7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) §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.

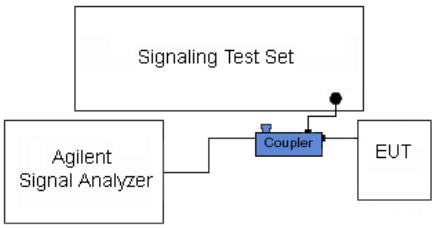


Figure 7-3. Test Instrument & Measurement Setup

© 2017 PCTEST Engineering Laboratory, Inc.

Test Notes

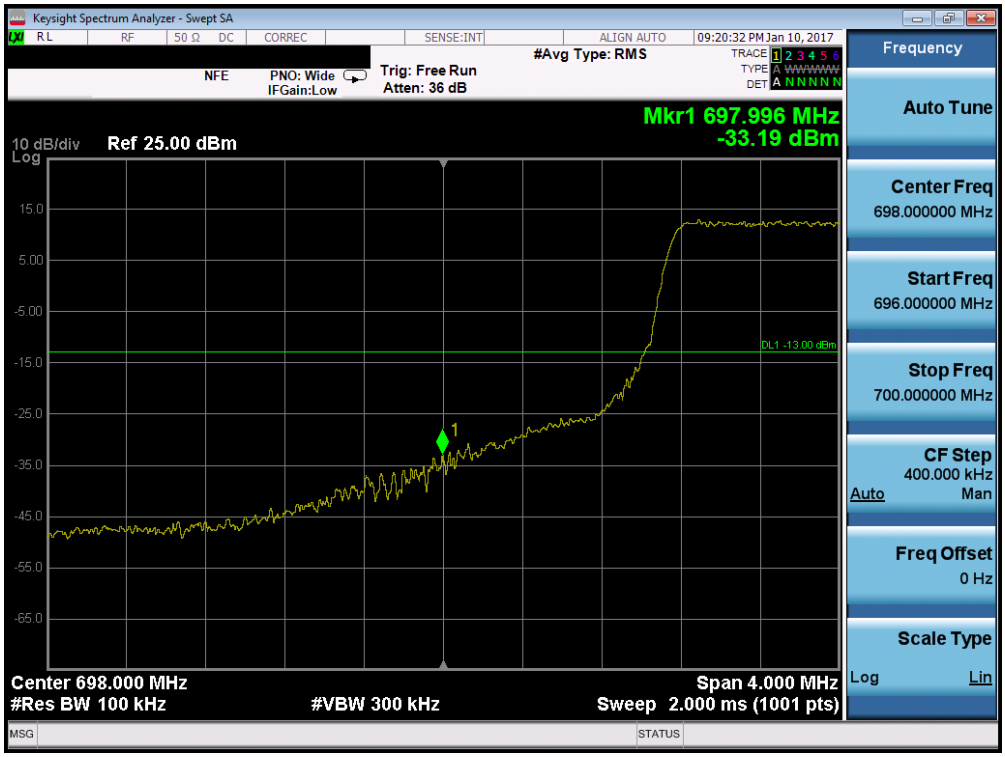
Per 22.917(b) 24.238(a) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions 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.

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

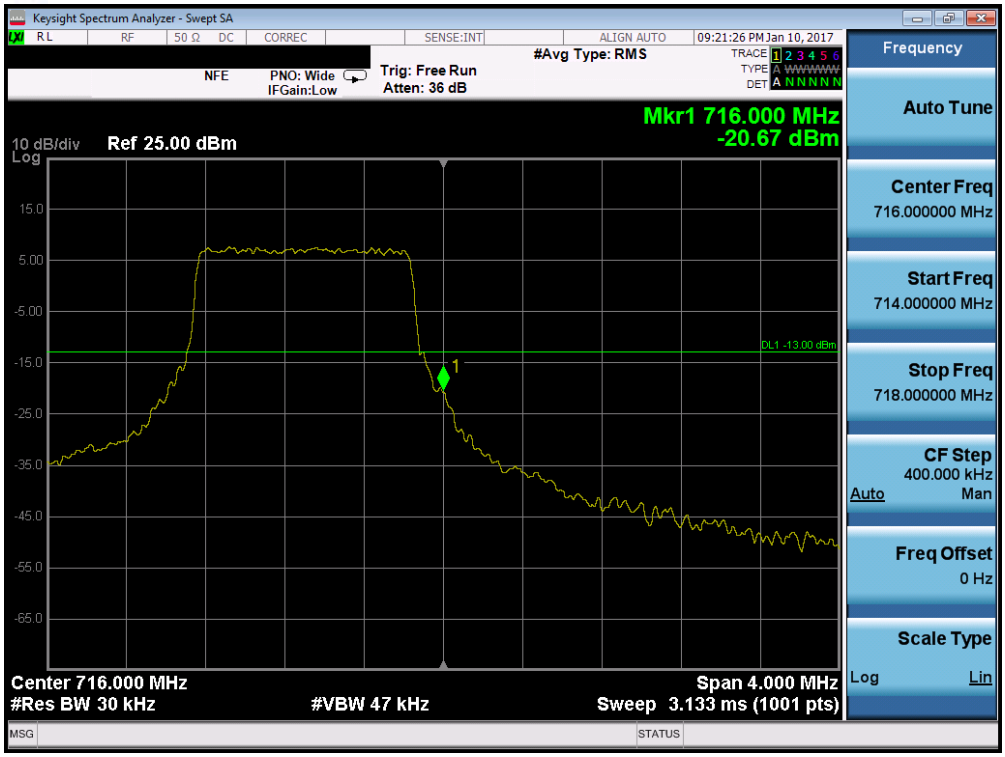
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + 10log$_{10}$(P) = -35dBm in a 6.25kHz bandwidth.

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.

