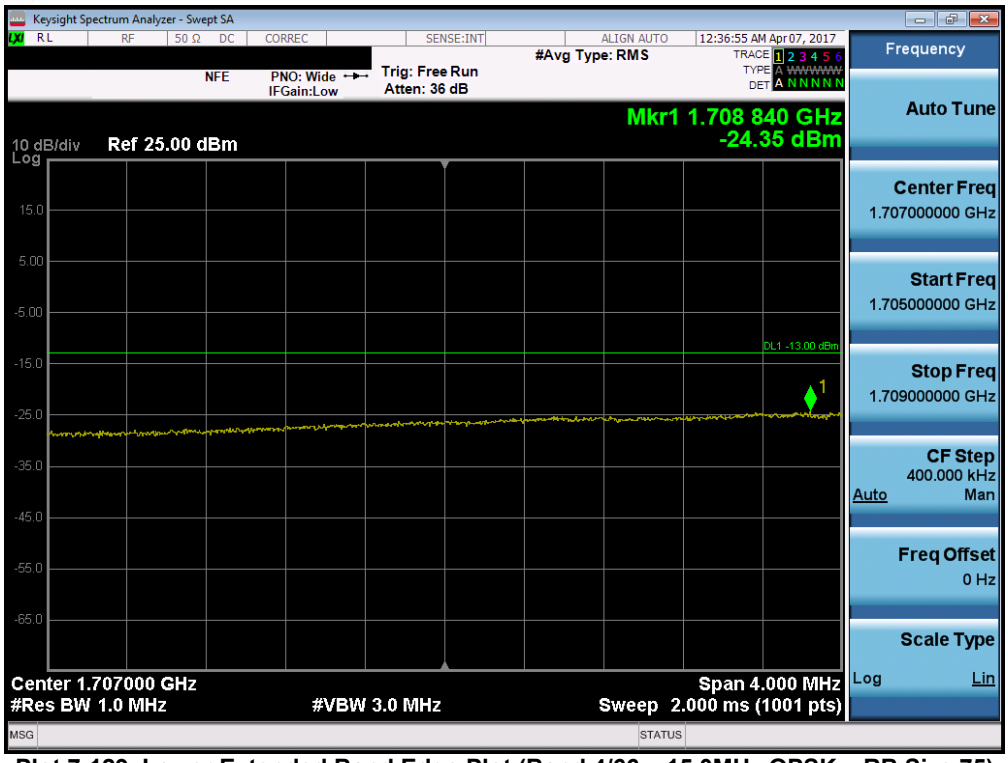
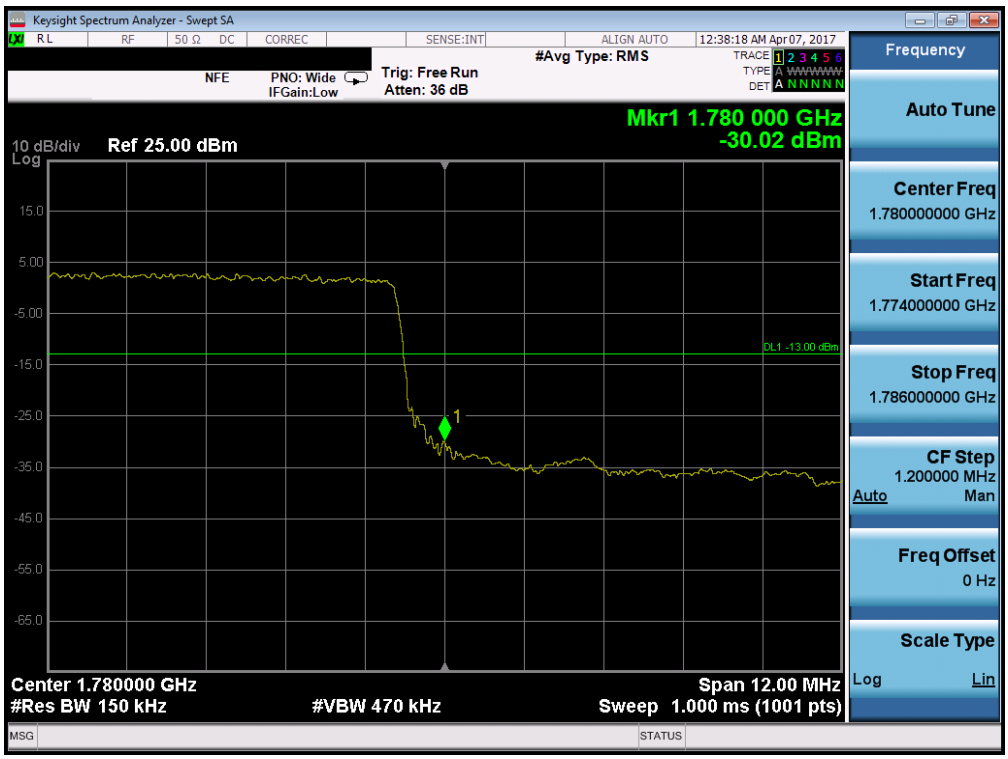


Plot 7-129. Lower Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



Plot 7-130. Upper Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

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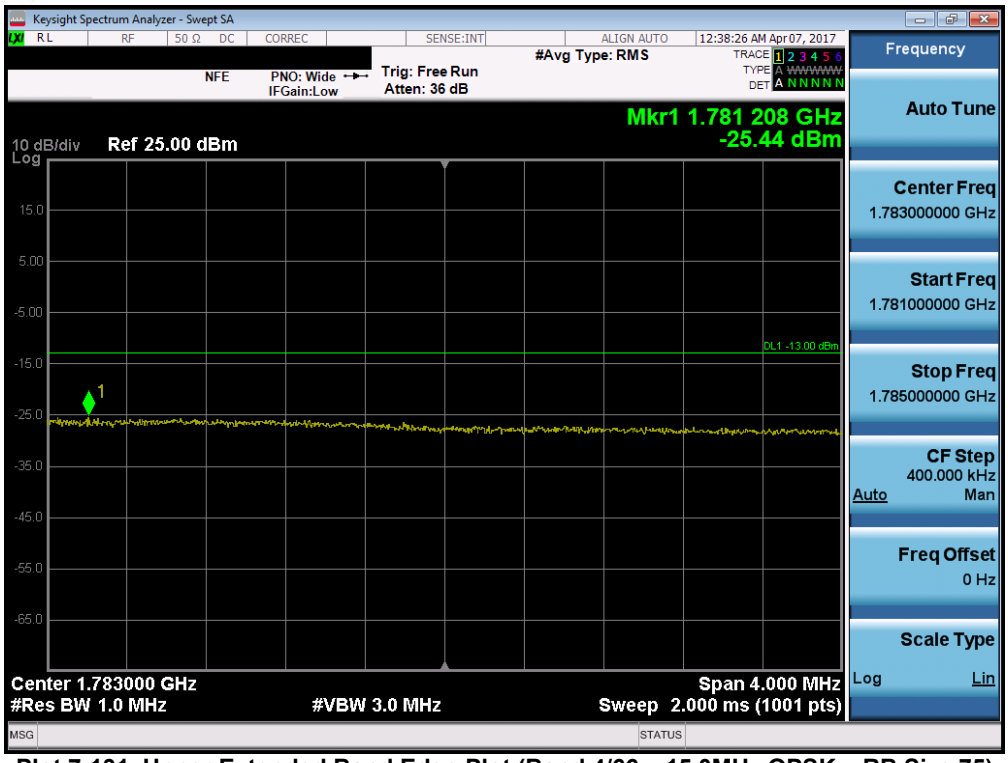
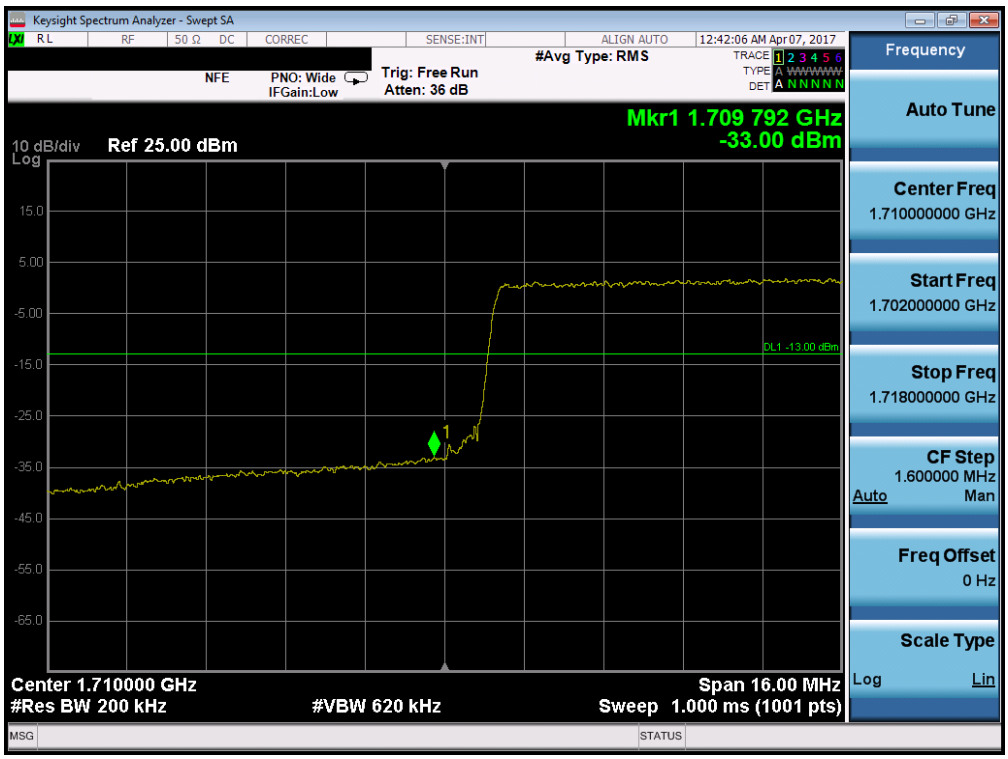


Plot 7-131. Upper Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



Plot 7-132. Lower Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

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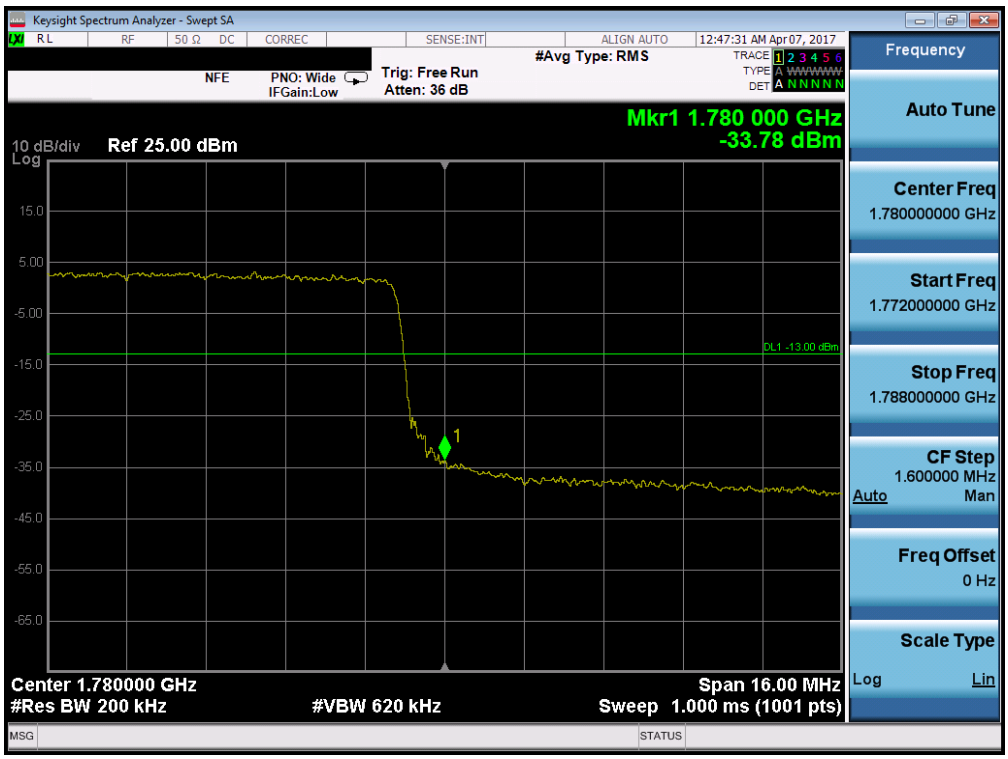
Plot 7-133. Lower Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



Plot 7-134. Upper Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

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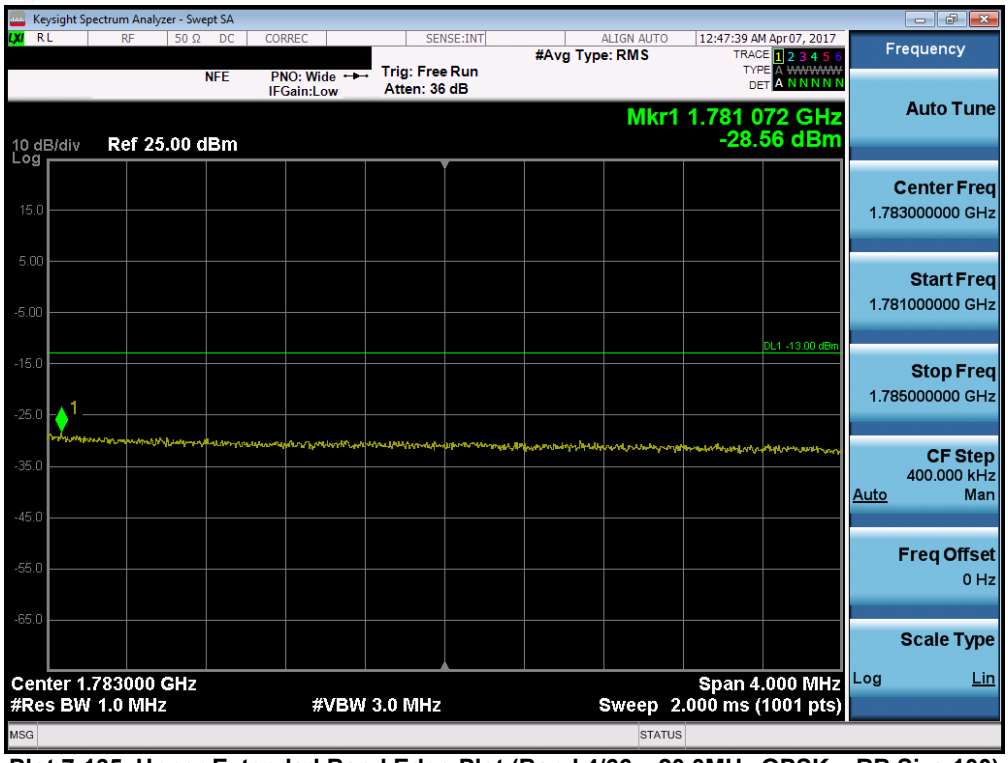
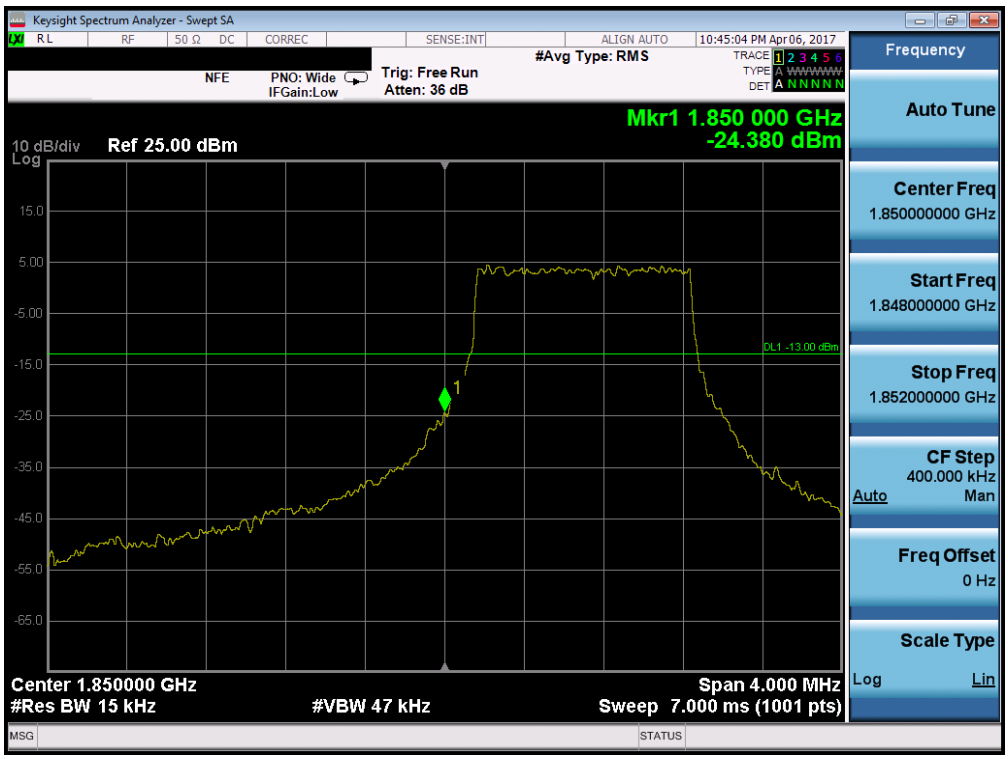


Plot 7-135. Upper Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



Plot 7-136. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

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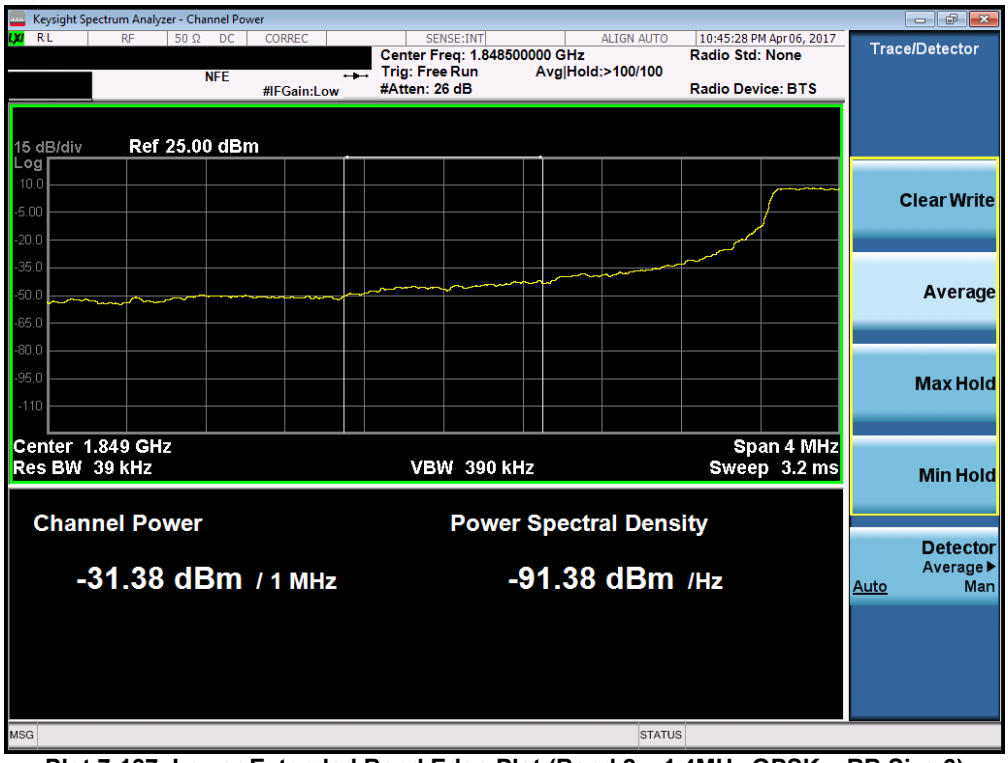
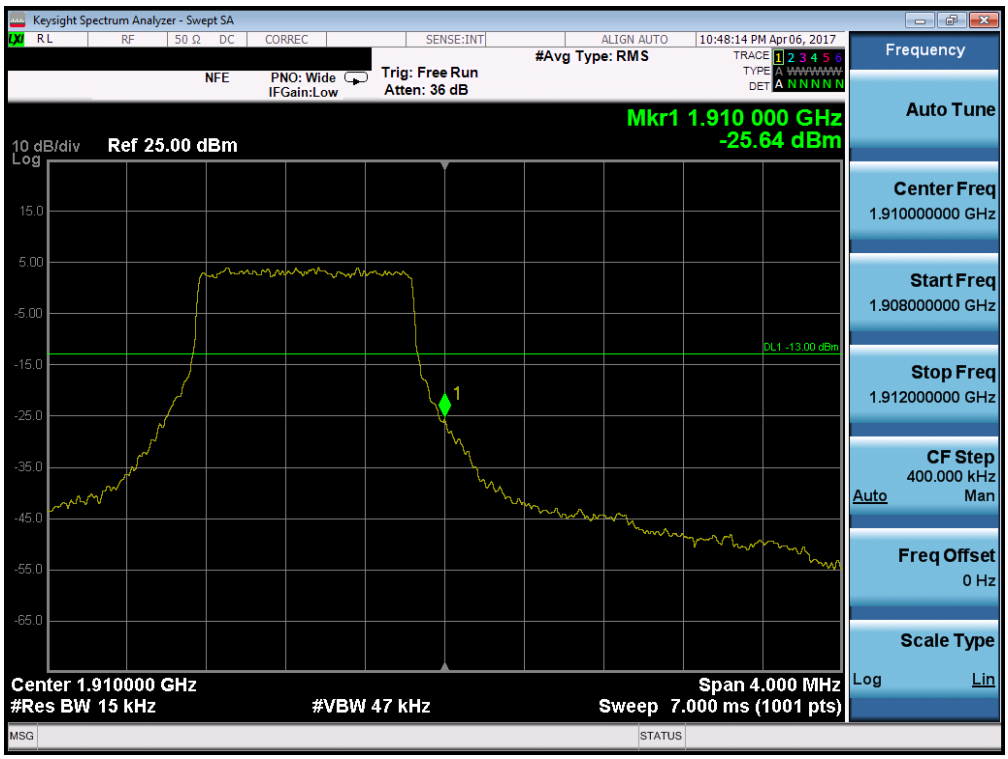


