6.4 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 7 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.

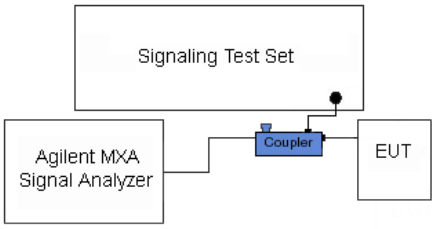

Figure 6-3. Test Instrument & Measurement Setup

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

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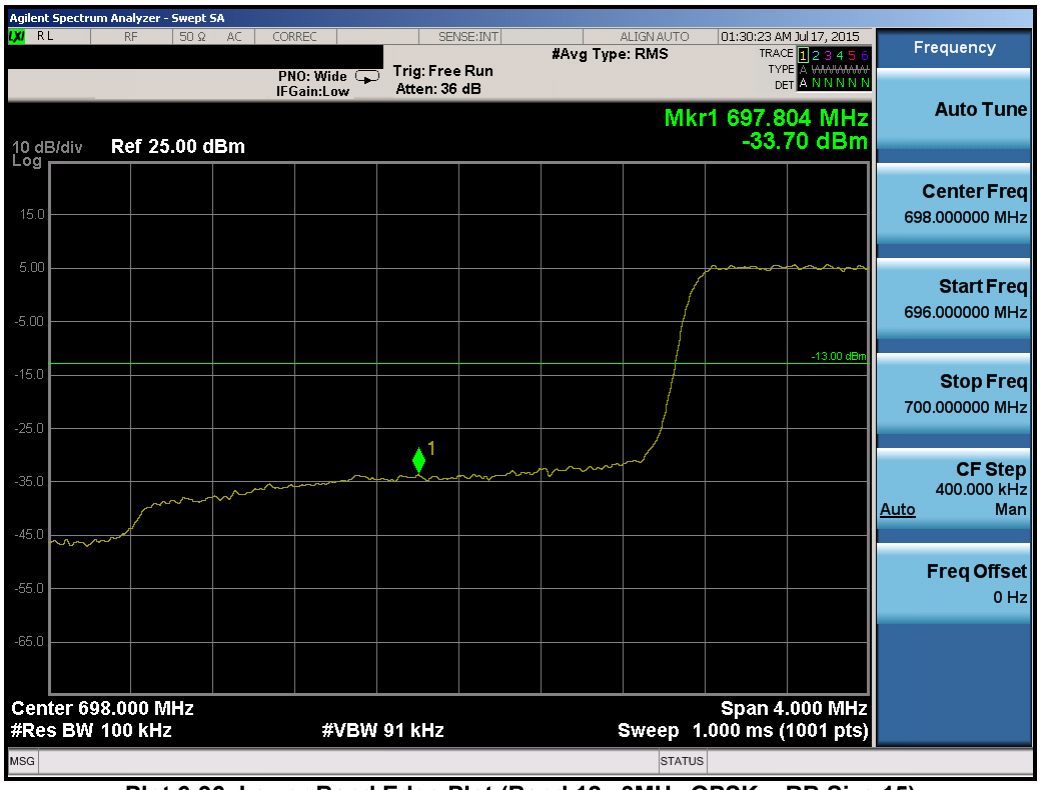
Plot 6-95. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 6-96. Lower Band Edge Plot (Band 12 –3MHz QPSK – RB Size 15)

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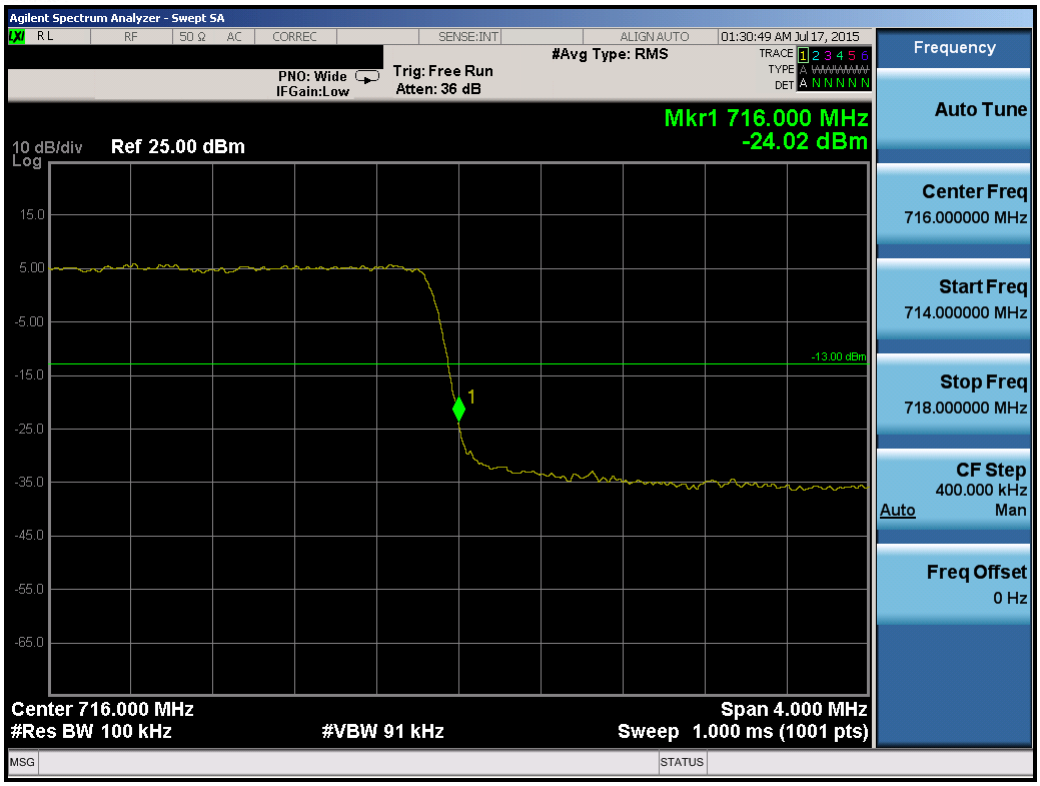
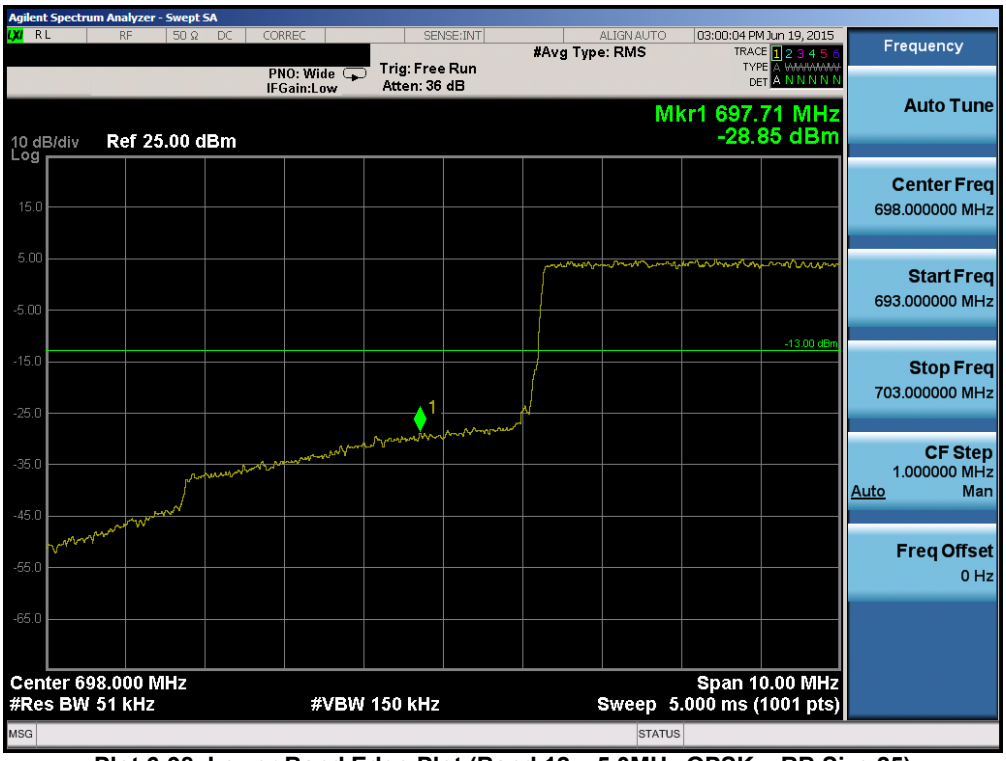


Plot 6-97. Upper Band Edge Plot (Band 12 – 3MHz QPSK – RB Size 15)



Plot 6-98. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

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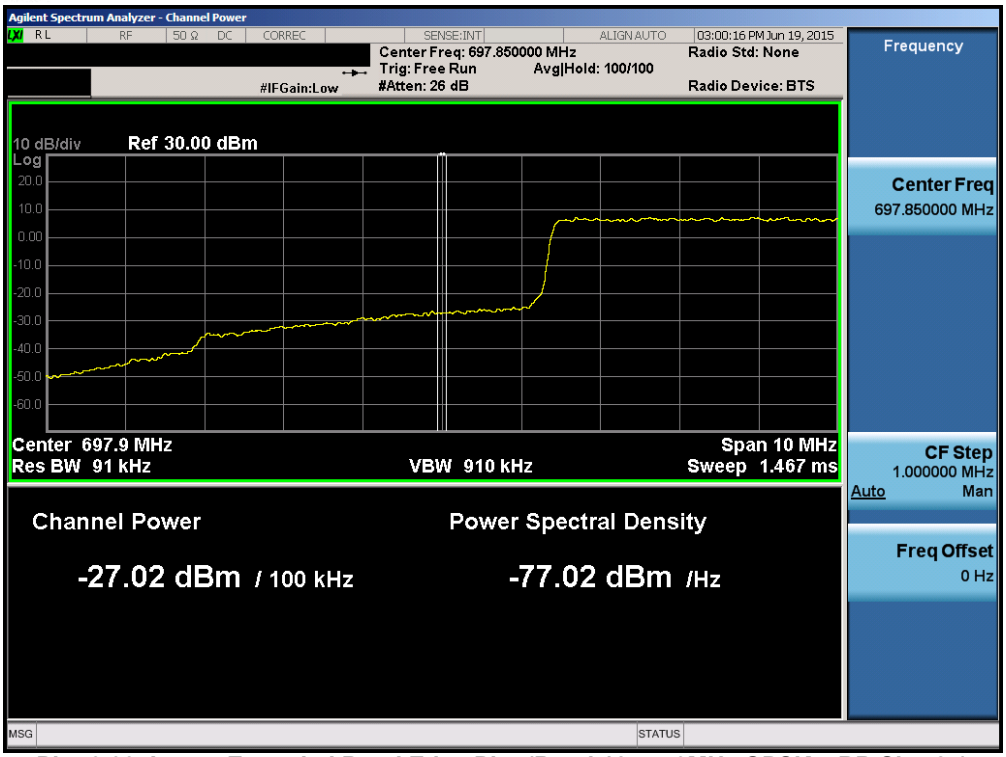

Plot 6-99. Lower Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

Plot 6-100. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

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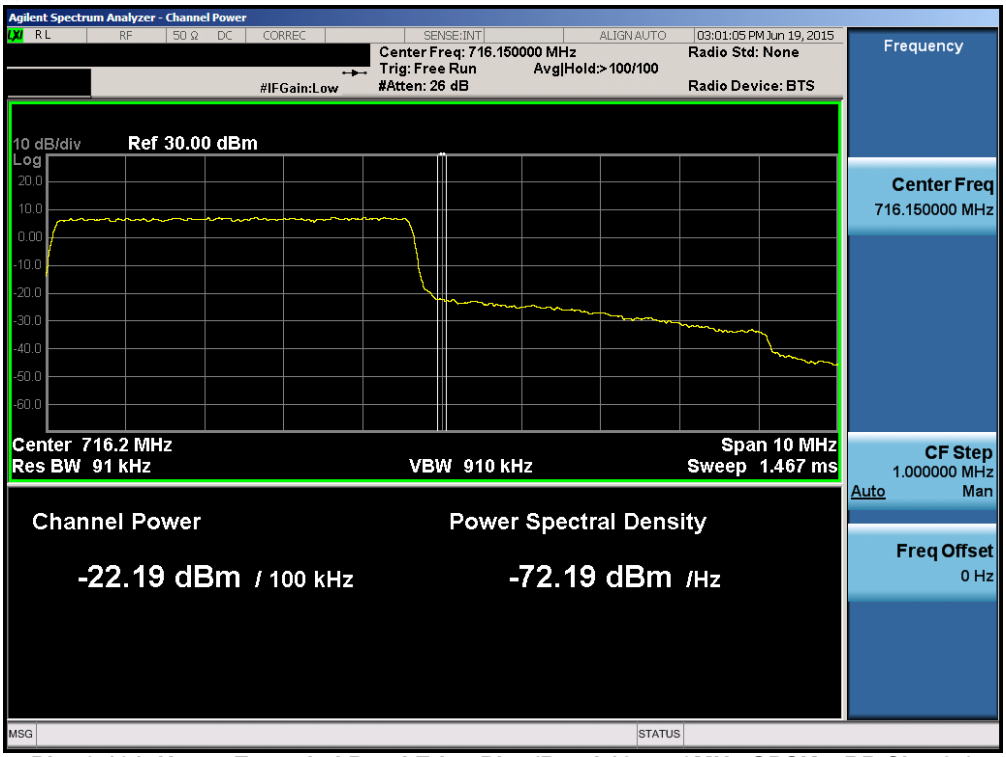
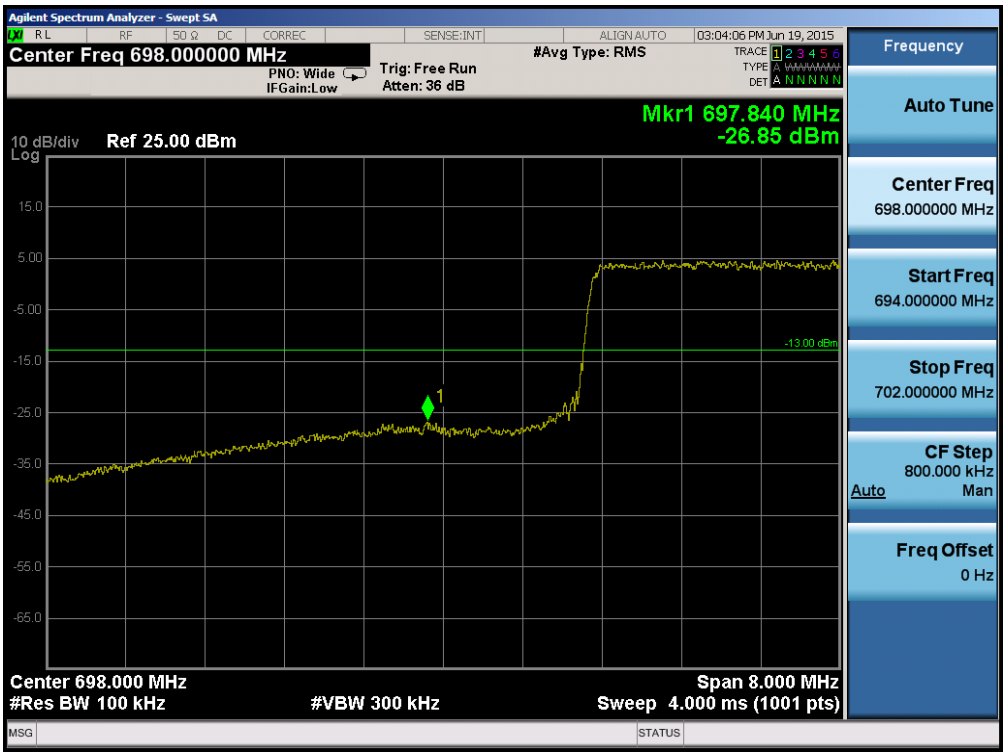


Plot 6-101. Upper Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 6-102. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

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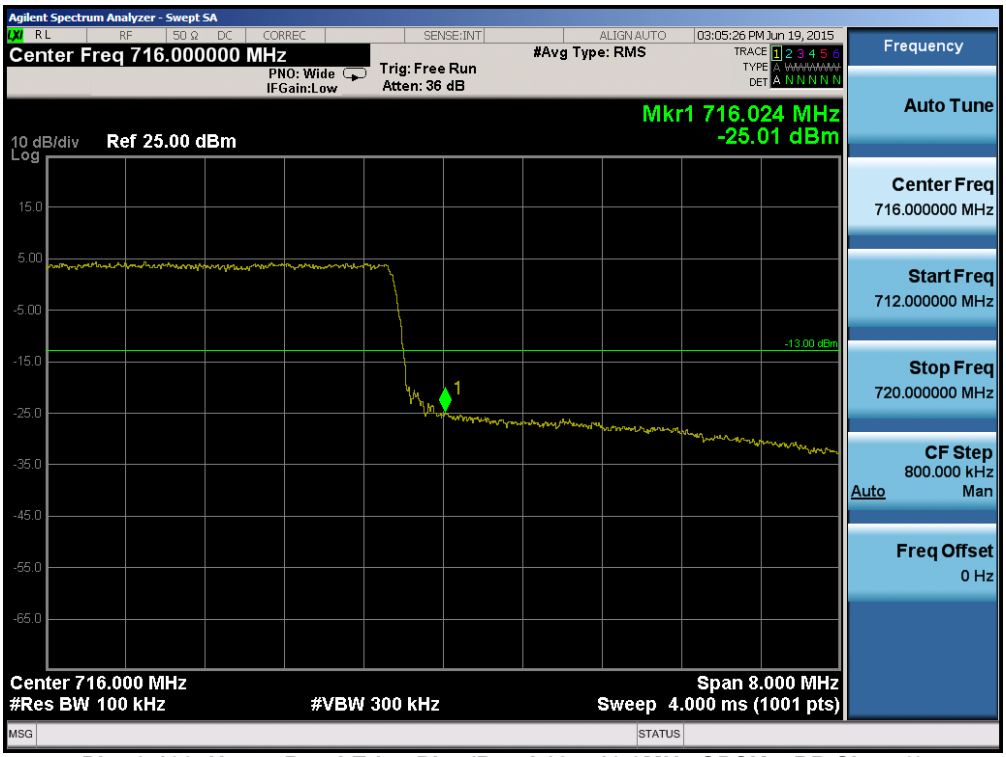
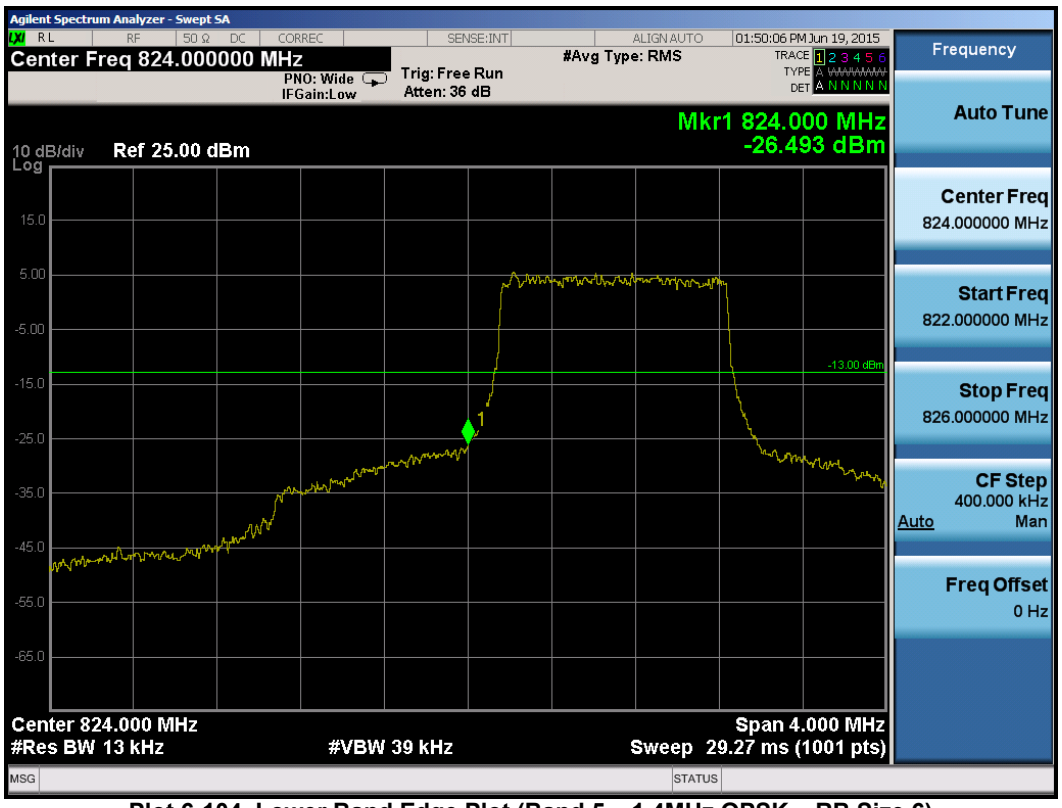


Plot 6-103. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



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

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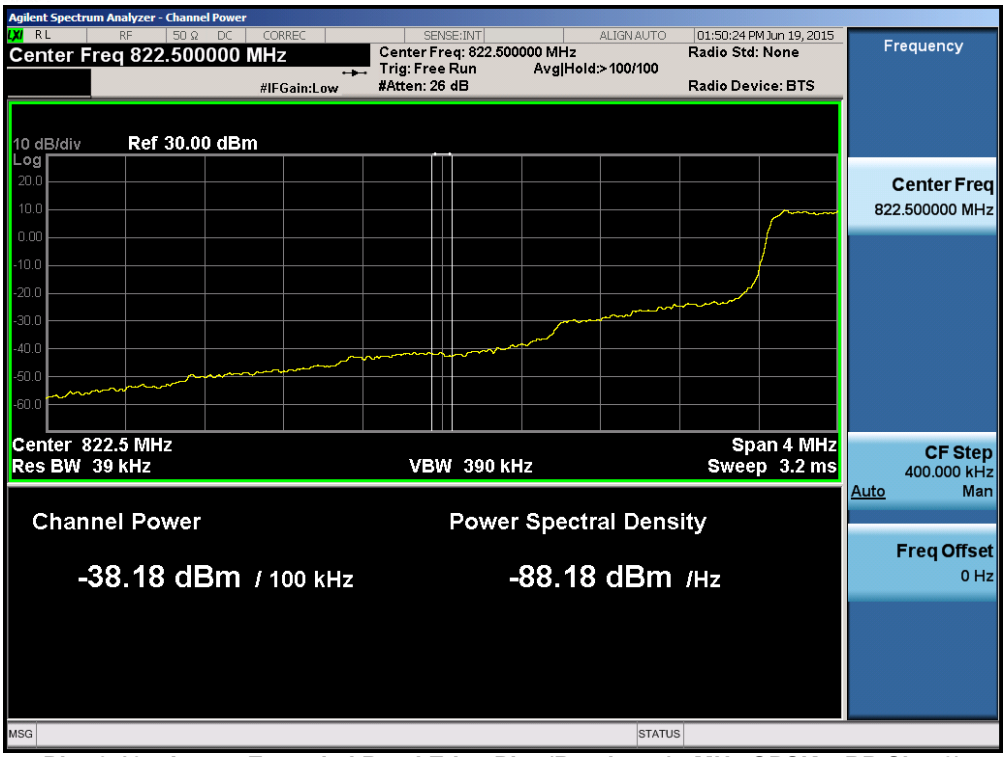

Plot 6-105. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

Plot 6-106. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

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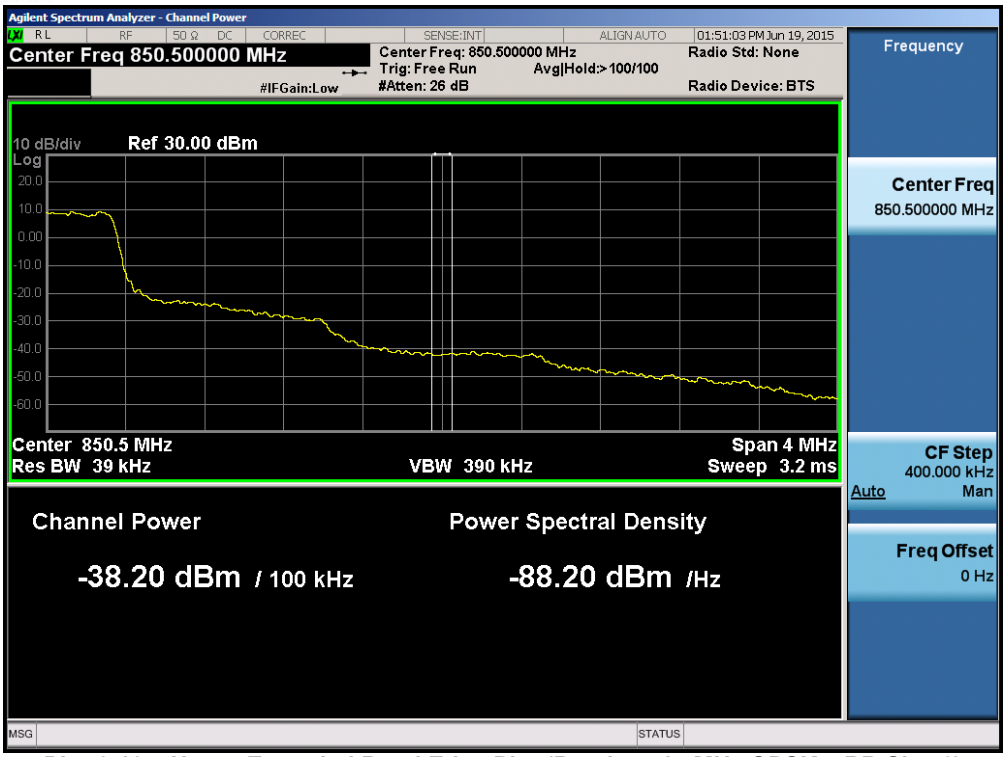
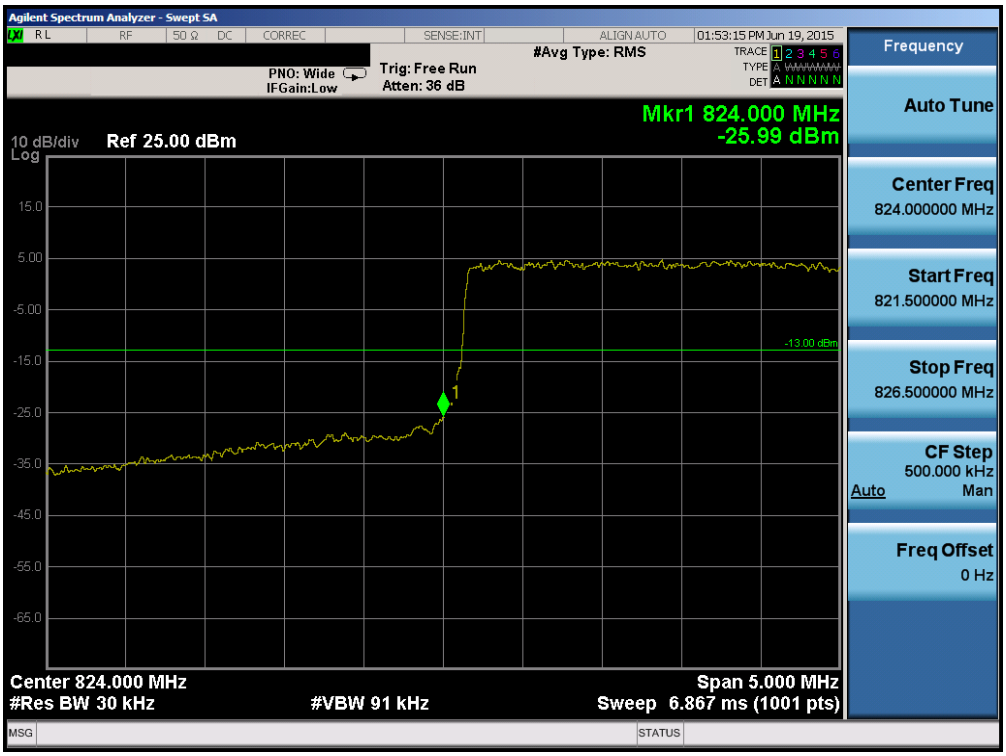


Plot 6-107. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 6-108. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