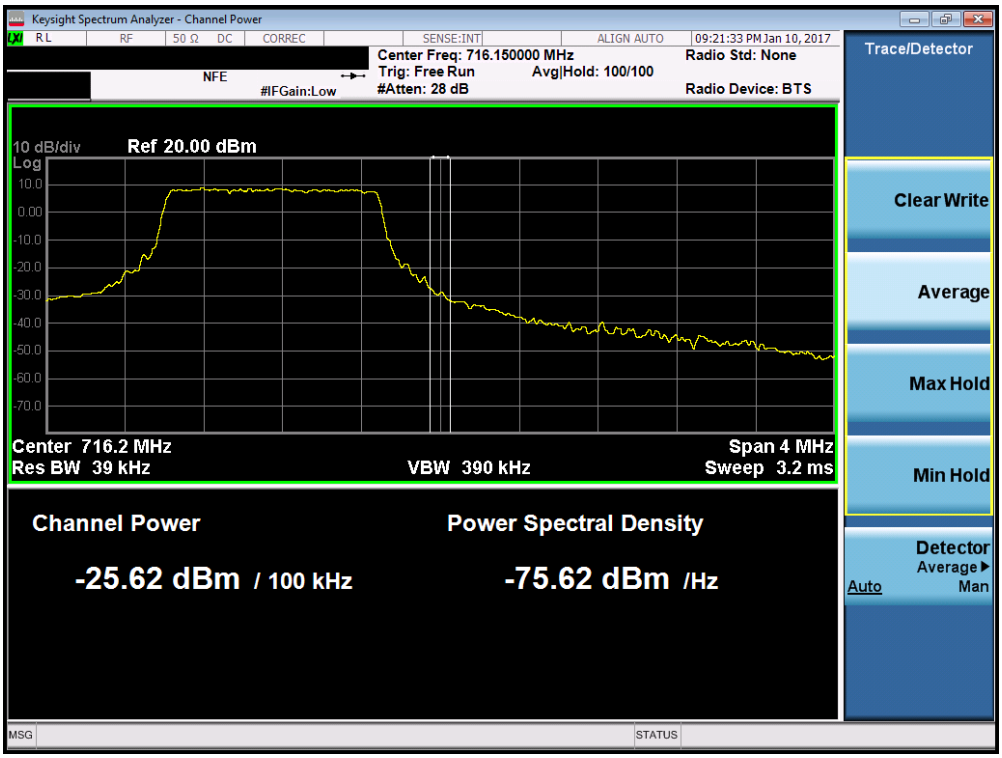


Plot 7-103. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.

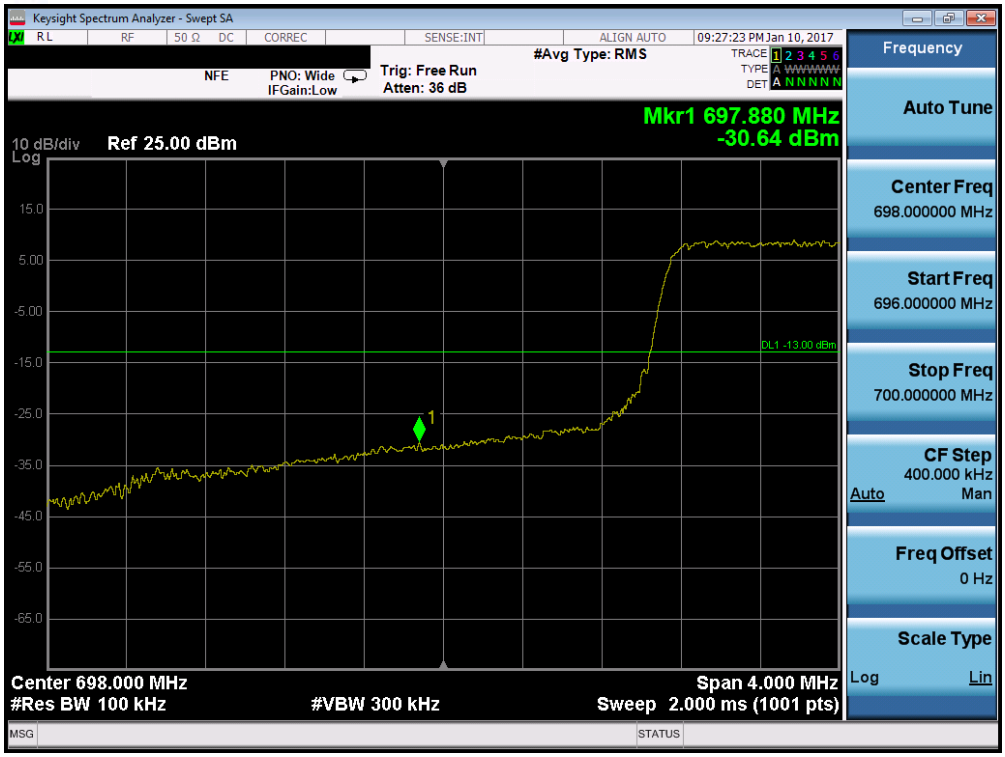


Plot 7-104. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-105. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.



Plot 7-106. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

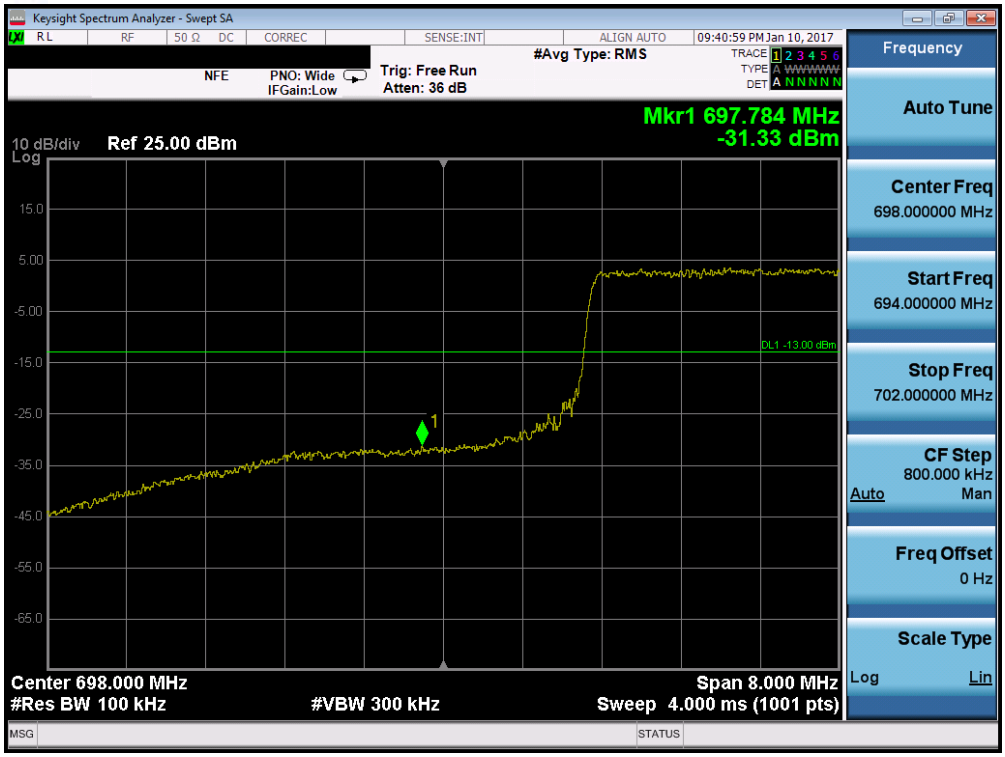
Plot 7-107. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