Plot 7-137. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 7-138. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

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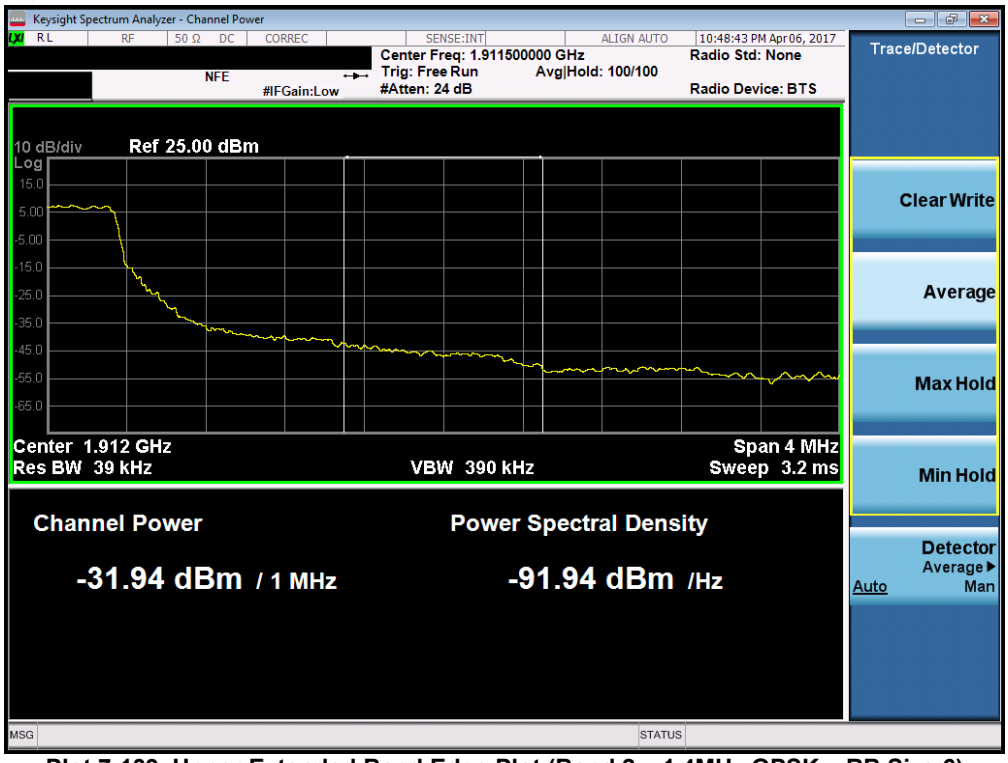
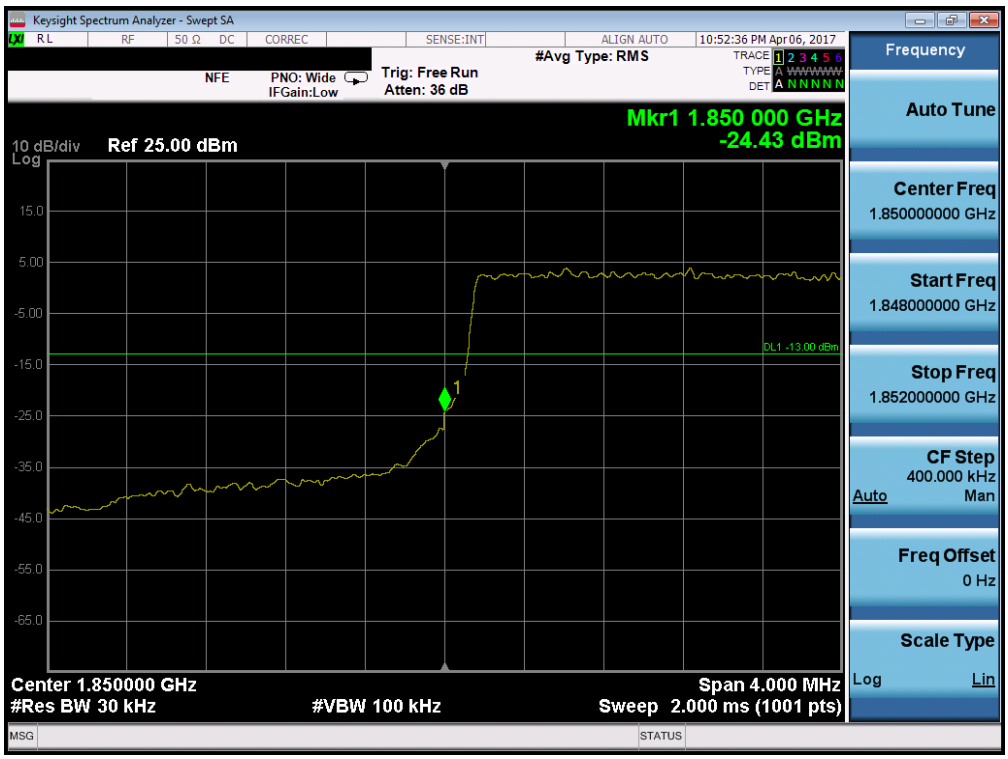


Plot 7-139. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 7-140. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

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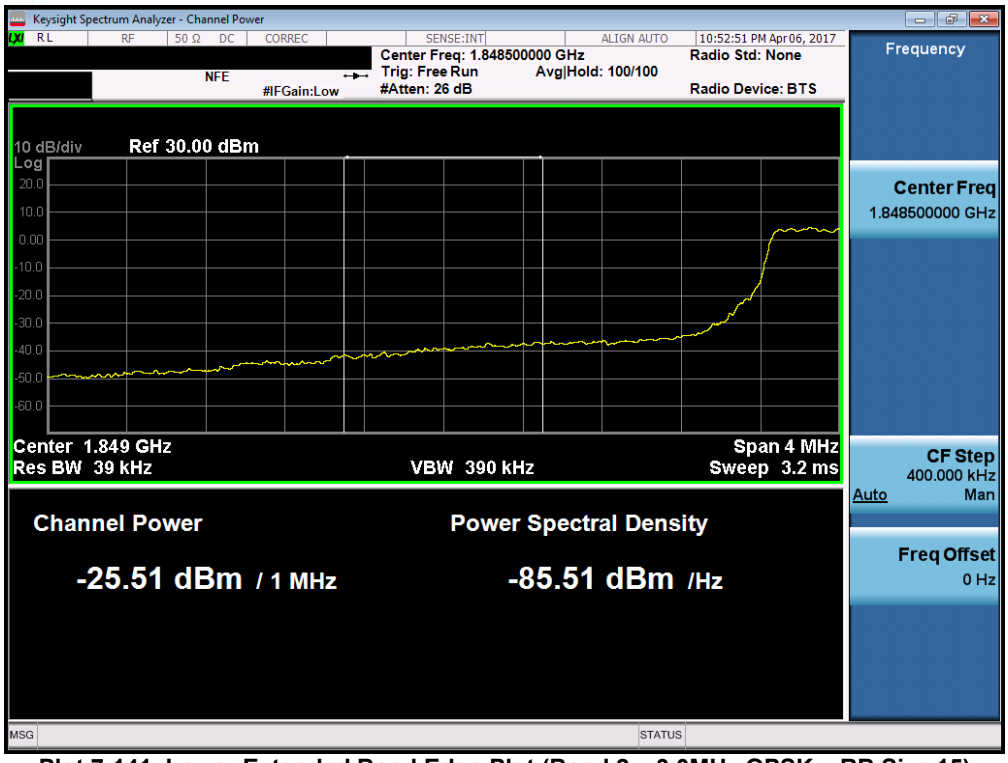
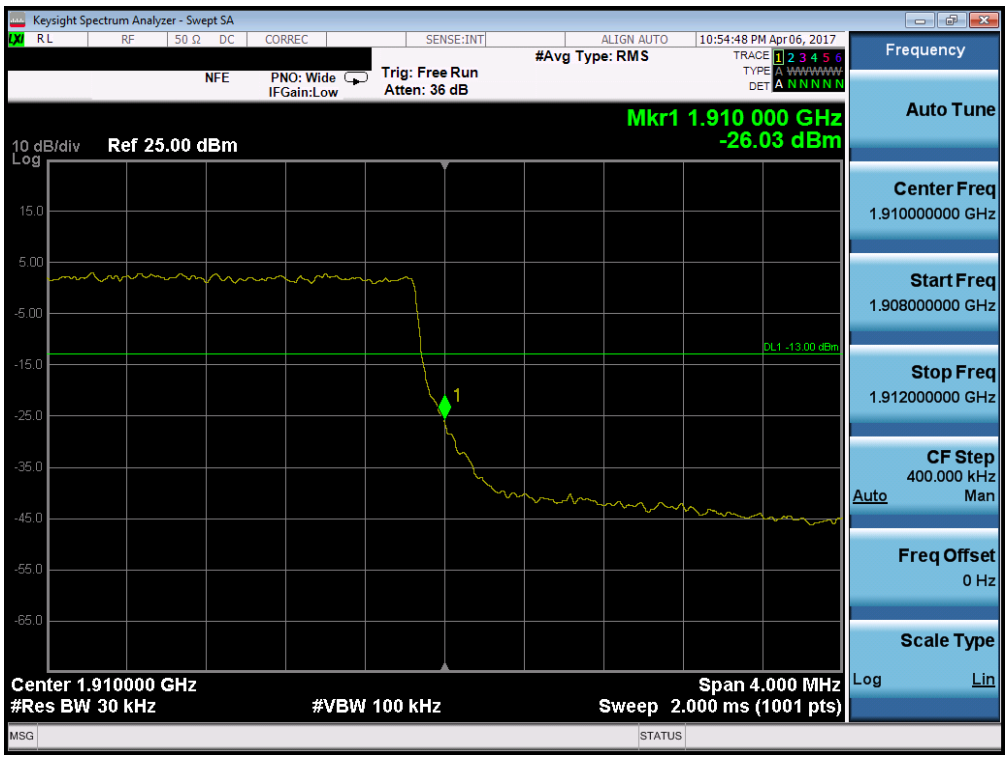


Plot 7-141. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 7-142. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

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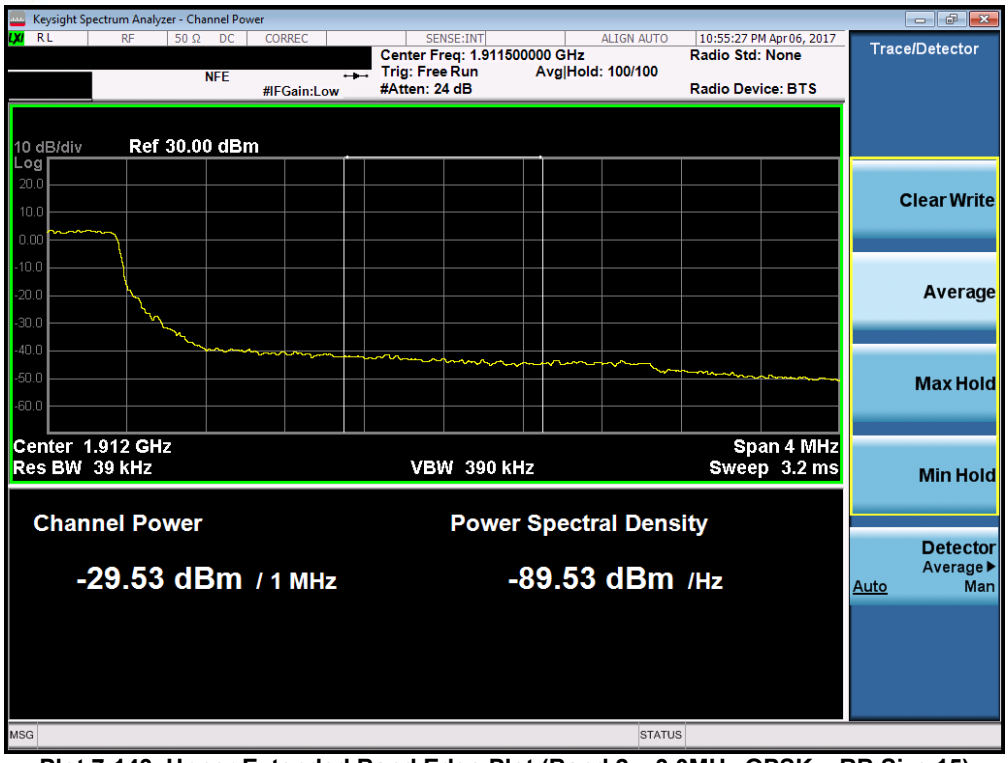
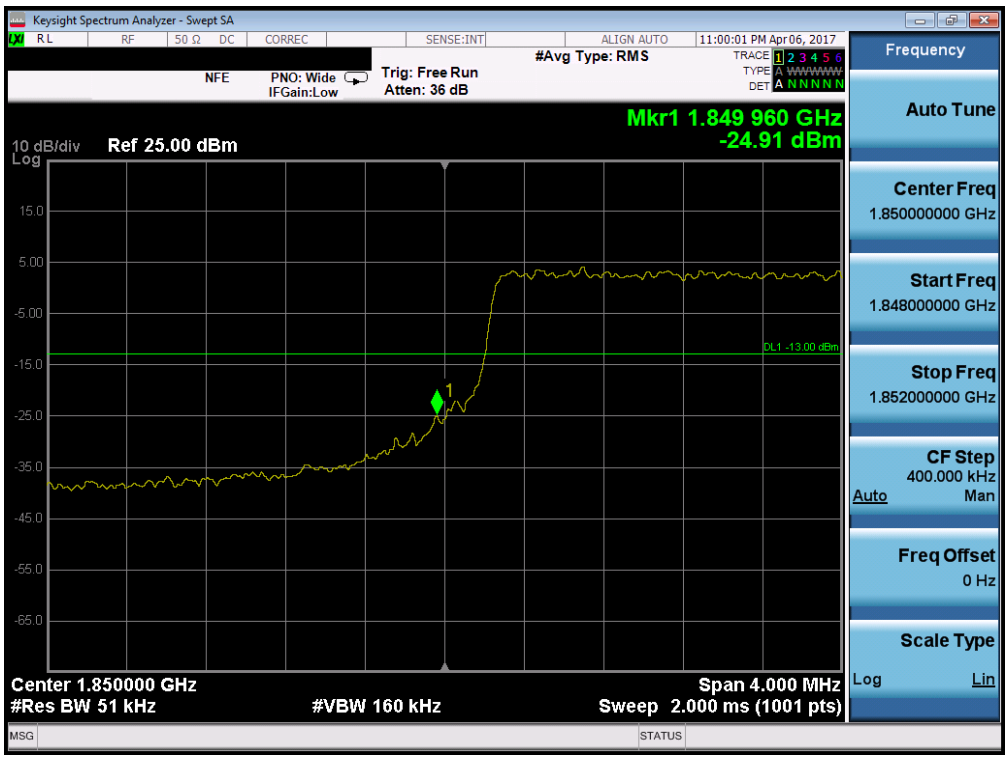


Plot 7-143. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 7-144. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

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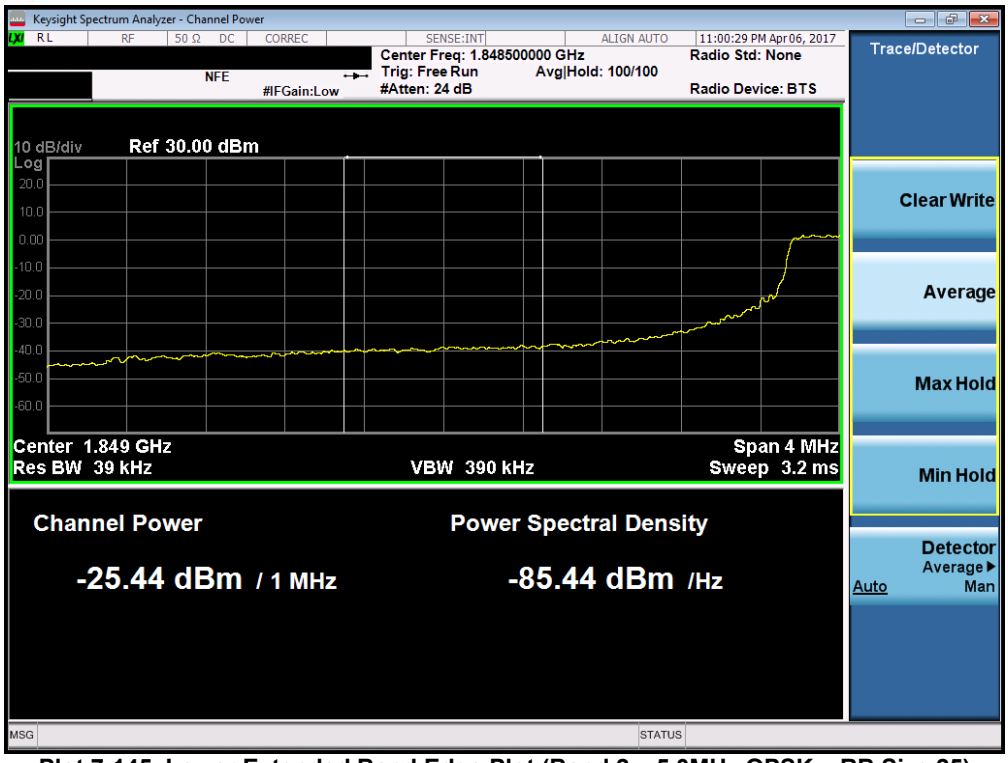