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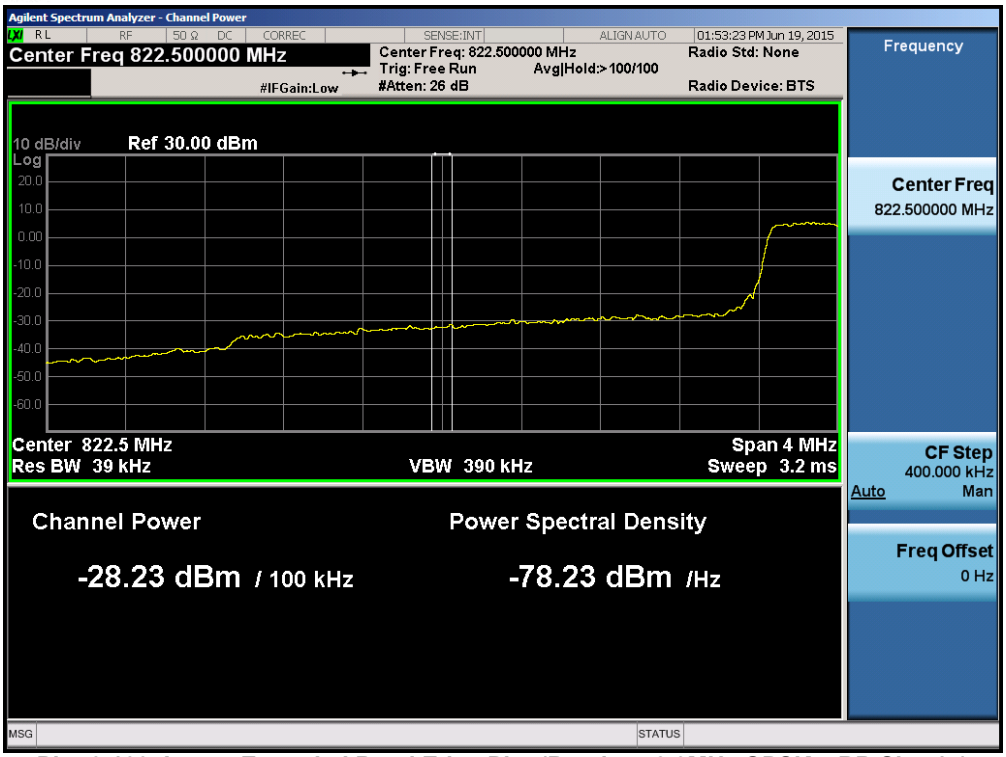

Plot 6-109. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

Plot 6-110. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

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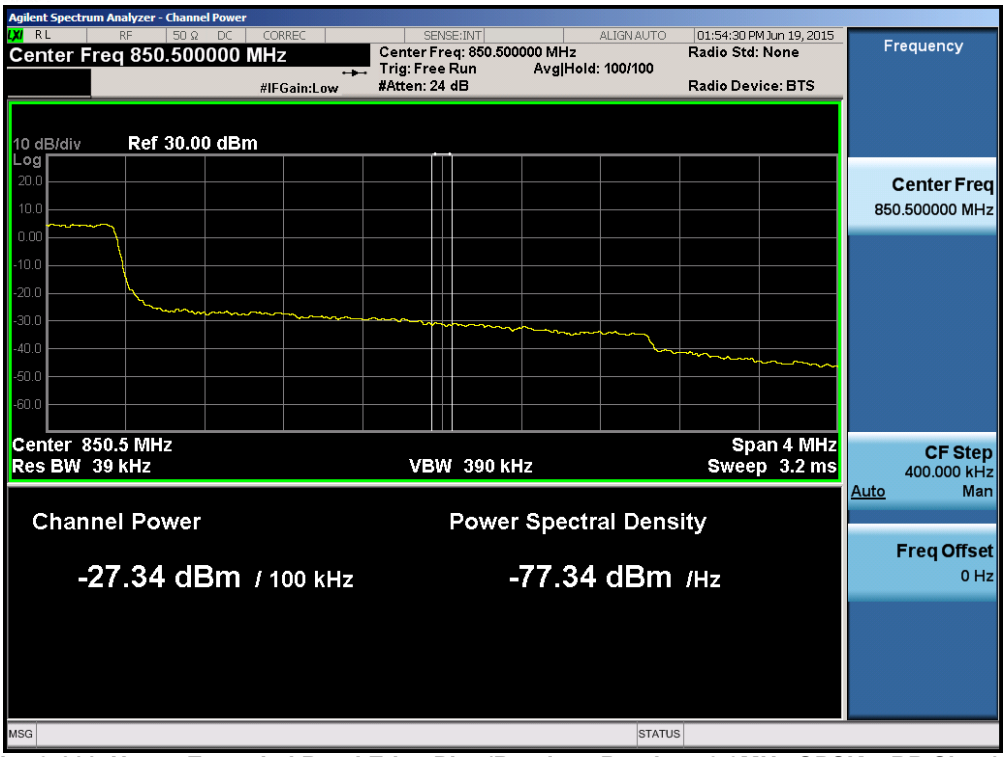
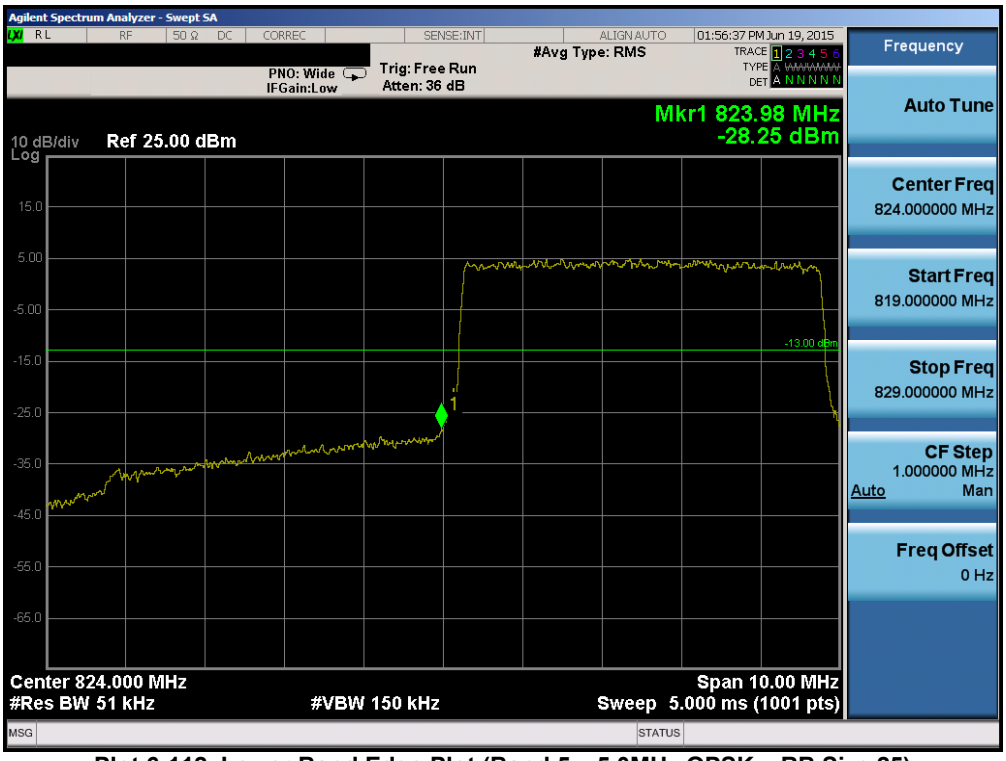


Plot 6-111. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 6-112. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

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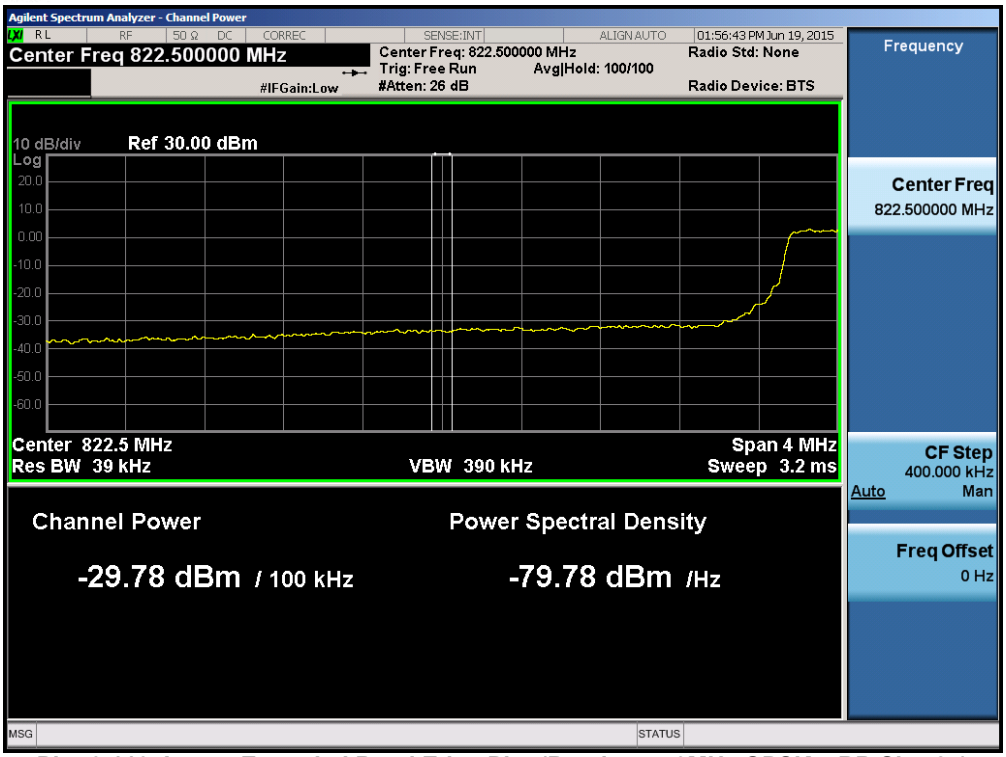

Plot 6-113. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

Plot 6-114. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

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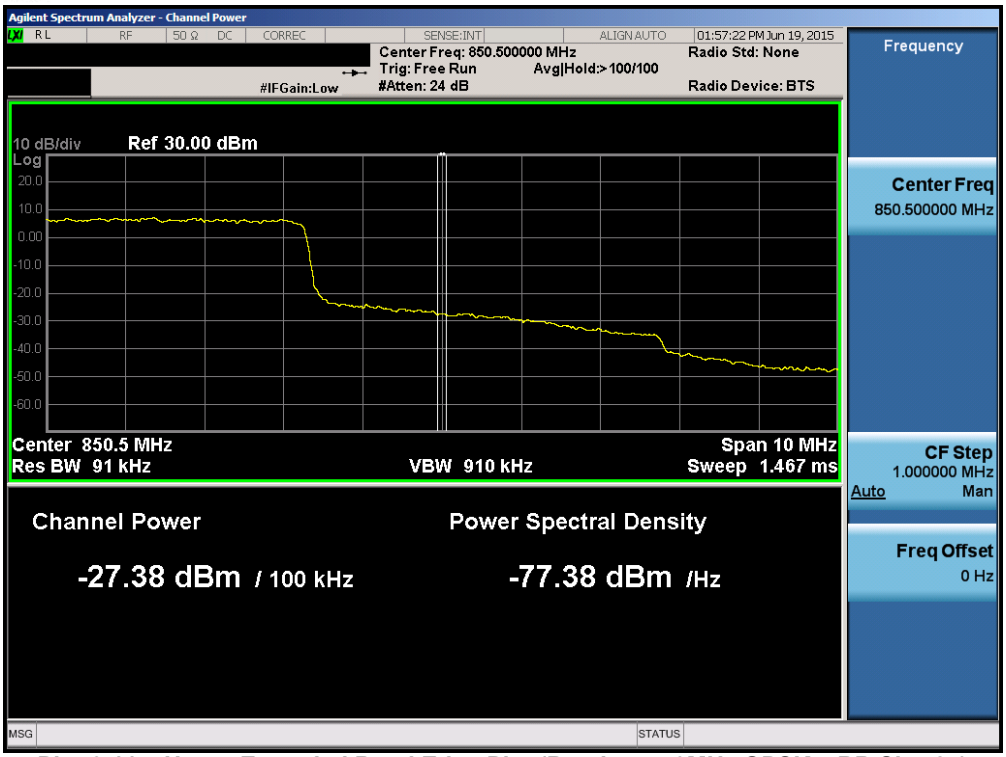
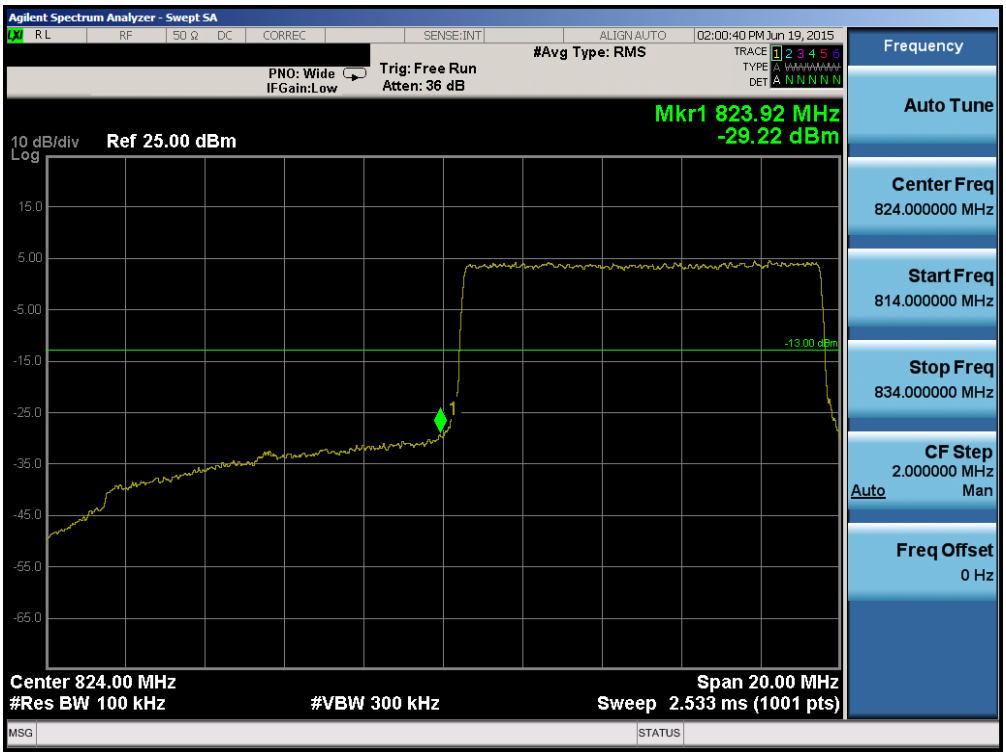


Plot 6-115. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 6-116. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

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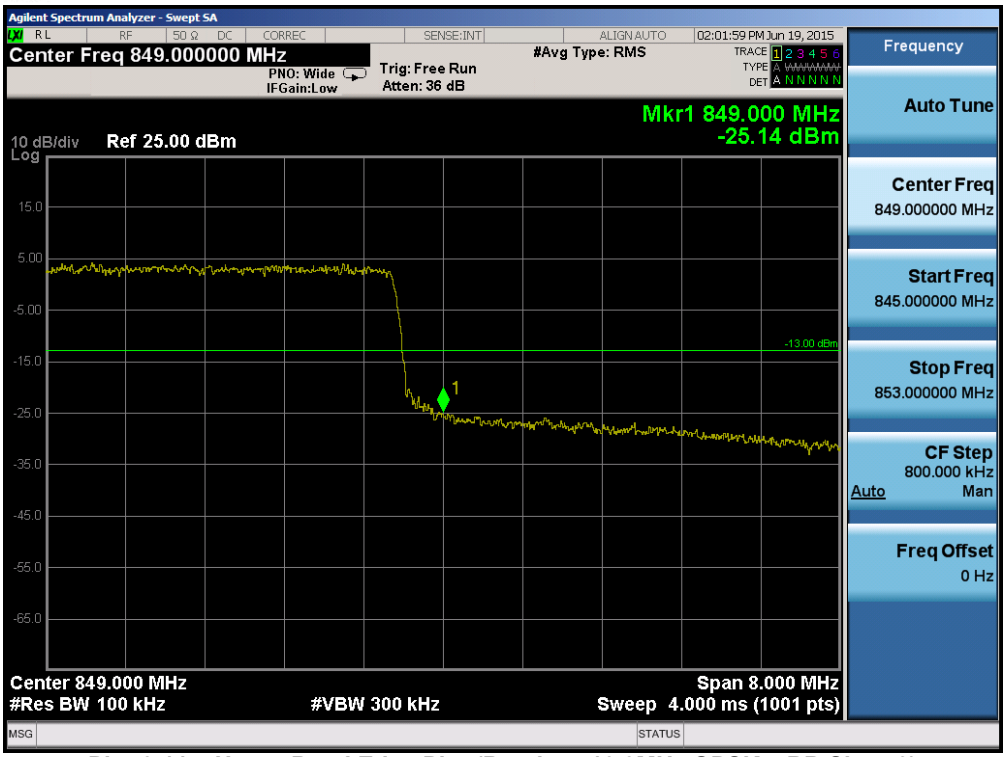
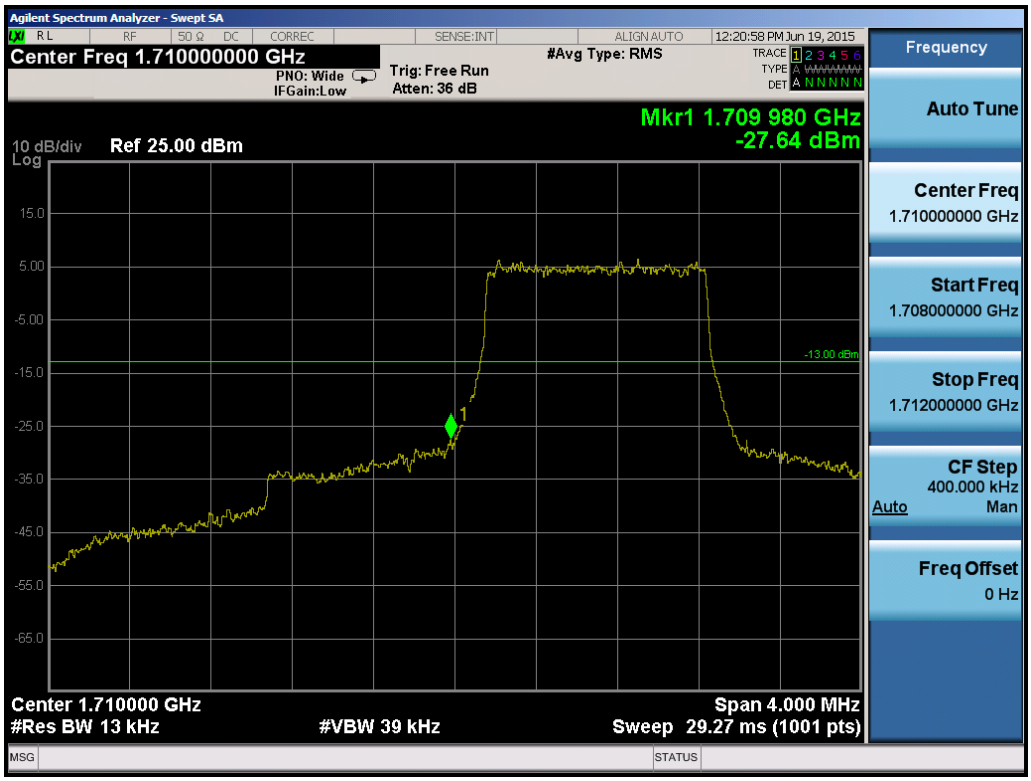


Plot 6-117. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



Plot 6-118. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

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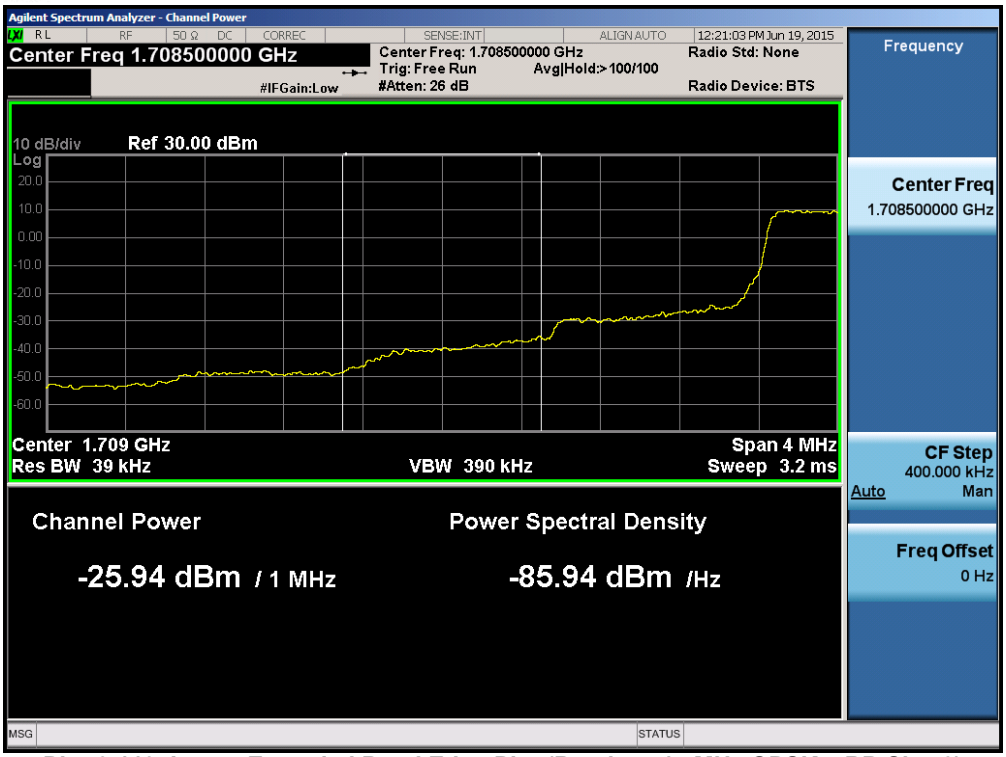

Plot 6-119. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

Plot 6-120. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

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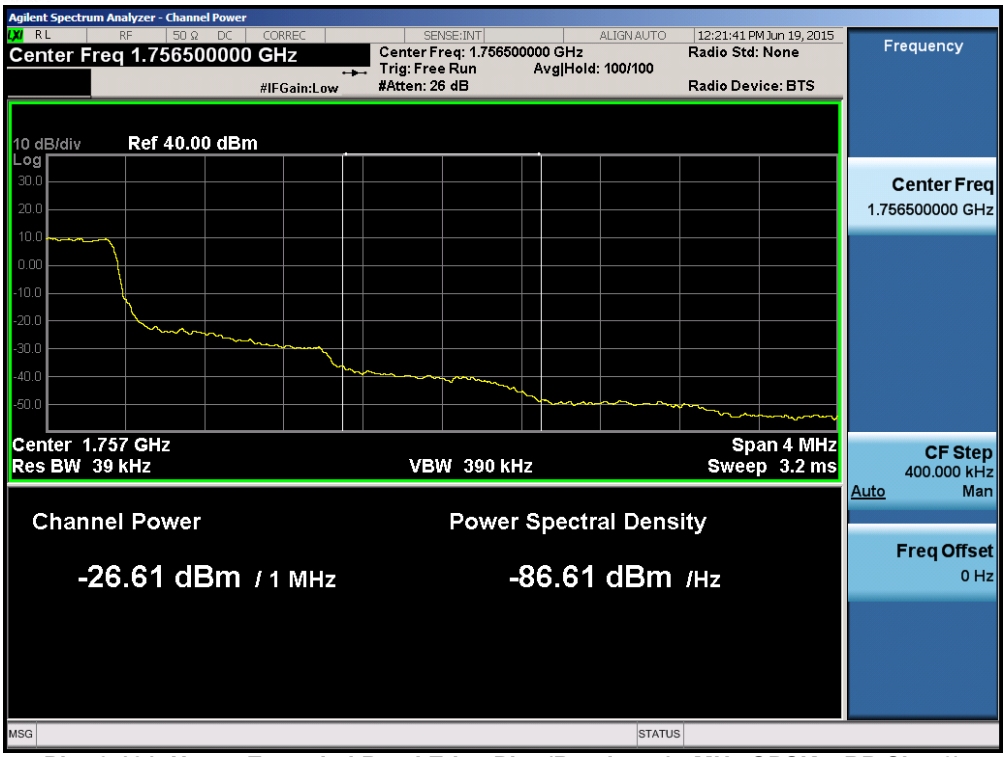
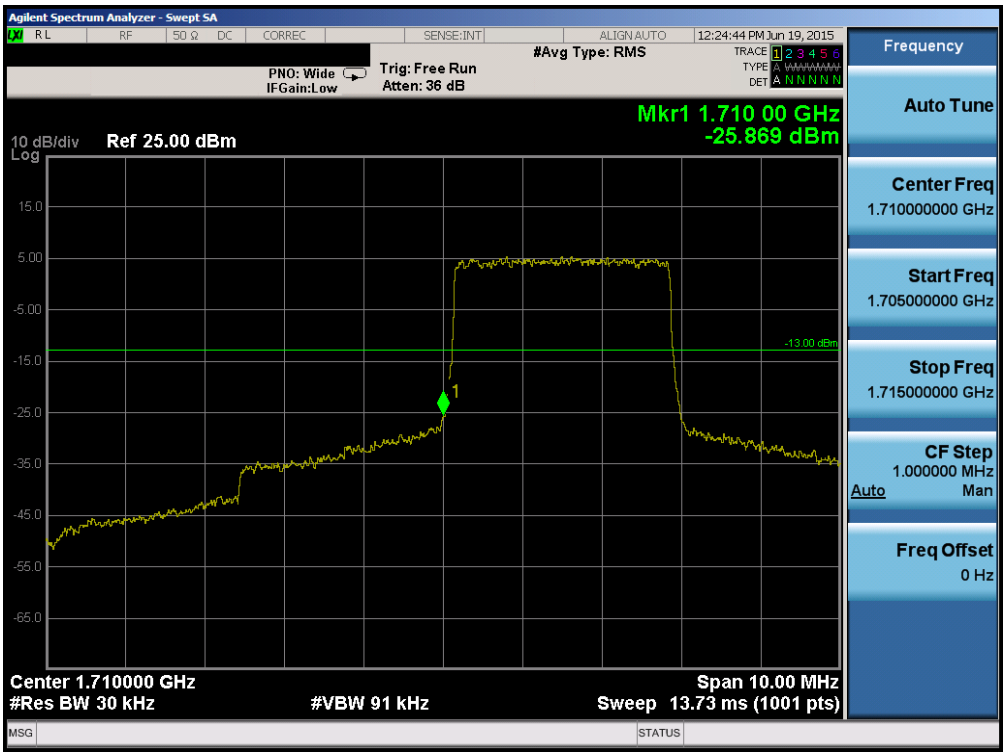


Plot 6-121. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



Plot 6-122. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

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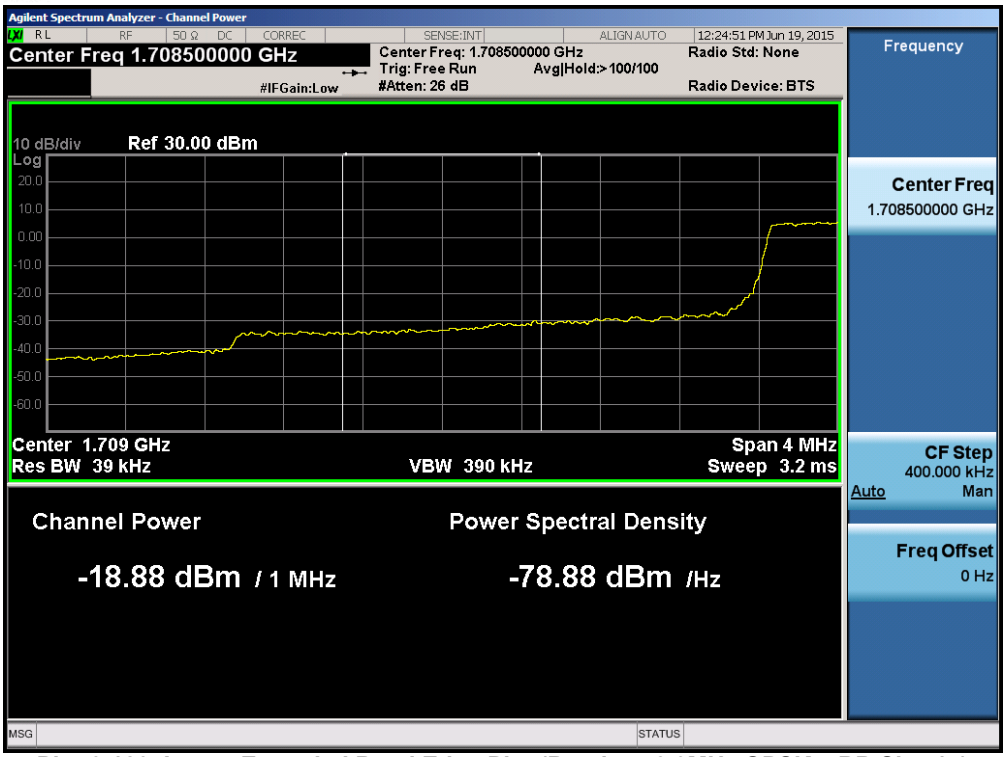
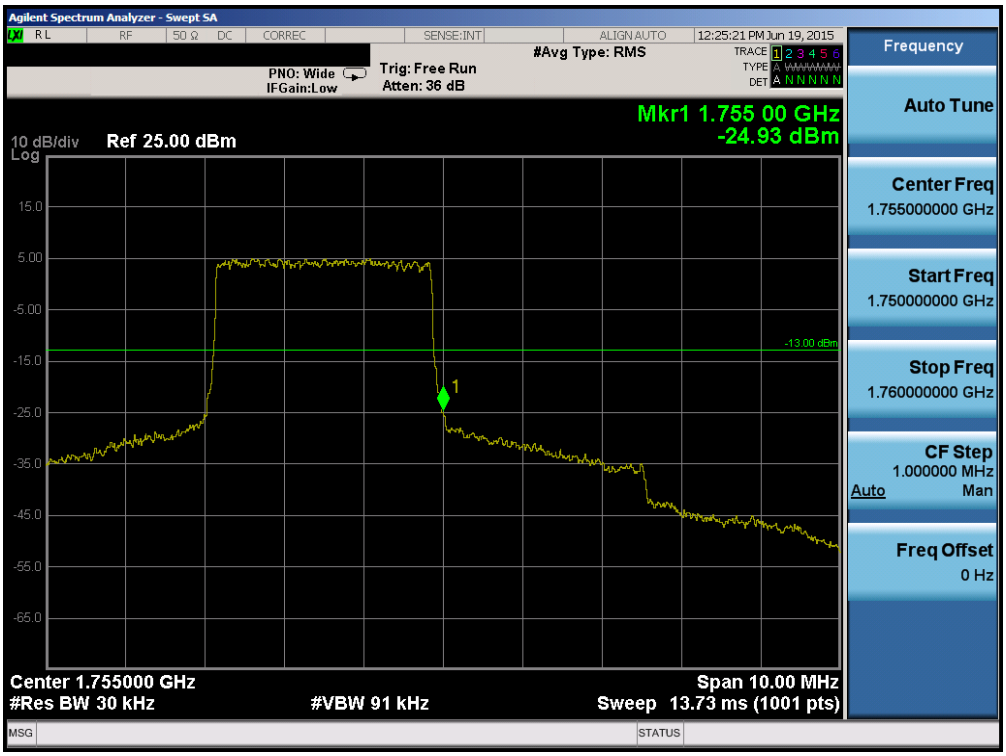