Plot 7-108. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

Plot 7-109. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

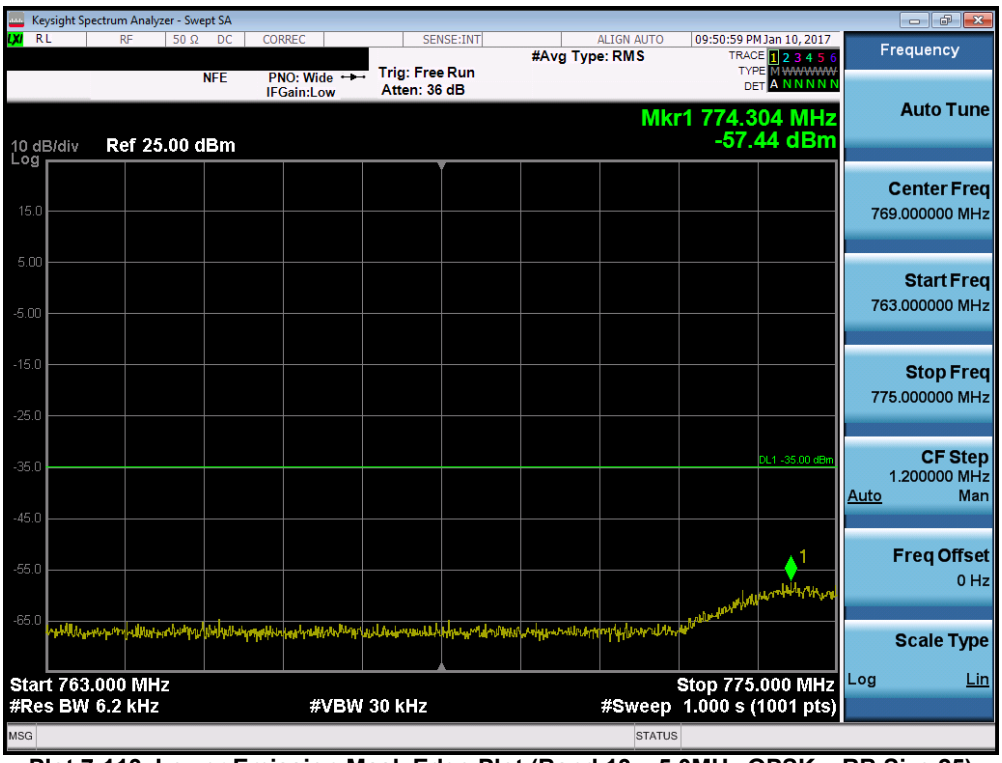


Plot 7-110. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

Plot 7-111. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

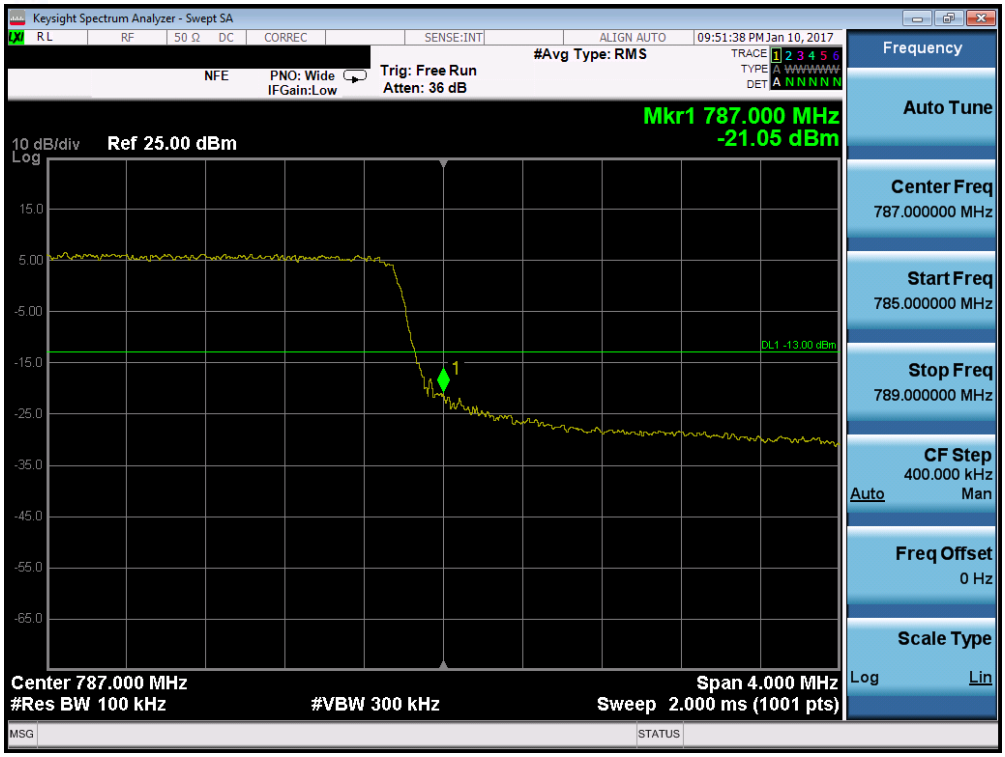
© 2017 PCTEST Engineering Laboratory, Inc.