Plot 7-145. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

Plot 7-146. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

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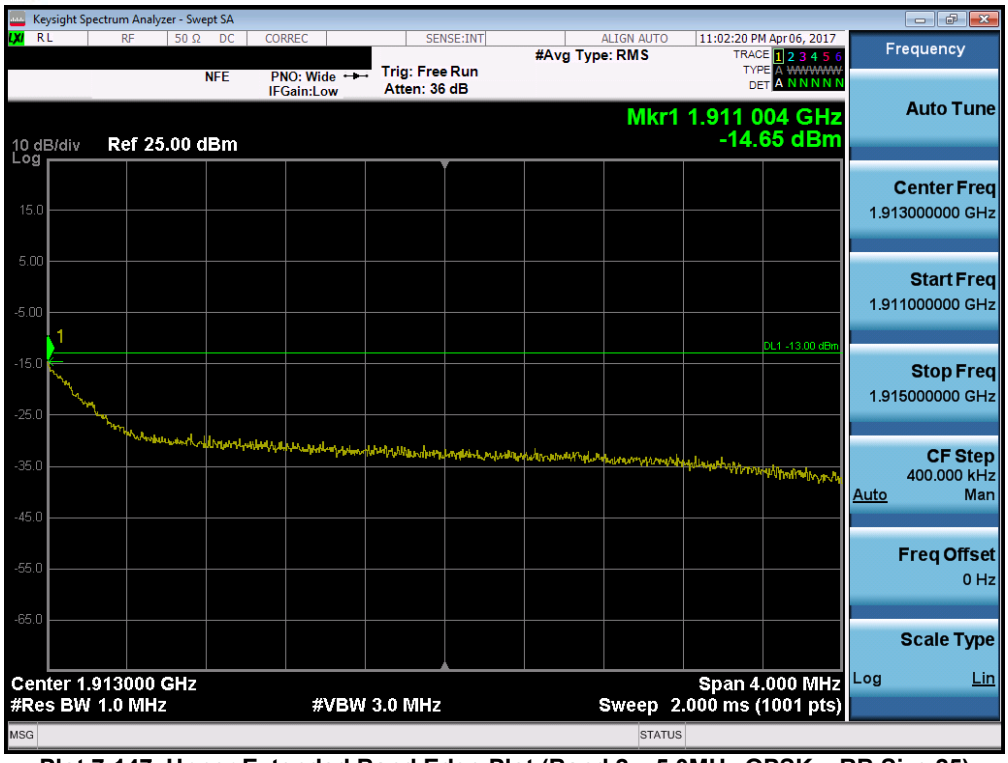
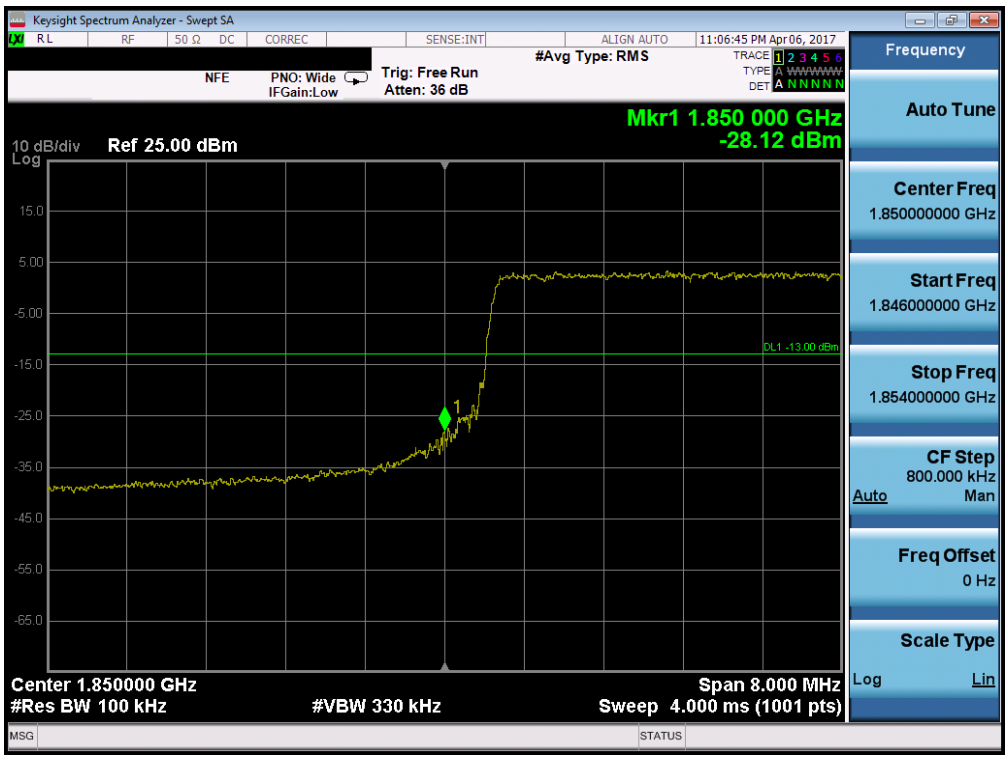


Plot 7-147. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 7-148. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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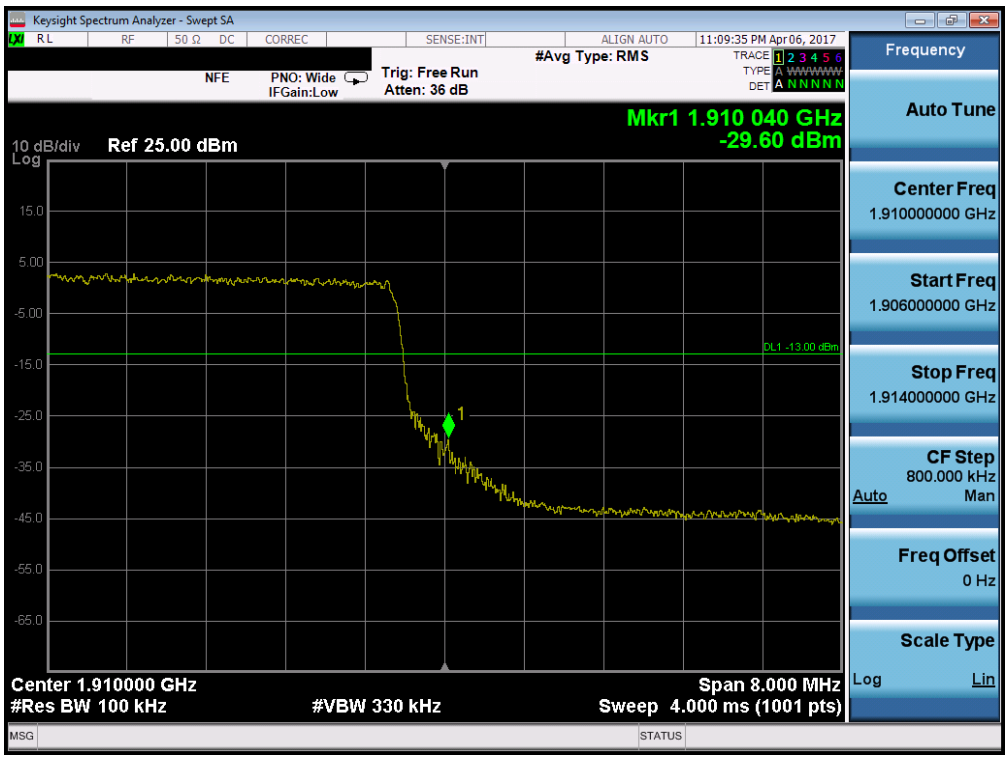
Plot 7-149. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-150. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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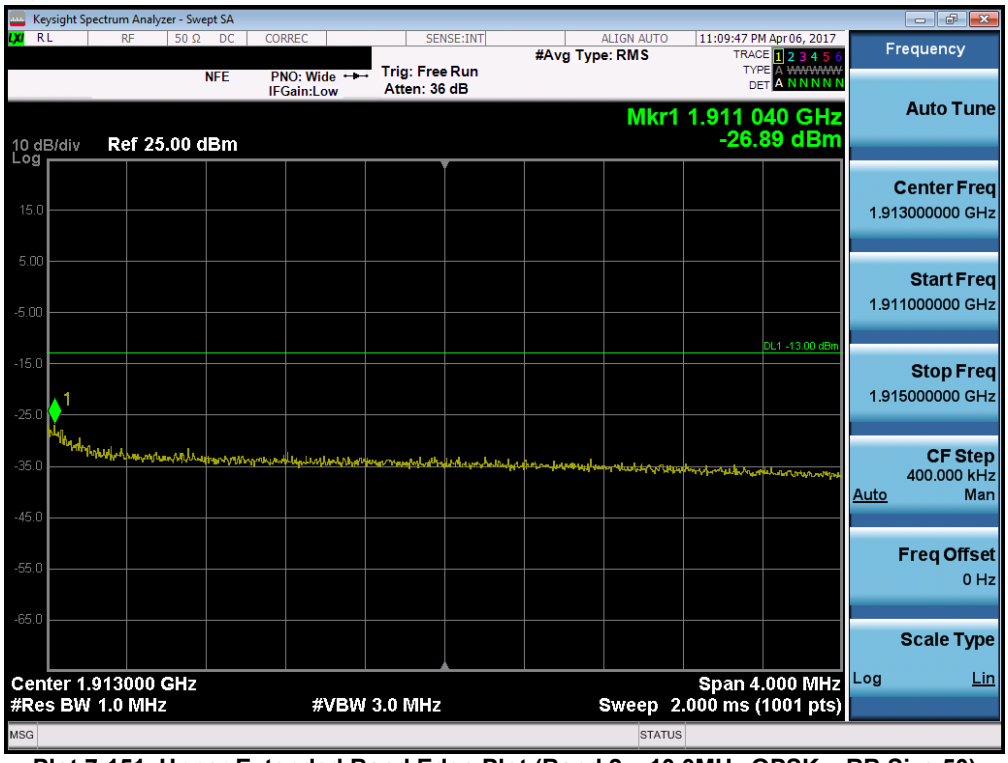
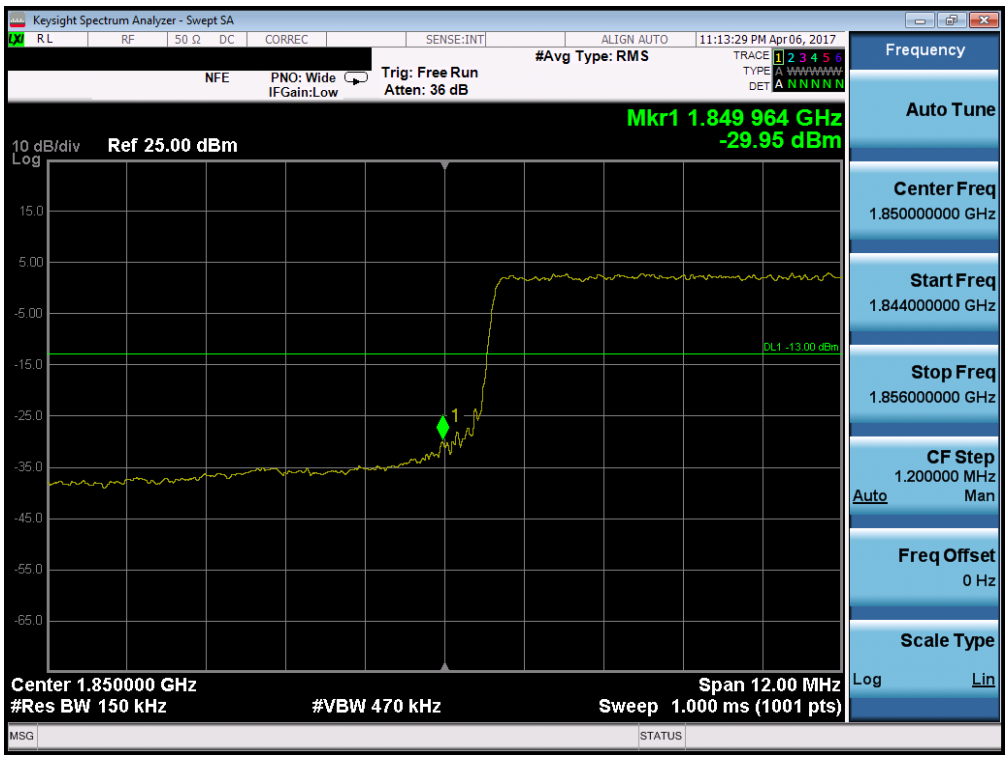


Plot 7-151. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-152. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

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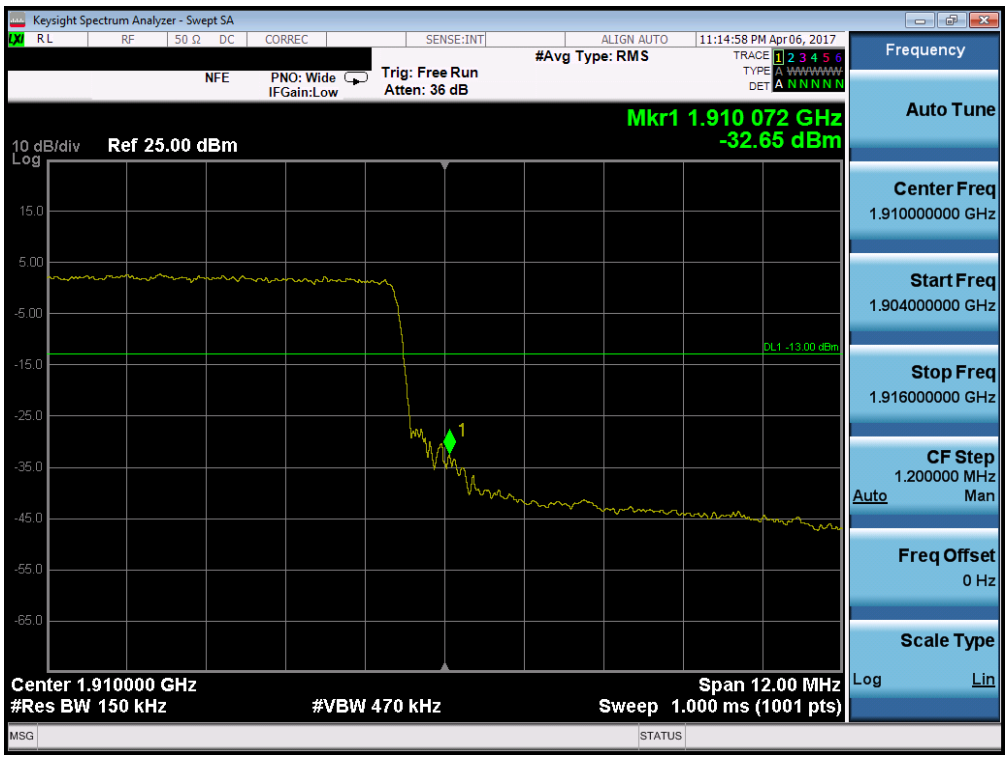
Plot 7-153. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-154. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

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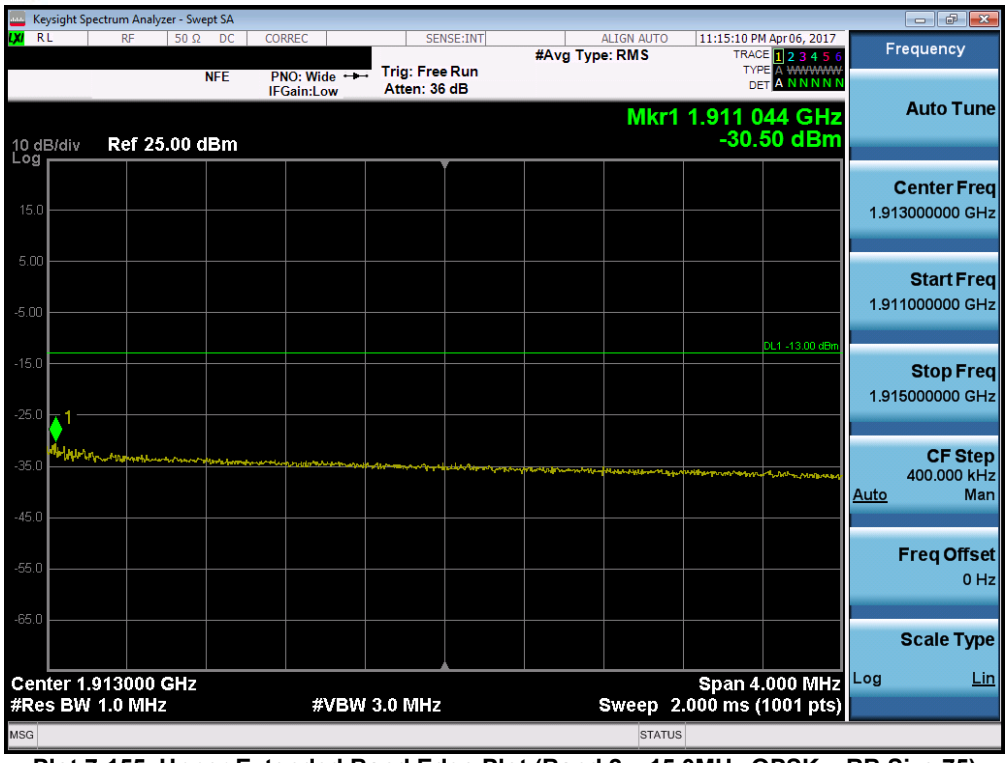
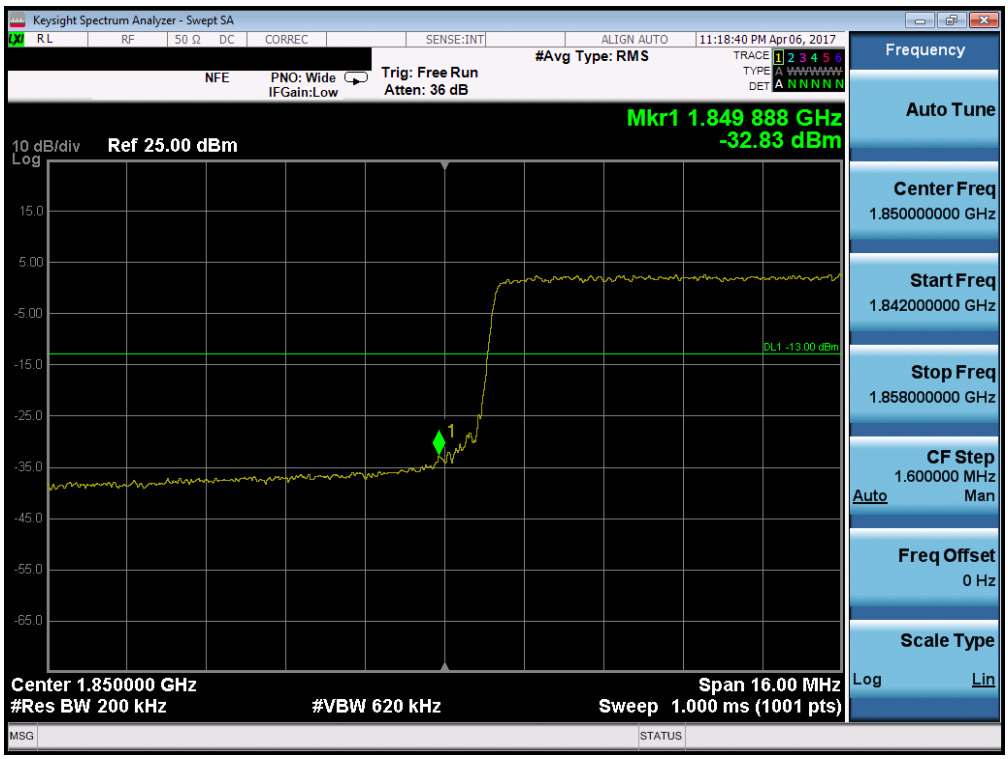


Plot 7-155. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-156. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