Plot 6-123. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 6-124. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

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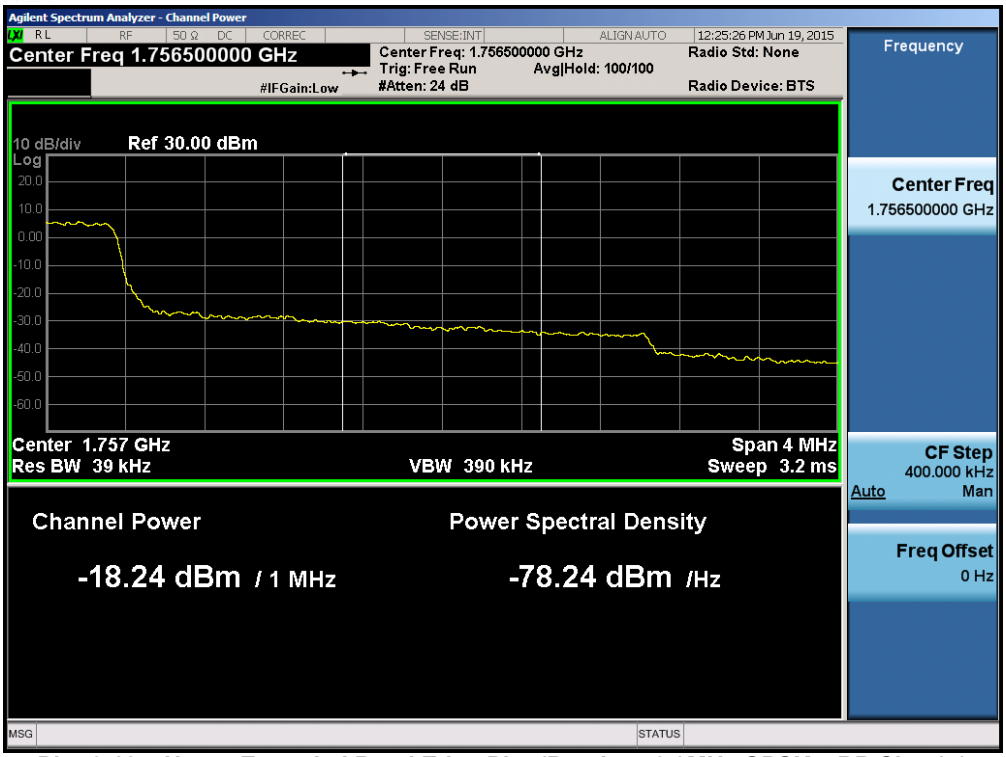
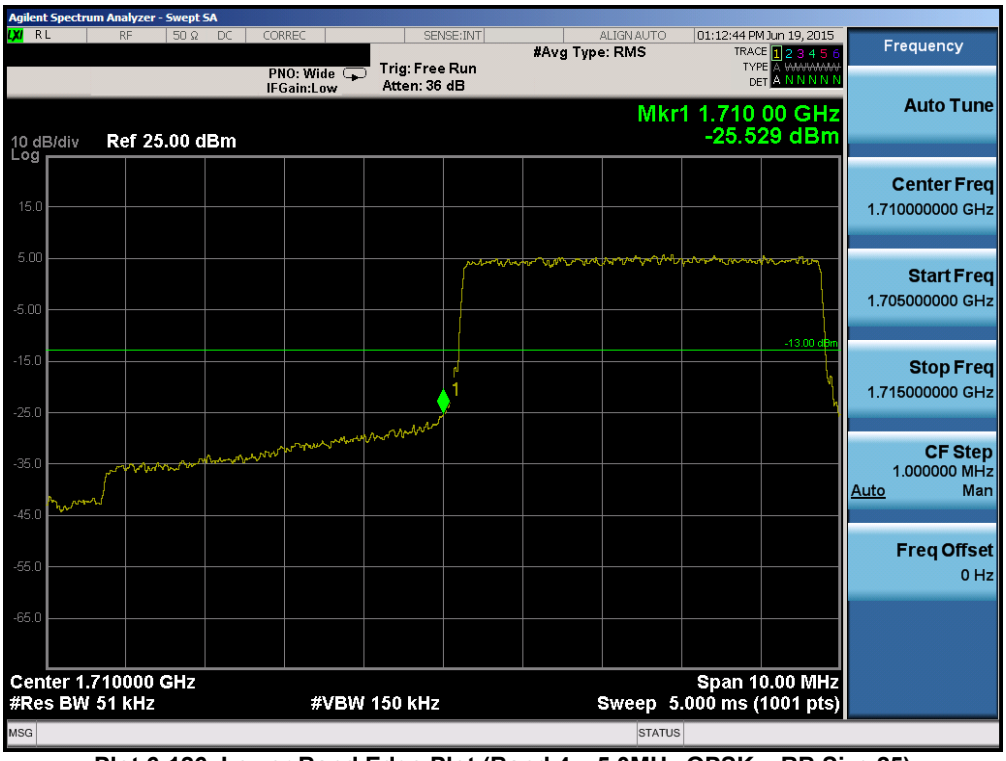


Plot 6-125. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 6-126. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

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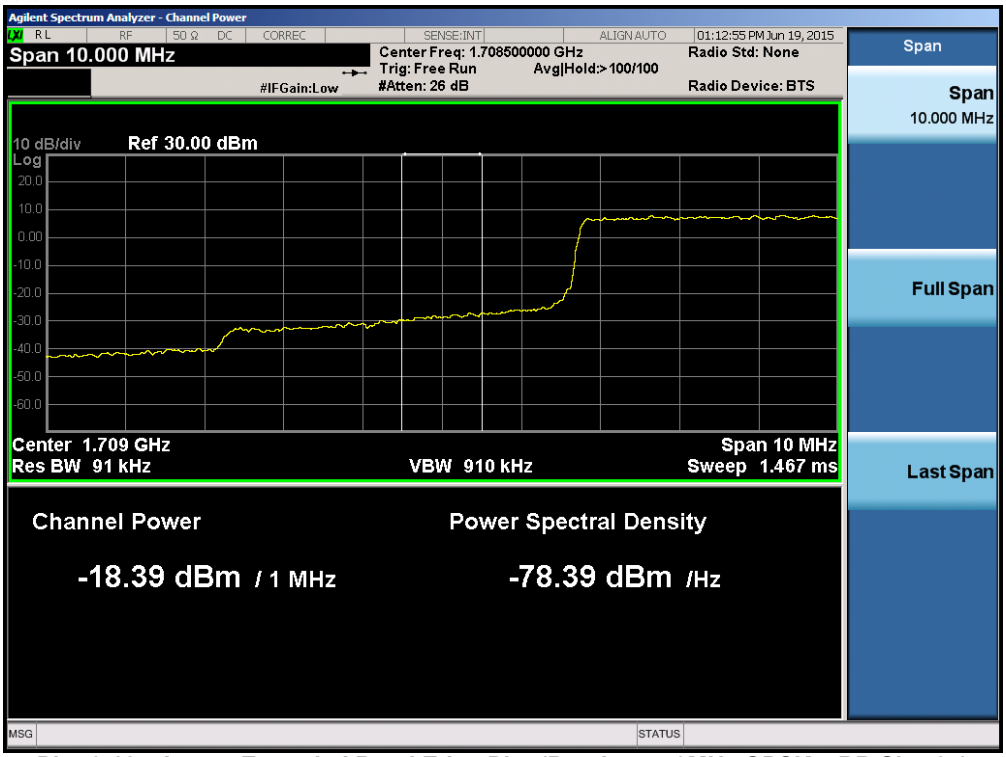
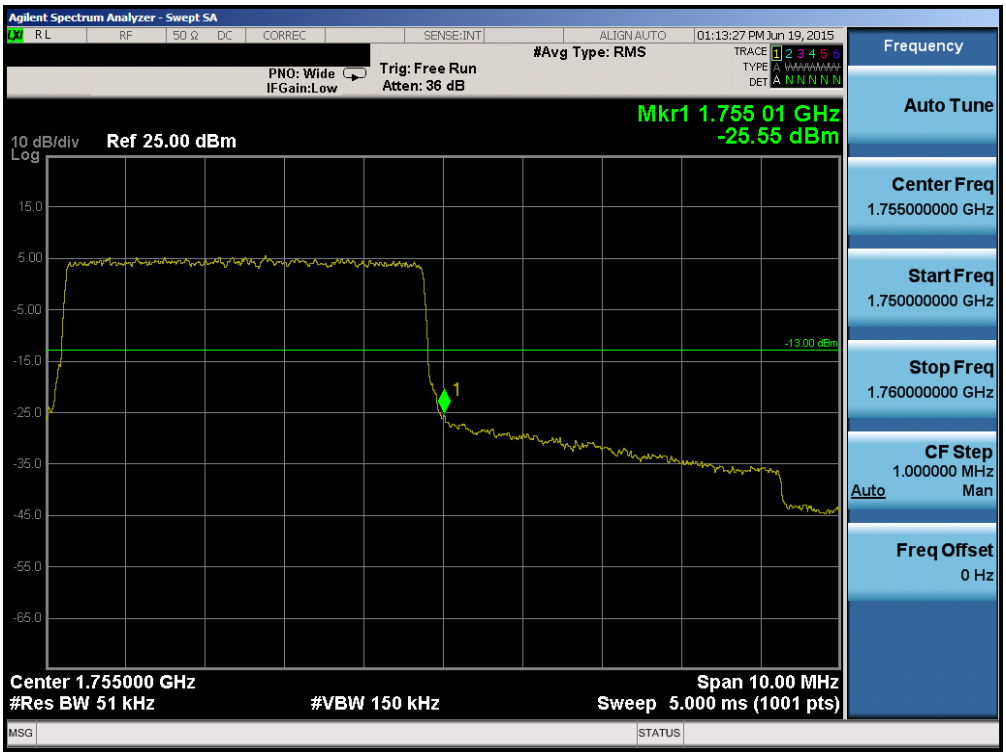


Plot 6-127. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



Plot 6-128. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

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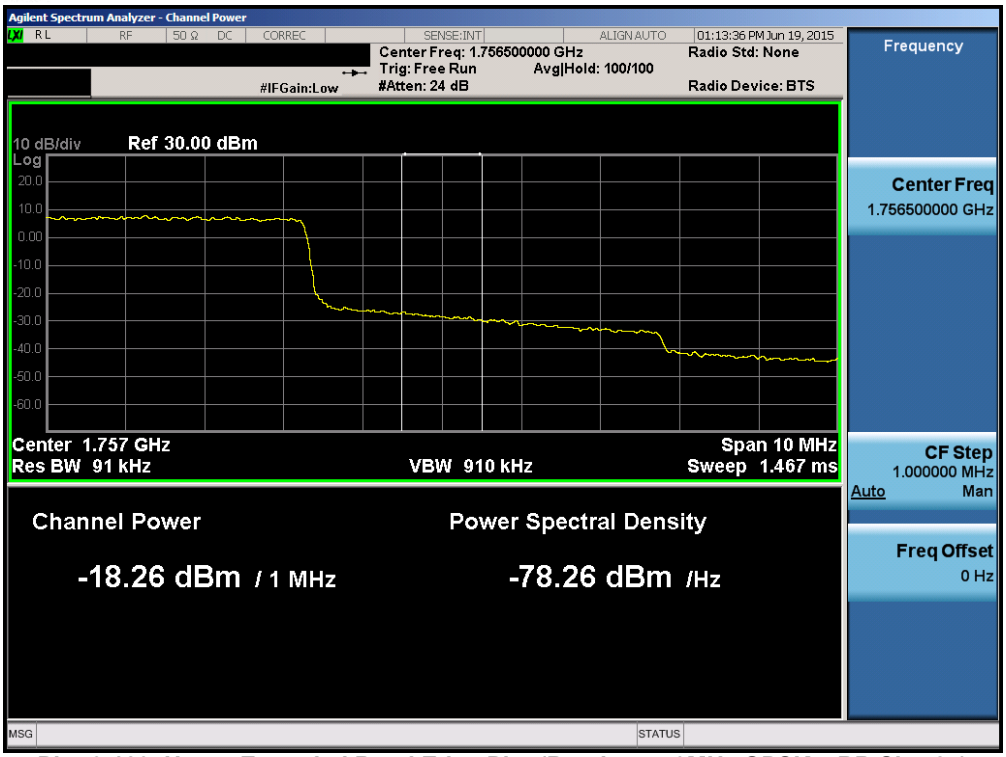

Plot 6-129. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

Plot 6-130. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

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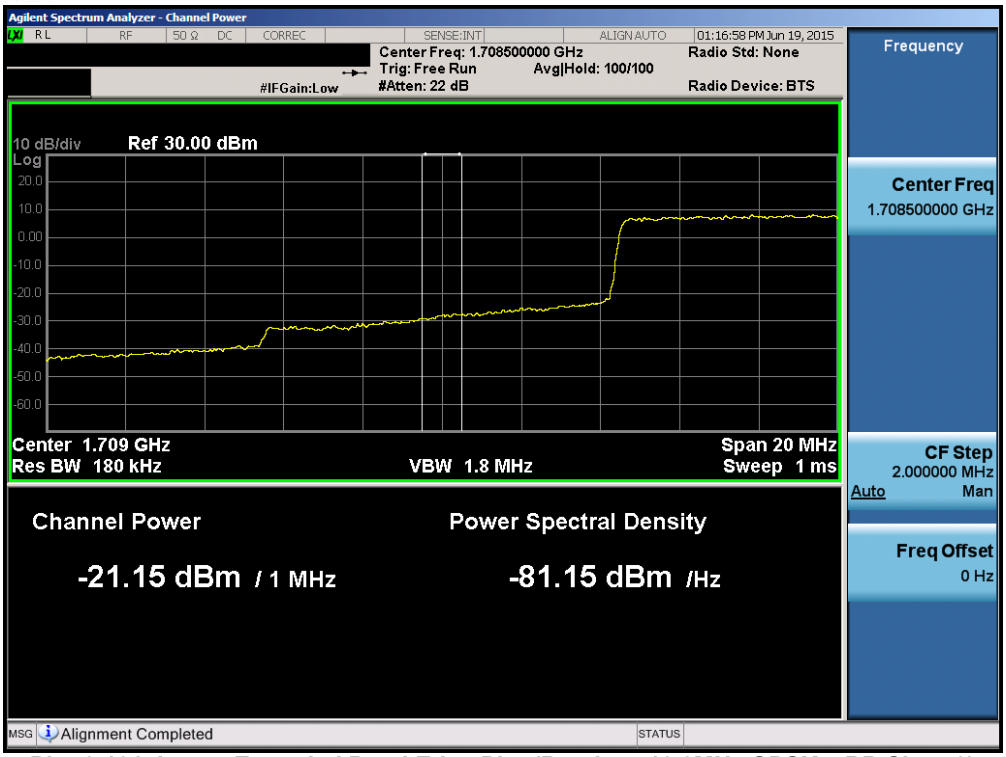

Plot 6-131. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

Plot 6-132. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

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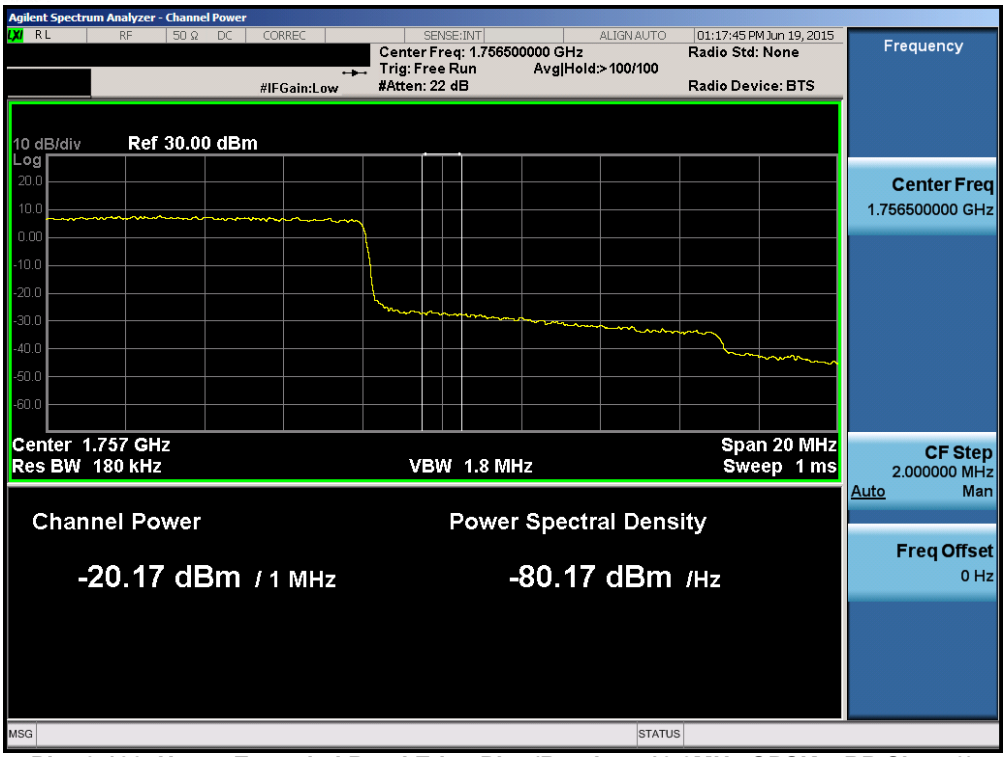

Plot 6-133. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

Plot 6-134. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

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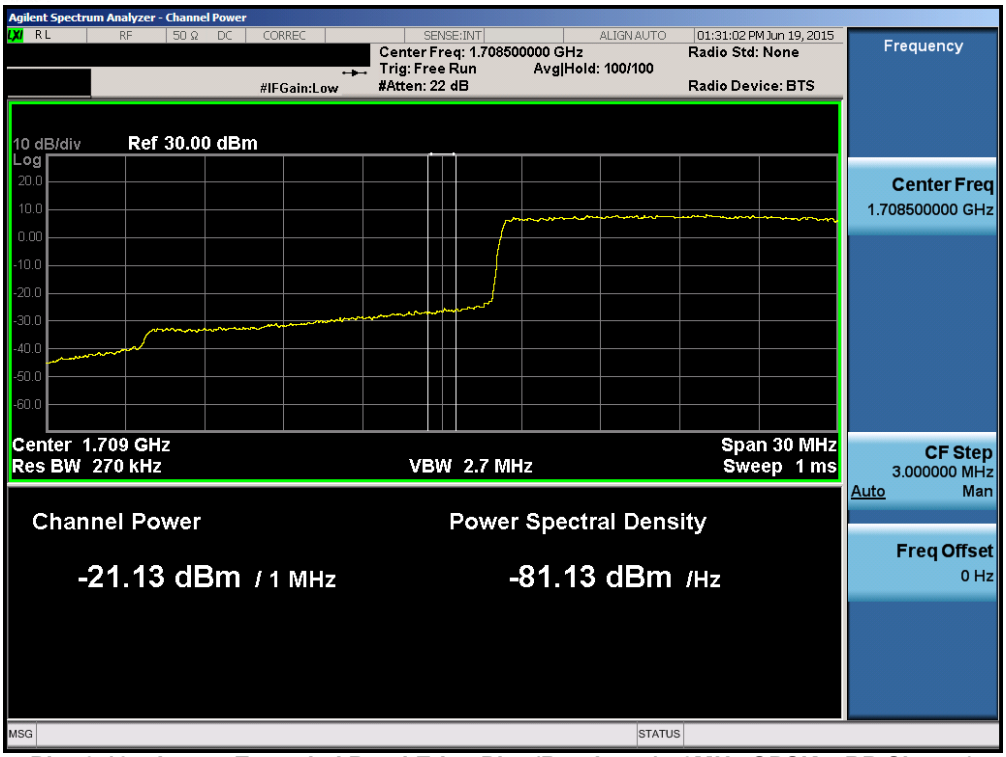

Plot 6-135. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

Plot 6-136. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

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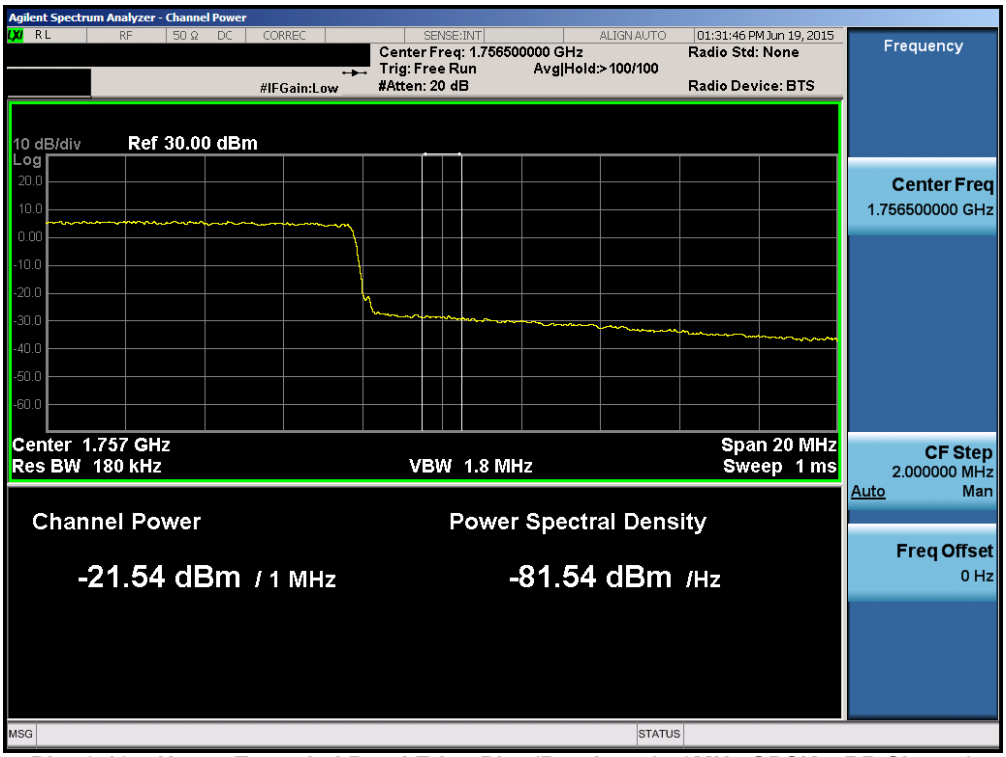
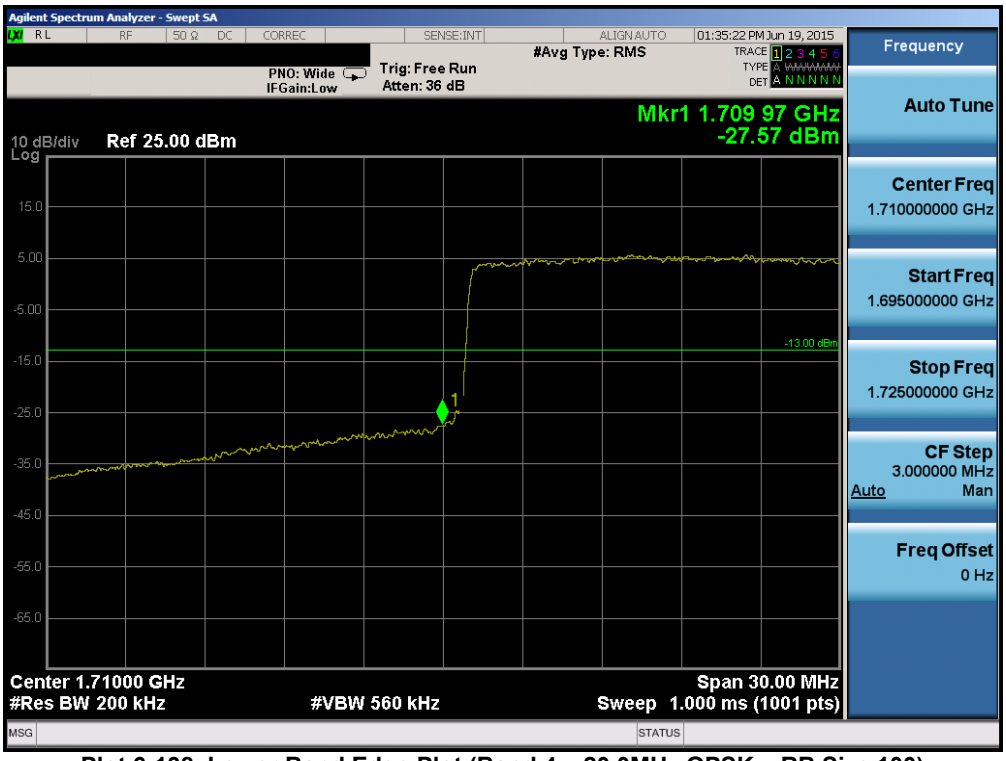


Plot 6-137. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 6-138. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