Plot 7-112. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

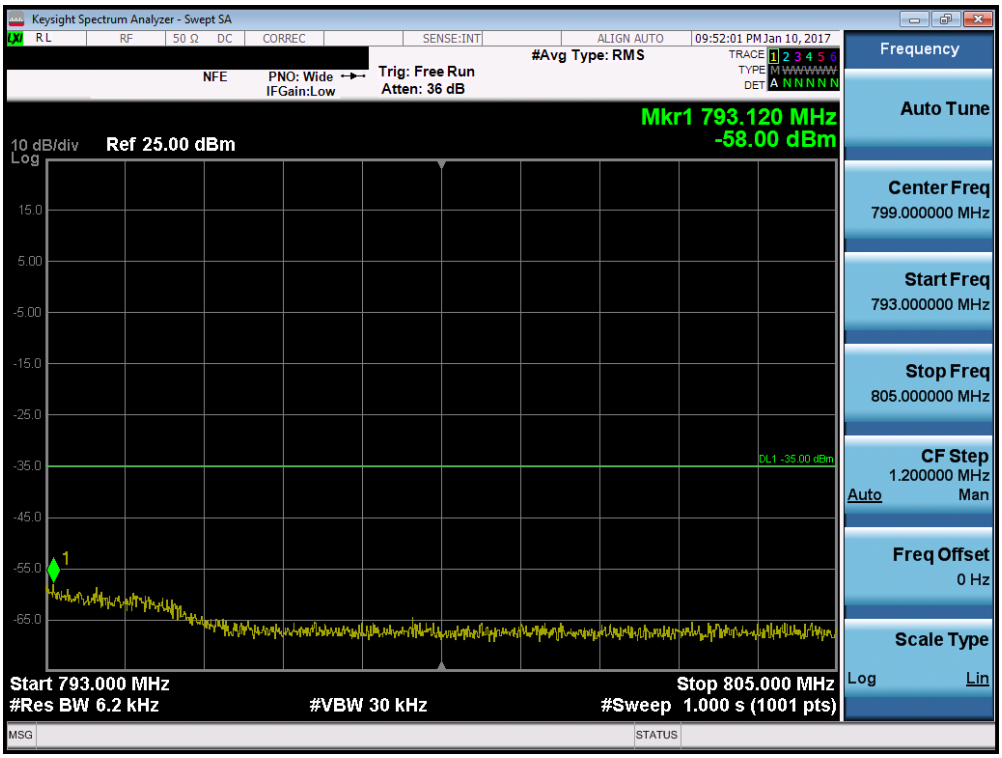


Plot 7-113. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

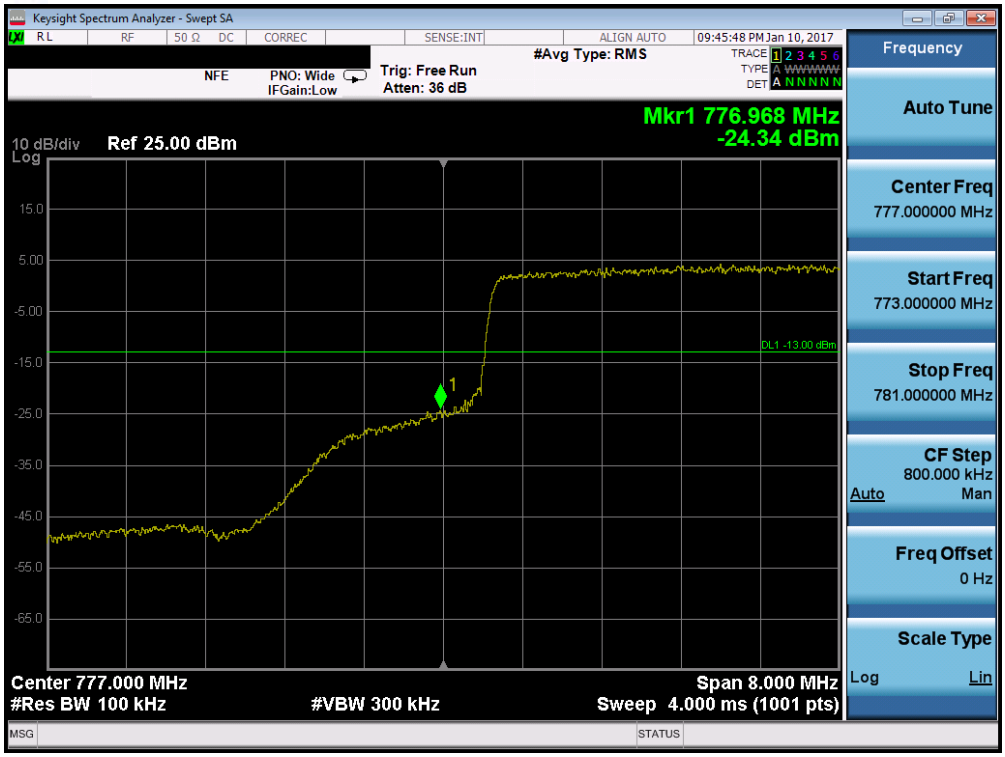


Plot 7-114. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

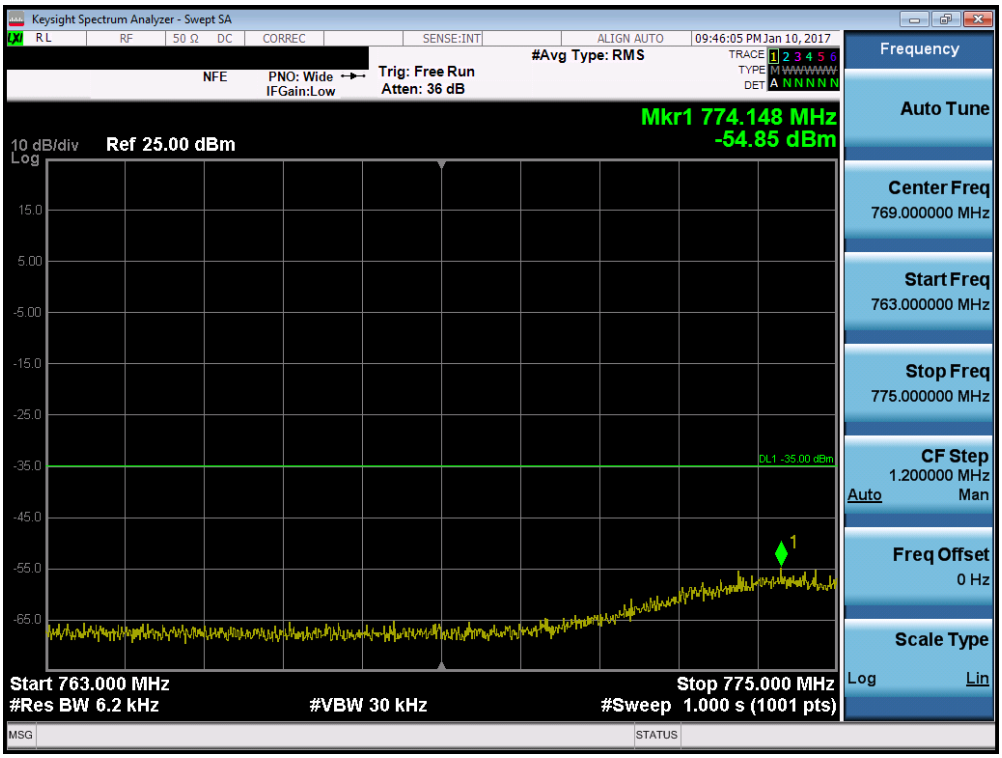