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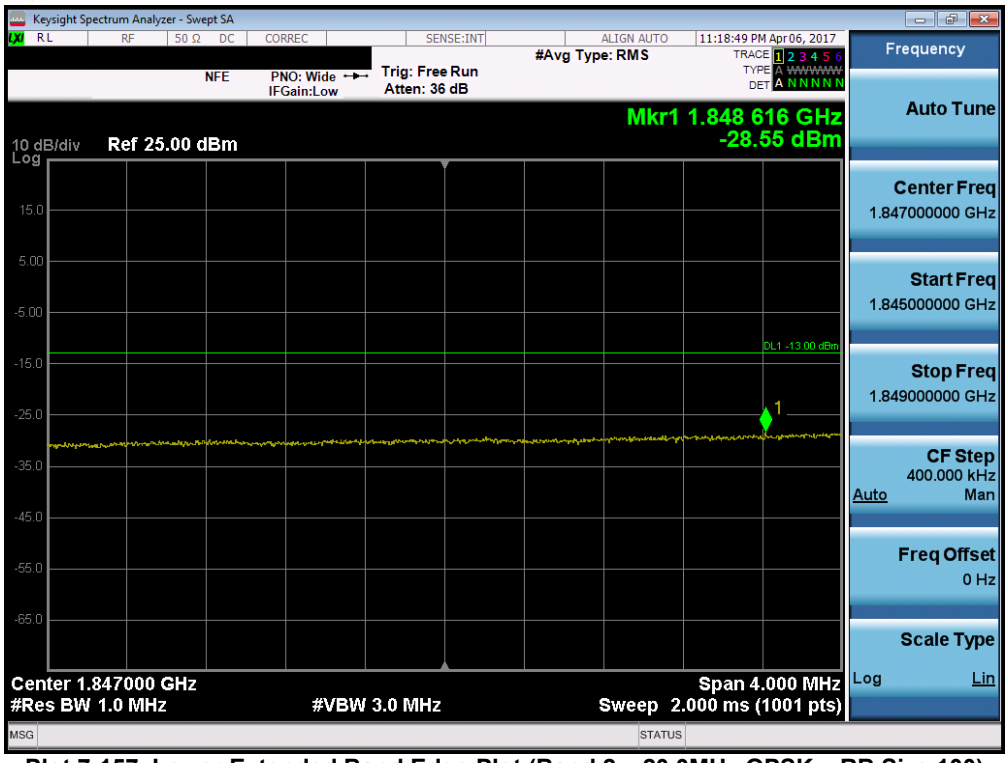
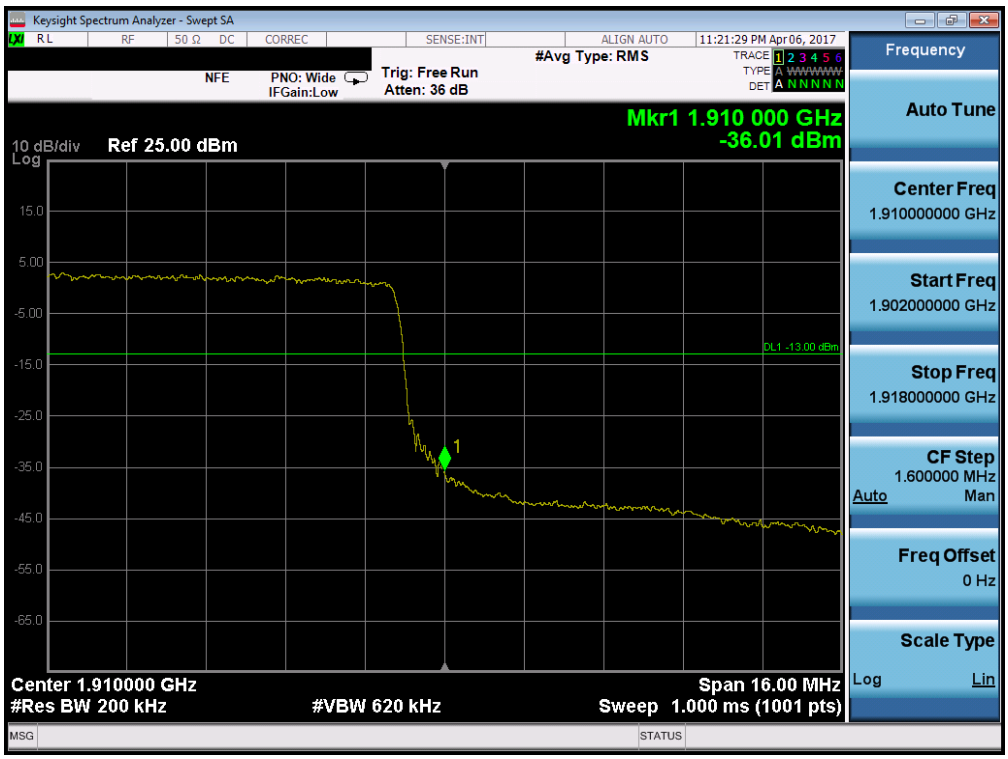


Plot 7-157. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-158. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

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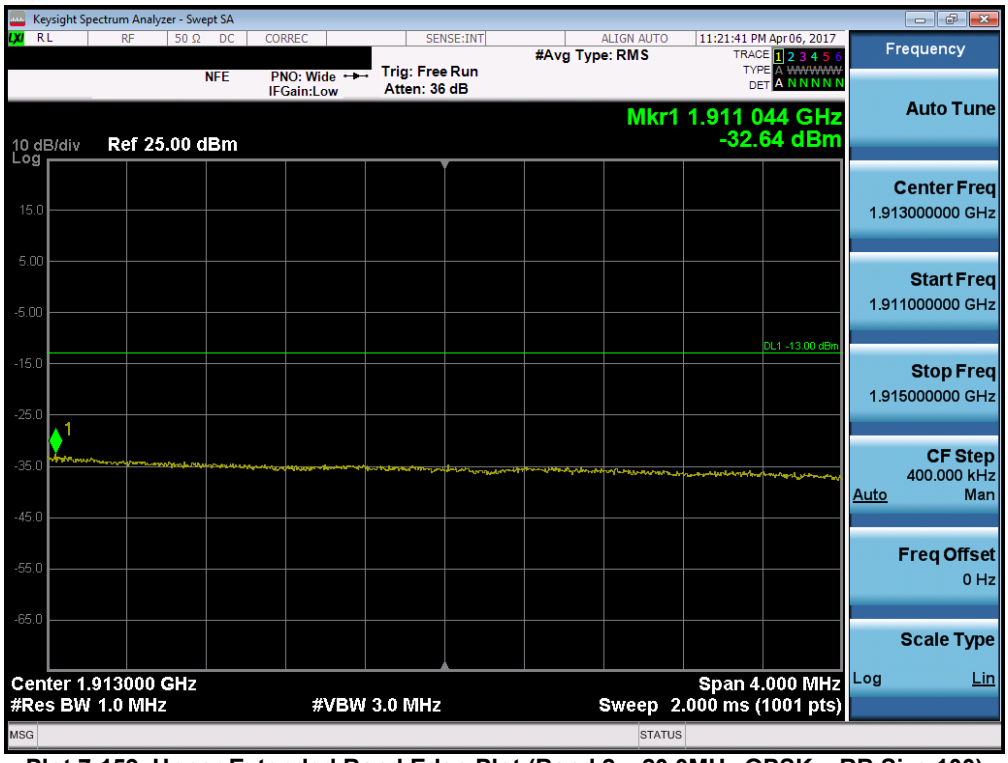
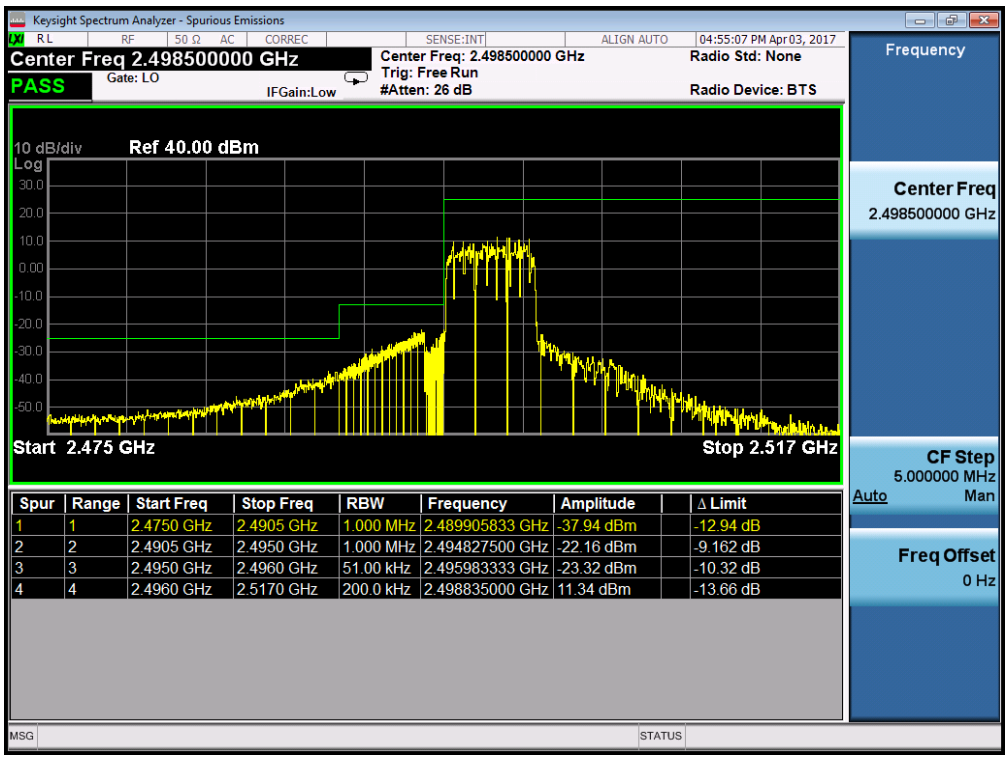


Plot 7-159. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489905833 GHz	-37.94 dBm		-12.94 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494827500 GHz	-22.16 dBm		-9.162 dB
3	3	2.4950 GHz	2.4960 GHz	51.00 kHz	2.495983333 GHz	-23.32 dBm		-10.32 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.498835000 GHz	11.34 dBm		-13.66 dB

Plot 7-160. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

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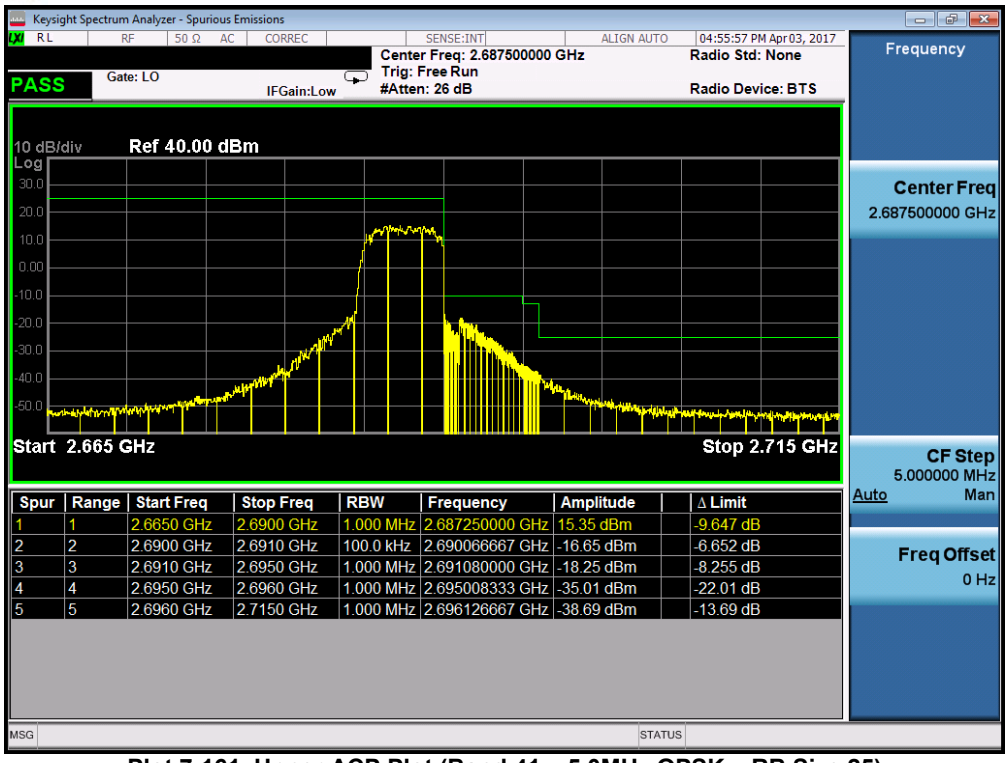
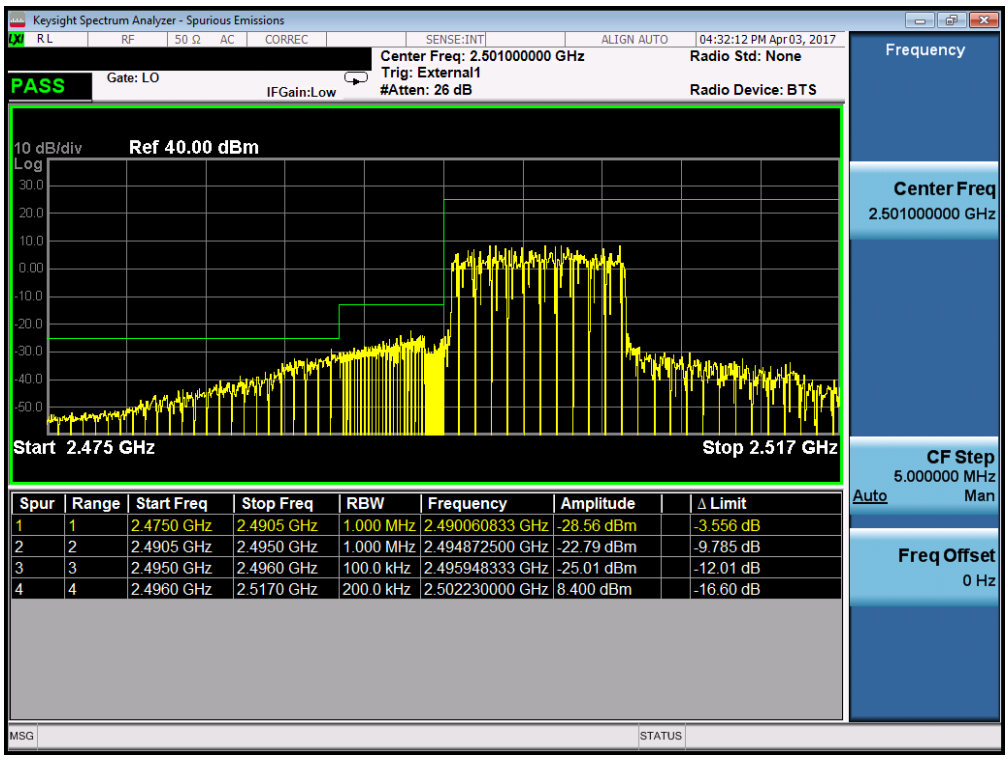


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.687250000 GHz	15.35 dBm	-9.647 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690066667 GHz	-16.65 dBm	-6.652 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691080000 GHz	-18.25 dBm	-8.255 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695008333 GHz	-35.01 dBm	-22.01 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696126667 GHz	-38.69 dBm	-13.69 dB

Plot 7-161. 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	2.490060833 GHz	-28.56 dBm	-3.556 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494872500 GHz	-22.79 dBm	-9.785 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495948333 GHz	-25.01 dBm	-12.01 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.502230000 GHz	8.400 dBm	-16.60 dB

Plot 7-162. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

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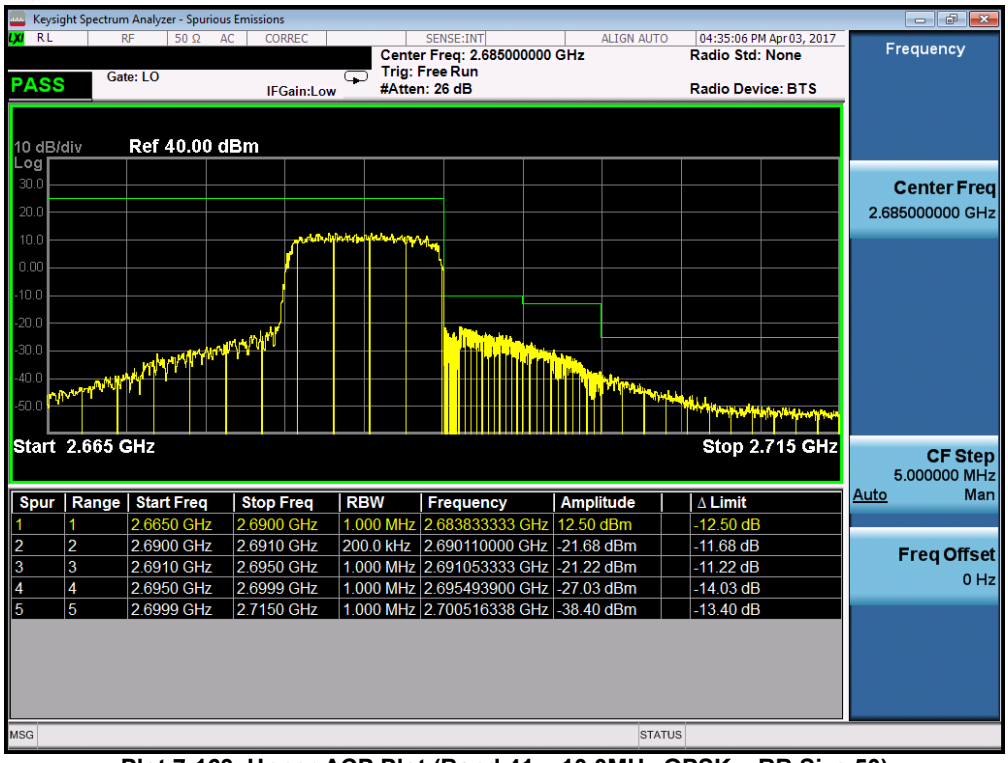
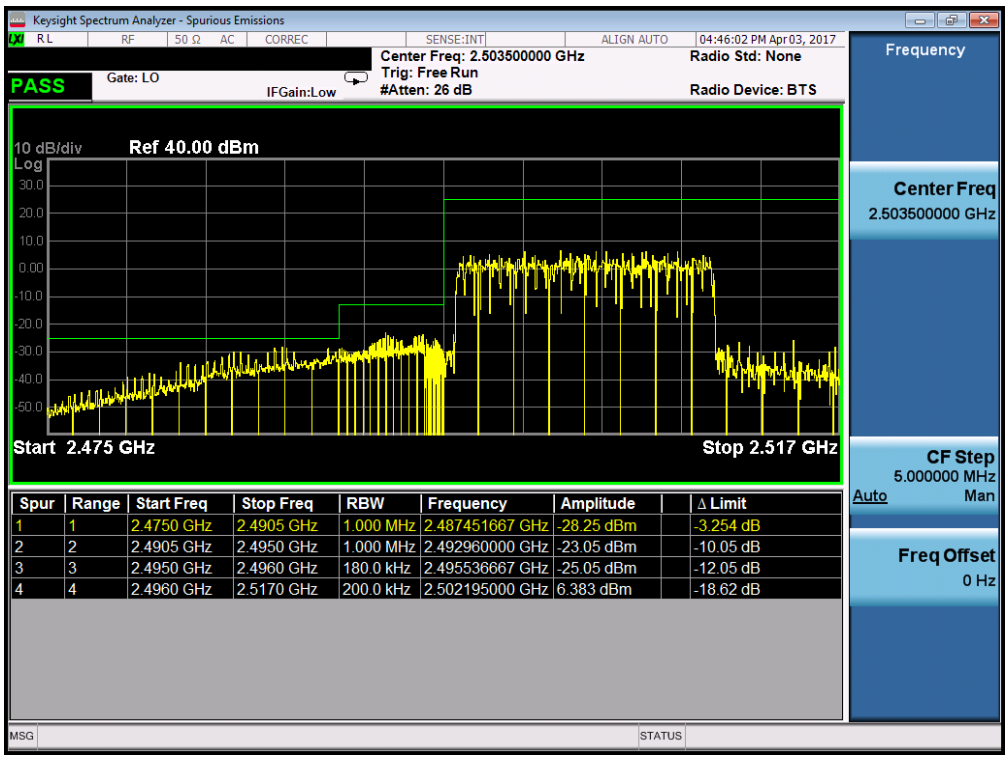


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.683833333 GHz	12.50 dBm	-12.50 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690110000 GHz	-21.68 dBm	-11.68 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691053333 GHz	-21.22 dBm	-11.22 dB
4	4	2.6950 GHz	2.6999 GHz	1.000 MHz	2.695493900 GHz	-27.03 dBm	-14.03 dB
5	5	2.6999 GHz	2.7150 GHz	1.000 MHz	2.700516338 GHz	-38.40 dBm	-13.40 dB

Plot 7-163. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.487451667 GHz	-28.25 dBm	-3.254 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.492960000 GHz	-23.05 dBm	-10.05 dB
3	3	2.4950 GHz	2.4960 GHz	180.0 kHz	2.495536667 GHz	-25.05 dBm	-12.05 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.502195000 GHz	6.383 dBm	-18.62 dB

Plot 7-164. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)