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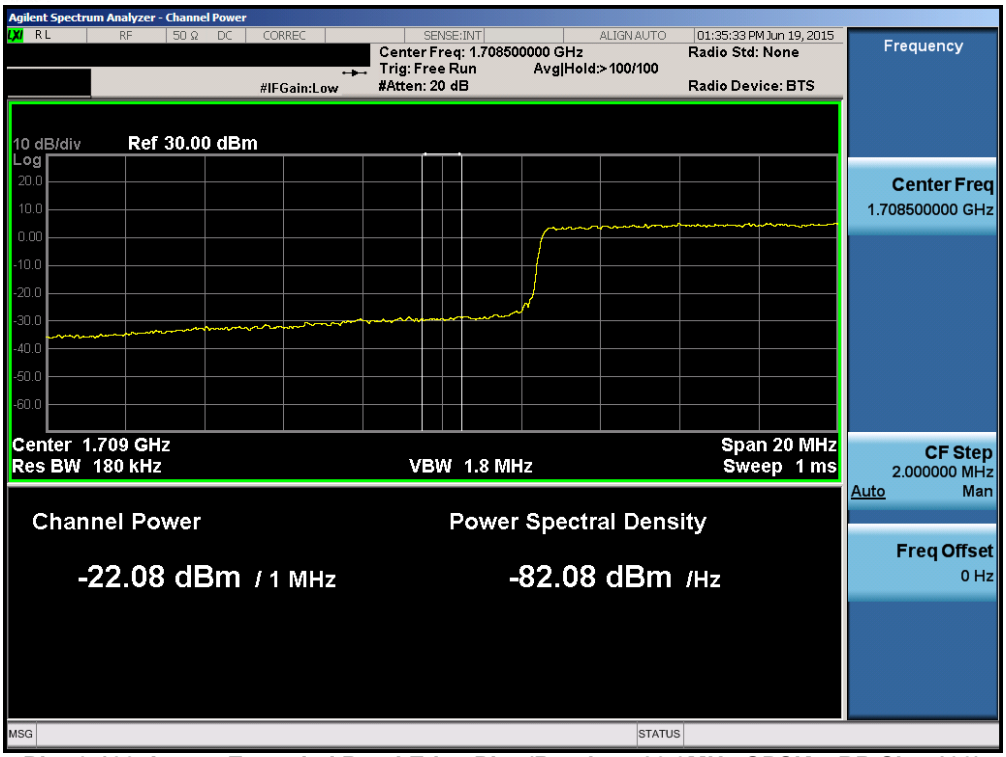
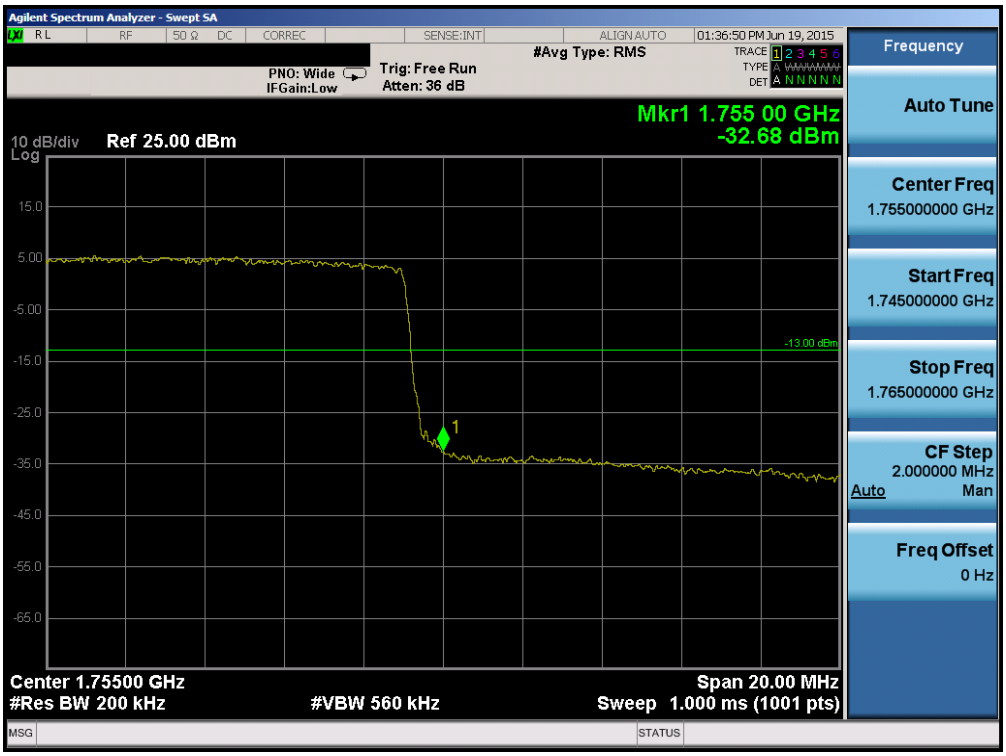


Plot 6-139. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 6-140. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

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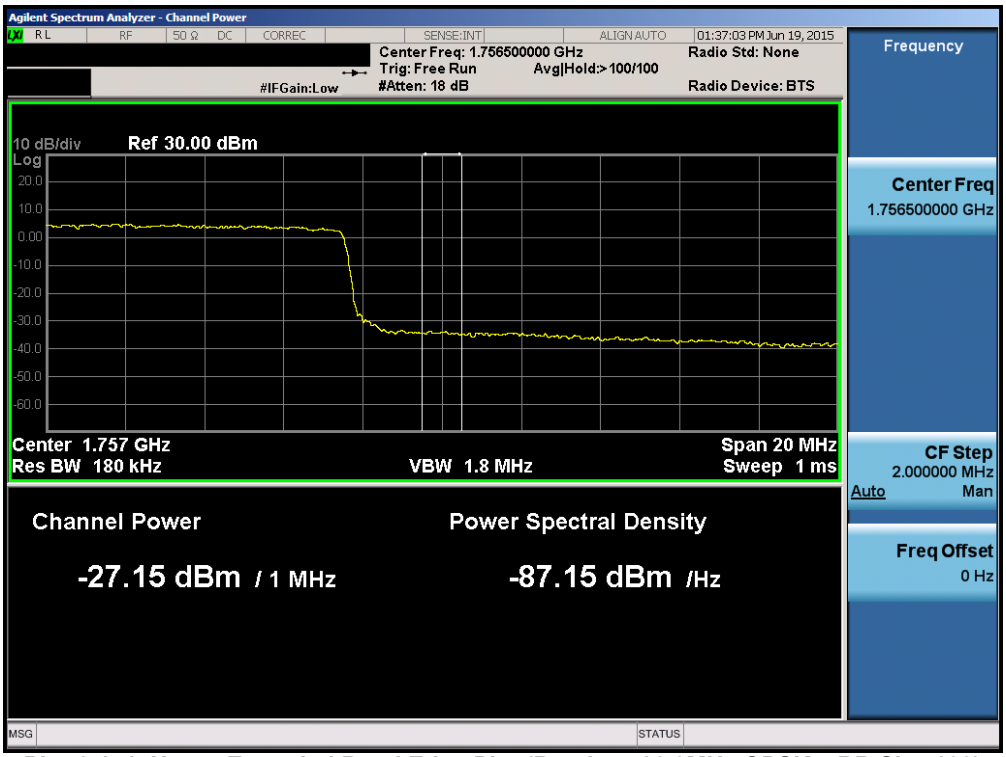

Plot 6-141. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

Plot 6-142. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

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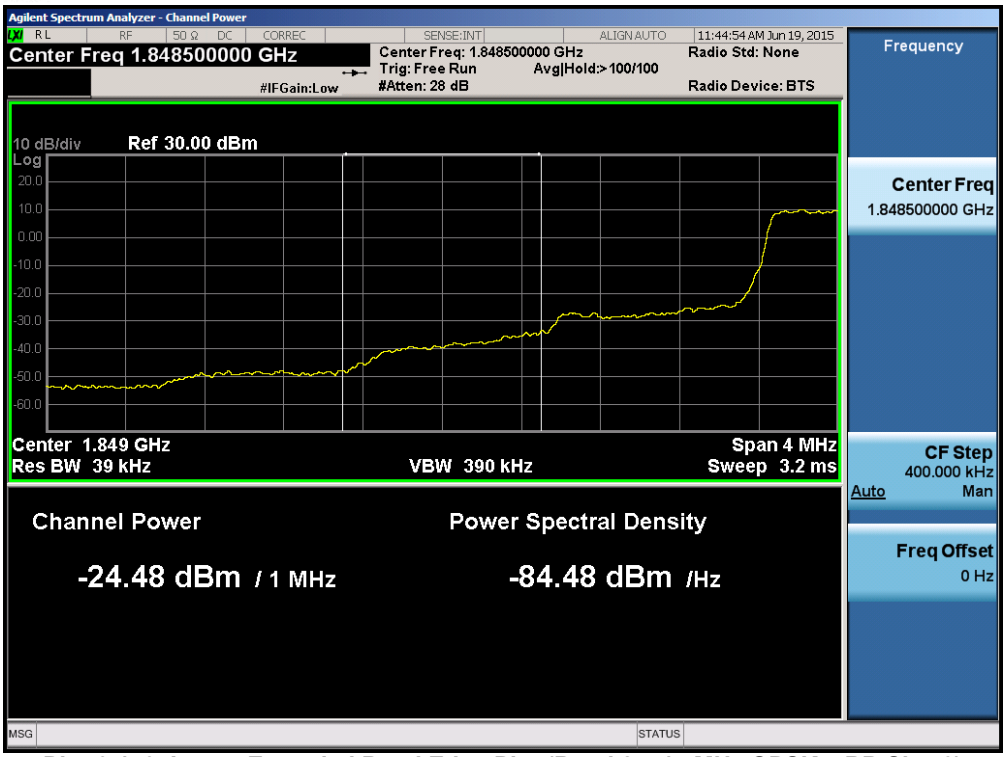

Plot 6-143. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

Plot 6-144. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

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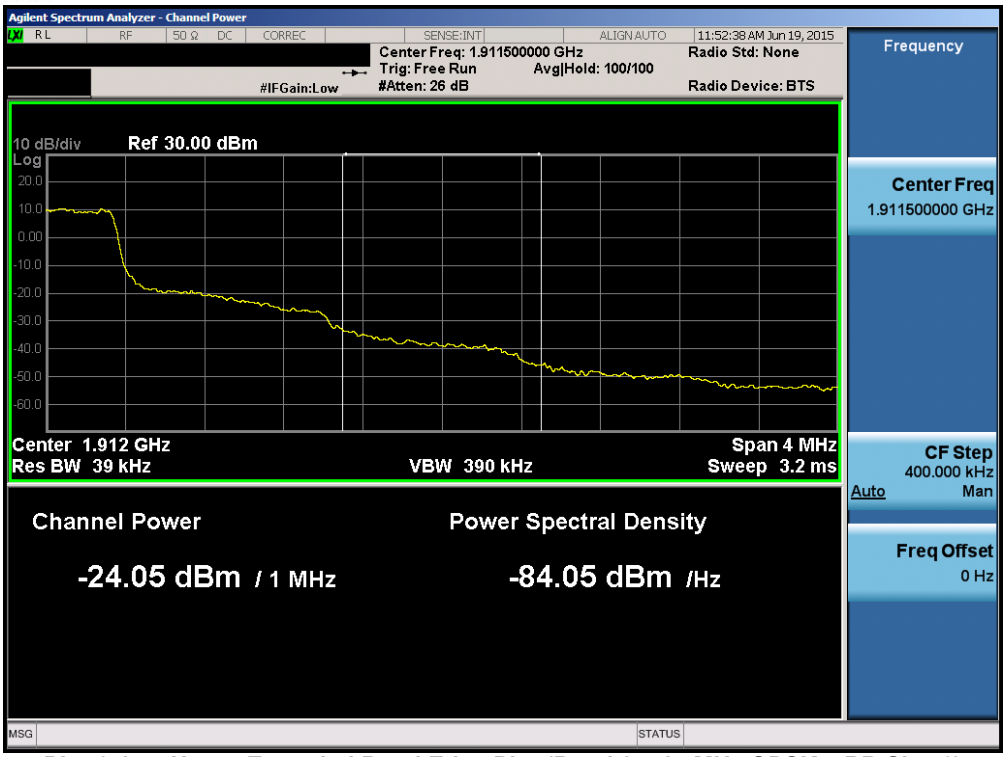
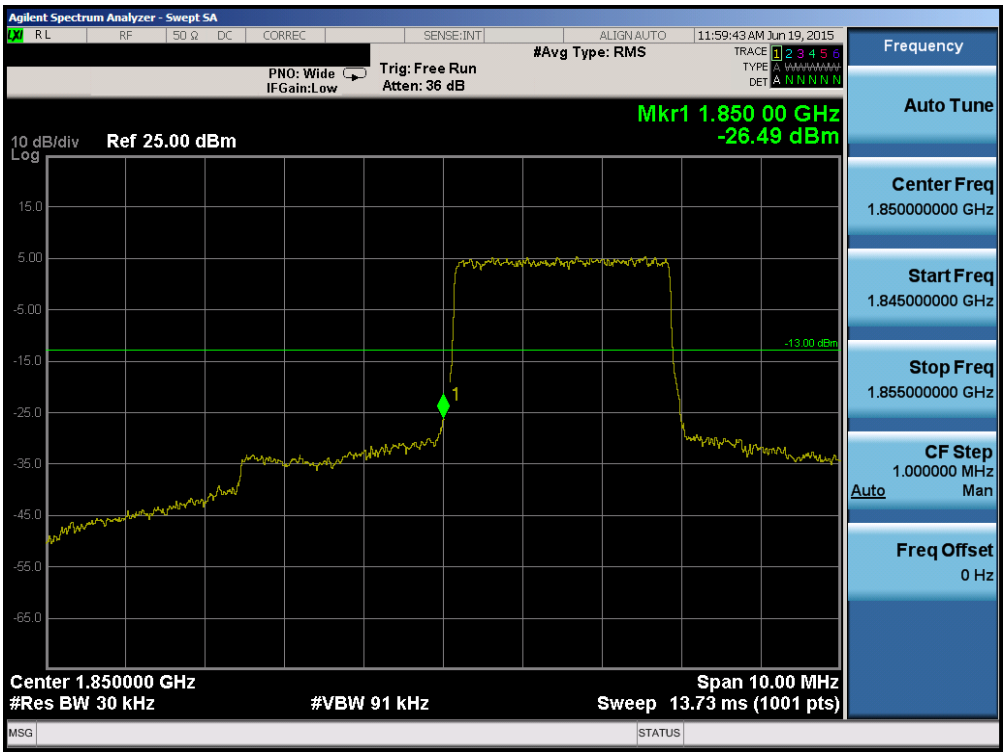


Plot 6-145. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 6-146. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

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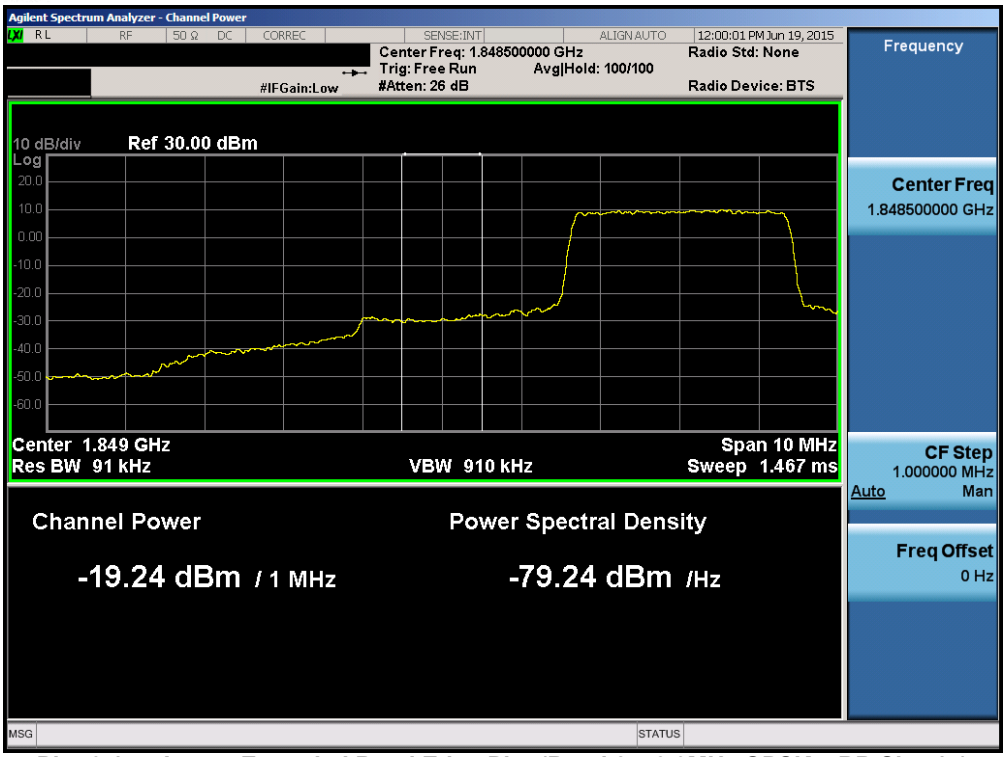

Plot 6-147. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

Plot 6-148. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

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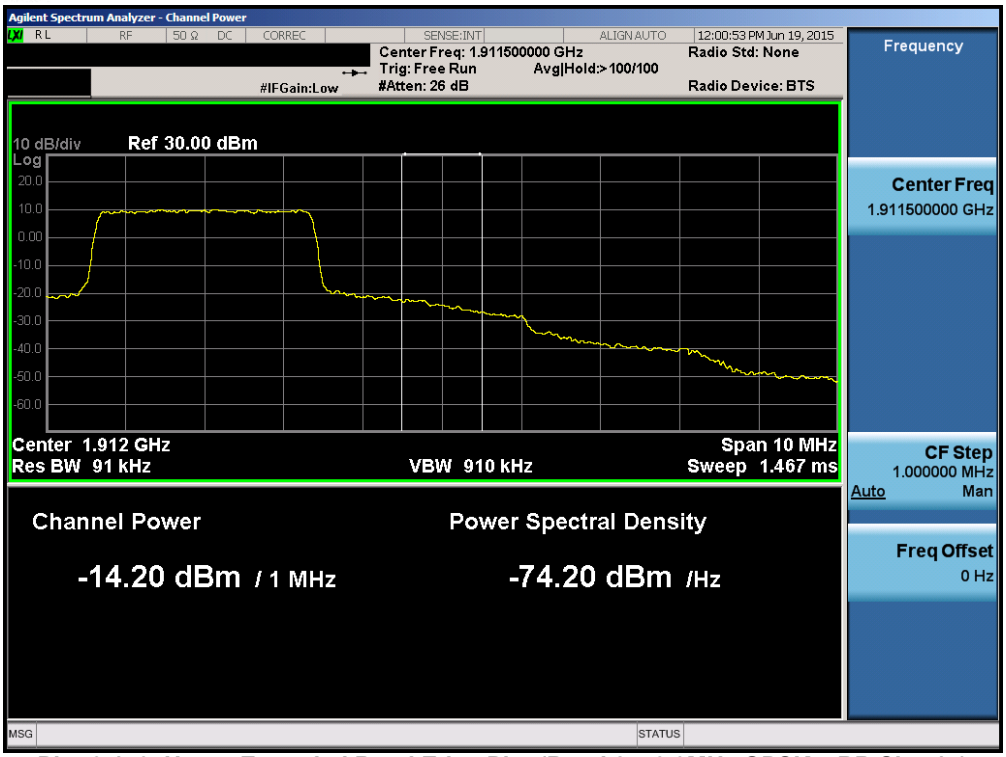
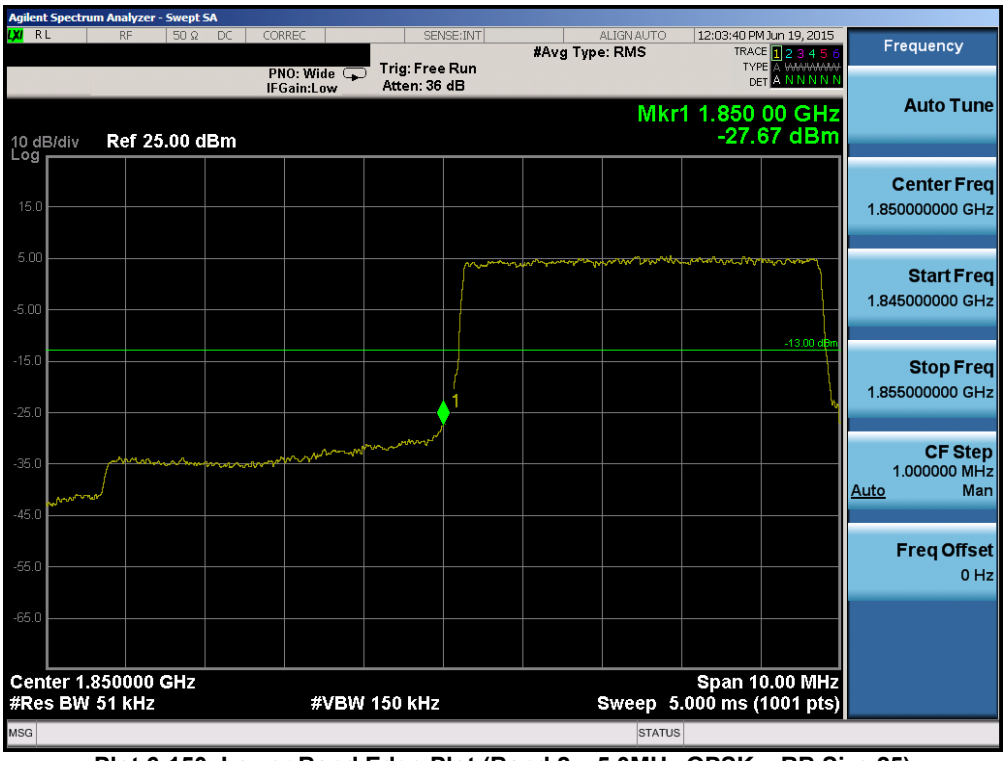


Plot 6-149. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 6-150. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

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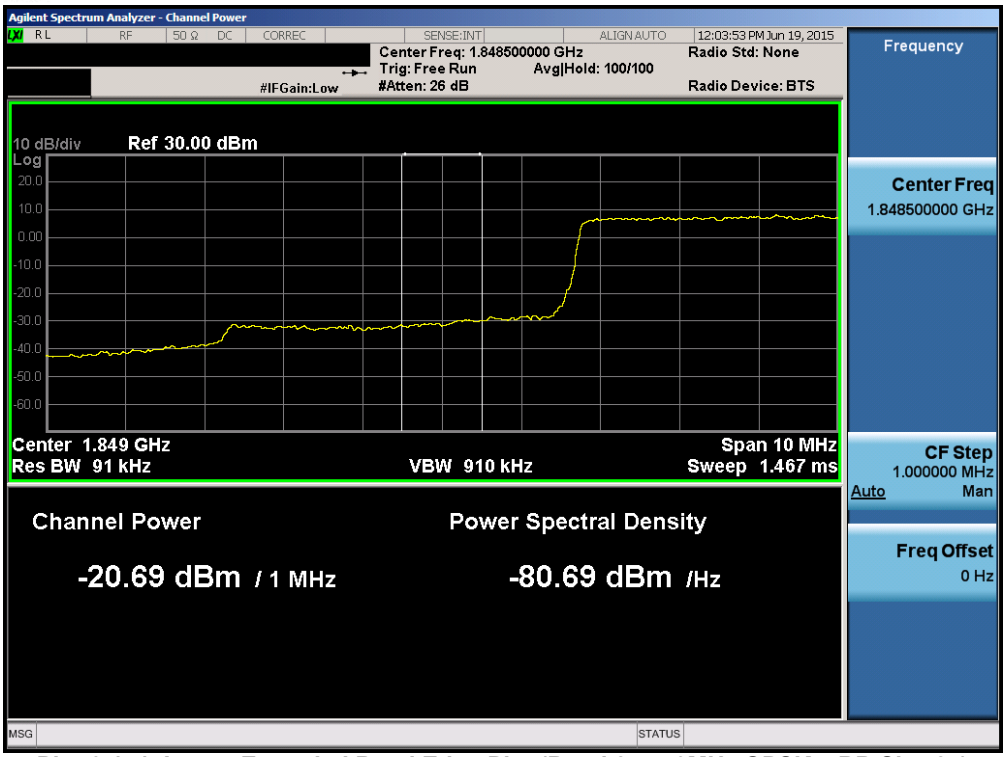

Plot 6-151. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

Plot 6-152. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

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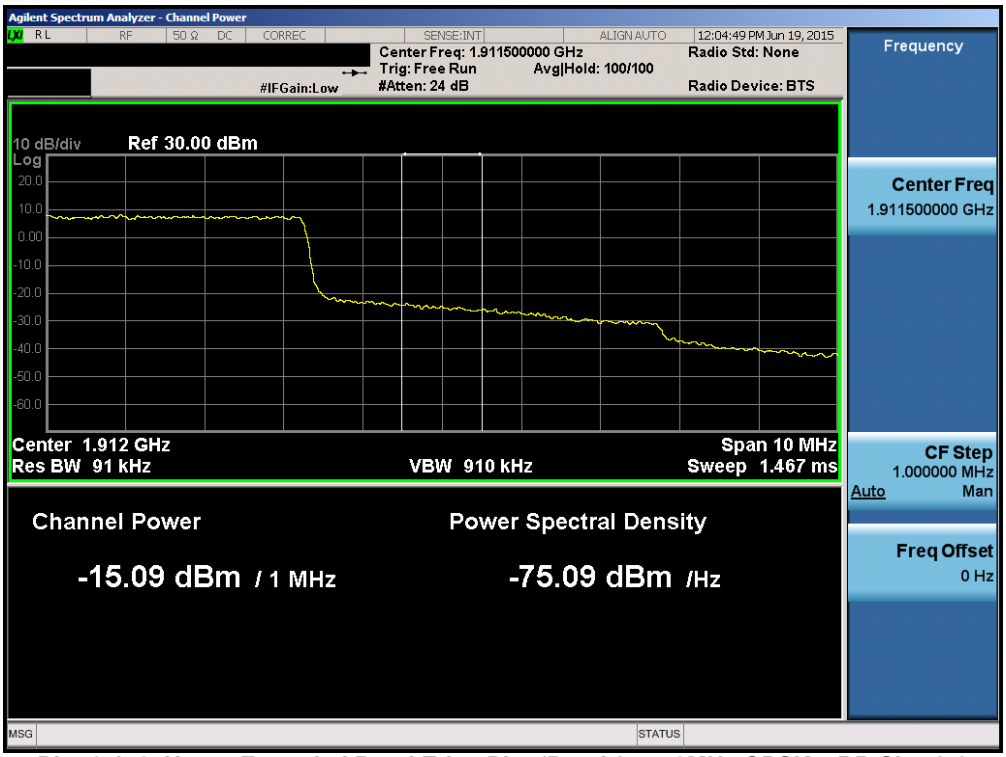
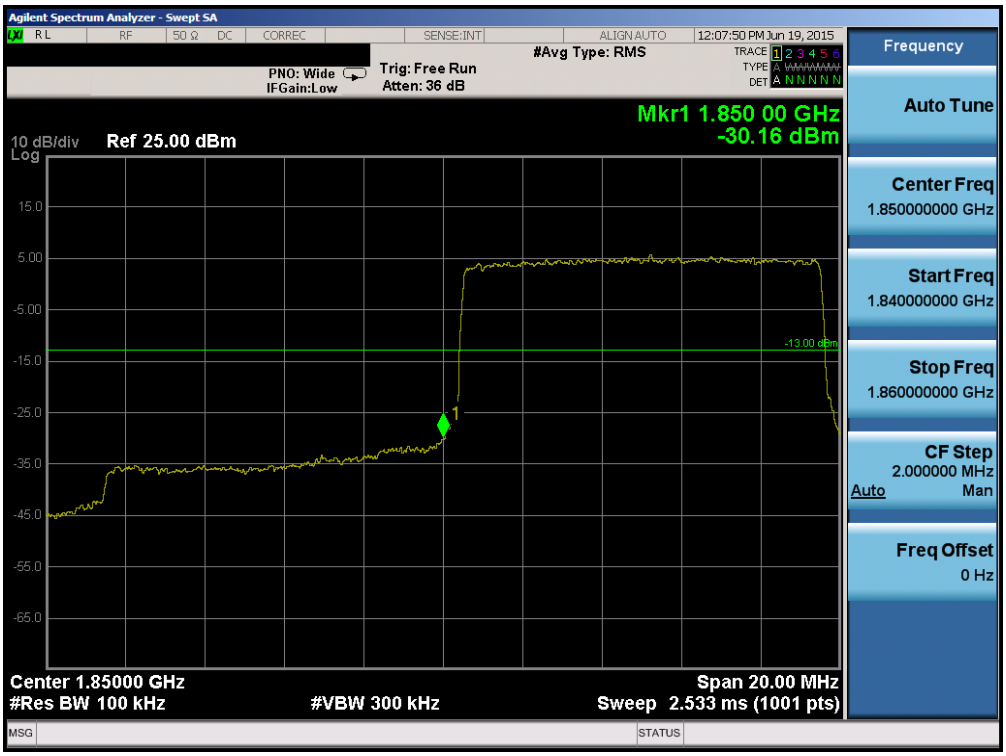


Plot 6-153. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 6-154. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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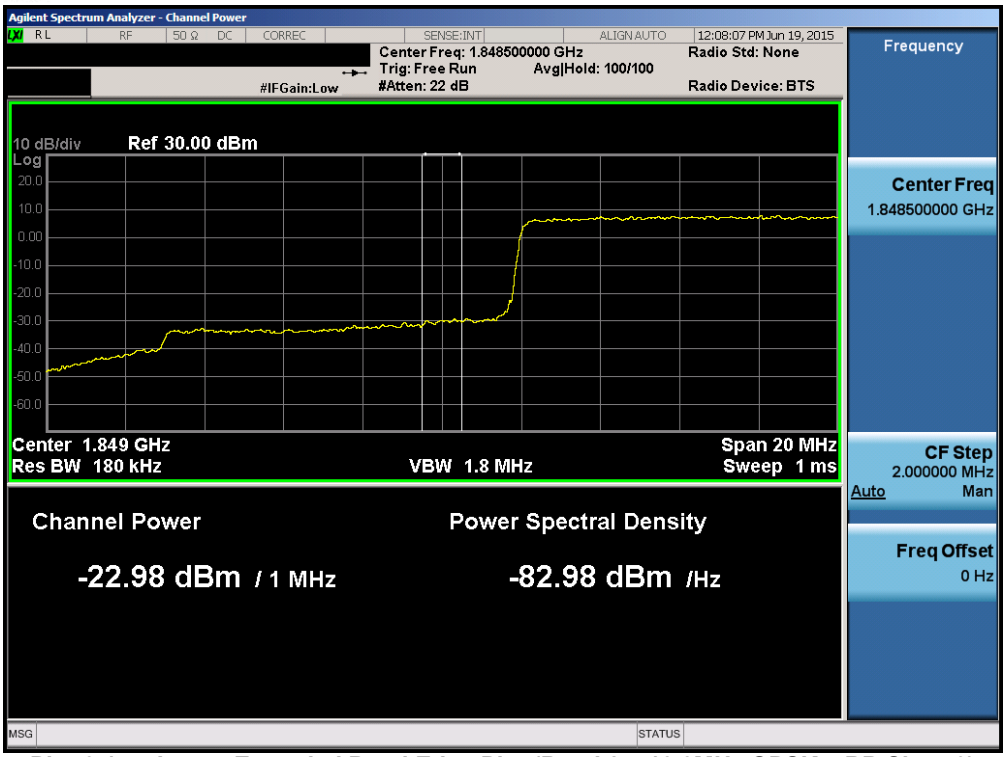