Plot 7-115. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

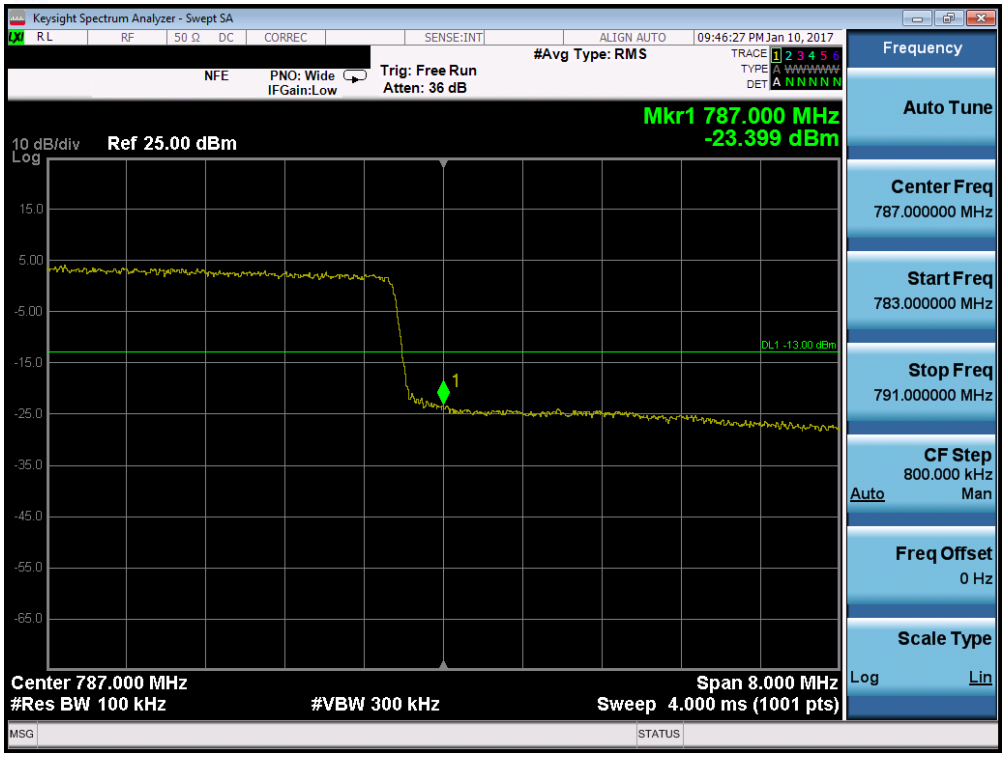


Plot 7-116. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

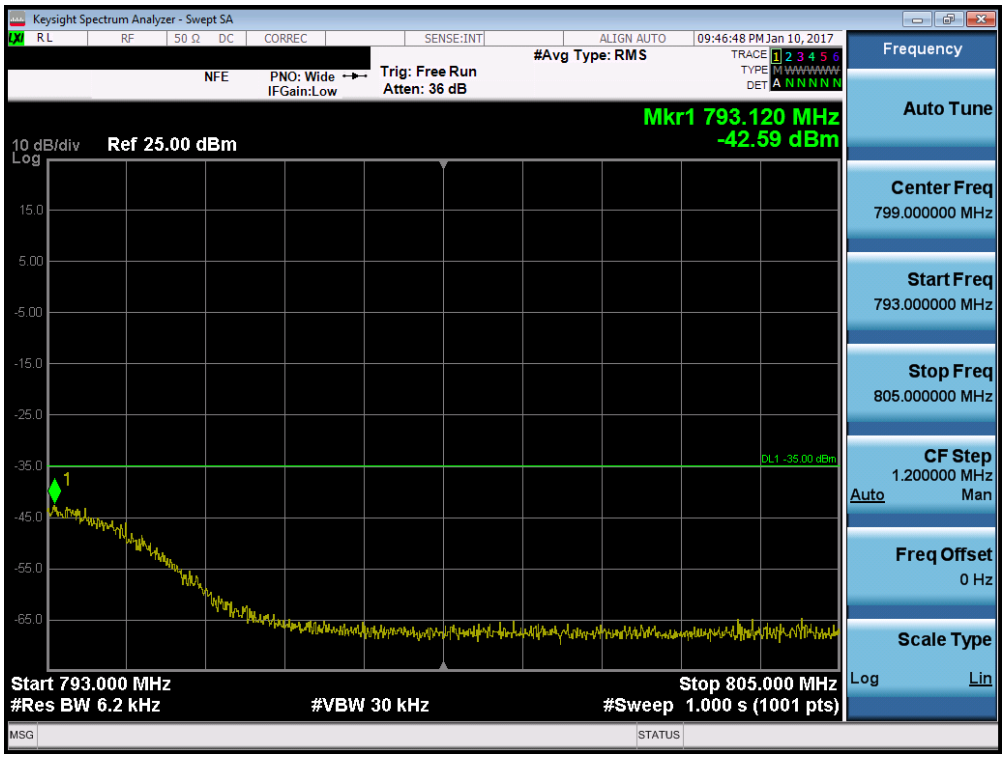


Plot 7-117. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

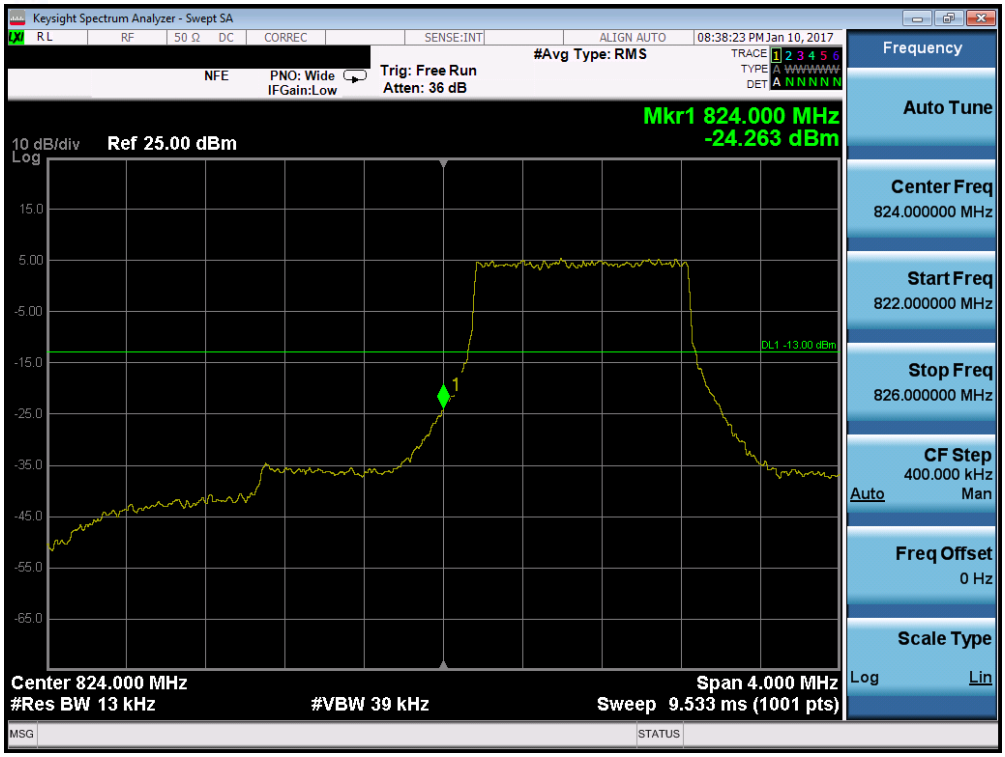


Plot 7-118. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