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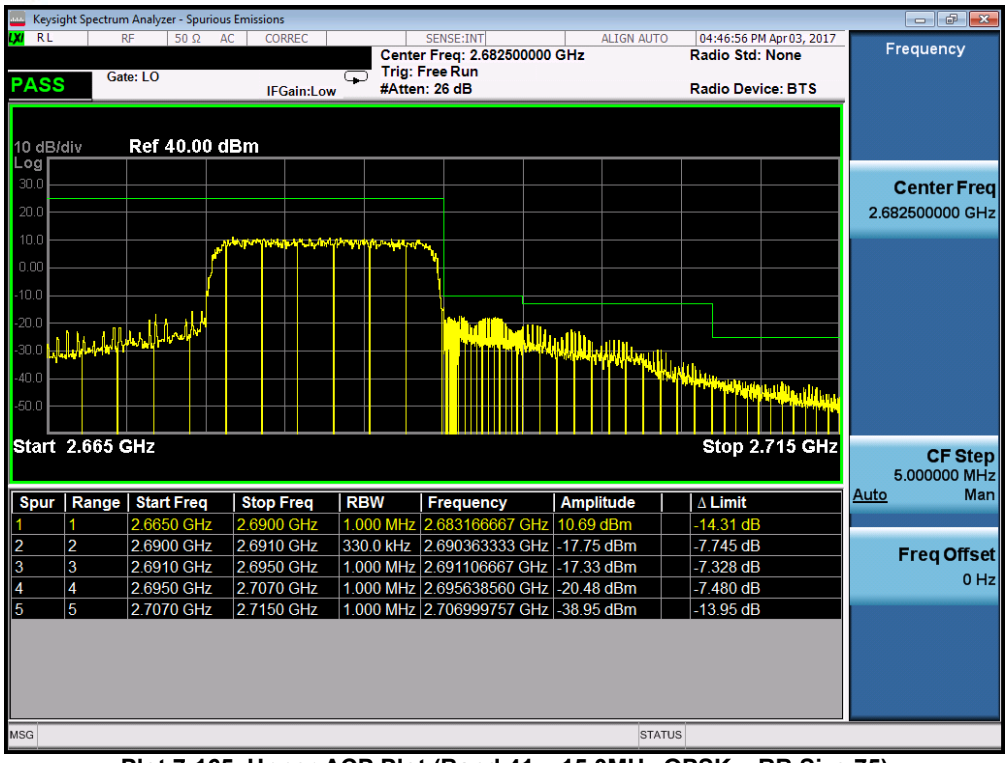
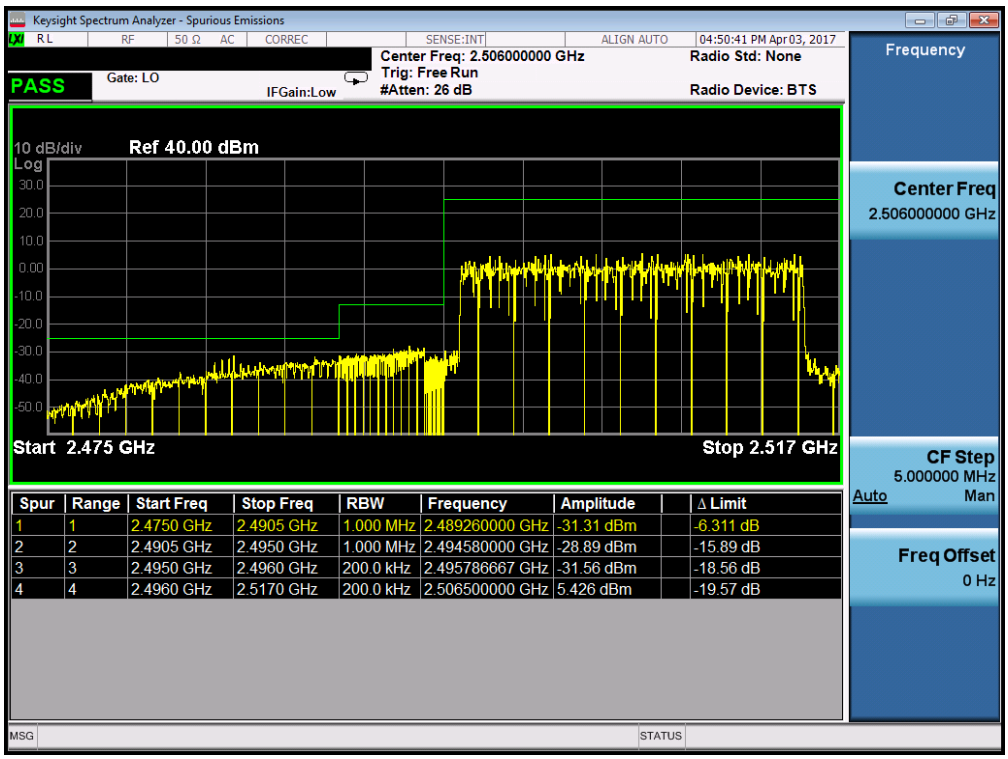


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.683166667 GHz	10.69 dBm	-14.31 dB
2	2	2.6900 GHz	2.6910 GHz	330.0 kHz	2.690363333 GHz	-17.75 dBm	-7.745 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691106667 GHz	-17.33 dBm	-7.328 dB
4	4	2.6950 GHz	2.7070 GHz	1.000 MHz	2.695638560 GHz	-20.48 dBm	-7.480 dB
5	5	2.7070 GHz	2.7150 GHz	1.000 MHz	2.706999757 GHz	-38.95 dBm	-13.95 dB

Plot 7-165. 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	2.489260000 GHz	-31.31 dBm	-6.311 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494580000 GHz	-28.89 dBm	-15.89 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495786667 GHz	-31.56 dBm	-18.56 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.506500000 GHz	5.426 dBm	-19.57 dB

Plot 7-166. Lower ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

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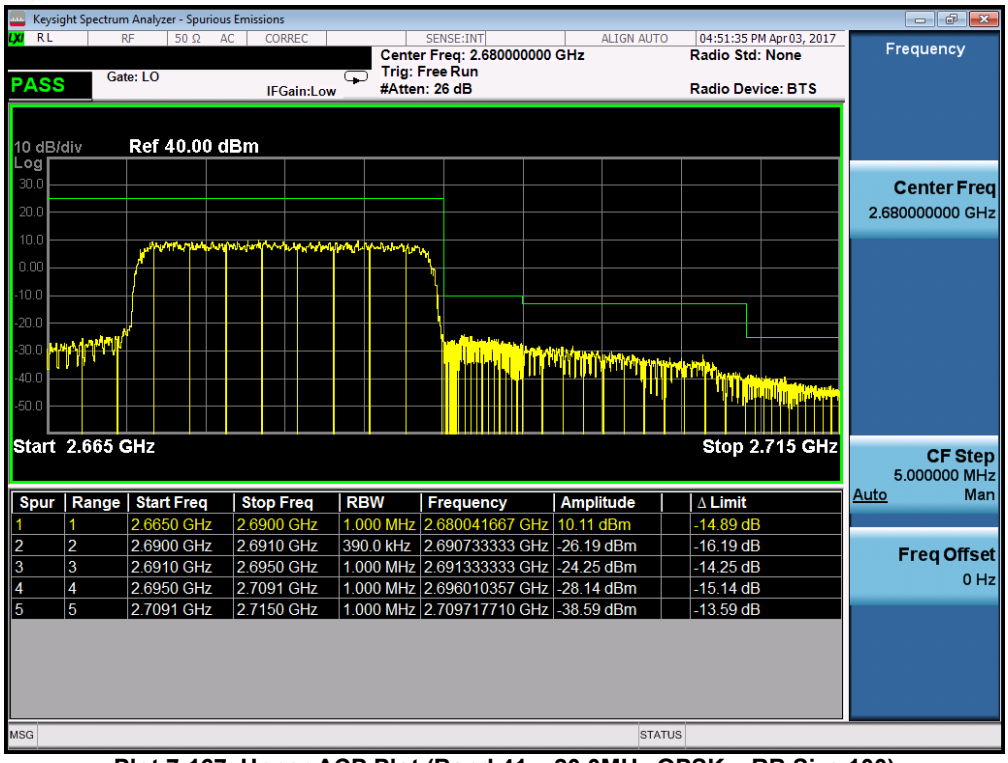

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.680041667 GHz	10.11 dBm		-14.89 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690733333 GHz	-26.19 dBm		-16.19 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691333333 GHz	-24.25 dBm		-14.25 dB
4	4	2.6950 GHz	2.7091 GHz	1.000 MHz	2.696010357 GHz	-28.14 dBm		-15.14 dB
5	5	2.7091 GHz	2.7150 GHz	1.000 MHz	2.709717710 GHz	-38.59 dBm		-13.59 dB

Plot 7-167. 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 D01 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.

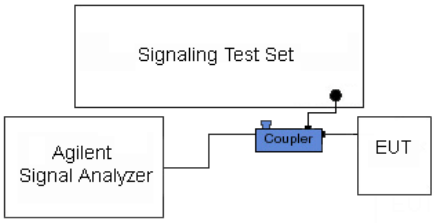

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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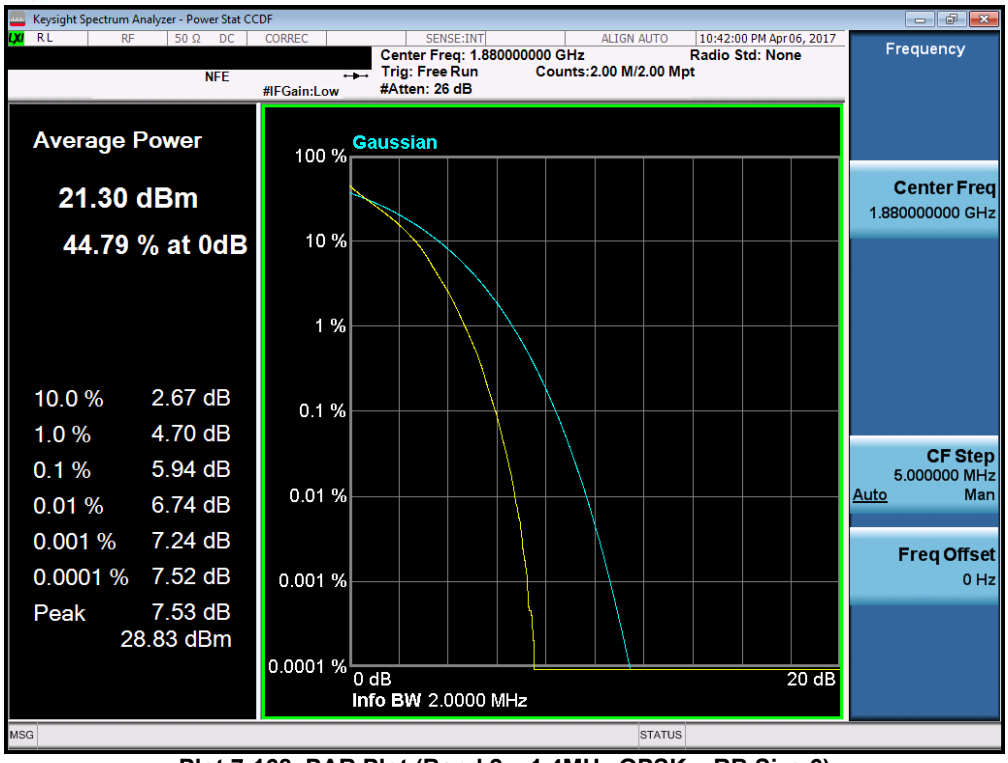
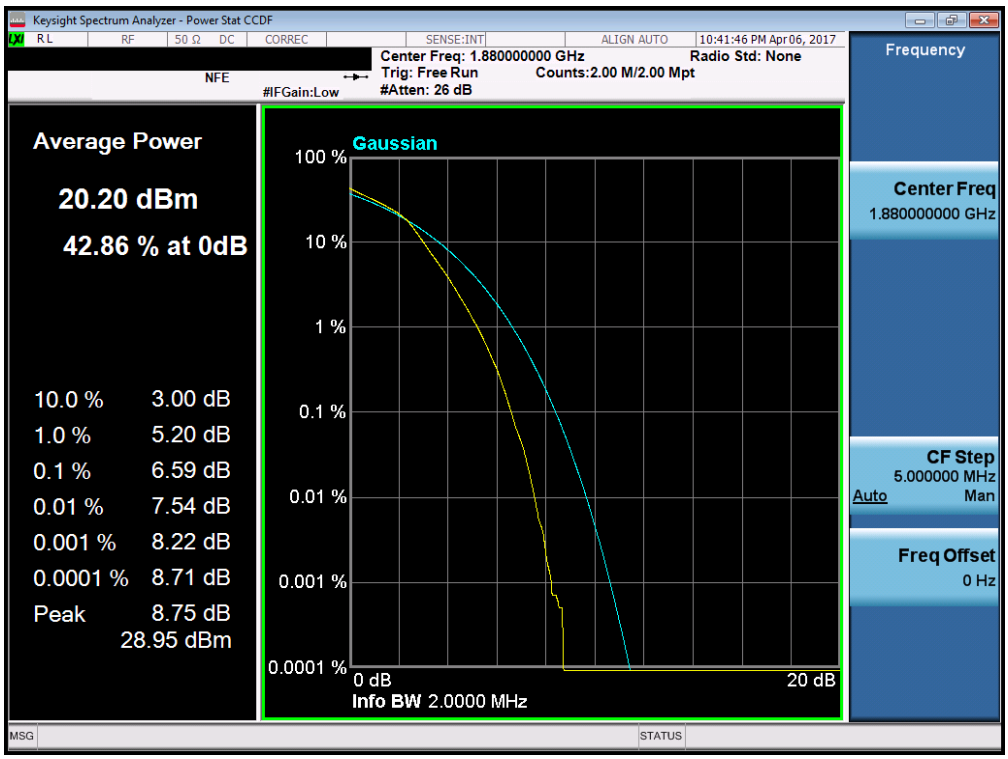


Plot 7-168. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 7-169. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

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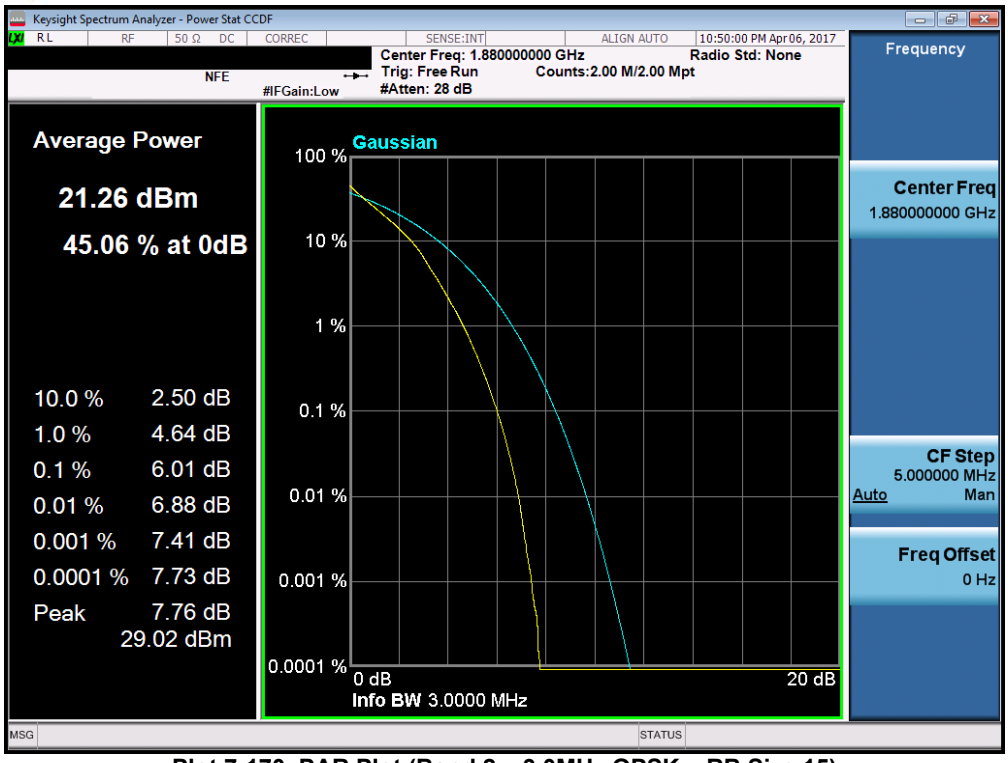
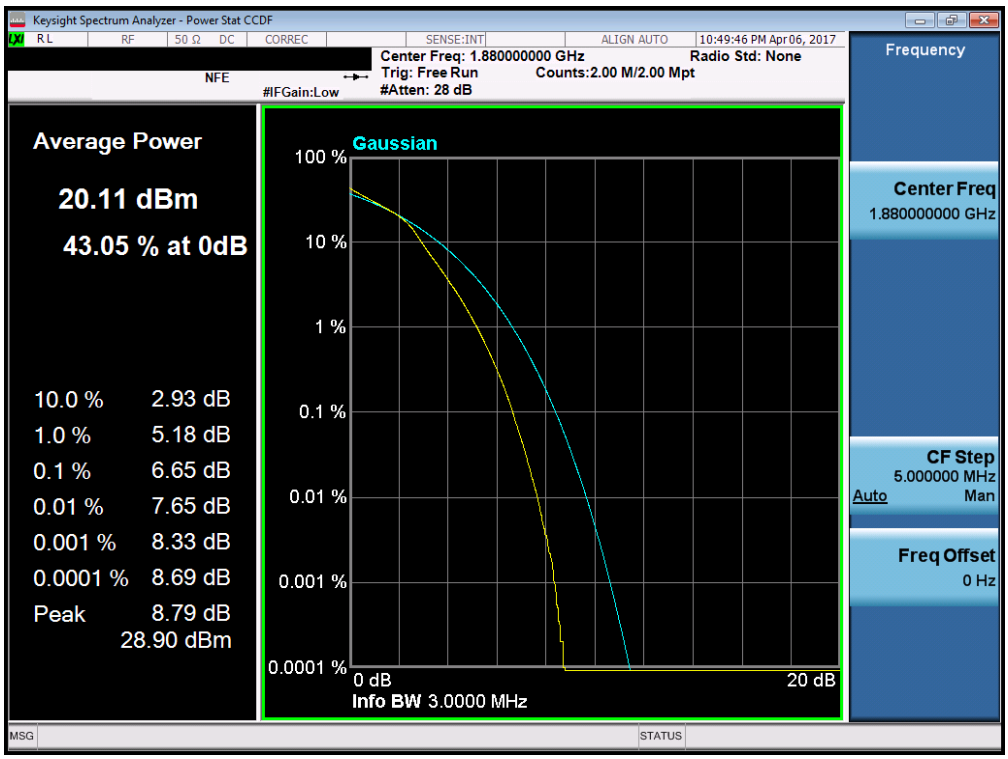


Plot 7-170. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 7-171. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

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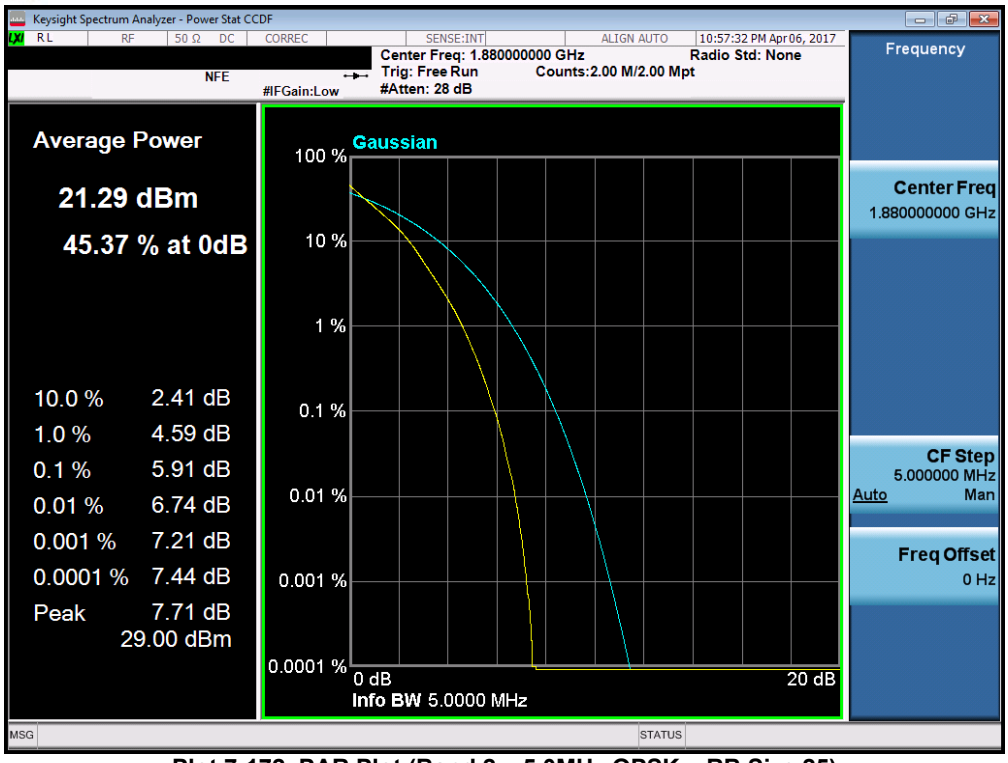
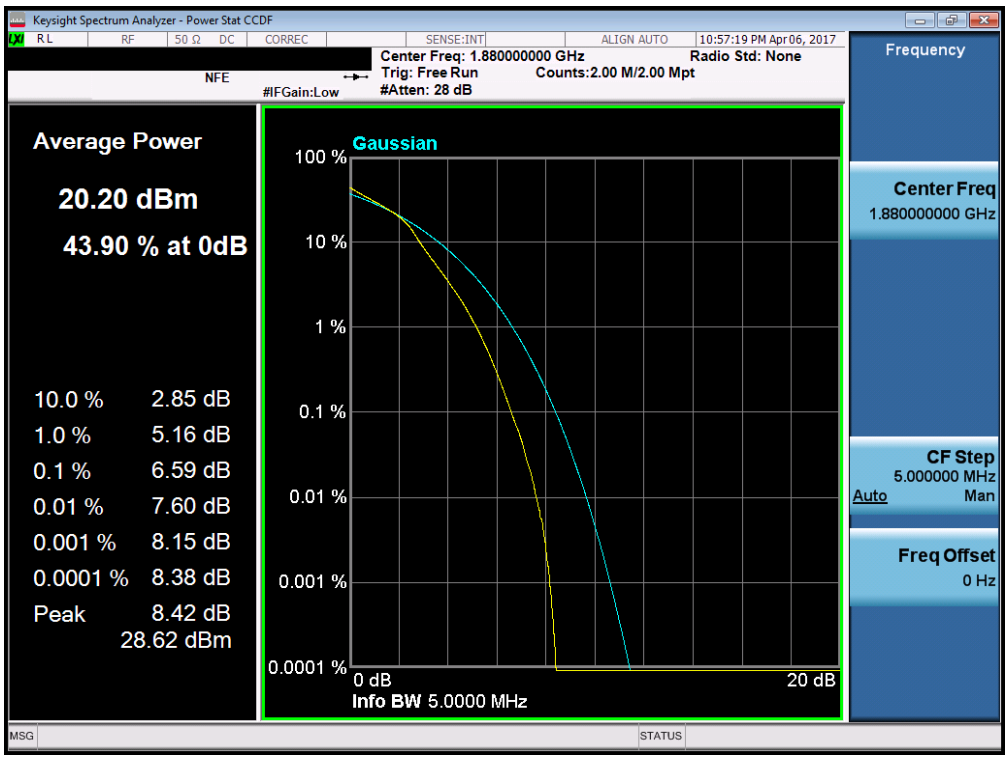