Plot 6-155. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

Plot 6-156. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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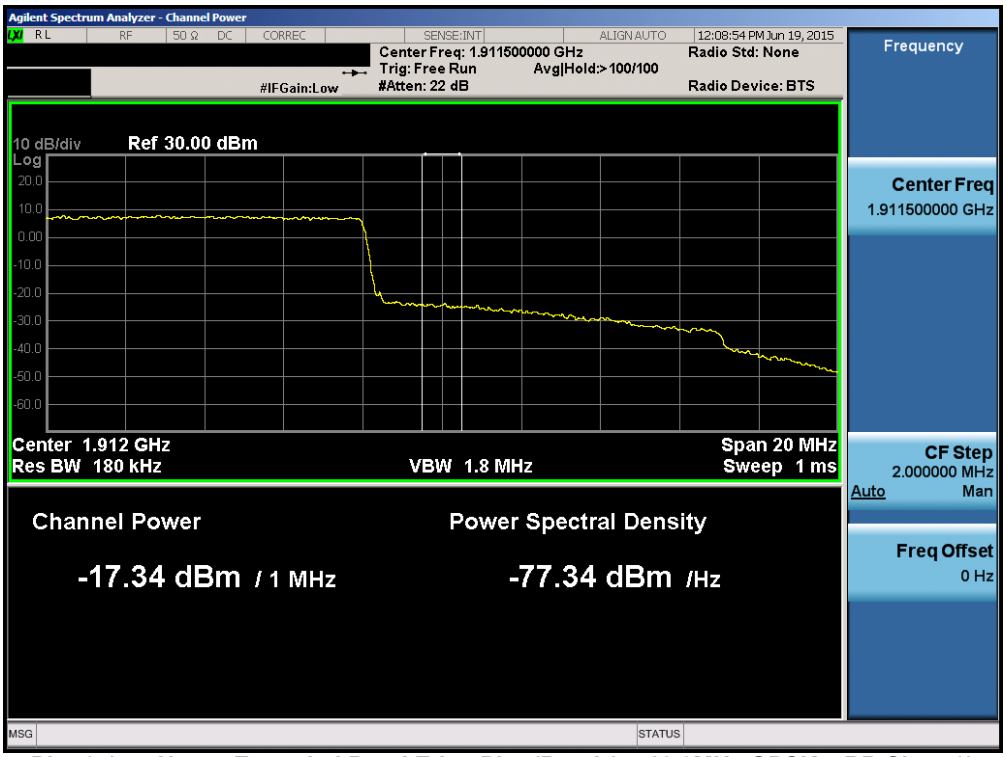
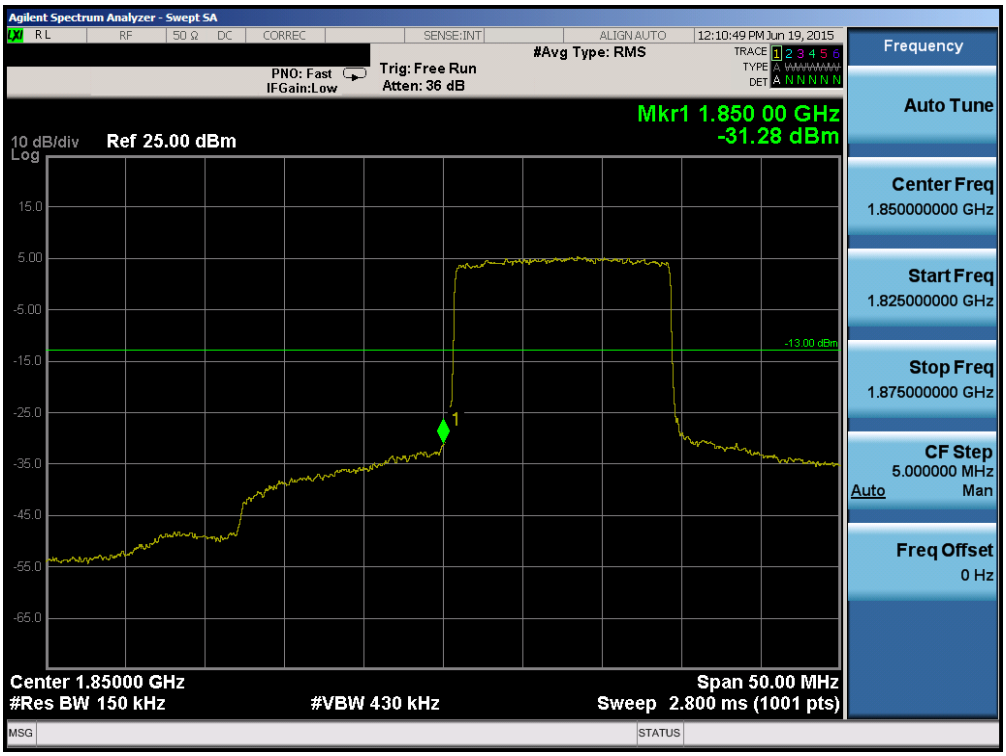


Plot 6-157. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 6-158. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

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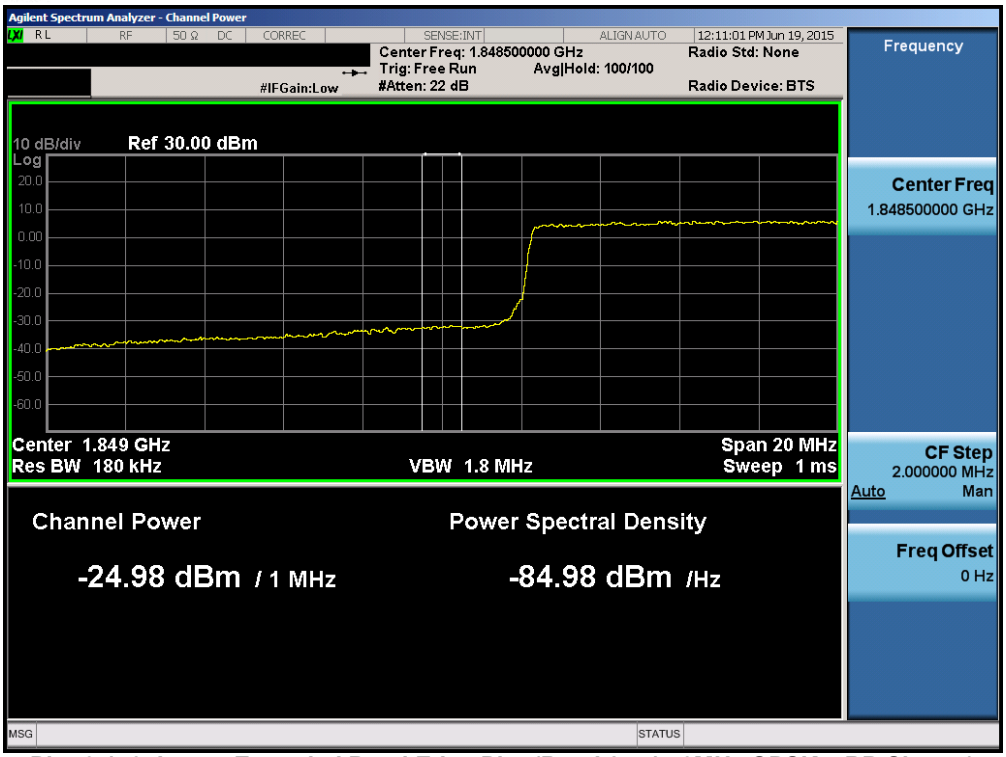

Plot 6-159. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

Plot 6-160. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

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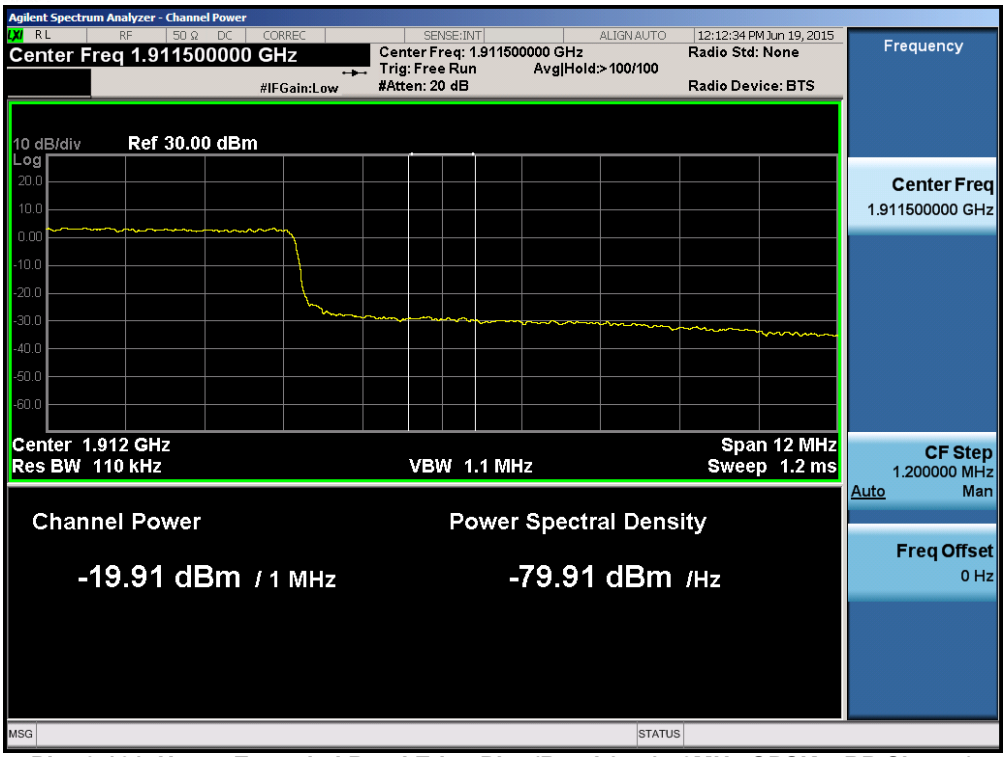
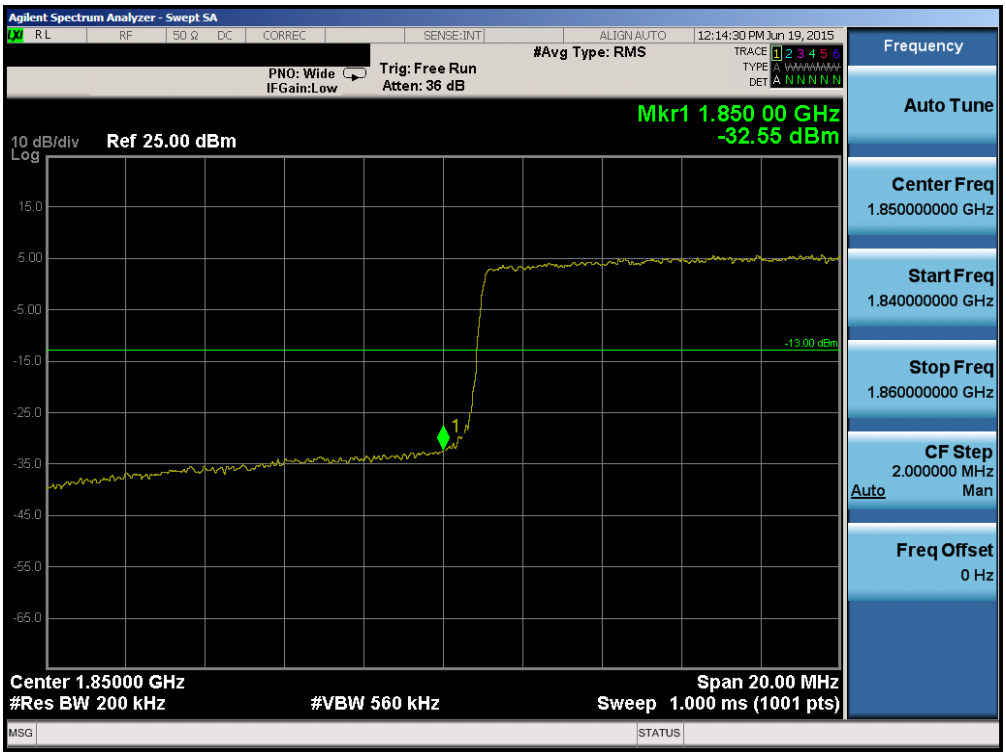


Plot 6-161. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 6-162. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

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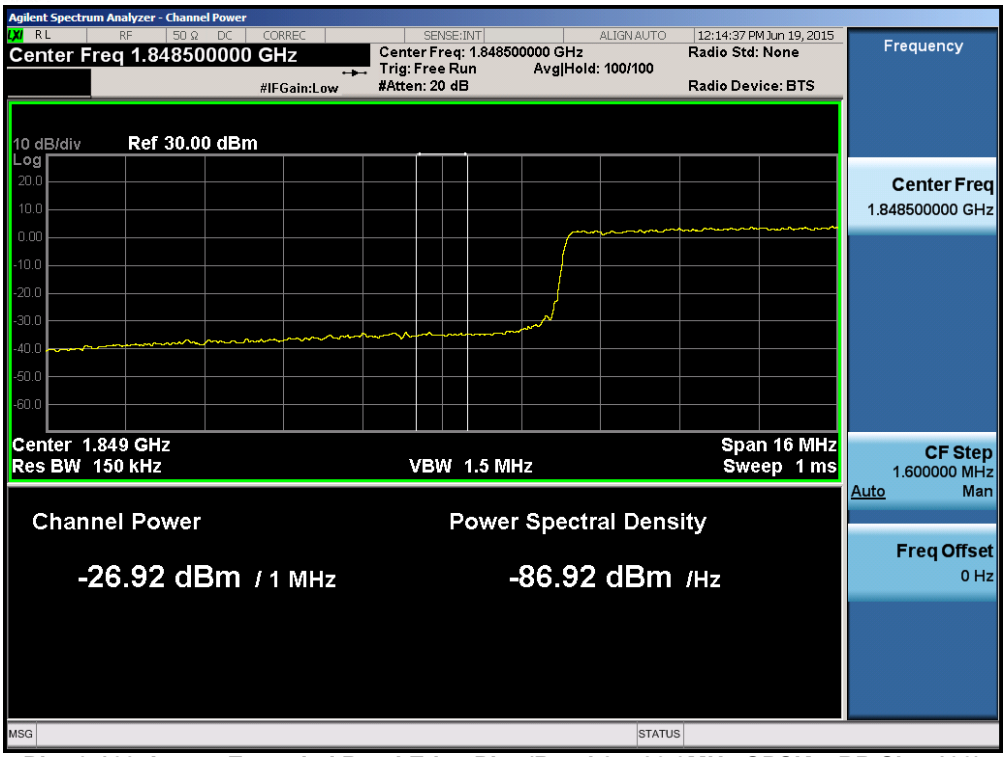
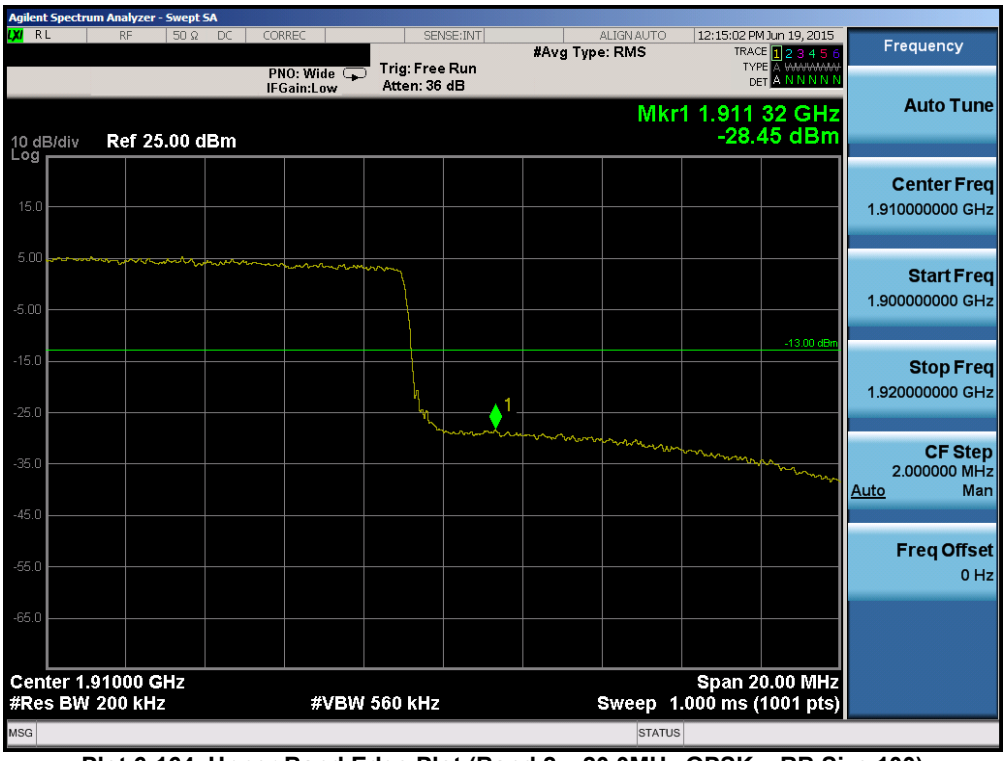


Plot 6-163. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-164. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

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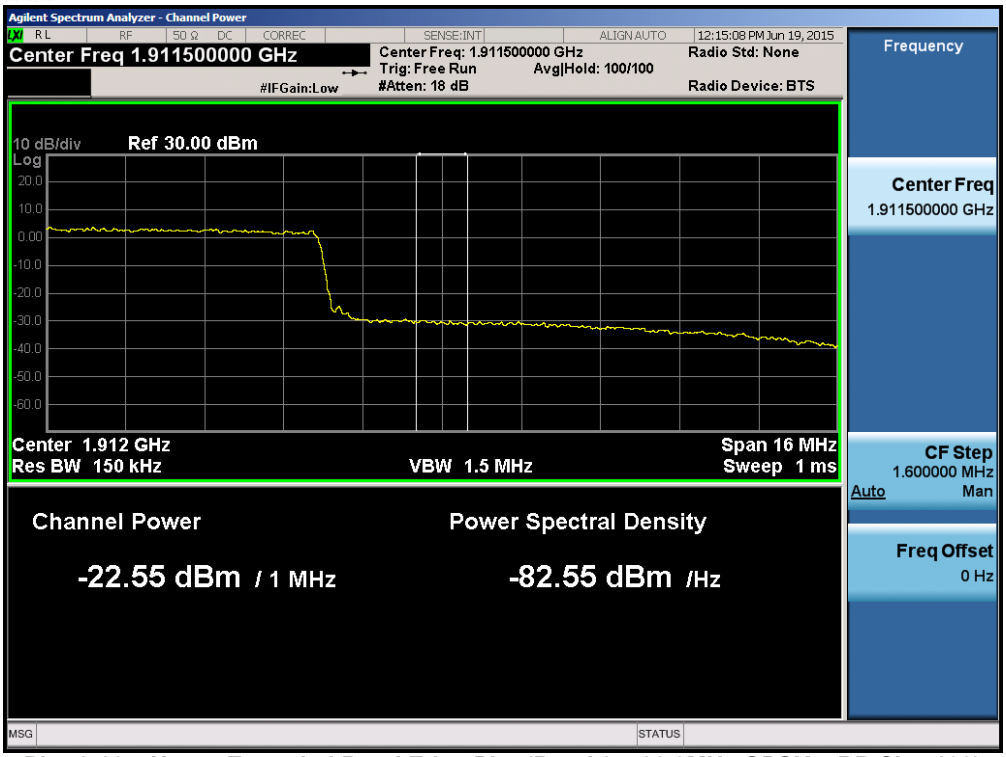
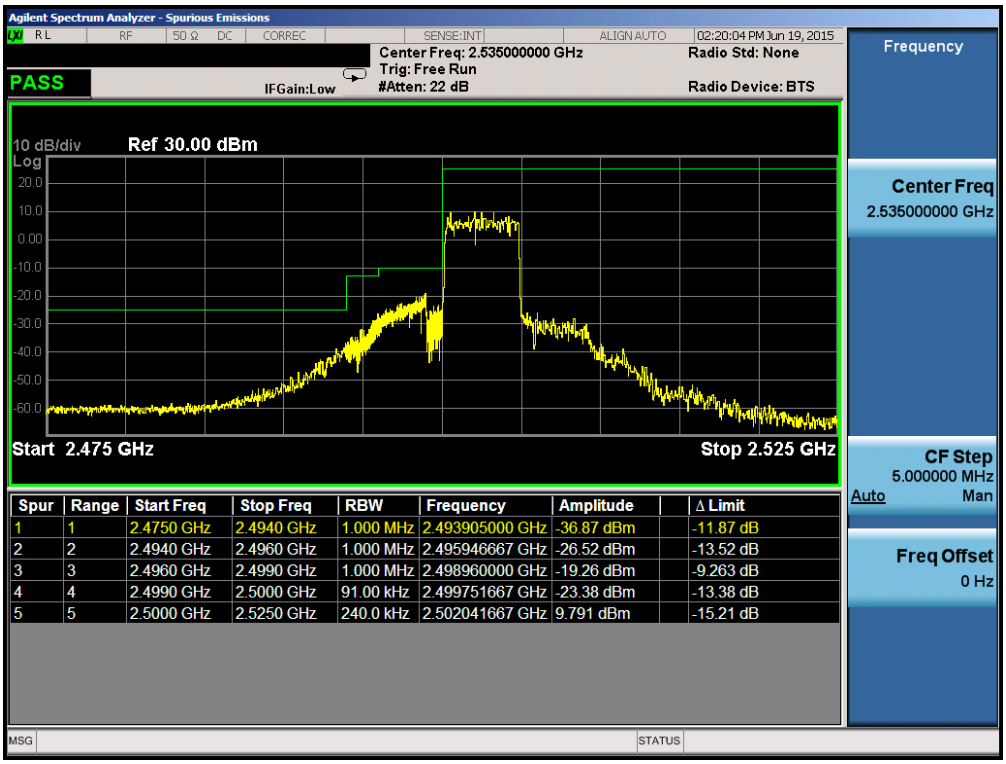


Plot 6-165. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-166. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

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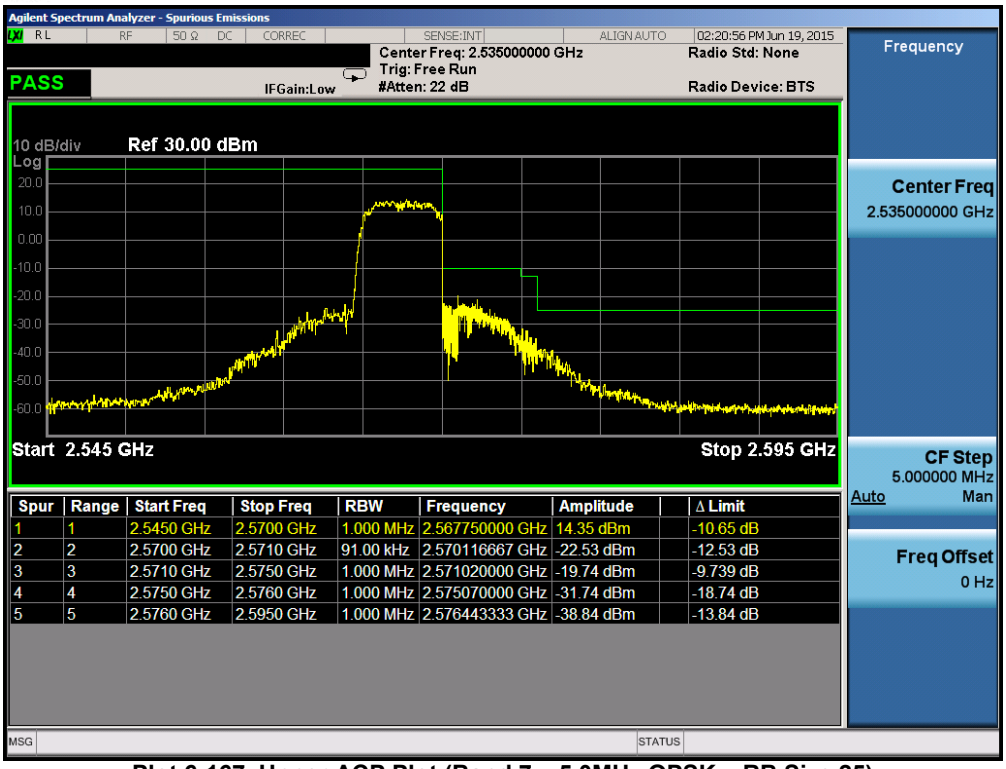
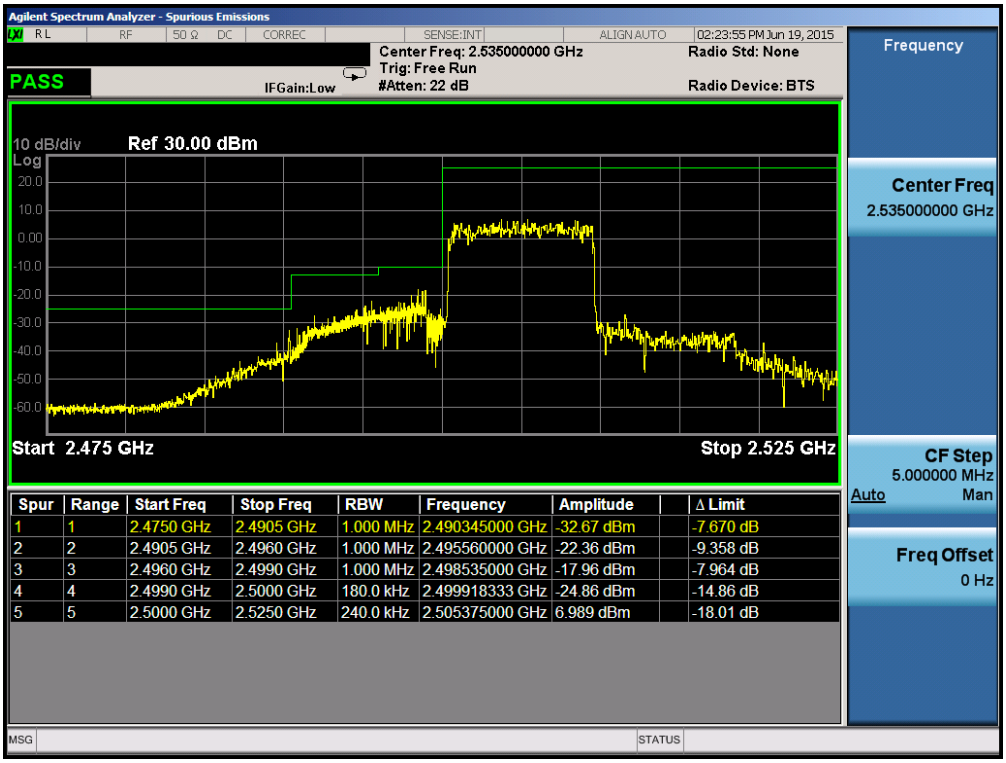


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	1.000 MHz	2.567750000 GHz	14.35 dBm	-10.65 dB
2	2	2.5700 GHz	2.5710 GHz	91.00 kHz	2.570116667 GHz	-22.53 dBm	-12.53 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571020000 GHz	-19.74 dBm	-9.739 dB
4	4	2.5750 GHz	2.5760 GHz	1.000 MHz	2.575070000 GHz	-31.74 dBm	-18.74 dB
5	5	2.5760 GHz	2.5950 GHz	1.000 MHz	2.576443333 GHz	-38.84 dBm	-13.84 dB

Plot 6-167. Upper ACP Plot (Band 7 – 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	2.490345000 GHz	-32.67 dBm	-7.670 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495560000 GHz	-22.36 dBm	-9.358 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498535000 GHz	-17.96 dBm	-7.964 dB
4	4	2.4990 GHz	2.5000 GHz	180.0 kHz	2.499918333 GHz	-24.86 dBm	-14.86 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.505375000 GHz	6.989 dBm	-18.01 dB