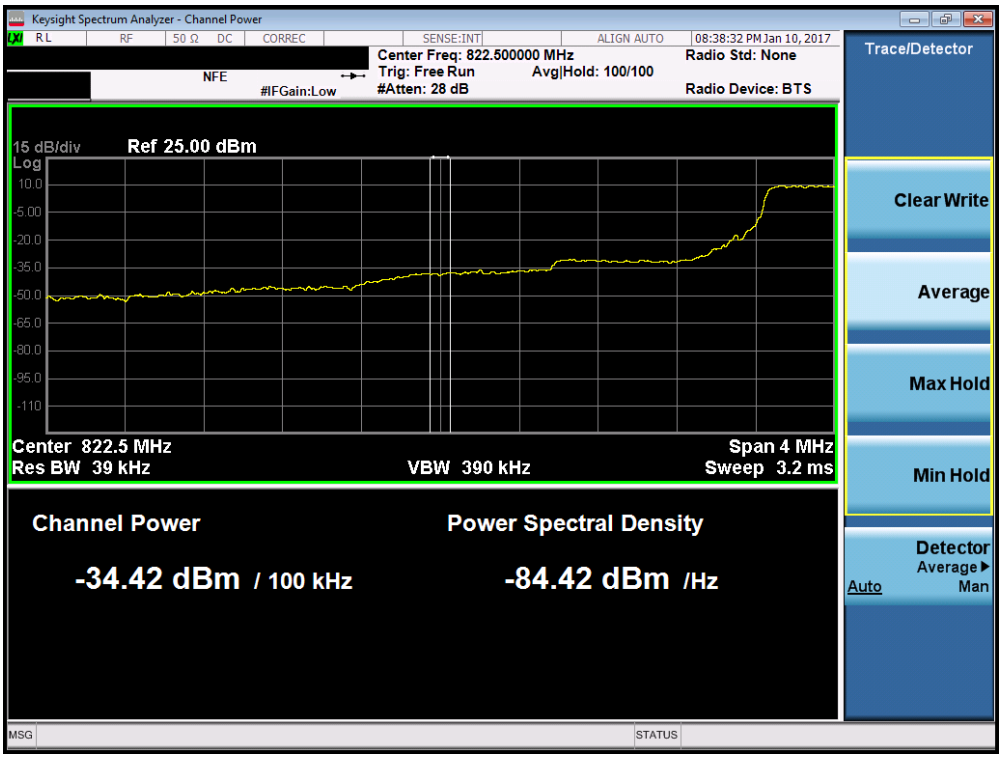


Plot 7-119. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

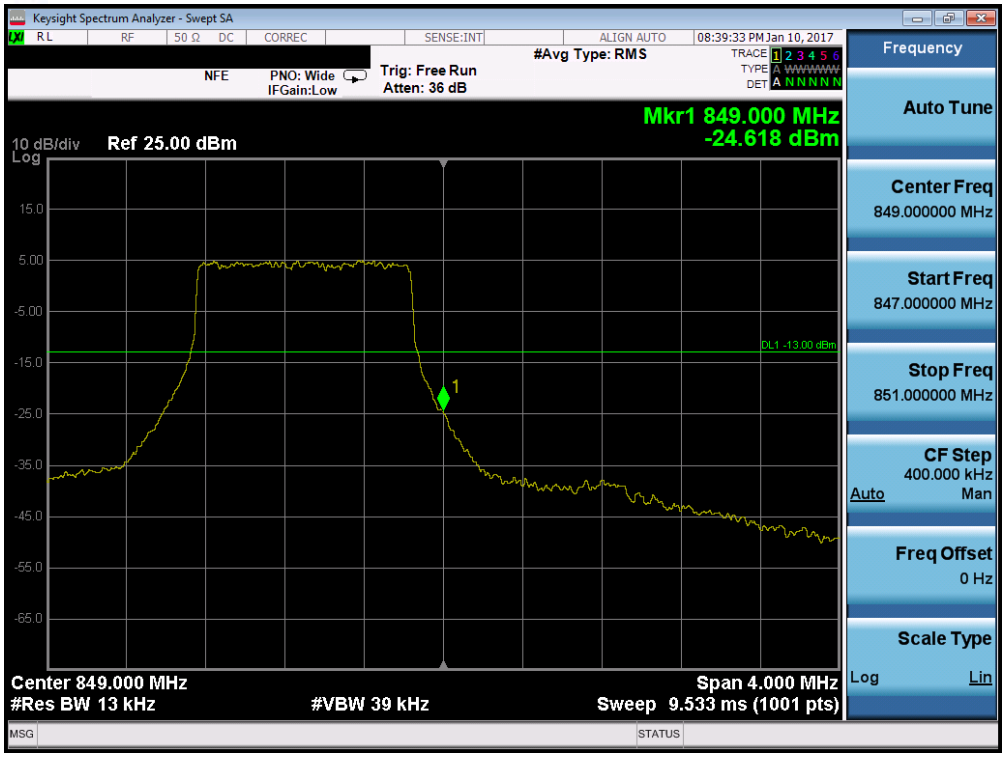


Plot 7-120. Lower Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

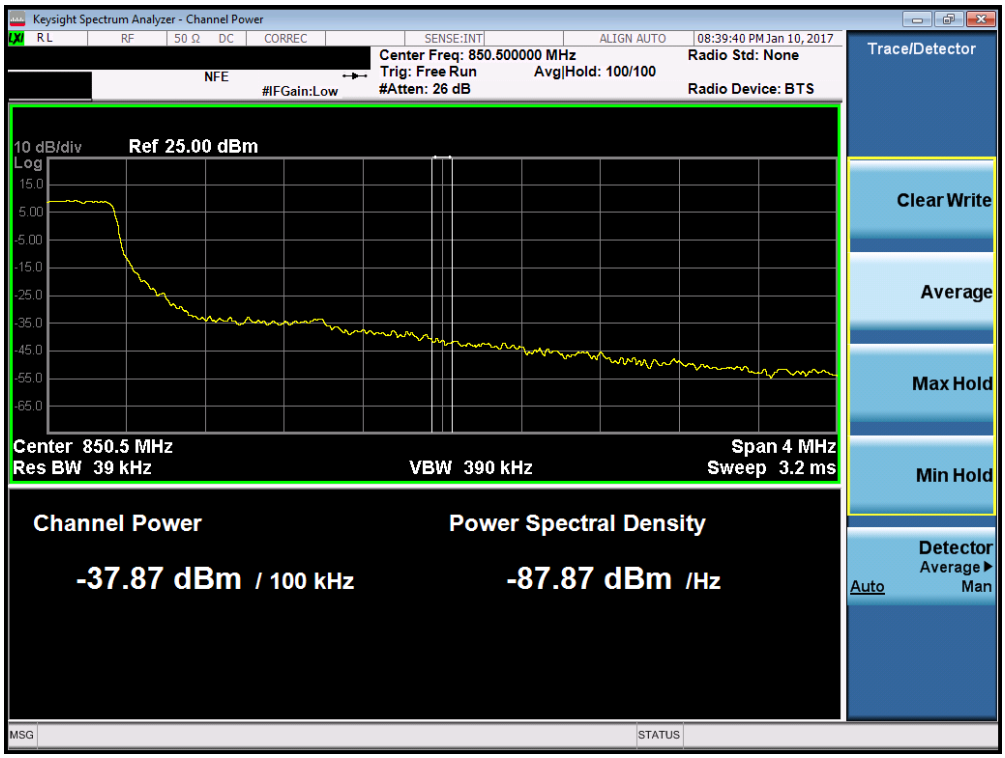


Plot 7-121. Lower Extended Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.