Plot 7-172. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 7-173. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

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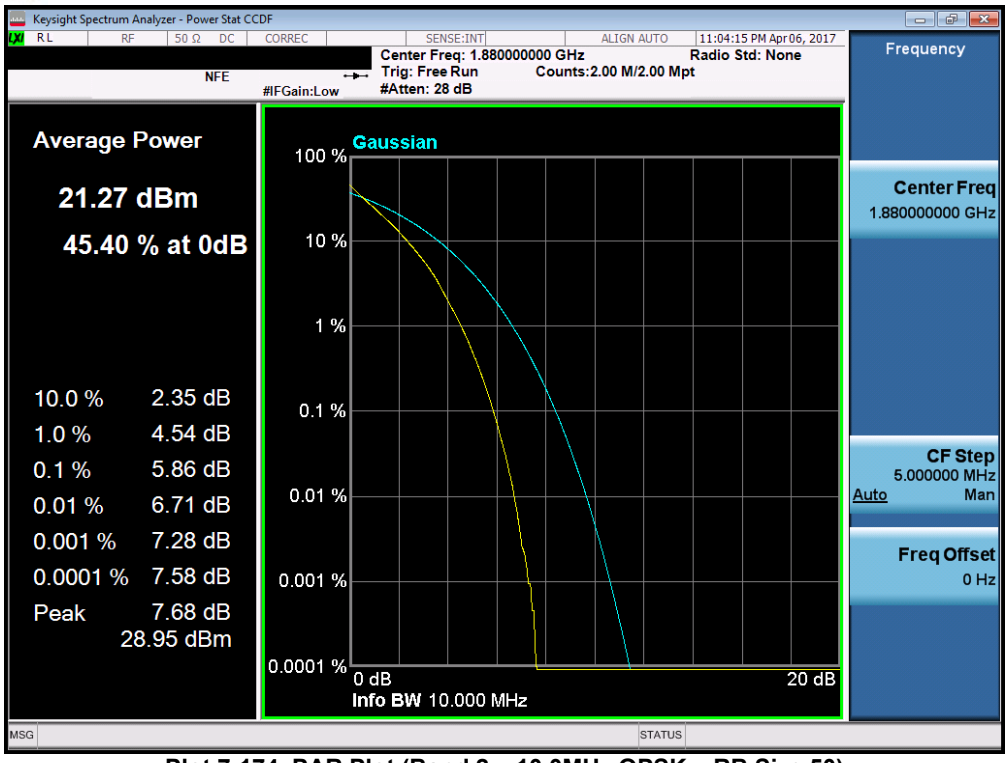
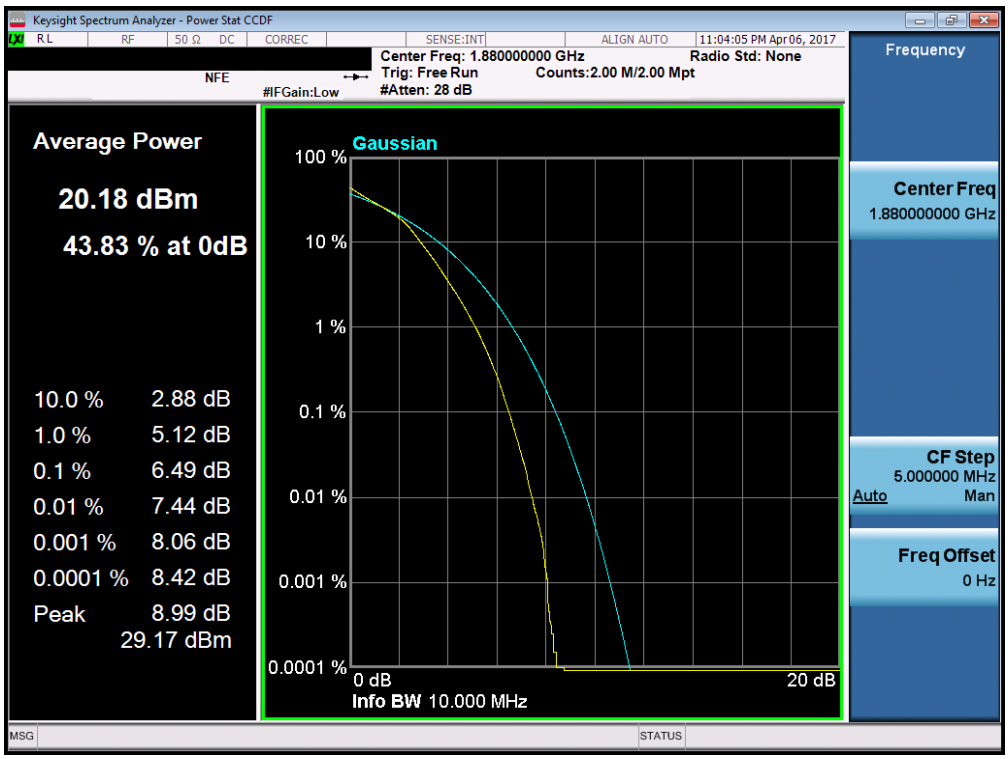


Plot 7-174. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-175. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

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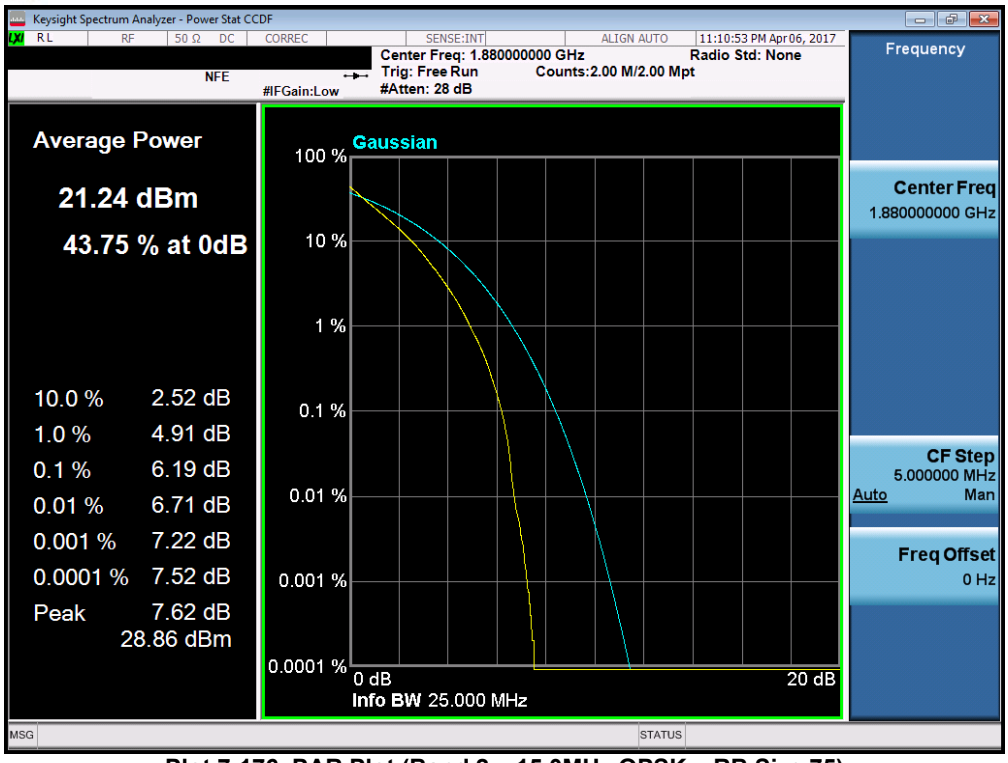
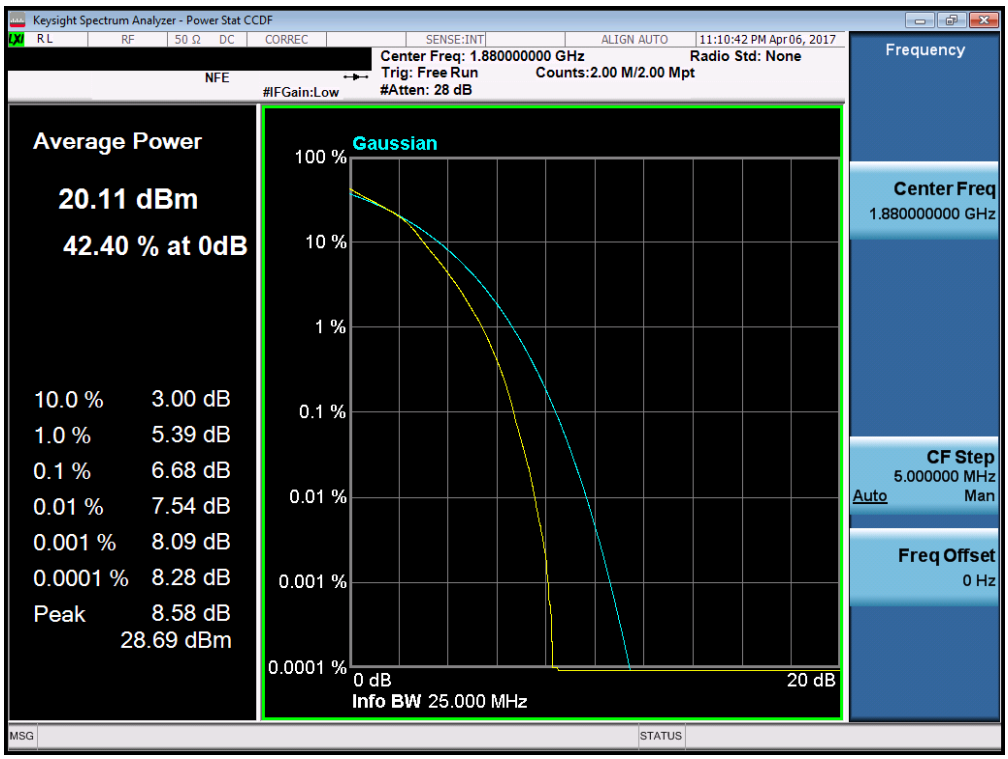


Plot 7-176. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-177. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

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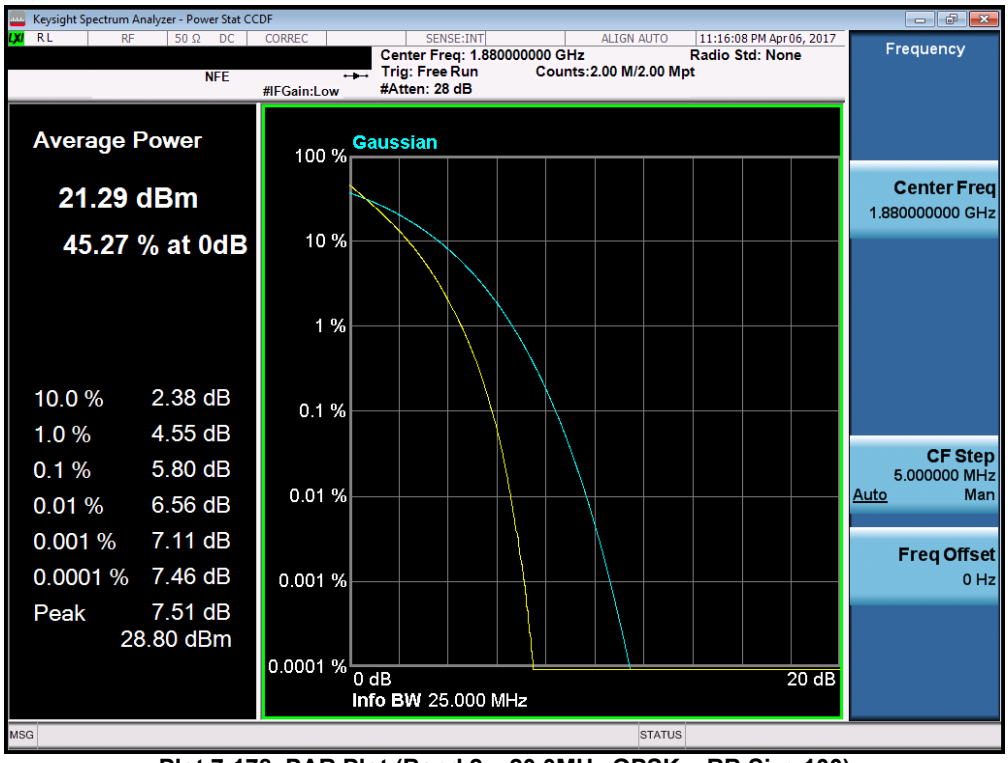
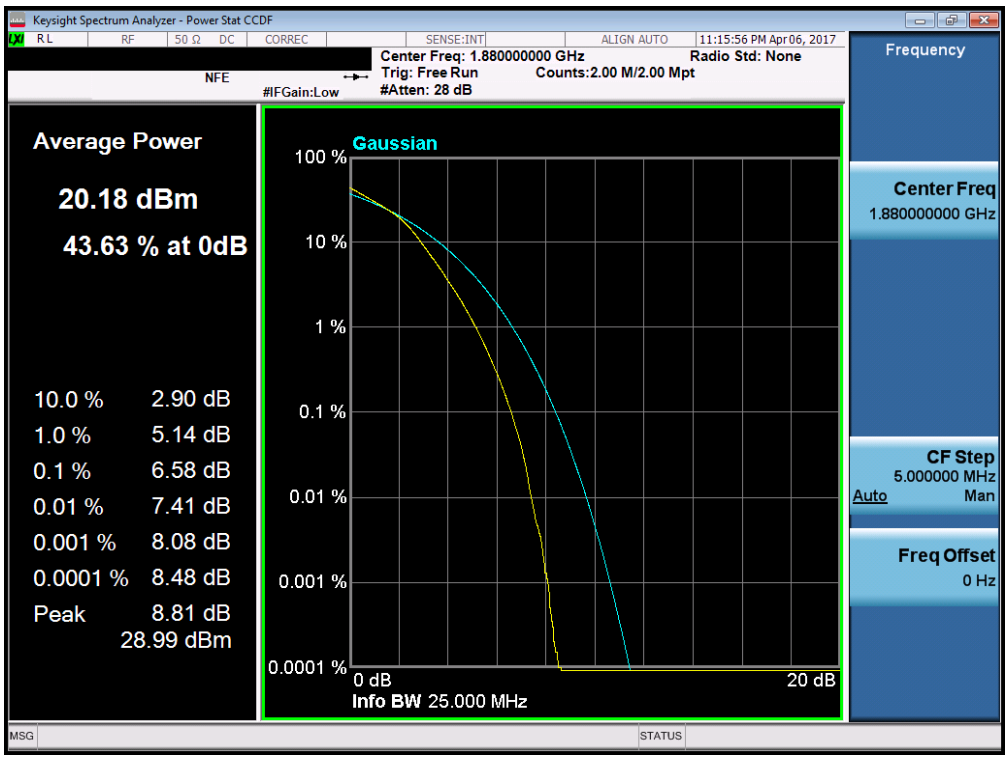


Plot 7-178. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-179. PAR Plot (Band 2 – 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 D01 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.

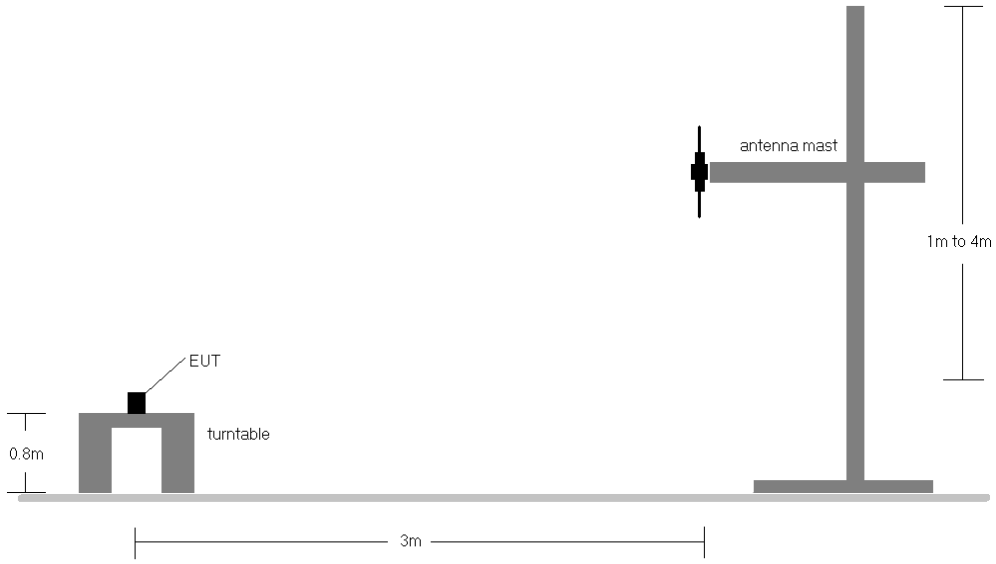

Figure 7-5. Radiated Test Setup <1GHz

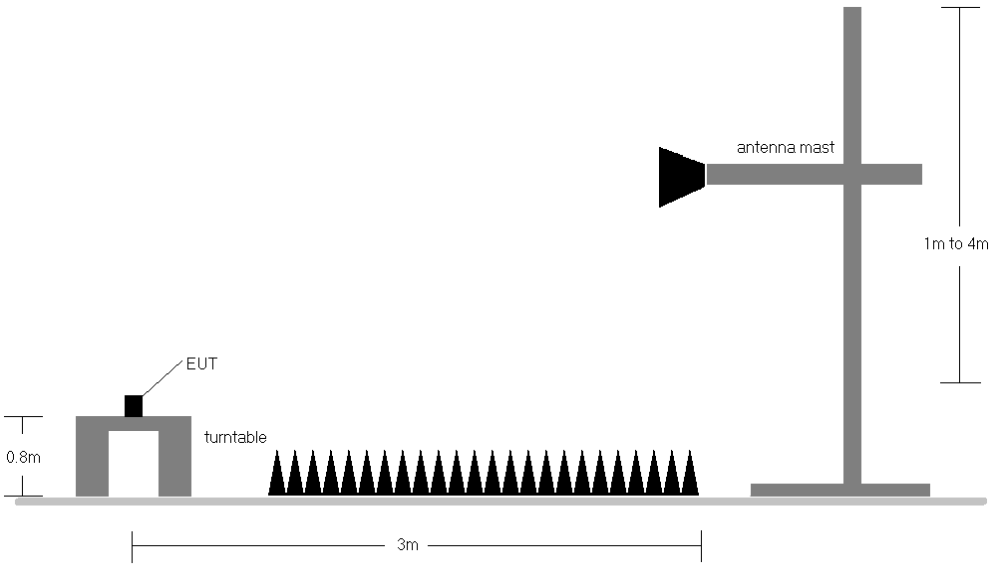

Figure 7-6. Radiated Test Setup >1GHz

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	133	266	1 / 5	13.78	2.56	16.34	34.77	-18.43
707.50	1.4	QPSK	H	134	269	1 / 5	14.59	2.56	17.15	34.77	-17.62
715.30	1.4	QPSK	H	267	291	1 / 0	15.03	2.60	17.63	34.77	-17.15
715.30	1.4	16-QAM	H	267	291	1 / 0	13.80	2.60	16.40	34.77	-18.38
700.50	3	QPSK	H	135	274	1 / 14	14.42	2.48	16.90	34.77	-17.87
707.50	3	QPSK	H	135	266	1 / 14	15.06	2.56	17.62	34.77	-17.15
714.50	3	QPSK	H	267	275	1 / 14	15.92	2.60	18.52	34.77	-16.25
714.50	3	16-QAM	H	267	275	1 / 14	14.57	2.60	17.17	34.77	-17.60