Plot 6-168. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

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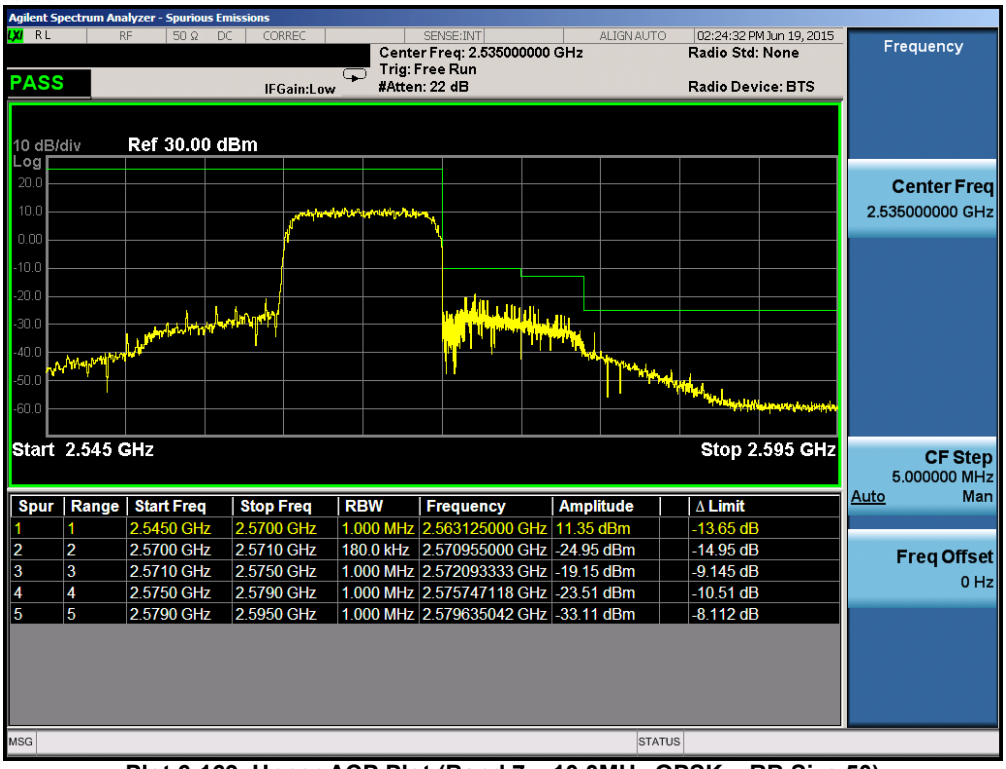
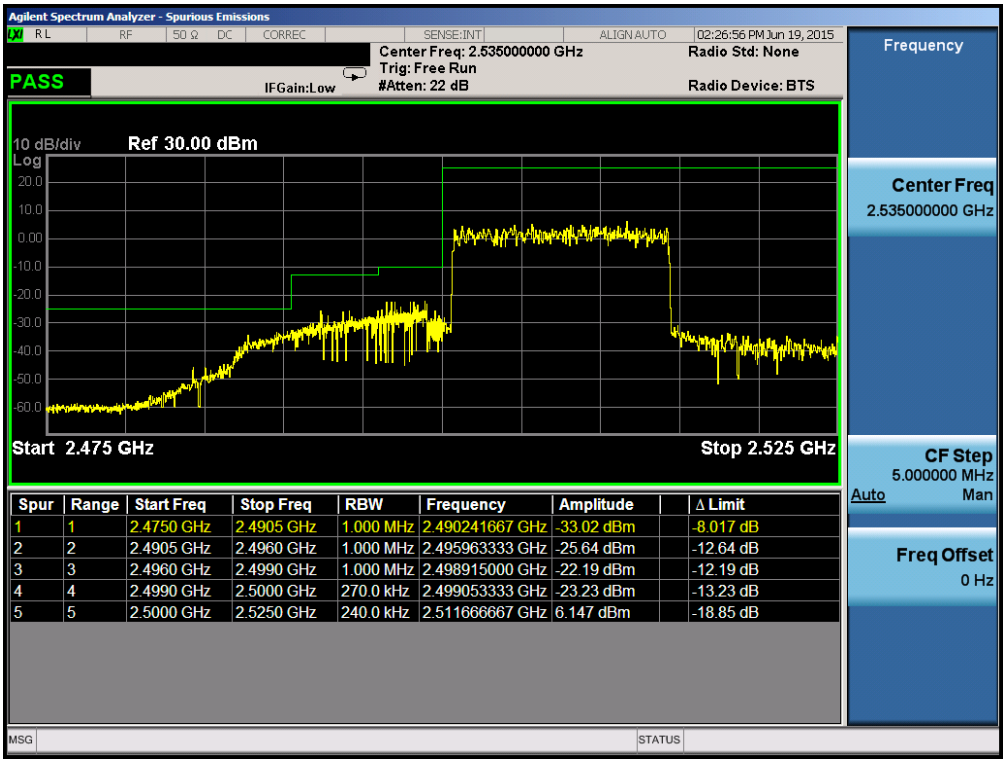


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	1.000 MHz	2.563125000 GHz	11.35 dBm	-13.65 dB
2	2	2.5700 GHz	2.5710 GHz	180.0 kHz	2.570955000 GHz	-24.95 dBm	-14.95 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.572093333 GHz	-19.15 dBm	-9.145 dB
4	4	2.5750 GHz	2.5790 GHz	1.000 MHz	2.575747118 GHz	-23.51 dBm	-10.51 dB
5	5	2.5790 GHz	2.5950 GHz	1.000 MHz	2.579635042 GHz	-33.11 dBm	-8.112 dB

Plot 6-169. Upper ACP Plot (Band 7 – 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	2.490241667 GHz	-33.02 dBm	-8.017 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495963333 GHz	-25.64 dBm	-12.64 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498915000 GHz	-22.19 dBm	-12.19 dB
4	4	2.4990 GHz	2.5000 GHz	270.0 kHz	2.499053333 GHz	-23.23 dBm	-13.23 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.511666667 GHz	6.147 dBm	-18.85 dB

Plot 6-170. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

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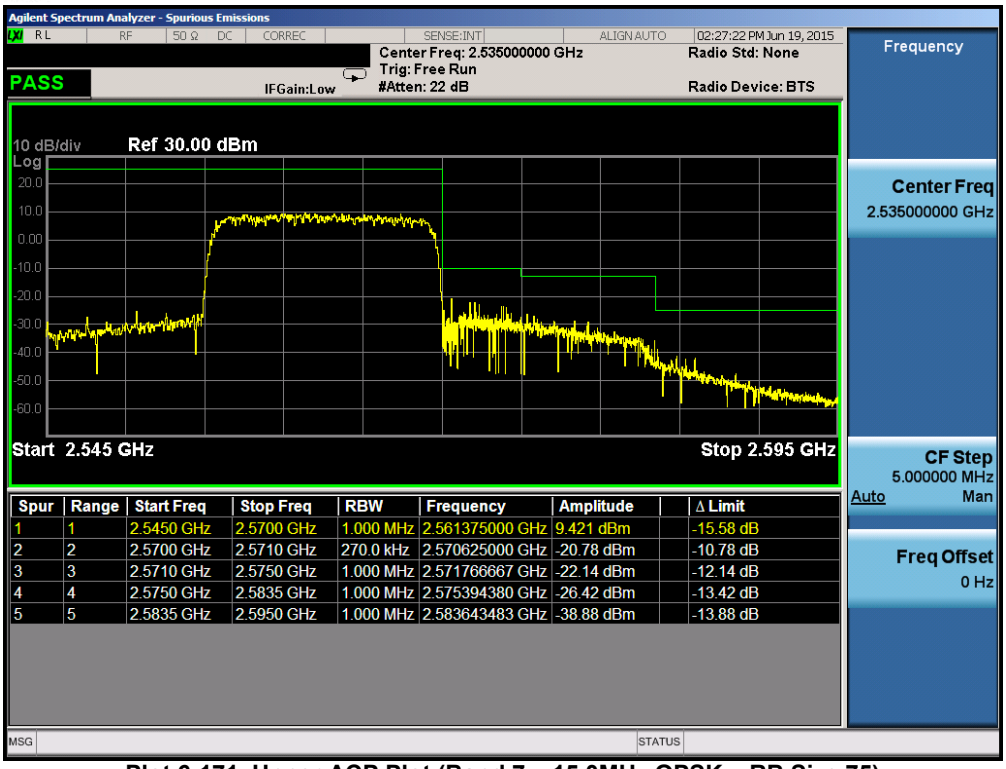
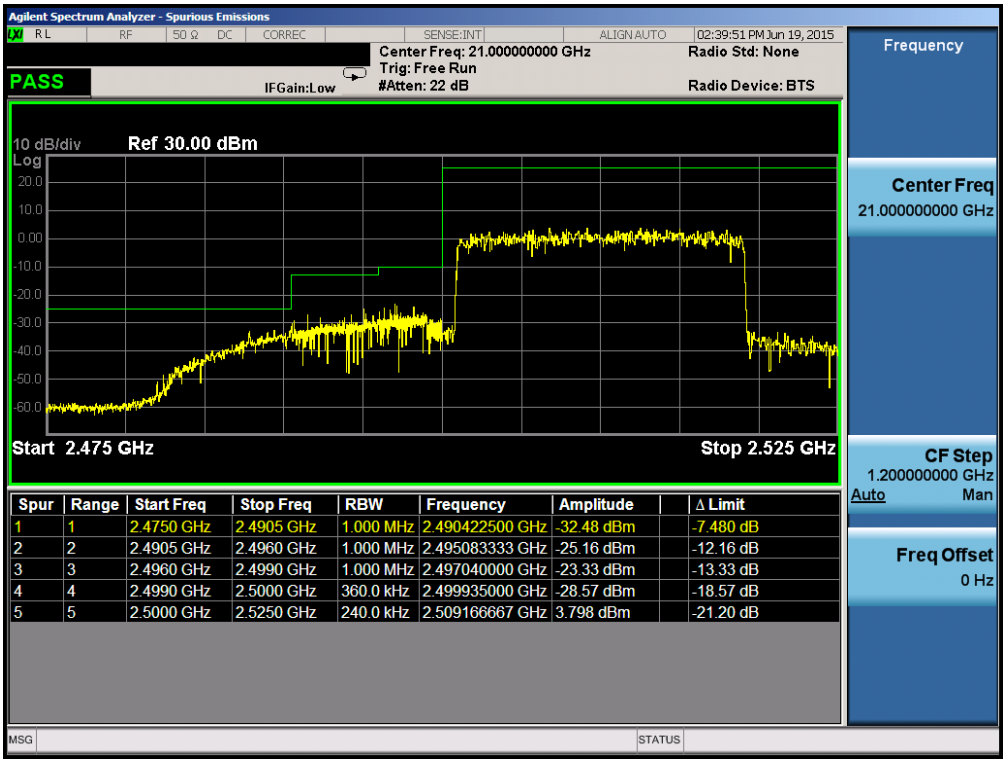


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	1.000 MHz	2.561375000 GHz	9.421 dBm	-15.58 dB
2	2	2.5700 GHz	2.5710 GHz	270.0 kHz	2.570625000 GHz	-20.78 dBm	-10.78 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571766667 GHz	-22.14 dBm	-12.14 dB
4	4	2.5750 GHz	2.5835 GHz	1.000 MHz	2.575394380 GHz	-26.42 dBm	-13.42 dB
5	5	2.5835 GHz	2.5950 GHz	1.000 MHz	2.583643483 GHz	-38.88 dBm	-13.88 dB

Plot 6-171. Upper ACP Plot (Band 7 – 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	2.490422500 GHz	-32.48 dBm	-7.480 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495083333 GHz	-25.16 dBm	-12.16 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.497040000 GHz	-23.33 dBm	-13.33 dB
4	4	2.4990 GHz	2.5000 GHz	360.0 kHz	2.499935000 GHz	-28.57 dBm	-18.57 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.509166667 GHz	3.798 dBm	-21.20 dB

Plot 6-172. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

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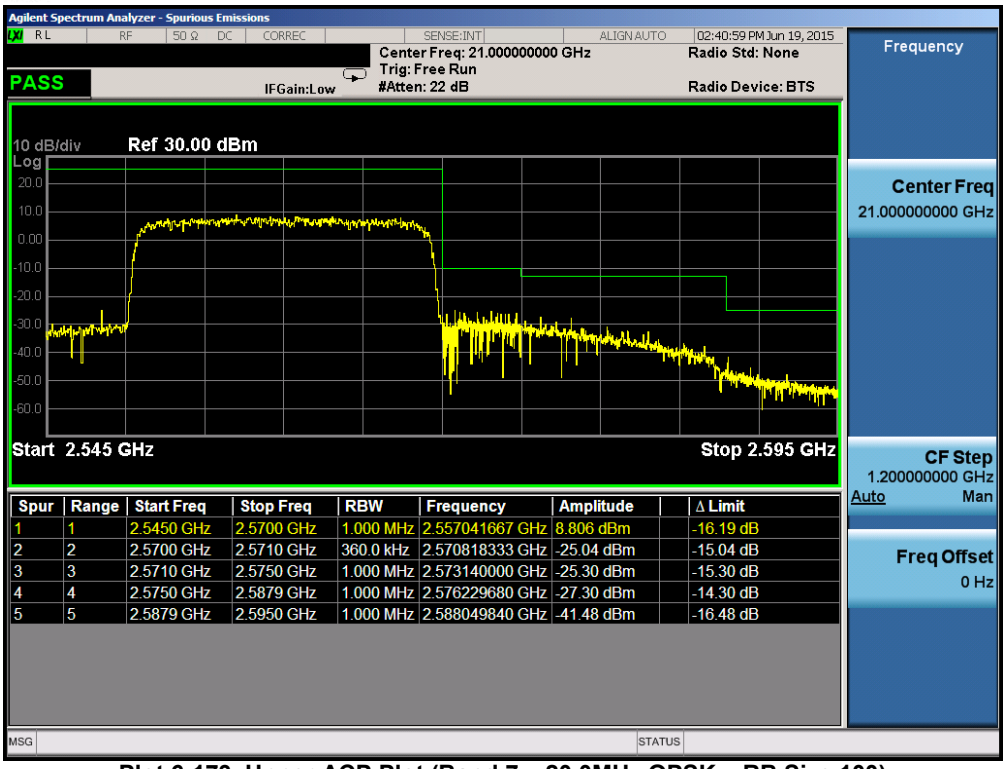

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.5450 GHz	2.5700 GHz	1.000 MHz	2.557041667 GHz	8.806 dBm		-16.19 dB
2	2	2.5700 GHz	2.5710 GHz	360.0 kHz	2.570818333 GHz	-25.04 dBm		-15.04 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.573140000 GHz	-25.30 dBm		-15.30 dB
4	4	2.5750 GHz	2.5879 GHz	1.000 MHz	2.576229680 GHz	-27.30 dBm		-14.30 dB
5	5	2.5879 GHz	2.5950 GHz	1.000 MHz	2.588049840 GHz	-41.48 dBm		-16.48 dB

Plot 6-173. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

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6.5 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.

Test Setup

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

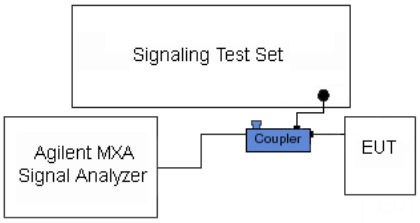

Figure 6-4. Test Instrument & Measurement Setup

Test Notes

None.

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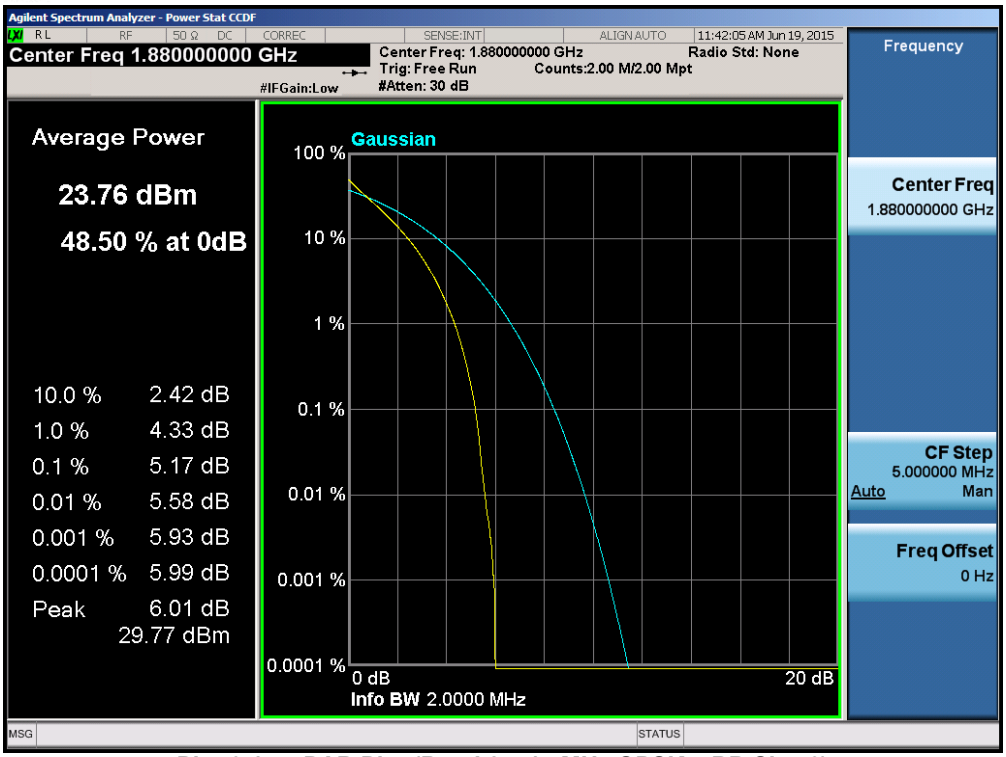
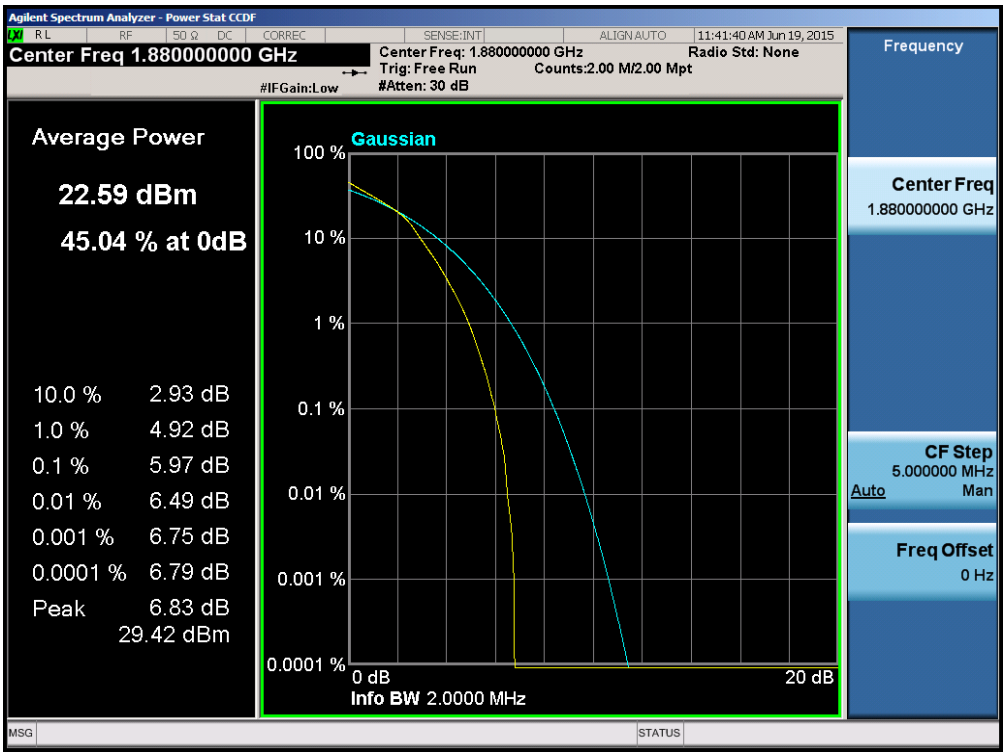


Plot 6-174. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 6-175. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

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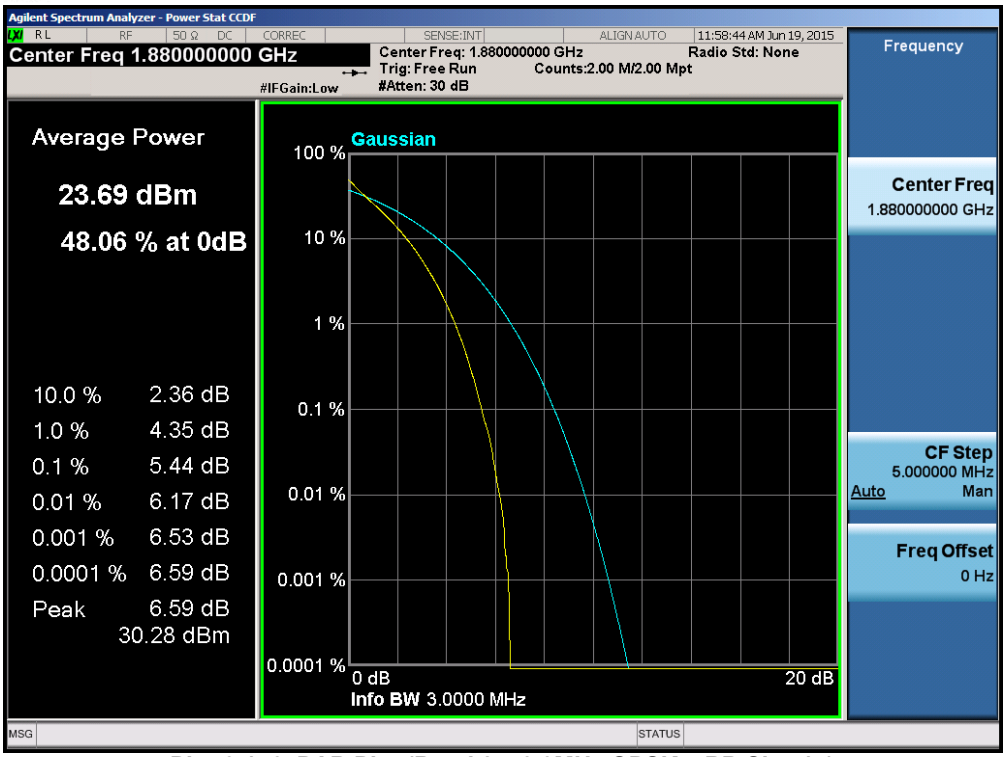
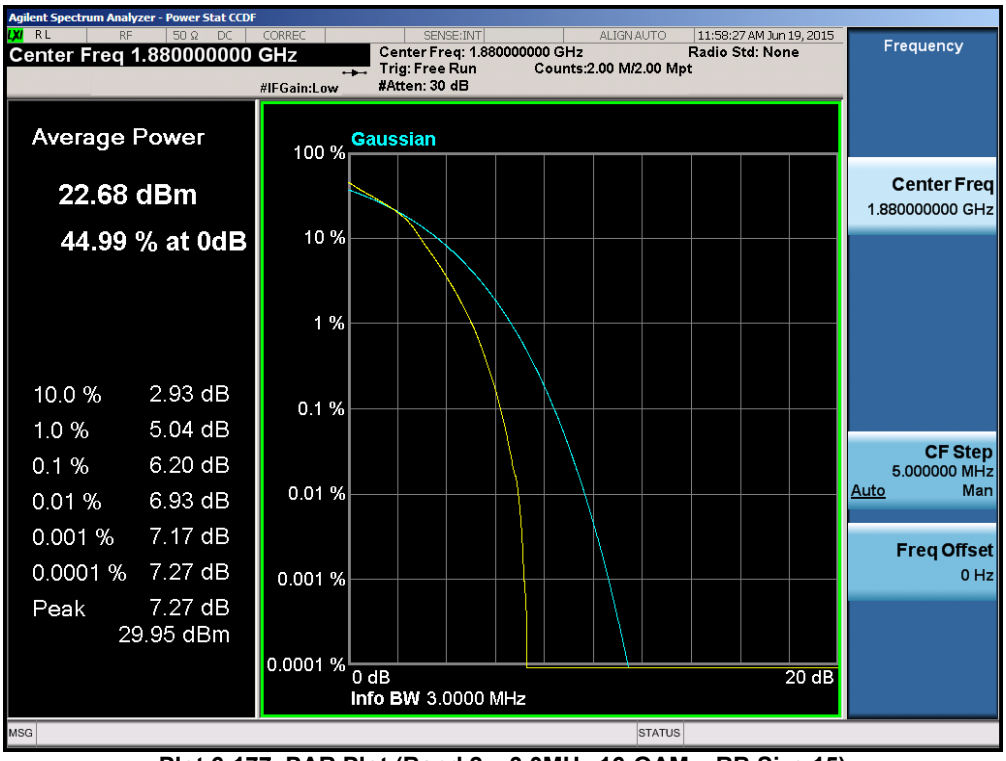


Plot 6-176. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 6-177. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

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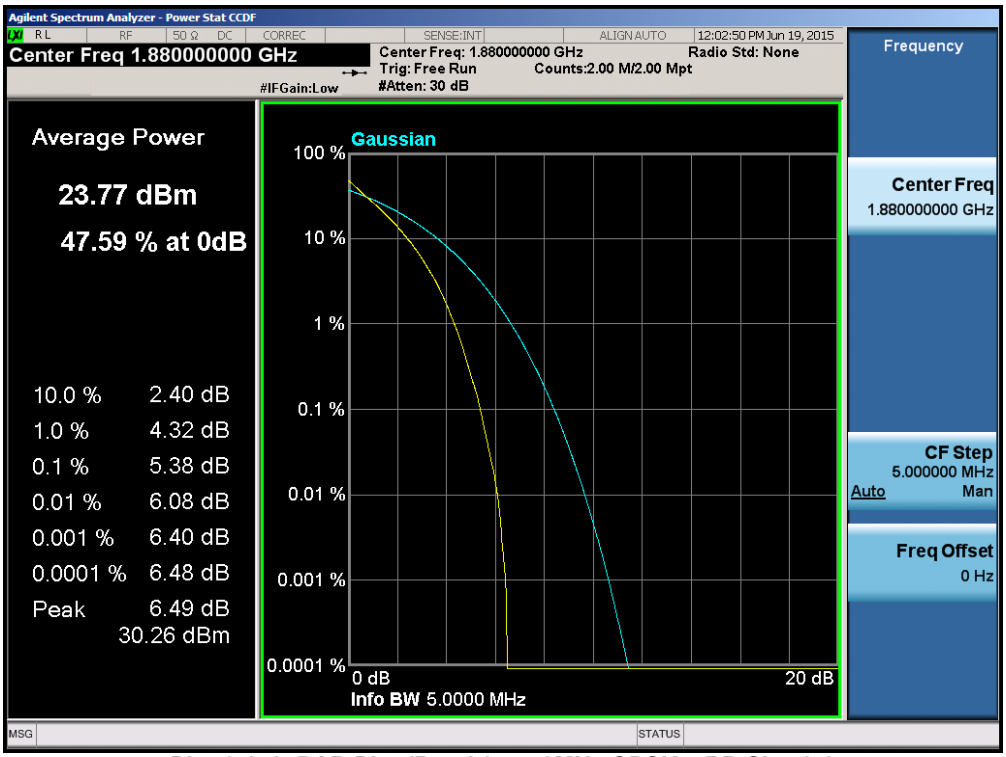
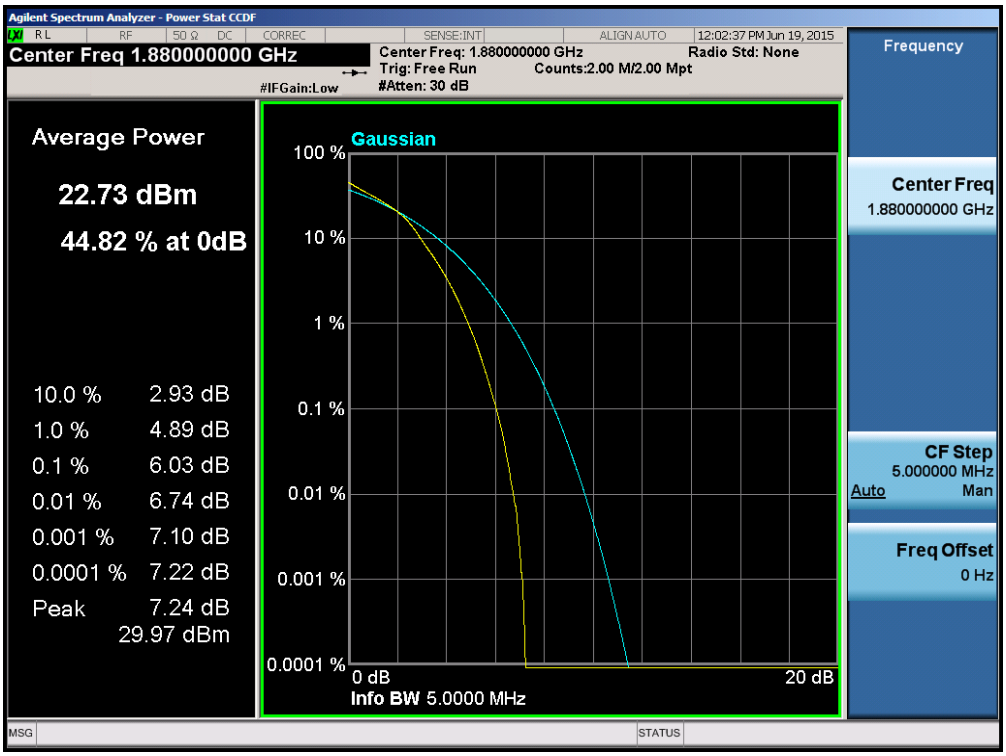