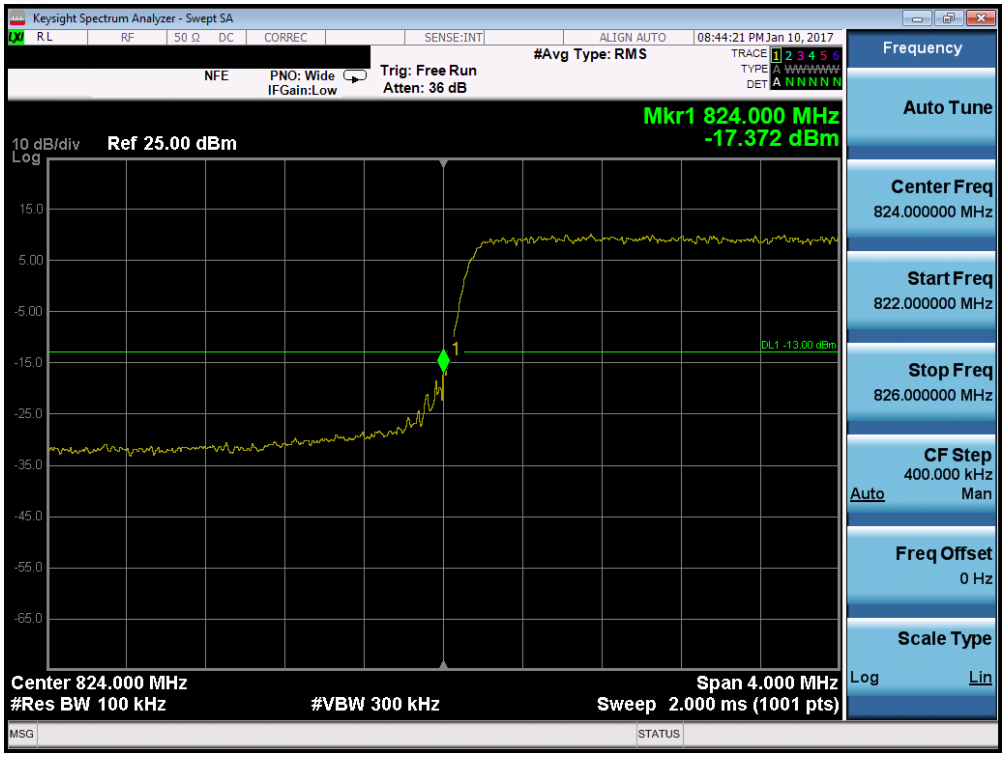


Plot 7-122. Upper Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)



Plot 7-123. Upper Extended Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

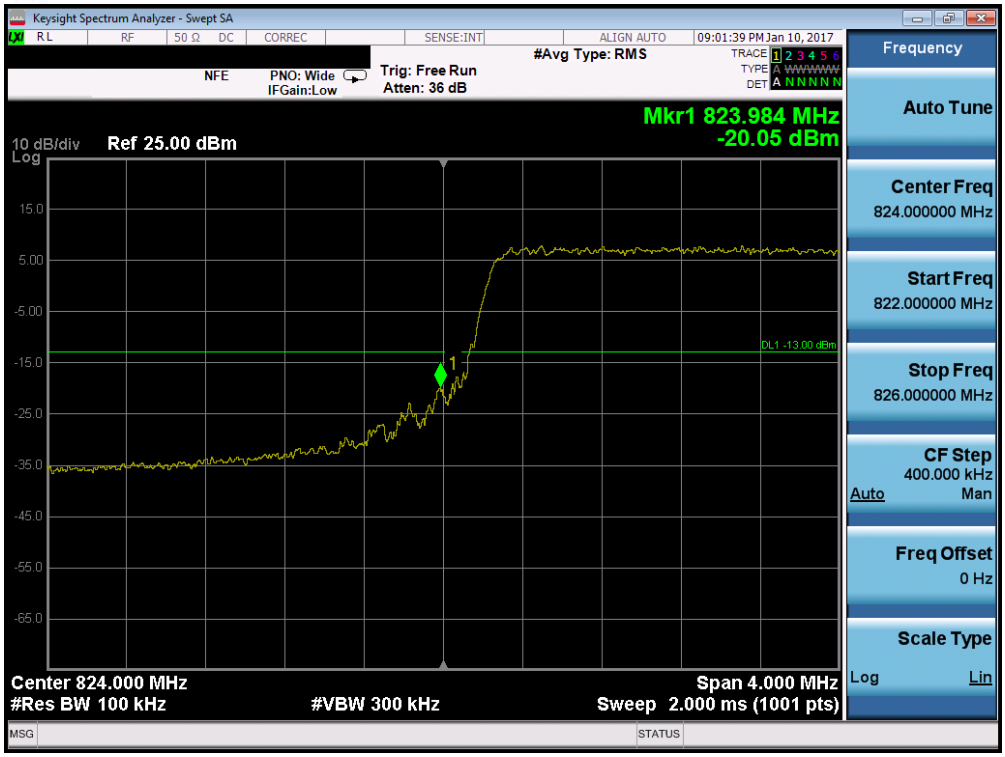
© 2017 PCTEST Engineering Laboratory, Inc.



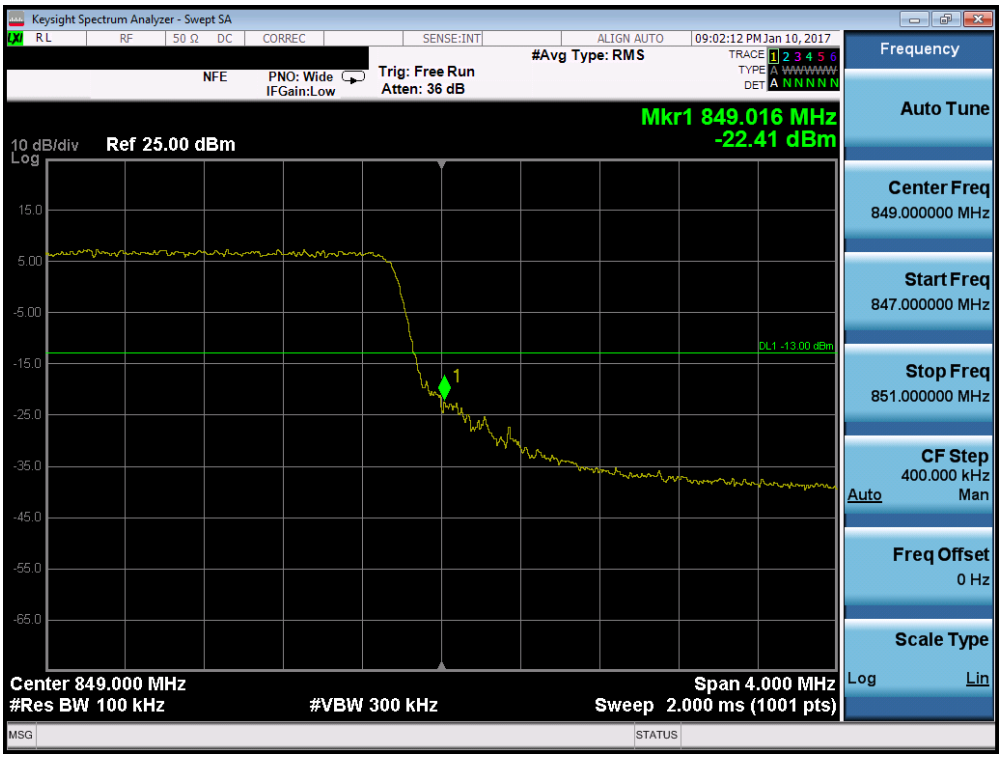
Plot 7-124. Lower Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