Table 7-2. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
701.50	5	QPSK	H	286	274	1 / 0	15.55	2.49	18.04	34.77	-16.73
707.50	5	QPSK	H	261	263	1 / 24	15.90	2.56	18.46	34.77	-16.31
713.50	5	QPSK	H	267	264	1 / 24	16.61	2.60	19.21	34.77	-15.56
713.50	5	16-QAM	H	267	264	1 / 24	14.92	2.60	17.52	34.77	-17.25
704.00	10	QPSK	H	290	266	1 / 49	15.78	2.51	18.29	34.77	-16.48
707.50	10	QPSK	H	266	267	1 / 49	16.17	2.56	18.73	34.77	-16.04
711.00	10	QPSK	H	266	269	1 / 0	16.31	2.60	18.91	34.77	-15.87
711.00	10	16-QAM	H	266	269	1 / 0	14.79	2.60	17.39	34.77	-17.39
713.50	5	QPSK	V	148	118	1 / 0	13.85	3.04	16.89	34.77	-17.88

Table 7-3. ERP Data (Band 12/17)

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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	359	91	3 / 2	20.27	-0.65	19.62	38.45	-18.83
836.50	1.4	QPSK	H	352	84	3 / 2	21.27	-0.65	20.62	38.45	-17.83
848.30	1.4	QPSK	H	358	89	1 / 3	21.89	-0.65	21.24	38.45	-17.21
848.30	1.4	16-QAM	H	358	89	1 / 3	20.89	-0.65	20.24	38.45	-18.21
825.50	3	QPSK	H	356	85	1 / 7	19.41	-0.65	18.76	38.45	-19.69
836.50	3	QPSK	H	358	86	1 / 14	20.78	-0.65	20.13	38.45	-18.32
847.50	3	QPSK	H	400	88	1 / 7	21.72	-0.65	21.07	38.45	-17.38
847.50	3	16-QAM	H	400	88	1 / 7	20.78	-0.65	20.13	38.45	-18.32
826.50	5	QPSK	H	200	86	1 / 24	20.59	-0.65	19.94	38.45	-18.51
836.50	5	QPSK	H	100	84	1 / 24	21.40	-0.65	20.75	38.45	-17.70
846.50	5	QPSK	H	400	86	1 / 12	22.48	-0.65	21.83	38.45	-16.62
846.50	5	16-QAM	H	400	86	1 / 12	20.92	-0.65	20.27	38.45	-18.18
829.00	10	QPSK	H	359	80	1 / 49	21.74	-0.65	21.09	38.45	-17.36
836.50	10	QPSK	H	250	85	1 / 49	22.41	-0.65	21.76	38.45	-16.69
844.00	10	QPSK	H	356	87	1 / 25	22.75	-0.65	22.10	38.45	-16.35
844.00	10	16-QAM	H	356	87	1 / 25	21.51	-0.65	20.86	38.45	-17.59
844.00	10	QPSK	V	107	343	1 / 25	21.12	-0.65	20.47	38.45	-17.98

Table 7-4. ERP Data (Band 5)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	136	22	1 / 5	13.66	9.44	23.10	30.00	-6.90
1745.00	1.4	QPSK	V	123	105	1 / 0	13.46	9.25	22.71	30.00	-7.29
1779.30	1.4	QPSK	V	198	105	1 / 0	10.53	9.05	19.58	30.00	-10.42
1710.70	1.4	16-QAM	V	136	22	1 / 5	12.36	9.44	21.80	30.00	-8.20
1711.50	3	QPSK	V	101	269	1 / 14	14.24	9.44	23.68	30.00	-6.32
1745.00	3	QPSK	V	100	270	1 / 0	14.16	9.25	23.41	30.00	-6.59
1778.50	3	QPSK	V	198	105	1 / 0	12.16	9.06	21.22	30.00	-8.78
1711.50	3	16-QAM	V	101	269	1 / 14	12.86	9.44	22.30	30.00	-7.70
1712.50	5	QPSK	V	100	331	1 / 24	14.75	9.43	24.18	30.00	-5.82
1745.00	5	QPSK	V	100	202	1 / 0	14.37	9.25	23.62	30.00	-6.38
1777.50	5	QPSK	V	103	195	1 / 0	13.51	9.06	22.57	30.00	-7.43
1712.50	5	16-QAM	V	100	331	1 / 24	13.36	9.43	22.79	30.00	-7.21
1715.00	10	QPSK	V	127	279	1 / 49	14.34	9.42	23.76	30.00	-6.24
1745.00	10	QPSK	V	115	198	1 / 49	14.16	9.25	23.41	30.00	-6.59
1775.00	10	QPSK	V	127	340	1 / 0	13.41	9.08	22.49	30.00	-7.51
1715.00	10	16-QAM	V	127	279	1 / 49	13.00	9.42	22.42	30.00	-7.58
1717.50	15	QPSK	V	100	273	1 / 74	15.58	9.40	24.98	30.00	-5.02
1745.00	15	QPSK	V	101	196	1 / 0	14.21	9.25	23.46	30.00	-6.54
1772.50	15	QPSK	V	100	198	1 / 0	14.34	9.09	23.43	30.00	-6.57
1717.50	15	16-QAM	V	100	273	1 / 74	14.16	9.40	23.56	30.00	-6.44
1720.00	20	QPSK	V	100	267	1 / 99	15.64	9.39	25.03	30.00	-4.97
1745.00	20	QPSK	V	100	270	1 / 0	15.18	9.25	24.43	30.00	-5.57
1770.00	20	QPSK	V	107	199	1 / 0	14.28	9.10	23.38	30.00	-6.62
1720.00	20	16-QAM	V	100	267	1 / 99	14.22	9.39	23.61	30.00	-6.39
1720.00	20	QPSK	H	112	83	1 / 99	14.81	9.39	24.20	30.00	-5.80

Table 7-5. EIRP Data (Band 4/66)

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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	V	114	259	1 / 0	18.17	4.79	22.96	33.01	-10.05
1880.00	1.4	QPSK	V	111	280	1 / 5	18.22	4.84	23.06	33.01	-9.95
1909.30	1.4	QPSK	V	113	335	1 / 5	18.35	4.86	23.21	33.01	-9.80
1909.30	1.4	16-QAM	V	113	335	1 / 5	17.19	4.86	22.05	33.01	-10.96
1851.50	3	QPSK	V	116	201	1 / 0	18.70	4.79	23.49	33.01	-9.52
1880.00	3	QPSK	V	110	285	1 / 14	18.49	4.84	23.33	33.01	-9.68
1908.50	3	QPSK	V	111	337	1 / 14	18.20	4.86	23.06	33.01	-9.95
1851.50	3	16-QAM	V	116	201	1 / 0	17.43	4.79	22.22	33.01	-10.79
1852.50	5	QPSK	V	117	208	1 / 0	19.89	4.79	24.68	33.01	-8.33
1880.00	5	QPSK	V	110	283	1 / 24	19.19	4.84	24.03	33.01	-8.98
1907.50	5	QPSK	V	112	333	1 / 24	18.89	4.87	23.76	33.01	-9.25
1852.50	5	16-QAM	V	117	208	1 / 0	17.99	4.79	22.78	33.01	-10.23
1855.00	10	QPSK	V	115	46	1 / 0	19.85	4.80	24.65	33.01	-8.36
1880.00	10	QPSK	V	110	158	1 / 49	18.31	4.84	23.15	33.01	-9.86
1905.00	10	QPSK	V	111	103	1 / 0	18.29	4.87	23.16	33.01	-9.85
1855.00	10	16-QAM	V	115	46	1 / 0	18.49	4.80	23.29	33.01	-9.72
1857.50	15	QPSK	V	112	49	1 / 0	19.84	4.80	24.64	33.01	-8.37
1880.00	15	QPSK	V	119	25	1 / 74	18.92	4.84	23.76	33.01	-9.25
1902.50	15	QPSK	V	112	105	1 / 0	18.20	4.88	23.08	33.01	-9.93
1857.50	15	16-QAM	V	112	49	1 / 74	17.69	4.80	22.49	33.01	-10.52
1860.00	20	QPSK	V	115	202	1 / 0	19.37	4.81	24.18	33.01	-8.84
1880.00	20	QPSK	V	111	281	1 / 0	18.44	4.84	23.28	33.01	-9.73
1900.00	20	QPSK	V	116	335	1 / 99	19.02	4.88	23.90	33.01	-9.11
1860.00	20	16-QAM	V	115	202	1 / 0	17.81	4.81	22.62	33.01	-10.40
1852.50	5	QPSK	H	220	6	1 / 0	18.11	4.79	22.90	33.01	-10.11

Table 7-6. EIRP Data (Band 2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	119	164	1 / 0	9.99	8.42	18.41	33.01	-14.60
2593.00	5	QPSK	H	115	155	1 / 0	12.97	8.65	21.62	33.01	-11.39
2687.50	5	QPSK	H	113	46	1 / 0	13.80	8.44	22.24	33.01	-10.77
2687.50	5	16-QAM	H	113	46	1 / 0	12.87	8.44	21.31	33.01	-11.70
2501.00	10	QPSK	H	124	153	1 / 0	10.58	8.41	18.99	33.01	-14.02
2593.00	10	QPSK	H	120	34	1 / 0	12.72	8.65	21.37	33.01	-11.64
2685.00	10	QPSK	H	110	50	1 / 0	13.48	8.45	21.93	33.01	-11.08
2685.00	10	16-QAM	H	110	50	1 / 0	11.85	8.45	20.30	33.01	-12.71
2503.50	15	QPSK	H	126	141	1 / 74	9.65	8.42	18.07	33.01	-14.94
2593.00	15	QPSK	H	142	153	1 / 0	12.39	8.65	21.04	33.01	-11.97
2682.50	15	QPSK	H	112	39	1 / 0	14.61	8.46	23.07	33.01	-9.94
2682.50	15	16-QAM	H	112	39	1 / 0	13.13	8.46	21.59	33.01	-11.42
2506.00	20	QPSK	H	118	141	1 / 99	9.44	8.42	17.86	33.01	-15.15
2593.00	20	QPSK	H	143	153	1 / 0	12.65	8.65	21.30	33.01	-11.71
2680.00	20	QPSK	H	113	47	1 / 0	14.02	8.46	22.48	33.01	-10.53
2680.00	20	16-QAM	H	113	47	1 / 0	12.76	8.46	21.22	33.01	-11.79
2682.50	15	QPSK	V	115	212	1 / 0	12.00	8.65	20.65	33.01	-12.36

Table 7-7. 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 D01 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 = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

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

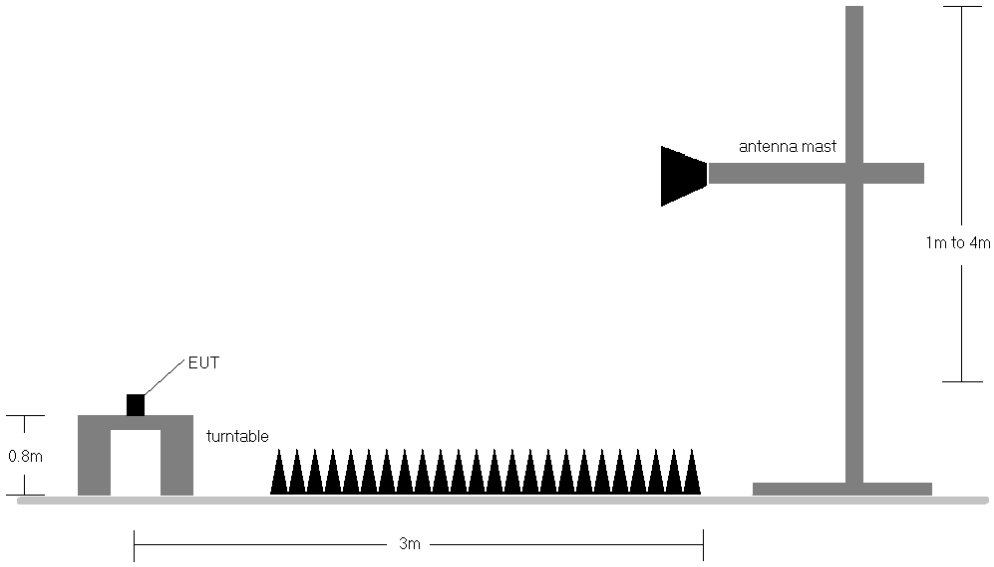

Figure 7-7. Test Instrument & Measurement Setup

Test Notes

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

2) This unit was tested with its standard battery.

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

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

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

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OPERATING FREQUENCY:	701.50		MHz	
CHANNEL:	23035			
MEASURED OUTPUT POWER:	18.04	dBm =	0.064	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.04	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]
1403.00	H	288	130	-65.71	5.60	-60.11	78.2
2104.50	H	197	44	-63.56	6.67	-56.89	74.9
2806.00	H	-	-	-67.58	7.92	-59.66	77.7
3507.50	H	141	284	-62.79	7.80	-54.99	73.0
4209.00	H	208	348	-59.32	8.30	-51.02	69.1
4910.50	H	-	-	-60.15	8.71	-51.44	69.5

Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY:	707.50		MHz	
CHANNEL:	23095			
MEASURED OUTPUT POWER:	18.46	dBm =	0.070	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.46	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	279	73	-65.41	5.69	-59.72	78.2
2122.50	H	151	62	-61.54	6.75	-54.80	73.3
2830.00	H	-	-	-67.47	7.90	-59.57	78.0
3537.50	H	210	284	-62.02	7.81	-54.21	72.7
4245.00	H	205	345	-61.03	8.41	-52.62	71.1
4952.50	H	-	-	-62.88	8.74	-54.13	72.6
5660.00	H	-	-	-62.37	9.09	-53.28	71.7

Table 7-9. Radiated Spurious Data (Band 12/17 – Mid Channel)

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OPERATING FREQUENCY:	713.50		MHz	
CHANNEL:	23155			
MEASURED OUTPUT POWER:	19.21	dBm =	0.083	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.21	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]
1427.00	H	198	1	-64.78	5.69	-59.09	78.3
2140.50	H	190	62	-62.06	6.75	-55.32	74.5
2854.00	H	259	307	-66.16	7.90	-58.26	77.5
3567.50	H	229	246	-62.92	7.81	-55.11	74.3
4281.00	H	228	342	-59.46	8.41	-51.05	70.3
4994.50	H	-	-	-60.53	8.74	-51.79	71.0

Table 7-10. Radiated Spurious Data (Band 12/17 – High Channel)

OPERATING FREQUENCY:	829.00		MHz	
CHANNEL:	20450			
MEASURED OUTPUT POWER:	21.09	dBm =	0.129	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.09	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]
1658.00	H	111	172	-69.69	6.70	-63.00	84.1
2487.00	H	117	156	-72.70	7.58	-65.13	86.2
3316.00	H	-	-	-69.79	7.42	-62.37	83.5
4145.00	H	147	246	-68.70	8.13	-60.57	81.7
4974.00	H	-	-	-68.46	8.76	-59.70	80.8
5803.00	H	-	-	-67.79	9.41	-58.38	79.5

Table 7-11. Radiated Spurious Data (Band 5 – Low Channel)

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OPERATING FREQUENCY:	836.50			MHz
CHANNEL:	20525			
MEASURED OUTPUT POWER:	21.76	dBm =	0.150	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.76		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	110	171	-71.39	6.70	-64.69	86.5
2509.50	H	110	159	-72.18	7.63	-64.55	86.3
3346.00	H	211	153	-70.03	7.51	-62.52	84.3
4182.50	H	204	242	-68.44	8.23	-60.21	82.0
5019.00	H	-	-	-67.79	8.75	-59.04	80.8
5855.50	H	-	-	-67.59	9.41	-58.18	79.9

Table 7-12. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	844.00			MHz
CHANNEL:	20600			
MEASURED OUTPUT POWER:	22.10	dBm =	0.162	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.10		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]
1688.00	H	111	168	-67.91	6.70	-61.21	83.3
2532.00	H	111	151	-71.93	7.61	-64.32	86.4
3376.00	H	-	-	-70.10	7.61	-62.49	84.6
4220.00	H	143	243	-68.52	8.33	-60.19	82.3
5064.00	H	-	-	-67.89	8.67	-59.22	81.3
5908.00	H	-	-	-66.43	9.39	-57.04	79.1

Table 7-13. Radiated Spurious Data (Band 5 – High Channel)

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OPERATING FREQUENCY:	1720.00		MHz	
CHANNEL:	132072			
MEASURED OUTPUT POWER:	25.03	dBm =	0.318	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	20.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.03	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]
3440.00	V	-	-	-64.63	9.80	-54.83	79.9
5160.00	V	-	-	-60.13	10.67	-49.46	74.5
6880.00	V	148	231	-53.56	11.72	-41.84	66.9
8600.00	V	153	165	-49.67	11.03	-38.64	63.7
10320.00	V	-	-	-52.09	12.44	-39.65	64.7

Table 7-14. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY:	1745.00		MHz	
CHANNEL:	132322			
MEASURED OUTPUT POWER:	24.43	dBm =	0.277	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	20.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.43	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]
3490.00	V	136	349	-64.45	9.90	-54.55	79.0
5235.00	V	-	-	-59.54	10.63	-48.92	73.3
6980.00	V	113	242	-53.71	11.77	-41.94	66.4
8725.00	V	-	-	-49.71	10.95	-38.76	63.2
10470.00	V	-	-	-52.67	12.65	-40.02	64.4

Table 7-15. Radiated Spurious Data (Band 66 – Mid Channel)

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OPERATING FREQUENCY:	1770.00		MHz	
CHANNEL:	132572			
MEASURED OUTPUT POWER:	23.38	dBm =	0.218	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	20.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.38	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]
3540.00	V	-	-	-64.23	9.90	-54.32	77.7
5310.00	V	144	158	-59.17	10.70	-48.46	71.8
7080.00	V	154	222	-52.27	11.78	-40.48	63.9
8850.00	V	156	181	-48.64	11.01	-37.63	61.0
10620.00	V	-	-	-52.60	12.65	-39.96	63.3

Table 7-16. Radiated Spurious Data (Band 66 – High Channel)

OPERATING FREQUENCY:	1852.50		MHz	
CHANNEL:	18625			
MEASURED OUTPUT POWER:	28.86	dBm =	0.769	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	41.86	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]
3705.00	V	256	320	-61.01	9.52	-51.49	80.3
5557.50	V	191	197	-58.30	10.95	-47.35	76.2
7410.00	V	158	146	-49.18	10.94	-38.25	67.1
9262.50	V	158	161	-47.54	11.50	-36.04	64.9
11115.00	V	-	-	-51.36	12.67	-38.69	67.5

Table 7-17. Radiated Spurious Data (Band 2 – Low Channel)

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OPERATING FREQUENCY:	1880.00			MHz
CHANNEL:	18900			
MEASURED OUTPUT POWER:	28.18	dBm =	0.658	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	41.18	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]
3760.00	V	175	359	-59.89	9.38	-50.51	78.7
5640.00	V	132	189	-60.43	11.15	-49.28	77.5
7520.00	V	164	140	-50.19	11.11	-39.07	67.3
9400.00	V	201	160	-48.68	11.53	-37.15	65.3
11280.00	V	-	-	-51.25	12.70	-38.55	66.7
13160.00	V	-	-	-48.59	13.01	-35.59	63.8

Table 7-18. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1907.50			MHz
CHANNEL:	19175			
MEASURED OUTPUT POWER:	27.88	dBm =	0.613	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	40.88	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	V	199	354	-60.00	9.29	-50.71	78.6
5722.50	V	143	185	-56.48	11.36	-45.12	73.0
7630.00	V	156	16	-50.23	11.31	-38.92	66.8
9537.50	V	-	-	-57.65	11.70	-45.95	73.8
11445.00	V	-	-	-57.65	12.71	-44.94	72.8