Plot 6-178. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 6-179. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

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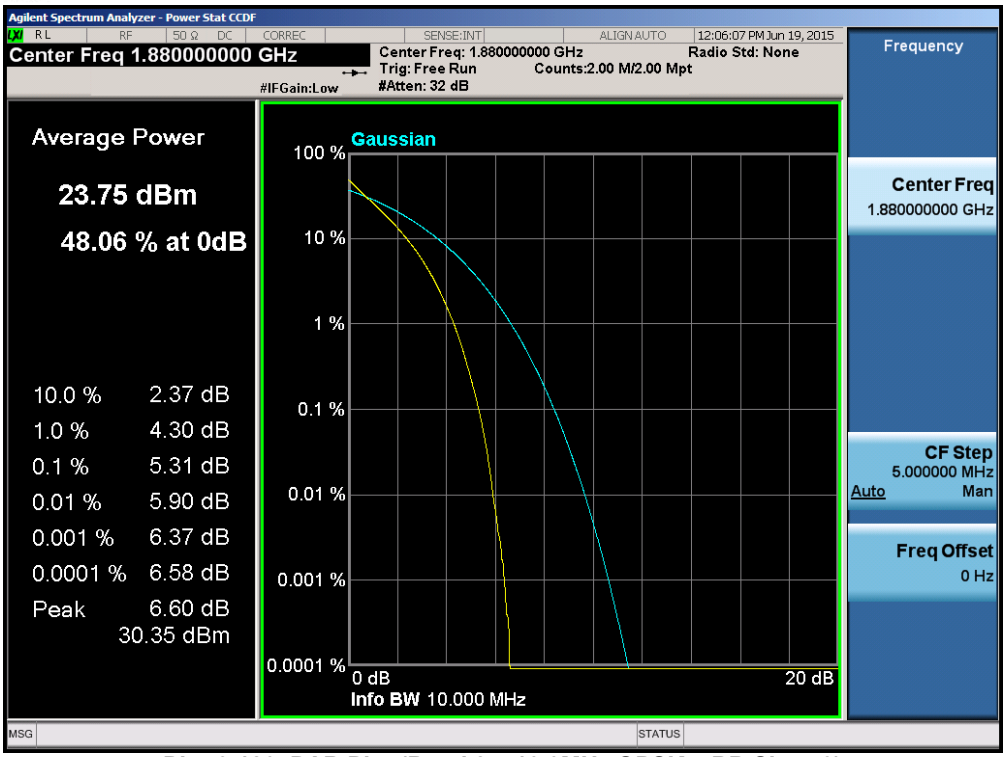
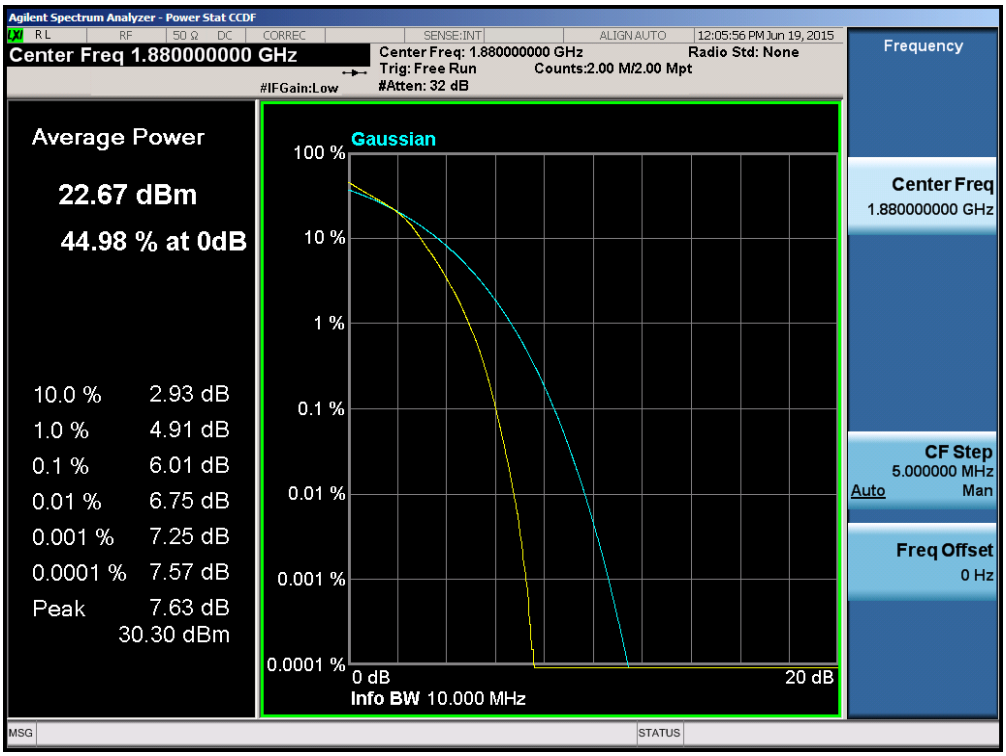


Plot 6-180. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 6-181. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

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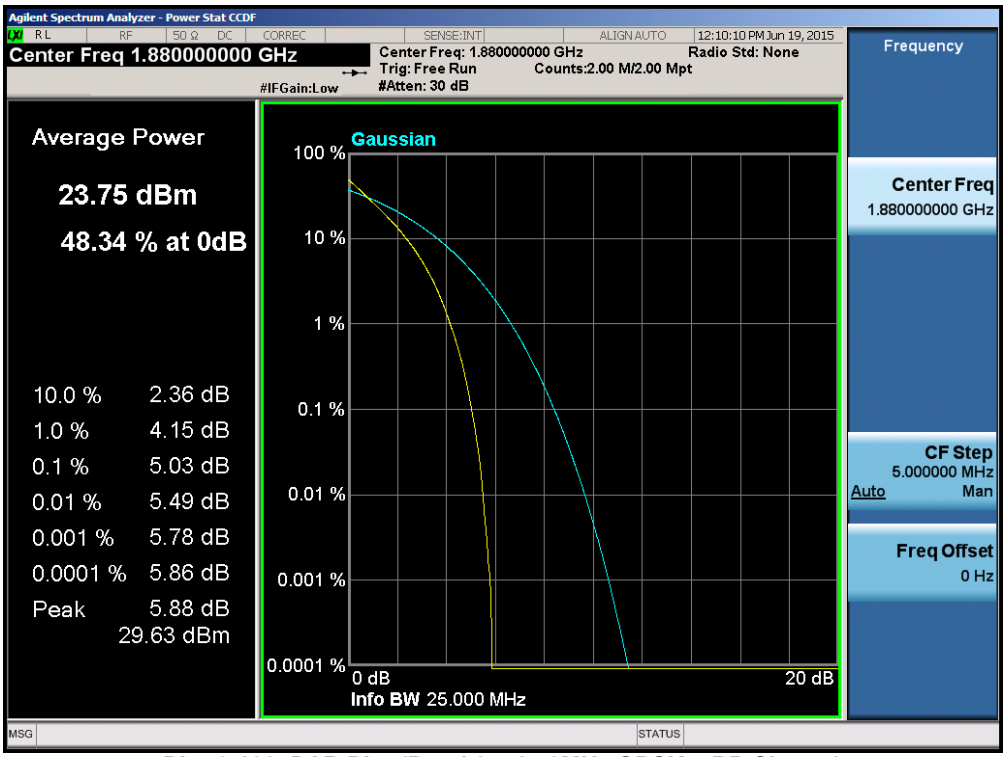
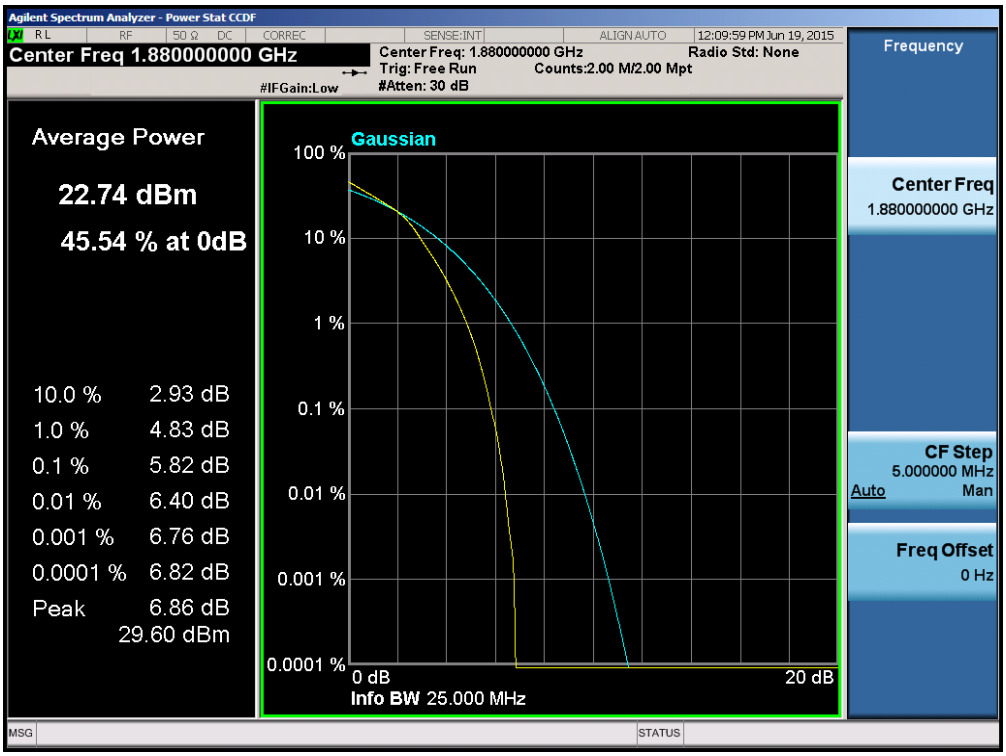


Plot 6-182. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 6-183. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

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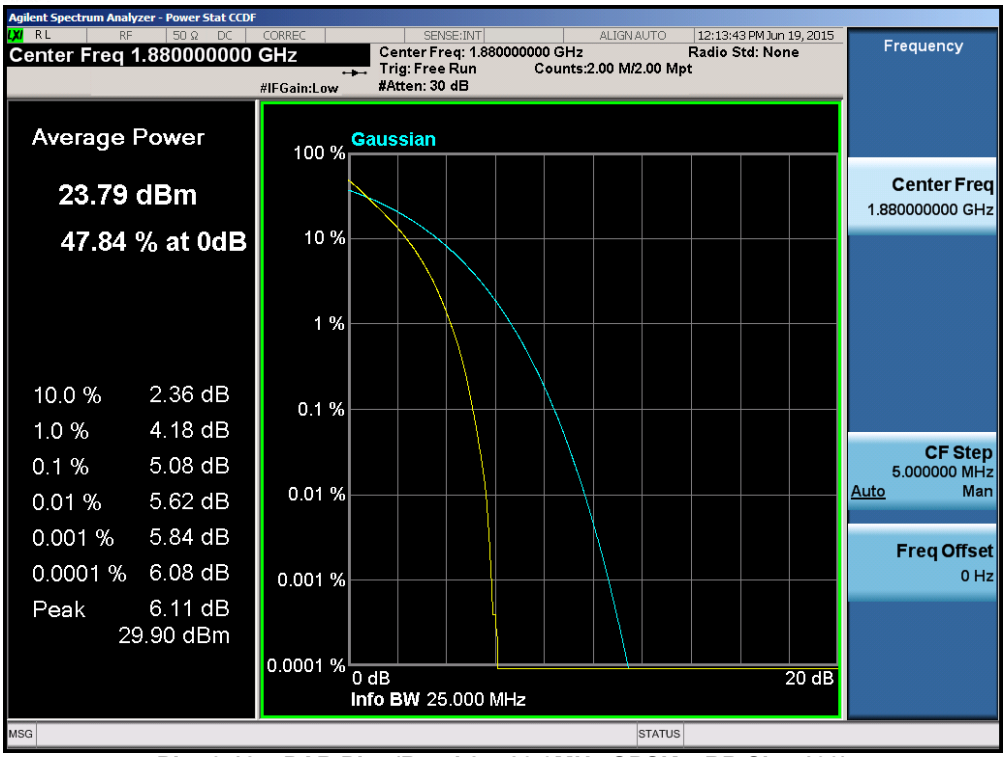
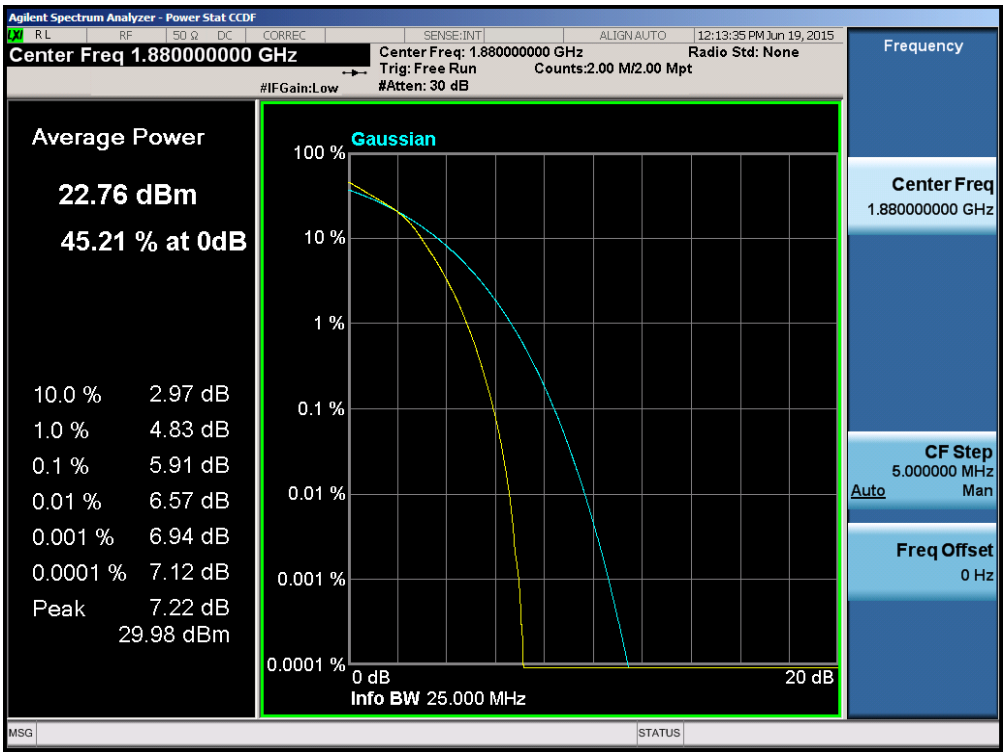


Plot 6-184. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-185. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

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6.6 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-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically 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-C-2004 – Section 2.2.17

Test Settings

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

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Test Setup

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

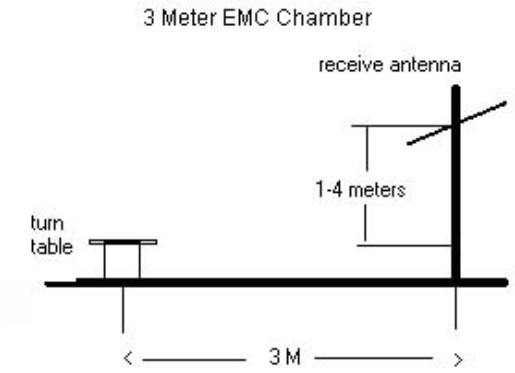

Figure 6-5. Test Instrument & Measurement Setup

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.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	Ant. Pol. [H/V]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	Standard	6 / 0	13.83	0.91	V	14.74	34.77	-20.03
707.50	1.4	QPSK	Standard	6 / 0	15.89	1.07	V	16.96	34.77	-17.81
715.30	1.4	QPSK	Standard	6 / 0	15.25	1.23	V	16.48	34.77	-18.30
699.70	1.4	16-QAM	Standard	6 / 0	14.55	0.91	V	15.46	34.77	-19.31
707.50	1.4	16-QAM	Standard	6 / 0	16.41	1.07	V	17.48	34.77	-17.29
715.30	1.4	16-QAM	Standard	6 / 0	14.36	1.23	V	15.59	34.77	-19.19
700.50	3	QPSK	Standard	15 / 0	15.14	0.92	V	16.06	34.77	-18.71
707.50	3	QPSK	Standard	15 / 0	17.17	1.07	V	18.24	34.77	-16.53
714.50	3	QPSK	Standard	15 / 0	16.58	1.21	V	17.79	34.77	-16.98
700.50	3	16-QAM	Standard	15 / 0	15.49	0.92	V	16.41	34.77	-18.36
707.50	3	16-QAM	Standard	15 / 0	17.58	1.07	V	18.65	34.77	-16.12
714.50	3	16-QAM	Standard	15 / 0	16.97	1.21	V	18.18	34.77	-16.59
701.50	5	QPSK	Standard	1 / 0	16.50	0.94	V	17.44	34.77	-17.33
707.50	5	QPSK	Standard	1 / 0	14.16	1.07	V	15.23	34.77	-19.54
713.50	5	QPSK	Standard	1 / 0	15.26	1.19	V	16.45	34.77	-18.32
701.50	5	16-QAM	Standard	1 / 0	15.36	0.94	V	16.30	34.77	-18.47
707.50	5	16-QAM	Standard	1 / 0	13.14	1.07	V	14.21	34.77	-20.56
713.50	5	16-QAM	Standard	1 / 0	14.27	1.19	V	15.46	34.77	-19.31
704.00	10	QPSK	Standard	1 / 0	15.33	1.00	V	16.33	34.77	-18.44
707.50	10	QPSK	Standard	1 / 0	14.69	1.07	V	15.76	34.77	-19.01
711.00	10	QPSK	Standard	1 / 0	14.45	1.14	V	15.59	34.77	-19.18
704.00	10	16-QAM	Standard	1 / 0	14.18	1.00	V	15.18	34.77	-19.59
707.50	10	16-QAM	Standard	1 / 0	13.81	1.07	V	14.88	34.77	-19.89
711.00	10	16-QAM	Standard	1 / 0	13.50	1.14	V	14.64	34.77	-20.13

Table 6-2. ERP Data (Band 12)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	Ant. Pol. [H/V]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	Standard	1 / 0	22.48	-1.85	V	20.63	38.45	-17.83
836.50	1.4	QPSK	Standard	1 / 0	21.43	-1.94	V	19.49	38.45	-18.96
848.30	1.4	QPSK	Standard	1 / 0	19.95	-2.03	V	17.92	38.45	-20.53
824.70	1.4	16-QAM	Standard	1 / 0	21.46	-1.85	V	19.61	38.45	-18.85
836.50	1.4	16-QAM	Standard	1 / 0	20.45	-1.94	V	18.51	38.45	-19.94
848.30	1.4	16-QAM	Standard	1 / 0	18.91	-2.03	V	16.88	38.45	-21.57
825.50	3	QPSK	Standard	1 / 0	22.29	-1.85	V	20.44	38.45	-18.02
836.50	3	QPSK	Standard	1 / 0	21.69	-1.94	V	19.75	38.45	-18.70
847.50	3	QPSK	Standard	1 / 0	20.54	-2.03	V	18.51	38.45	-19.94
825.50	3	16-QAM	Standard	1 / 0	21.14	-1.85	V	19.29	38.45	-19.17
836.50	3	16-QAM	Standard	1 / 0	20.67	-1.94	V	18.73	38.45	-19.72
847.50	3	16-QAM	Standard	1 / 0	19.46	-2.03	V	17.43	38.45	-21.02
826.50	5	QPSK	Standard	1 / 0	21.16	-1.85	V	19.31	38.45	-19.15
836.50	5	QPSK	Standard	1 / 0	20.34	-1.94	V	18.40	38.45	-20.05
846.50	5	QPSK	Standard	1 / 0	18.59	-2.03	V	16.56	38.45	-21.89
826.50	5	16-QAM	Standard	1 / 0	20.11	-1.85	V	18.26	38.45	-20.20
836.50	5	16-QAM	Standard	1 / 0	19.24	-1.94	V	17.30	38.45	-21.15
846.50	5	16-QAM	Standard	1 / 0	17.52	-2.03	V	15.49	38.45	-22.96
829.00	10	QPSK	Standard	1 / 0	22.56	-1.85	V	20.71	38.45	-17.75
836.50	10	QPSK	Standard	1 / 0	21.76	-1.94	V	19.82	38.45	-18.63
844.00	10	QPSK	Standard	1 / 0	21.54	-2.03	V	19.51	38.45	-18.94
829.00	10	16-QAM	Standard	1 / 0	21.51	-1.85	V	19.66	38.45	-18.80
836.50	10	16-QAM	Standard	1 / 0	20.71	-1.94	V	18.77	38.45	-19.68
844.00	10	16-QAM	Standard	1 / 0	20.56	-2.03	V	18.53	38.45	-19.92

Table 6-3. ERP Data (Band 5)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	Ant. Pol. [H/V]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	Standard	1 / 0	16.06	8.21	V	24.27	30.00	-5.73
1732.50	1.4	QPSK	Standard	1 / 0	15.46	8.13	V	23.59	30.00	-6.41
1754.30	1.4	QPSK	Standard	1 / 5	14.37	8.06	V	22.43	30.00	-7.57
1710.70	1.4	16-QAM	Standard	1 / 0	14.96	8.21	V	23.17	30.00	-6.83
1732.50	1.4	16-QAM	Standard	1 / 0	13.36	8.13	V	21.49	30.00	-8.51
1754.30	1.4	16-QAM	Standard	1 / 5	13.26	8.06	V	21.32	30.00	-8.68
1711.50	3	QPSK	Standard	1 / 14	17.35	8.21	V	25.56	30.00	-4.44
1732.50	3	QPSK	Standard	1 / 14	15.27	8.13	V	23.40	30.00	-6.60
1753.50	3	QPSK	Standard	1 / 14	14.88	8.06	V	22.94	30.00	-7.06
1711.50	3	16-QAM	Standard	1 / 14	16.39	8.21	V	24.60	30.00	-5.40
1732.50	3	16-QAM	Standard	1 / 14	14.13	8.13	V	22.26	30.00	-7.74
1753.50	3	16-QAM	Standard	1 / 14	13.83	8.06	V	21.89	30.00	-8.11
1712.50	5	QPSK	Standard	1 / 24	17.39	8.21	V	25.60	30.00	-4.40
1732.50	5	QPSK	Standard	1 / 24	17.26	8.13	V	25.39	30.00	-4.61
1752.50	5	QPSK	Standard	1 / 24	15.25	8.06	V	23.31	30.00	-6.69
1712.50	5	16-QAM	Standard	1 / 24	16.17	8.21	V	24.38	30.00	-5.62
1732.50	5	16-QAM	Standard	1 / 24	16.03	8.13	V	24.16	30.00	-5.84
1752.50	5	16-QAM	Standard	1 / 24	13.99	8.06	V	22.04	30.00	-7.96
1715.00	10	QPSK	Standard	1 / 49	17.55	8.21	V	25.76	30.00	-4.24
1732.50	10	QPSK	Standard	1 / 49	16.92	8.13	V	25.05	30.00	-4.95
1750.00	10	QPSK	Standard	1 / 49	14.83	8.06	V	22.89	30.00	-7.11
1715.00	10	16-QAM	Standard	1 / 49	16.47	8.21	V	24.68	30.00	-5.32
1732.50	10	16-QAM	Standard	1 / 49	15.85	8.13	V	23.98	30.00	-6.02
1750.00	10	16-QAM	Standard	1 / 49	13.74	8.06	V	21.80	30.00	-8.20
1717.50	15	QPSK	Standard	1 / 74	17.41	8.21	V	25.62	30.00	-4.38
1732.50	15	QPSK	Standard	1 / 74	16.30	8.13	V	24.43	30.00	-5.57
1747.50	15	QPSK	Standard	1 / 74	15.13	8.06	V	23.19	30.00	-6.81
1717.50	15	16-QAM	Standard	1 / 74	16.27	8.21	V	24.48	30.00	-5.52
1732.50	15	16-QAM	Standard	1 / 74	15.17	8.13	V	23.30	30.00	-6.70
1747.50	15	16-QAM	Standard	1 / 74	14.35	8.06	V	22.41	30.00	-7.59
1720.00	20	QPSK	Standard	1 / 0	16.86	8.21	V	25.07	30.00	-4.93
1732.50	20	QPSK	Standard	1 / 0	16.90	8.13	V	25.03	30.00	-4.97
1745.00	20	QPSK	Standard	1 / 0	17.01	8.06	V	25.07	30.00	-4.93
1720.00	20	16-QAM	Standard	1 / 0	15.89	8.21	V	24.10	30.00	-5.90
1732.50	20	16-QAM	Standard	1 / 0	15.70	8.13	V	23.83	30.00	-6.17
1745.00	20	16-QAM	Standard	1 / 0	15.94	8.06	V	24.00	30.00	-6.00

Table 6-4. EIRP Data (Band 4)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	Ant. Pol. [H/V]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	Standard	1 / 0	15.90	7.98	V	23.88	33.01	-9.13
1880.00	1.4	QPSK	Standard	1 / 0	16.81	8.02	V	24.83	33.01	-8.18
1909.30	1.4	QPSK	Standard	1 / 5	14.90	8.08	V	22.98	33.01	-10.03
1850.70	1.4	16-QAM	Standard	1 / 0	14.77	7.98	V	22.75	33.01	-10.26
1880.00	1.4	16-QAM	Standard	1 / 0	15.58	8.02	V	23.60	33.01	-9.41
1909.30	1.4	16-QAM	Standard	1 / 5	14.04	8.08	V	22.12	33.01	-10.89
1851.50	3	QPSK	Standard	1 / 0	17.74	7.98	V	25.72	33.01	-7.29
1880.00	3	QPSK	Standard	1 / 0	17.48	8.02	V	25.50	33.01	-7.51
1908.50	3	QPSK	Standard	1 / 0	14.86	8.08	V	22.94	33.01	-10.07
1851.50	3	16-QAM	Standard	1 / 0	16.48	7.98	V	24.46	33.01	-8.55
1880.00	3	16-QAM	Standard	1 / 0	16.35	8.02	V	24.37	33.01	-8.64
1908.50	3	16-QAM	Standard	1 / 0	13.61	8.08	V	21.69	33.01	-11.32
1852.50	5	QPSK	Standard	1 / 24	17.86	7.98	V	25.84	33.01	-7.17
1880.00	5	QPSK	Standard	1 / 24	17.04	8.02	V	25.06	33.01	-7.95
1907.50	5	QPSK	Standard	1 / 0	15.47	8.08	V	23.55	33.01	-9.46
1852.50	5	16-QAM	Standard	1 / 24	16.71	7.98	V	24.69	33.01	-8.32
1880.00	5	16-QAM	Standard	1 / 24	15.84	8.02	V	23.86	33.01	-9.15
1907.50	5	16-QAM	Standard	1 / 0	14.60	8.08	V	22.68	33.01	-10.33
1855.00	10	QPSK	Standard	1 / 0	17.31	7.98	V	25.29	33.01	-7.72
1880.00	10	QPSK	Standard	1 / 0	17.24	8.02	V	25.26	33.01	-7.75
1905.00	10	QPSK	Standard	1 / 0	15.86	8.08	V	23.94	33.01	-9.07
1855.00	10	16-QAM	Standard	1 / 0	16.16	7.98	V	24.14	33.01	-8.87
1880.00	10	16-QAM	Standard	1 / 0	16.04	8.02	V	24.06	33.01	-8.95
1905.00	10	16-QAM	Standard	1 / 0	14.68	8.08	V	22.76	33.01	-10.25
1857.50	15	QPSK	Standard	1 / 74	17.23	7.98	V	25.21	33.01	-7.80
1880.00	15	QPSK	Standard	1 / 74	17.75	8.02	V	25.77	33.01	-7.24
1902.50	15	QPSK	Standard	1 / 74	15.27	8.08	V	23.35	33.01	-9.66
1857.50	15	16-QAM	Standard	1 / 74	16.67	7.98	V	24.65	33.01	-8.36
1880.00	15	16-QAM	Standard	1 / 74	16.56	8.02	V	24.58	33.01	-8.43
1902.50	15	16-QAM	Standard	1 / 74	14.08	8.08	V	22.16	33.01	-10.85
1860.00	20	QPSK	Standard	1 / 99	16.00	7.98	V	23.98	33.01	-9.03
1880.00	20	QPSK	Standard	1 / 99	16.61	8.02	V	24.63	33.01	-8.38
1900.00	20	QPSK	Standard	1 / 0	17.04	8.08	V	25.12	33.01	-7.89
1860.00	20	16-QAM	Standard	1 / 99	15.63	7.98	V	23.61	33.01	-9.40
1880.00	20	16-QAM	Standard	1 / 99	15.47	8.02	V	23.49	33.01	-9.52
1900.00	20	16-QAM	Standard	1 / 0	15.82	8.08	V	23.90	33.01	-9.11

Table 6-5. EIRP Data (Band 2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	Ant. Pol. [H/V]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	Standard	1 / 24	11.45	8.95	V	20.40	33.01	-12.61
2535.00	5	QPSK	Standard	1 / 24	11.27	9.00	V	20.27	33.01	-12.74
2567.50	5	QPSK	Standard	1 / 24	11.09	9.04	V	20.13	33.01	-12.88
2502.50	5	16-QAM	Standard	1 / 24	10.05	8.95	V	19.00	33.01	-14.01
2535.00	5	16-QAM	Standard	1 / 24	9.80	9.00	V	18.80	33.01	-14.21
2567.50	5	16-QAM	Standard	1 / 24	9.86	9.04	V	18.90	33.01	-14.11
2505.00	10	QPSK	Standard	1 / 49	13.47	8.95	V	22.42	33.01	-10.59
2535.00	10	QPSK	Standard	1 / 49	11.56	9.00	V	20.56	33.01	-12.45
2565.00	10	QPSK	Standard	1 / 49	11.45	9.04	V	20.49	33.01	-12.52
2505.00	10	16-QAM	Standard	1 / 49	12.19	8.95	V	21.14	33.01	-11.87
2535.00	10	16-QAM	Standard	1 / 49	10.35	9.00	V	19.35	33.01	-13.66
2565.00	10	16-QAM	Standard	1 / 49	10.08	9.04	V	19.12	33.01	-13.89
2507.50	15	QPSK	Standard	1 / 0	11.50	8.95	V	20.45	33.01	-12.56
2535.00	15	QPSK	Standard	1 / 0	13.30	9.00	V	22.30	33.01	-10.71
2562.50	15	QPSK	Standard	1 / 74	11.36	9.04	V	20.40	33.01	-12.61
2507.50	15	16-QAM	Standard	1 / 0	10.30	8.95	V	19.25	33.01	-13.76
2535.00	15	16-QAM	Standard	1 / 0	12.13	9.00	V	21.13	33.01	-11.88
2562.50	15	16-QAM	Standard	1 / 74	10.25	9.04	V	19.29	33.01	-13.72
2510.00	20	QPSK	Standard	1 / 0	11.58	8.95	V	20.53	33.01	-12.48
2535.00	20	QPSK	Standard	1 / 0	12.61	9.00	V	21.61	33.01	-11.40
2560.00	20	QPSK	Standard	1 / 0	10.50	9.04	V	19.54	33.01	-13.47
2510.00	20	16-QAM	Standard	1 / 0	10.46	8.95	V	19.41	33.01	-13.60
2535.00	20	16-QAM	Standard	1 / 0	11.49	9.00	V	20.49	33.01	-12.52
2560.00	20	16-QAM	Standard	1 / 0	9.56	9.04	V	18.60	33.01	-14.41

Table 6-6. EIRP Data (Band 7)

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6.7 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-C-2004 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-C-2004 – 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

Test Setup

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

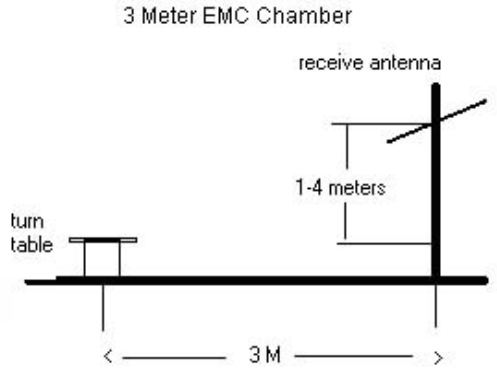

Figure 6-6. Test Instrument & Measurement Setup

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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.

OPERATING FREQUENCY:	701.50	MHz		
CHANNEL:	23035			
MEASURED OUTPUT POWER:	15.24	dBm	=	0.033 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	28.24	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1403.00	-55.86	6.07	-49.78	V	65.0
2104.50	-74.98	6.91	-68.07	V	83.3
2806.00	-62.71	8.08	-54.63	V	69.9
3507.50	-72.73	7.57	-65.15	V	80.4

Table 6-7. Radiated Spurious Data (Band 12 – Low Channel)

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OPERATING FREQUENCY:	707.50	MHz			
CHANNEL:	23095				
MEASURED OUTPUT POWER:	12.88	dBm	=	0.019	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	25.88	dBc		

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1415.00	-57.40	6.10	-51.30	V	64.2
2122.50	-66.02	6.90	-59.12	V	72.0
2830.00	-64.19	8.09	-56.10	V	69.0
3537.50	-72.61	7.70	-64.91	V	77.8

Table 6-8. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	713.50	MHz			
CHANNEL:	23155				
MEASURED OUTPUT POWER:	13.96	dBm	=	0.025	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	26.96	dBc		

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1427.00	-56.92	6.13	-50.79	V	64.7
2140.50	-62.51	6.89	-55.62	V	69.6
2854.00	-63.54	8.10	-55.44	V	69.4
3567.50	-72.76	7.83	-64.93	V	78.9

Table 6-9. Radiated Spurious Data (Band 12 – High Channel)

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OPERATING FREQUENCY:	829.00	MHz		
CHANNEL:	20450			
MEASURED OUTPUT POWER:	20.71	dBm	=	0.118 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.71	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1658.00	-42.54	6.28	-36.26	V	57.0
2487.00	-59.48	6.57	-52.91	V	73.6
3316.00	-46.47	7.03	-39.44	V	60.1
4145.00	-69.71	7.75	-61.96	V	82.7

Table 6-10. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz		
CHANNEL:	20525			
MEASURED OUTPUT POWER:	19.82	dBm	=	0.096 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.82	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1673.00	-44.29	6.19	-38.10	V	57.9
2509.50	-59.14	6.58	-52.56	V	72.4
3346.00	-48.60	7.16	-41.44	V	61.3
4182.50	-71.48	7.99	-63.49	V	83.3

Table 6-11. Radiated Spurious Data (Band 5 – Mid Channel)

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OPERATING FREQUENCY:	844.00	MHz		
CHANNEL:	20600			
MEASURED OUTPUT POWER:	19.51	dBm	=	0.089 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.51	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1688.00	-46.91	6.09	-40.82	V	60.3
2532.00	-59.54	6.66	-52.88	V	72.4
3376.00	-49.01	7.28	-41.73	V	61.2
4220.00	-64.34	8.18	-56.16	V	75.7
5064.00	-67.58	8.89	-58.70	V	78.2

Table 6-12. Radiated Spurious Data (Band 5 – High Channel)

OPERATING FREQUENCY:	1715.00	MHz		
CHANNEL:	20000			
MEASURED OUTPUT POWER:	25.76	dBm	=	0.376 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.76	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
3430.00	-59.85	9.47	-50.38	V	76.1
5145.00	-56.45	10.75	-45.70	V	71.5
6860.00	-54.00	10.44	-43.56	V	69.3

Table 6-13. Radiated Spurious Data (Band 4 – Low Channel)

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OPERATING FREQUENCY:	1732.50	MHz		
CHANNEL:	20175			
MEASURED OUTPUT POWER:	25.05	dBm	=	0.320 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.05	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
3465.00	-56.18	9.61	-46.57	V	71.6
5197.50	-56.10	10.65	-45.45	V	70.5
6930.00	-53.37	10.53	-42.85	V	67.9

Table 6-14. Radiated Spurious Data (Band 4 – Mid Channel)

OPERATING FREQUENCY:	1750.00	MHz		
CHANNEL:	20350			
MEASURED OUTPUT POWER:	22.89	dBm	=	0.194 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.89	dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
3500.00	-57.54	9.76	-47.78	V	70.7
5250.00	-56.64	10.77	-45.87	V	68.8
7000.00	-54.47	10.61	-43.86	V	66.7

Table 6-15. Radiated Spurious Data (Band 4 – High Channel)

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OPERATING FREQUENCY:	1852.50			MHz	
CHANNEL:	18625				
MEASURED OUTPUT POWER:	25.84	dBm	=	0.384	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.84		dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
3705.00	-49.20	9.91	-39.28	V	65.1
5557.50	-66.40	11.12	-55.28	V	81.1
7410.00	-63.43	10.76	-52.68	V	78.5

Table 6-16. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY:	1880.00			MHz	
CHANNEL:	18900				
MEASURED OUTPUT POWER:	25.06	dBm	=	0.321	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.06		dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
3760.00	-54.06	9.70	-44.36	V	69.4
5640.00	-66.67	11.25	-55.43	V	80.5
7520.00	-63.32	10.99	-52.33	V	77.4

Table 6-17. Radiated Spurious Data (Band 2 – Mid Channel)

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OPERATING FREQUENCY:	1907.50			MHz	
CHANNEL:	19175				
MEASURED OUTPUT POWER:	23.55	dBm	=	0.227	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.55		dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
3815.00	-56.03	9.49	-46.53	V	70.1
5722.50	-66.41	11.29	-55.11	V	78.7
7630.00	-63.15	11.21	-51.94	V	75.5

Table 6-18. Radiated Spurious Data (Band 2 – High Channel)

OPERATING FREQUENCY:	2505.00			MHz	
CHANNEL:	20800				
MEASURED OUTPUT POWER:	22.42	dBm	=	0.175	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W) =	47.42		dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
5010.00	-47.20	11.14	-36.05	V	58.5
7515.00	-45.77	10.98	-34.79	V	57.2
10020.00	-45.45	12.32	-33.14	V	55.6

Table 6-19. Radiated Spurious Data (Band 7 – Low Channel)

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OPERATING FREQUENCY:	2535.00			MHz	
CHANNEL:	21100				
MEASURED OUTPUT POWER:	20.56	dBm	=	0.114	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W) =	45.56		dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
5070.00	-46.53	11.02	-35.51	V	56.1
7605.00	-52.50	11.17	-41.32	V	61.9
10140.00	-53.79	12.40	-41.39	V	61.9

Table 6-20. Radiated Spurious Data (Band 7 – Mid Channel)

OPERATING FREQUENCY:	2565.00			MHz	
CHANNEL:	21400				
MEASURED OUTPUT POWER:	20.49	dBm	=	0.112	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W) =	45.49		dBc	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
5130.00	-50.66	10.96	-39.71	V	60.2
7695.00	-46.02	11.30	-34.71	V	55.2
10260.00	-44.00	12.50	-31.50	V	52.0

Table 6-21. Radiated Spurious Data (Band 7 – High Channel)

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6.8 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-C-2004. 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-C-2004

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:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	707,500,052	52	0.0000074
100 %		- 30	707,500,141	141	0.0000199
100 %		- 20	707,500,007	7	0.0000010
100 %		- 10	707,500,162	162	0.0000229
100 %		0	707,500,101	101	0.0000143
100 %		+ 10	707,500,028	28	0.0000040
100 %		+ 20	707,500,027	27	0.0000039
100 %		+ 30	707,500,175	175	0.0000248
100 %		+ 40	707,500,012	12	0.0000017
100 %		+ 50	707,500,054	54	0.0000076
BATT. ENDPOINT	3.40	+ 20	707,500,099	99	0.0000139

Table 6-22. 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

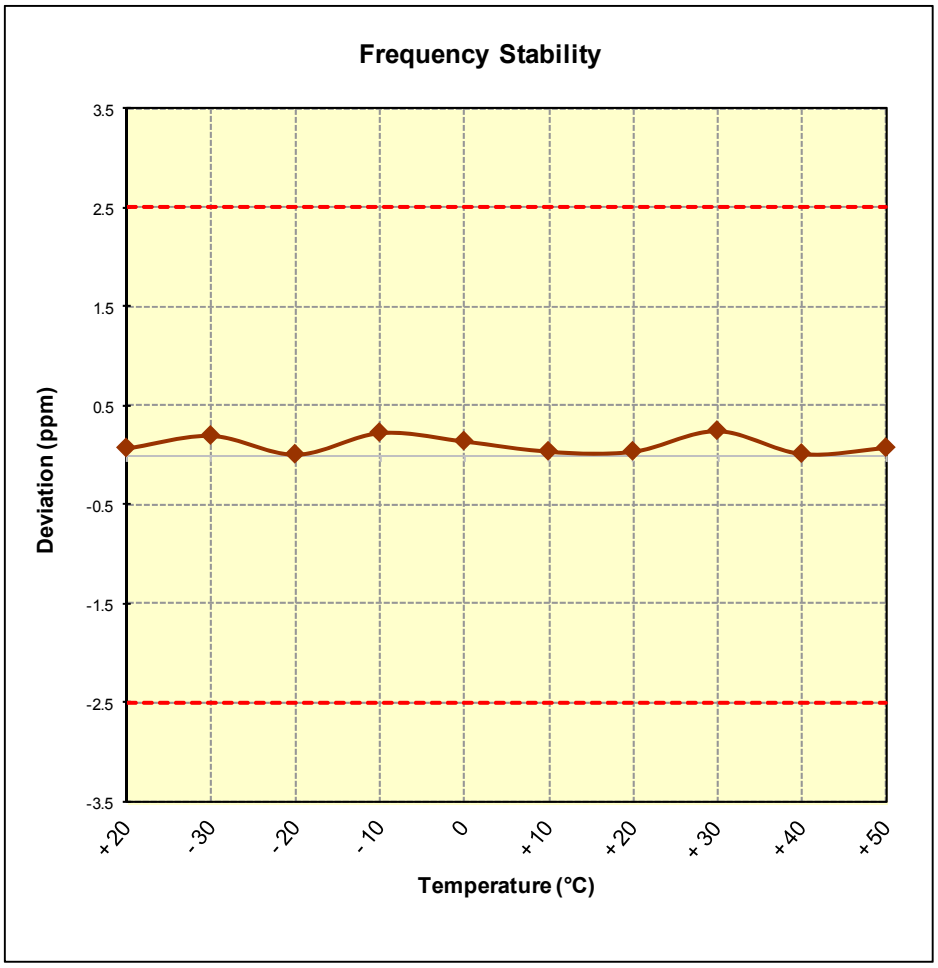

Figure 6-7. Frequency Stability Graph (Band 12)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,500,100	100	0.0000119
100 %		- 30	836,500,025	25	0.0000030
100 %		- 20	836,500,100	100	0.0000120
100 %		- 10	836,500,076	76	0.0000091
100 %		0	836,500,198	198	0.0000237
100 %		+ 10	836,500,160	160	0.0000191
100 %		+ 20	836,500,167	167	0.0000200
100 %		+ 30	836,500,062	62	0.0000074
100 %		+ 40	836,500,139	139	0.0000166
100 %		+ 50	836,500,175	175	0.0000210
BATT. ENDPOINT	3.40	+ 20	836,500,120	120	0.0000143

Table 6-23. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

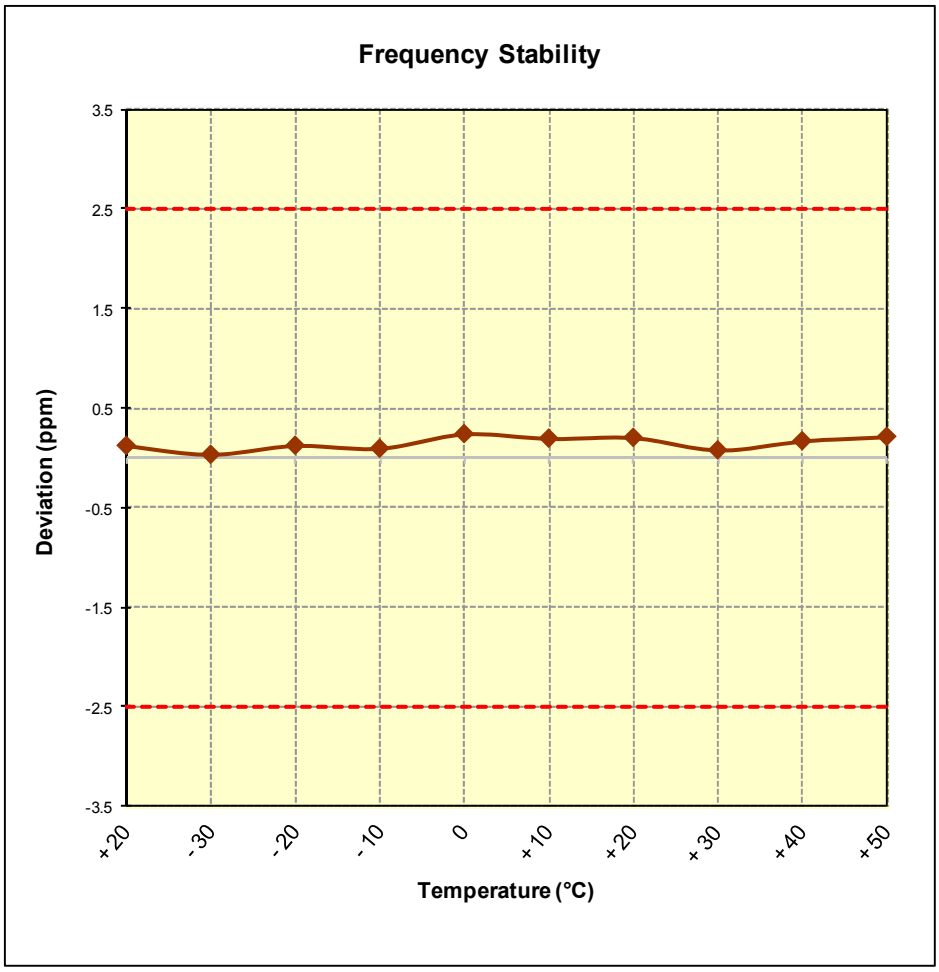

Figure 6-8. Frequency Stability Graph (Band 5)

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Band 4 Frequency Stability Measurements
§2.1055 §§27.54

OPERATING FREQUENCY: 1,732,500,000 Hz

CHANNEL: 20175

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,500,040	40	0.0000023
100 %		- 30	1,732,500,030	30	0.0000017
100 %		- 20	1,732,500,189	189	0.0000109
100 %		- 10	1,732,500,089	89	0.0000052
100 %		0	1,732,500,169	169	0.0000098
100 %		+ 10	1,732,500,129	129	0.0000074
100 %		+ 20	1,732,500,147	147	0.0000085
100 %		+ 30	1,732,500,062	62	0.0000036
100 %		+ 40	1,732,500,027	27	0.0000016
100 %		+ 50	1,732,500,117	117	0.0000067
BATT. ENDPOINT	3.40	+ 20	1,732,500,030	30	0.0000017

Table 6-24. 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

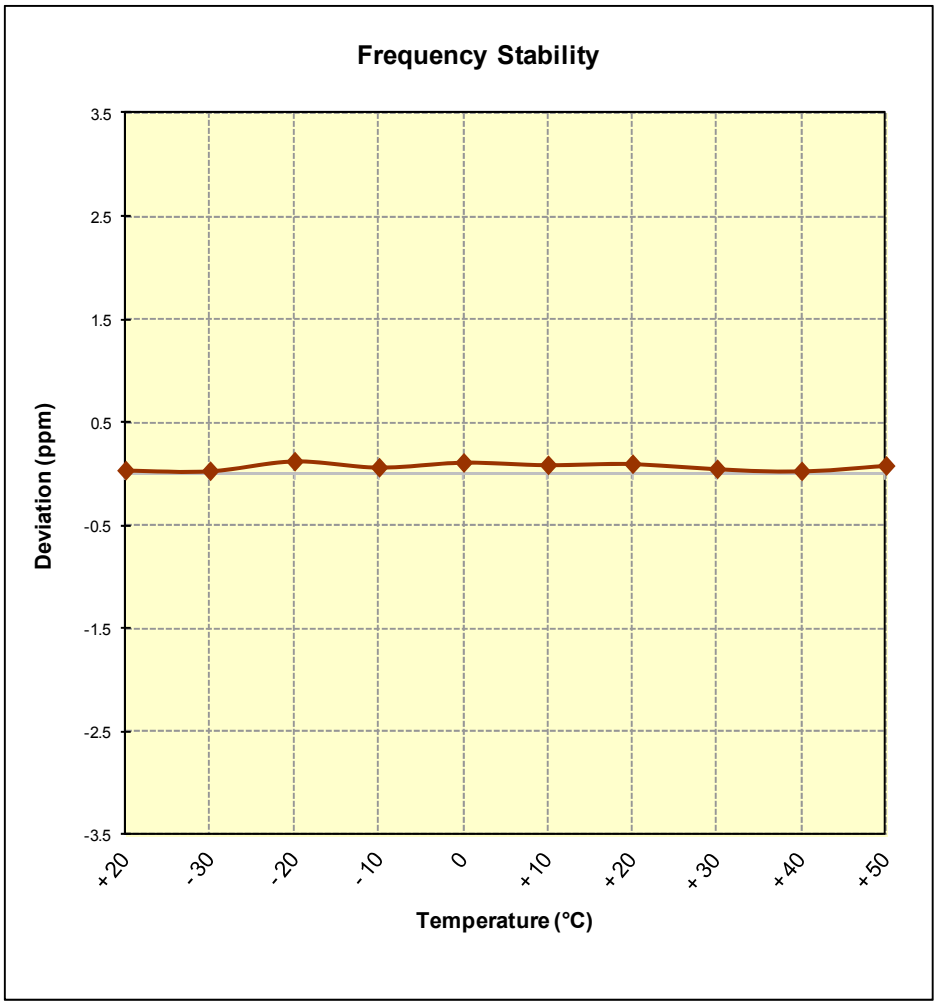

Figure 6-9. Frequency Stability Graph (Band 4)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,880,000,014	14	0.0000008
100 %		- 30	1,880,000,084	84	0.0000044
100 %		- 20	1,880,000,024	24	0.0000013
100 %		- 10	1,880,000,141	141	0.0000075
100 %		0	1,880,000,179	179	0.0000095
100 %		+ 10	1,880,000,012	12	0.0000006
100 %		+ 20	1,880,000,133	133	0.0000071
100 %		+ 30	1,880,000,136	136	0.0000072
100 %		+ 40	1,880,000,026	26	0.0000014
100 %		+ 50	1,880,000,019	19	0.0000010
BATT. ENDPOINT	3.40	+ 20	1,880,000,126	126	0.0000067

Table 6-25. 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

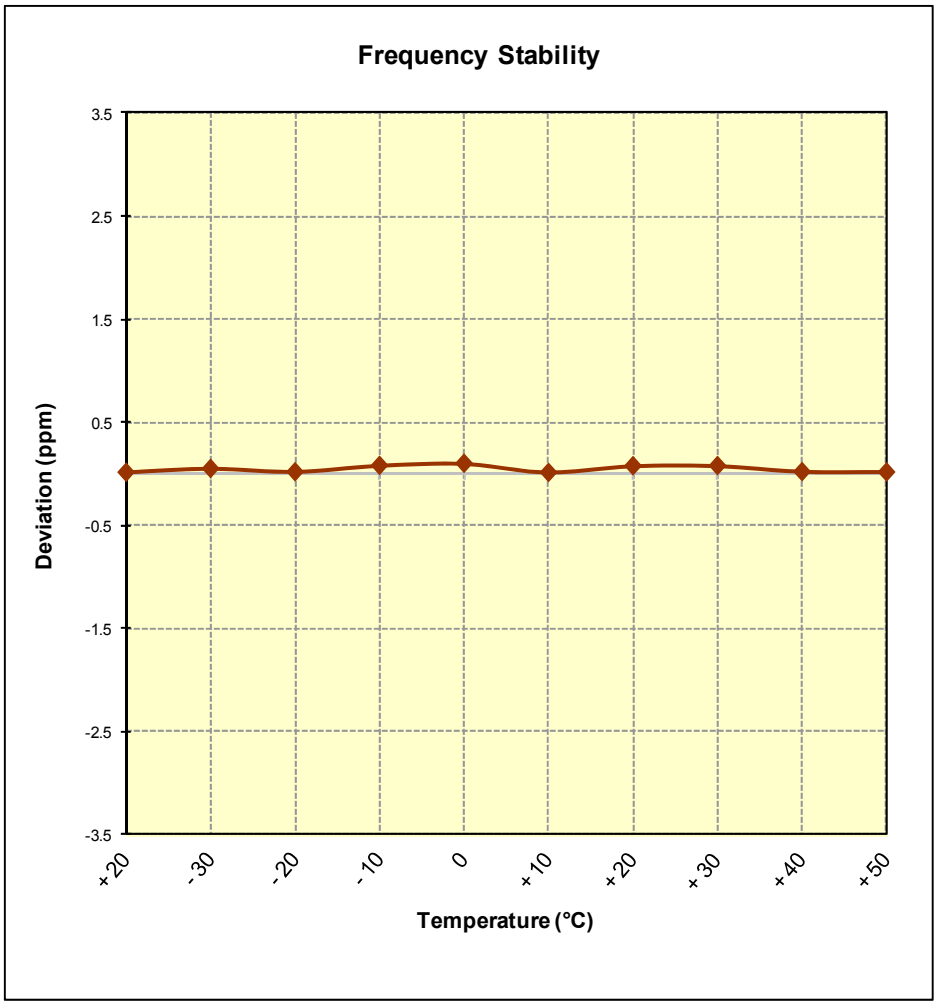

Figure 6-10. Frequency Stability Graph (Band 2)

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Band 7 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	2,535,000,000	Hz
CHANNEL:	21100	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	2,535,000,050	50	0.0000020
100 %		- 30	2,535,000,127	127	0.0000050
100 %		- 20	2,535,000,014	14	0.0000006
100 %		- 10	2,535,000,169	169	0.0000067
100 %		0	2,535,000,122	122	0.0000048
100 %		+ 10	2,535,000,089	89	0.0000035
100 %		+ 20	2,535,000,183	183	0.0000072
100 %		+ 30	2,535,000,097	97	0.0000038
100 %		+ 40	2,535,000,104	104	0.0000041
100 %		+ 50	2,535,000,166	166	0.0000066
BATT. ENDPOINT	3.40	+ 20	2,535,000,038	38	0.0000015

Table 6-26. Frequency Stability Data (Band 7)

Note:

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

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Band 7 Frequency Stability Measurements

§2.1055 §27.54

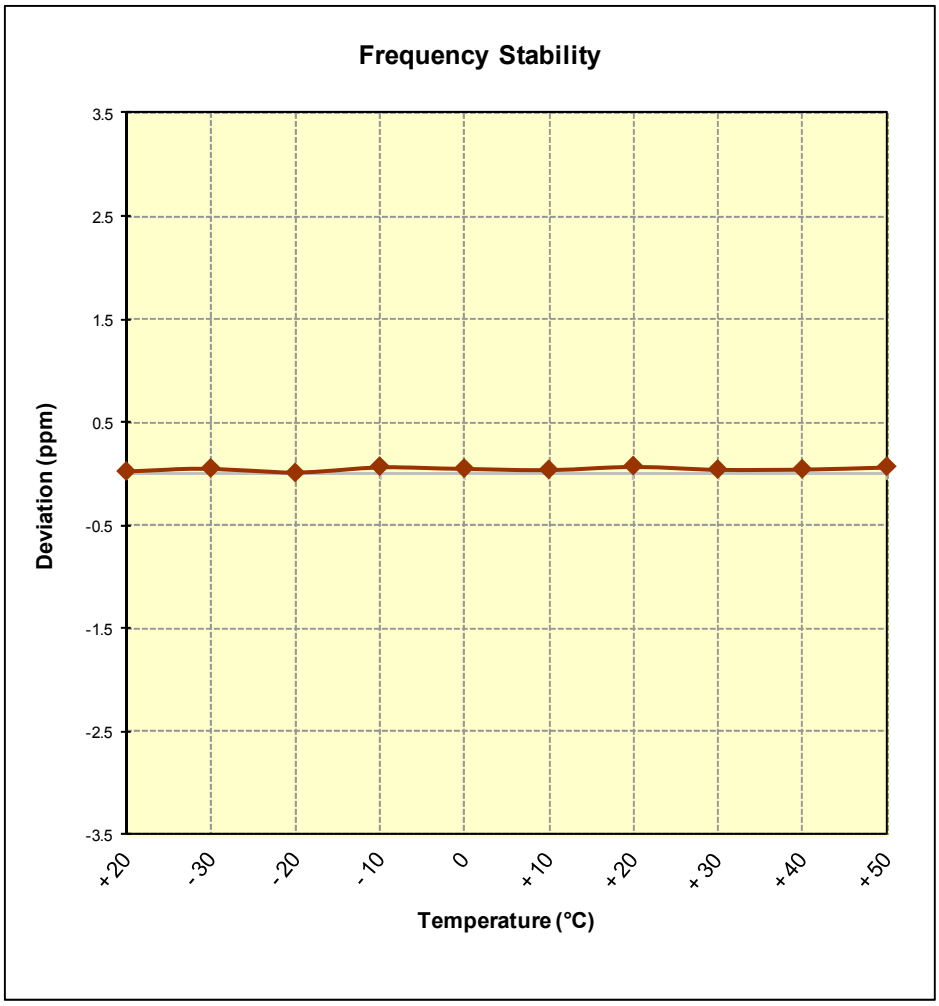

Figure 6-11. Frequency Stability Graph (Band 7)

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Tablet FCC ID: ZNFV930** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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