Table 7-19. Radiated Spurious Data (Band 2 – High Channel)

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OPERATING FREQUENCY:	2503.50		MHz	
CHANNEL:	39725			
MEASURED OUTPUT POWER:	18.07	dBm =	0.064	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W) =	43.07	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]
5007.00	H	181	309	-55.01	1.97	-53.04	71.1
7510.50	H	-	-	-57.45	10.61	-46.83	64.9
10014.00	H	-	-	-56.33	12.33	-44.00	62.1

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

OPERATING FREQUENCY:	2593.00		MHz	
CHANNEL:	40620			
MEASURED OUTPUT POWER:	21.04	dBm =	0.127	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W) =	46.04	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	H	146	283	-61.02	10.83	-50.19	71.2
7779.00	H	-	-	-57.98	11.60	-46.38	67.4
10372.00	H	-	-	-57.90	12.74	-45.16	66.2

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

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OPERATING FREQUENCY:	2682.50		MHz	
CHANNEL:	41515			
MEASURED OUTPUT POWER:	23.07	dBm =	0.203	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W) =	48.07	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]
5365.00	H	167	132	-62.70	11.09	-51.61	74.7
8047.50	H	-	-	-57.70	11.55	-46.15	69.2
10730.00	H	-	-	-58.19	13.01	-45.18	68.2

Table 7-22. 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 12/17 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)	707,499,815	-185	-0.0000262
100 %		- 30	707,499,980	-20	-0.0000029
100 %		- 20	707,499,889	-111	-0.0000157
100 %		- 10	707,499,895	-105	-0.0000148
100 %		0	707,499,955	-45	-0.0000064
100 %		+ 10	707,499,832	-168	-0.0000238
100 %		+ 20	707,499,992	-8	-0.0000011
100 %		+ 30	707,499,891	-109	-0.0000154
100 %		+ 40	707,499,821	-179	-0.0000253
100 %		+ 50	707,499,850	-150	-0.0000212
BATT. ENDPOINT	3.45	+ 20	707,499,950	-50	-0.0000071

Table 7-23. Frequency Stability Data (Band 12/17)

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Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

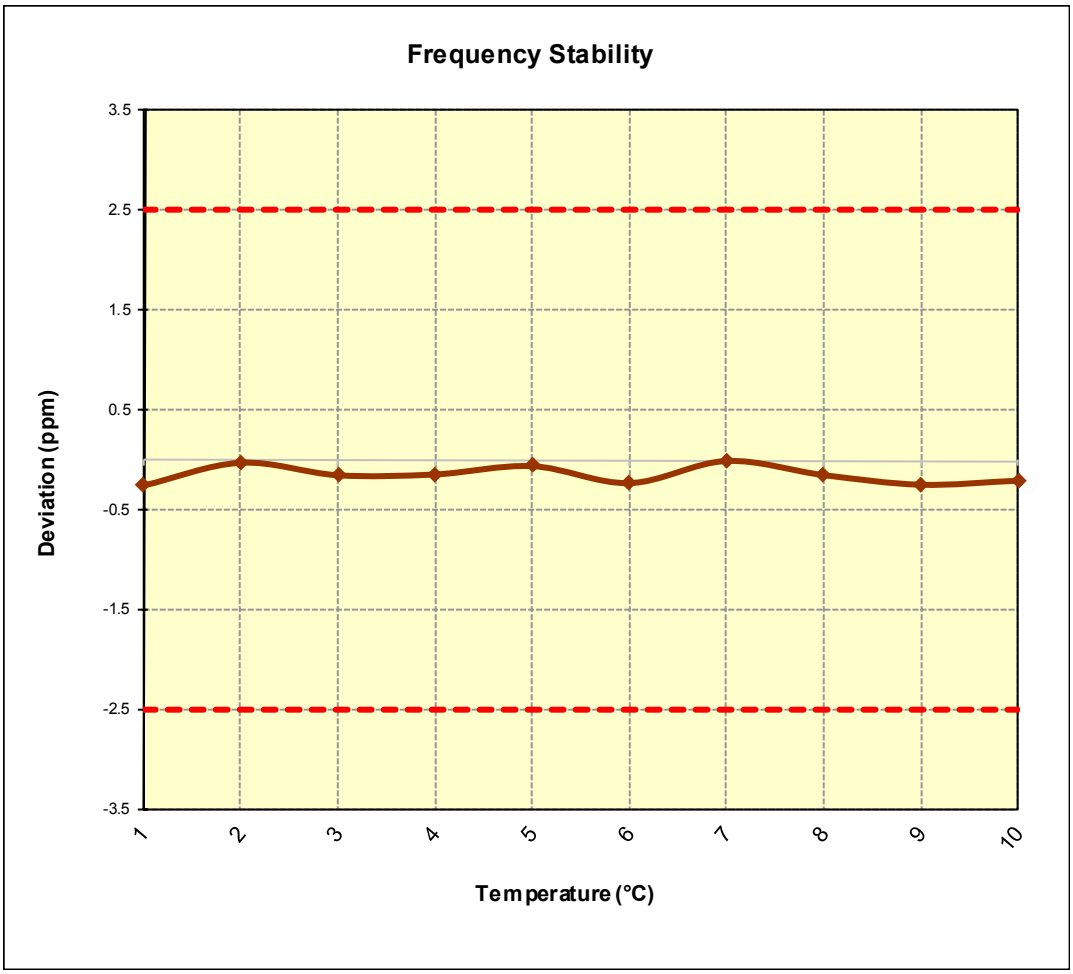

Figure 7-8. Frequency Stability Graph (Band 12/17)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY: 836,500,000 Hz

CHANNEL: 20525

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)	836,499,868	-132	-0.0000157
100 %		- 30	836,499,984	-16	-0.0000019
100 %		- 20	836,499,928	-72	-0.0000086
100 %		- 10	836,499,907	-93	-0.0000111
100 %		0	836,499,978	-22	-0.0000026
100 %		+ 10	836,499,994	-6	-0.0000007
100 %		+ 20	836,499,833	-167	-0.0000200
100 %		+ 30	836,499,833	-167	-0.0000199
100 %		+ 40	836,499,806	-194	-0.0000232
100 %		+ 50	836,499,836	-164	-0.0000196
BATT. ENDPOINT		+ 20	836,499,983	-17	-0.0000021

Table 7-24. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

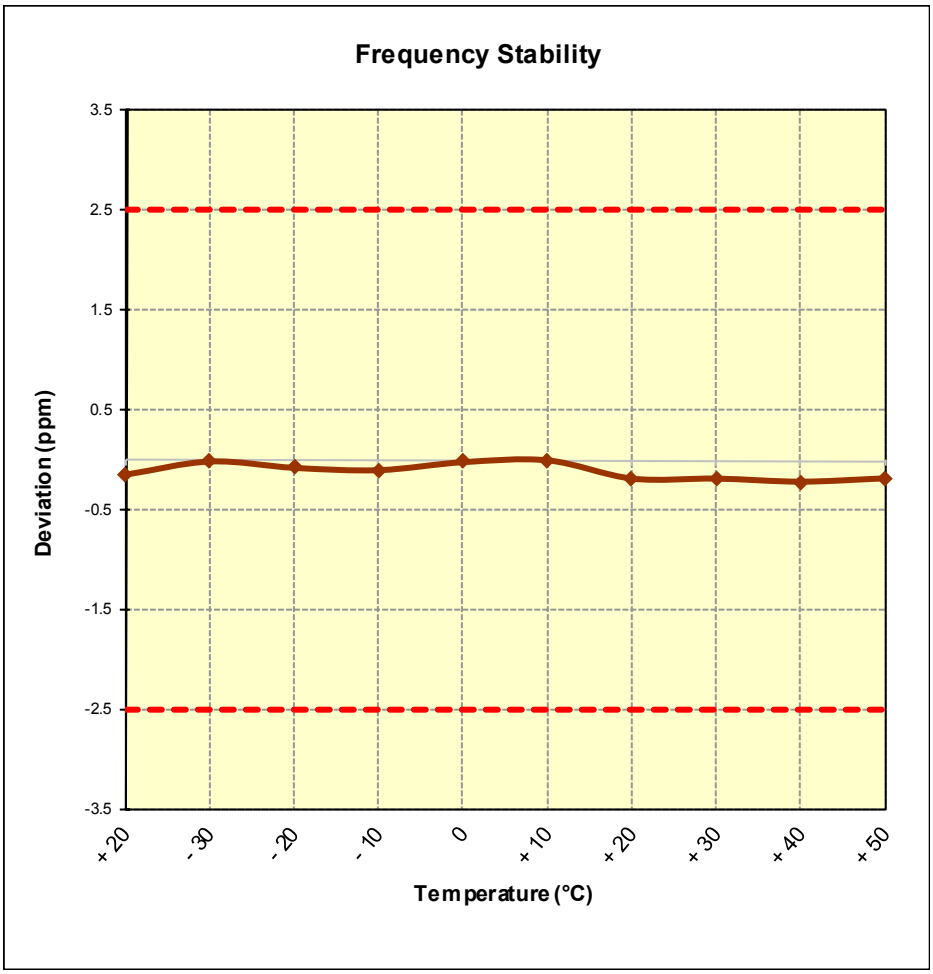

Figure 7-9. Frequency Stability Graph (Band 5)

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Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,878	-122	-0.0000070
100 %		- 30	1,744,999,962	-38	-0.0000022
100 %		- 20	1,744,999,814	-186	-0.0000106
100 %		- 10	1,744,999,864	-136	-0.0000078
100 %		0	1,744,999,808	-192	-0.0000110
100 %		+ 10	1,744,999,990	-10	-0.0000006
100 %		+ 20	1,744,999,998	-2	-0.0000001
100 %		+ 30	1,744,999,832	-168	-0.0000096
100 %		+ 40	1,744,999,816	-184	-0.0000106
100 %		+ 50	1,744,999,948	-52	-0.0000030
BATT. ENDPOINT		+ 20	1,744,999,946	-54	-0.0000031

Table 7-25. 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.

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Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54

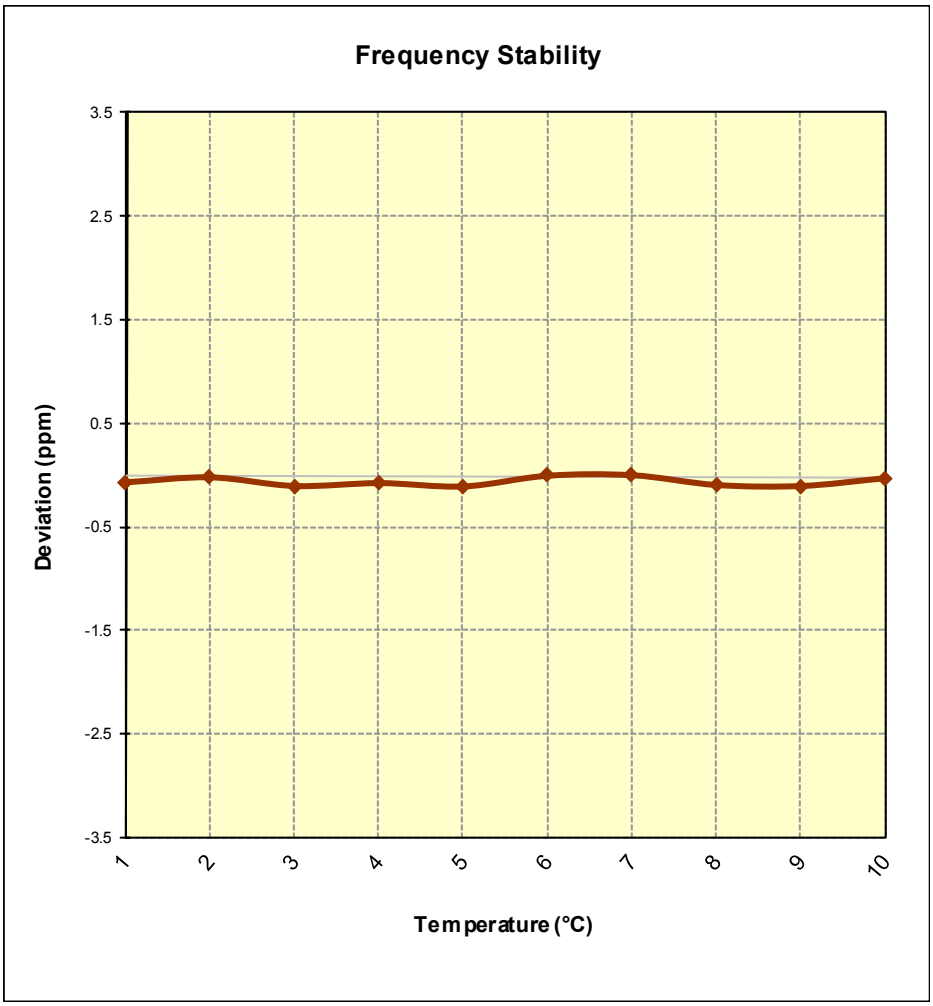

Figure 7-10. Frequency Stability Graph (Band 4/66)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,948	-52	-0.0000028
100 %		- 30	1,879,999,982	-18	-0.0000009
100 %		- 20	1,879,999,816	-184	-0.0000098
100 %		- 10	1,879,999,869	-131	-0.0000070
100 %		0	1,879,999,859	-141	-0.0000075
100 %		+ 10	1,879,999,813	-187	-0.0000100
100 %		+ 20	1,879,999,803	-197	-0.0000105
100 %		+ 30	1,879,999,984	-16	-0.0000008
100 %		+ 40	1,879,999,886	-114	-0.0000061
100 %		+ 50	1,880,000,000	0	0.0000000
BATT. ENDPOINT		+ 20	1,879,999,825	-175	-0.0000093

Table 7-26. Frequency Stability Data (Band 2)

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 2 Frequency Stability Measurements

§2.1055 §24.235

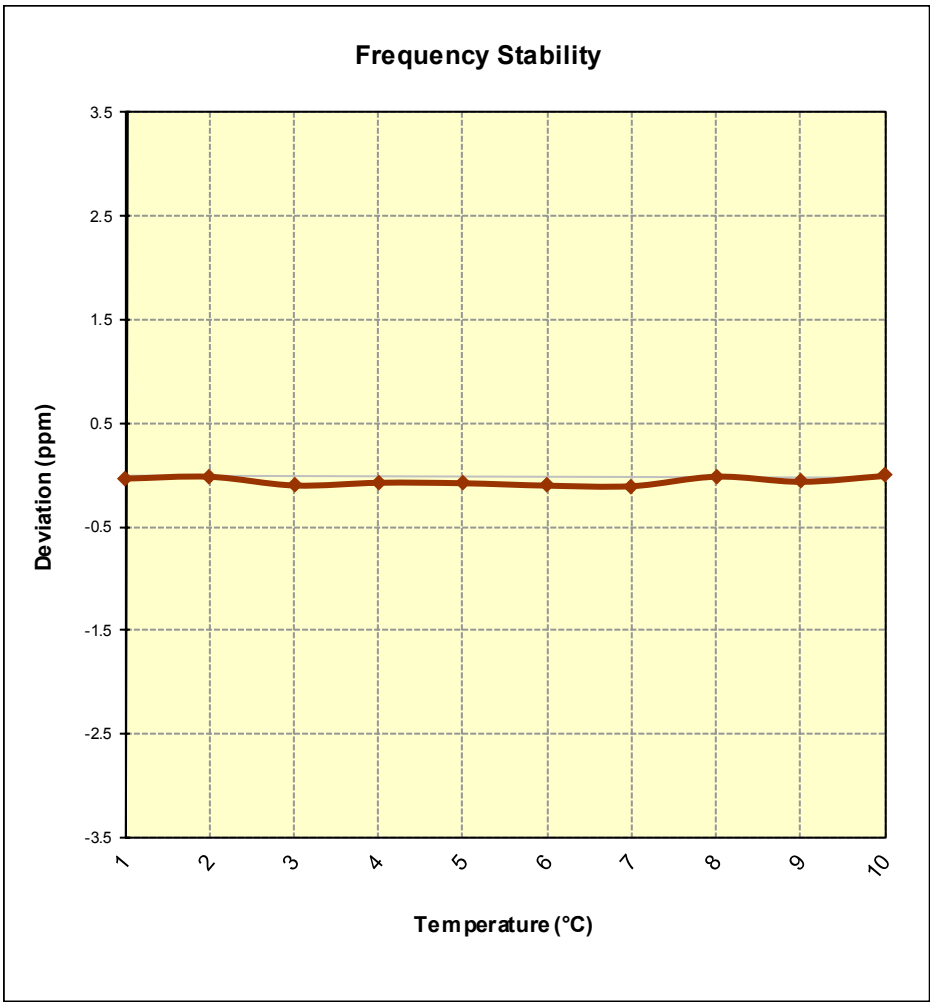

Figure 7-11. Frequency Stability Graph (Band 2)

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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)	2,592,999,879	-121	-0.0000047
100 %		- 30	2,592,999,811	-189	-0.0000073
100 %		- 20	2,592,999,869	-131	-0.0000050
100 %		- 10	2,592,999,987	-13	-0.0000005
100 %		0	2,592,999,969	-31	-0.0000012
100 %		+ 10	2,592,999,932	-68	-0.0000026
100 %		+ 20	2,592,999,830	-170	-0.0000066
100 %		+ 30	2,592,999,919	-81	-0.0000031
100 %		+ 40	2,592,999,928	-72	-0.0000028
100 %		+ 50	2,592,999,803	-197	-0.0000076
BATT. ENDPOINT		+ 20	2,592,999,873	-127	-0.0000049

Table 7-27. 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

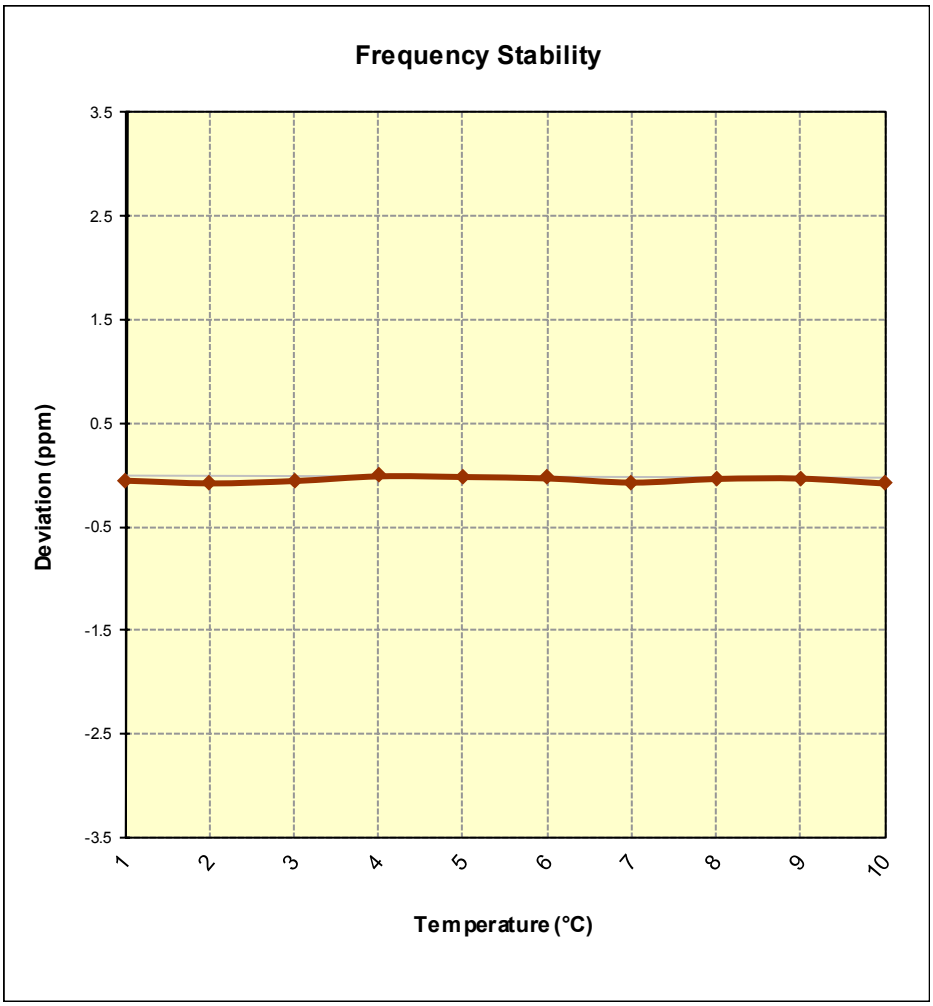

Figure 7-12. Frequency Stability Graph (Band 41)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMJ730GM** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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