Plot 7-125. Upper Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

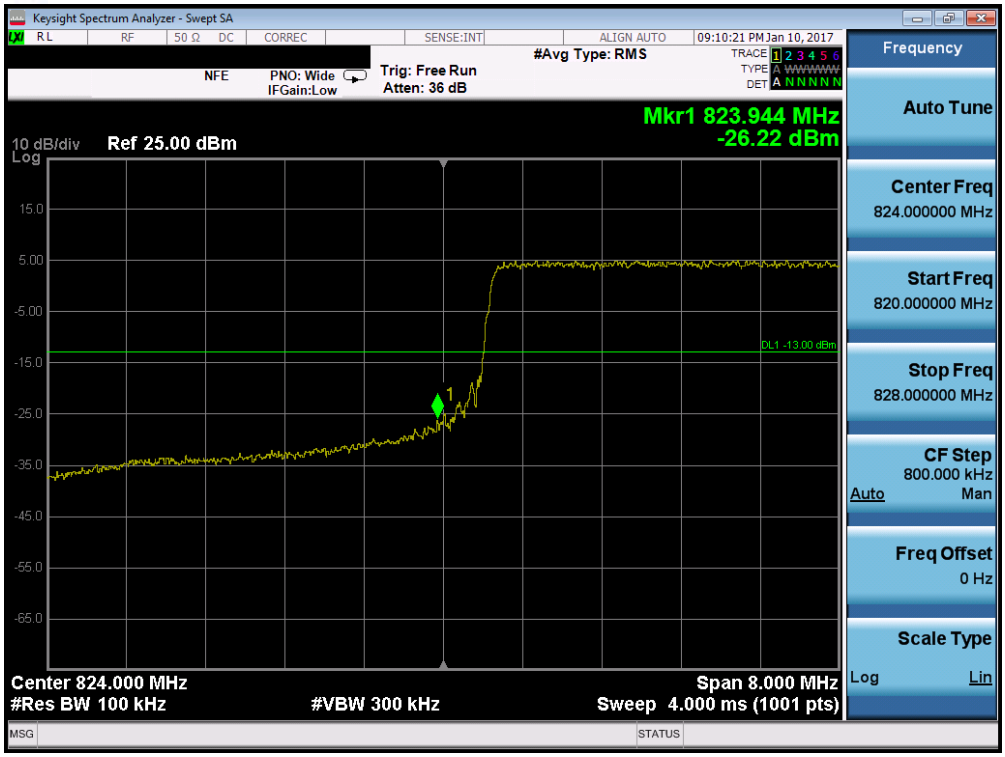


Plot 7-126. Lower Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)



Plot 7-127. Upper Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

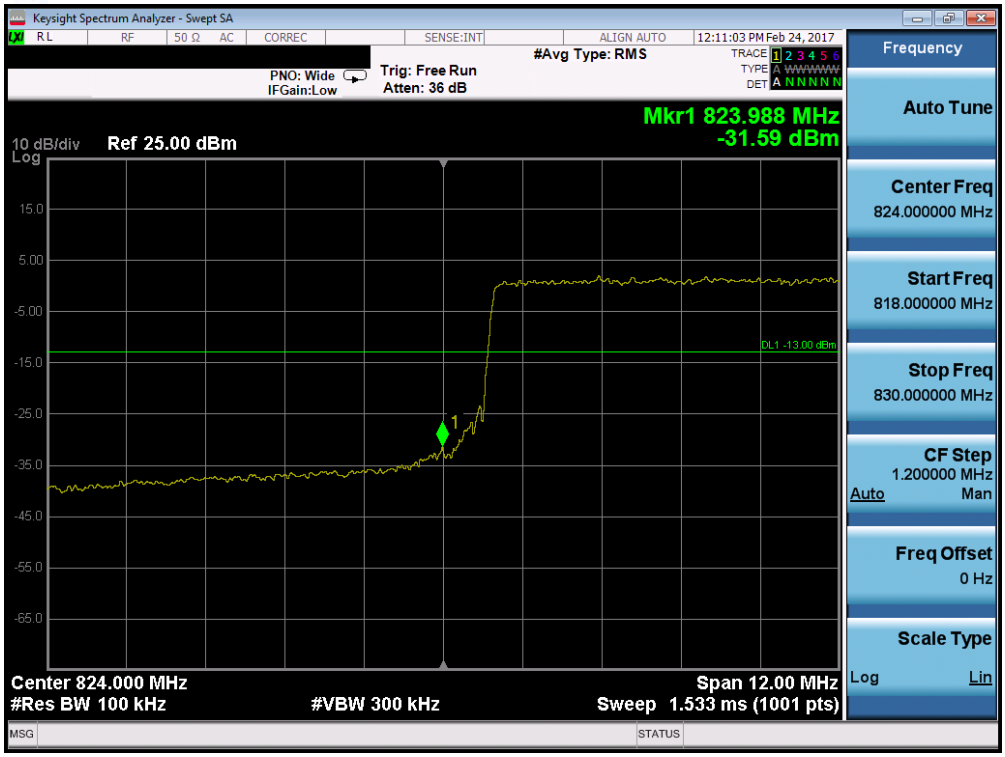
© 2017 PCTEST Engineering Laboratory, Inc.



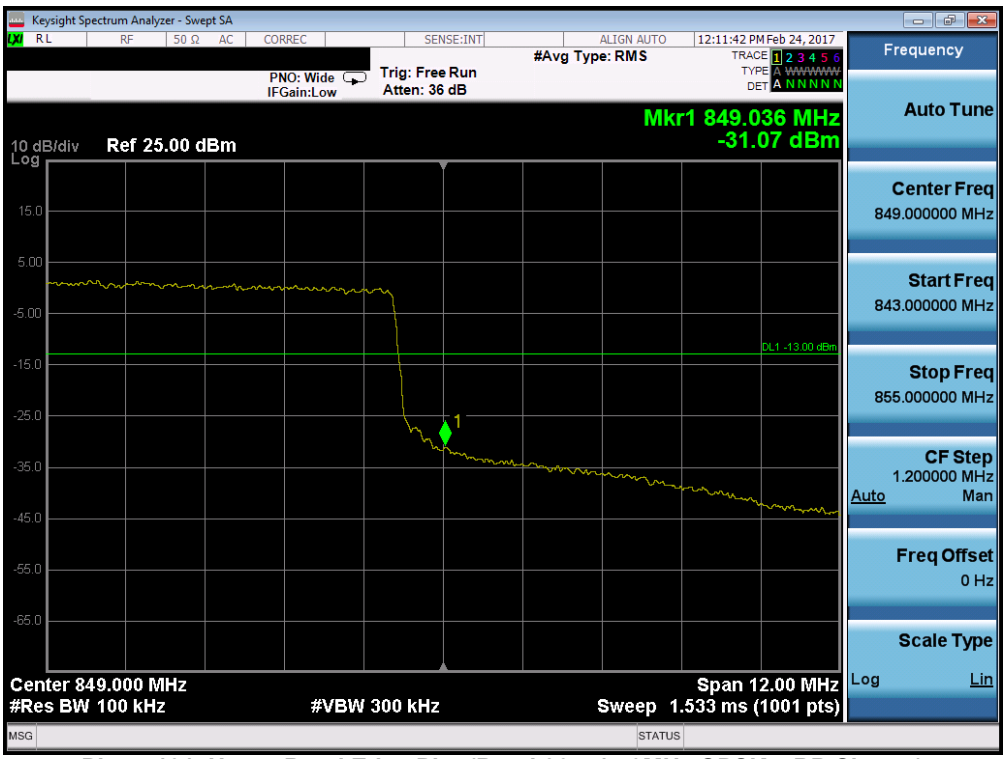
Plot 7-128. Lower Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

Plot 7-129. Upper Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

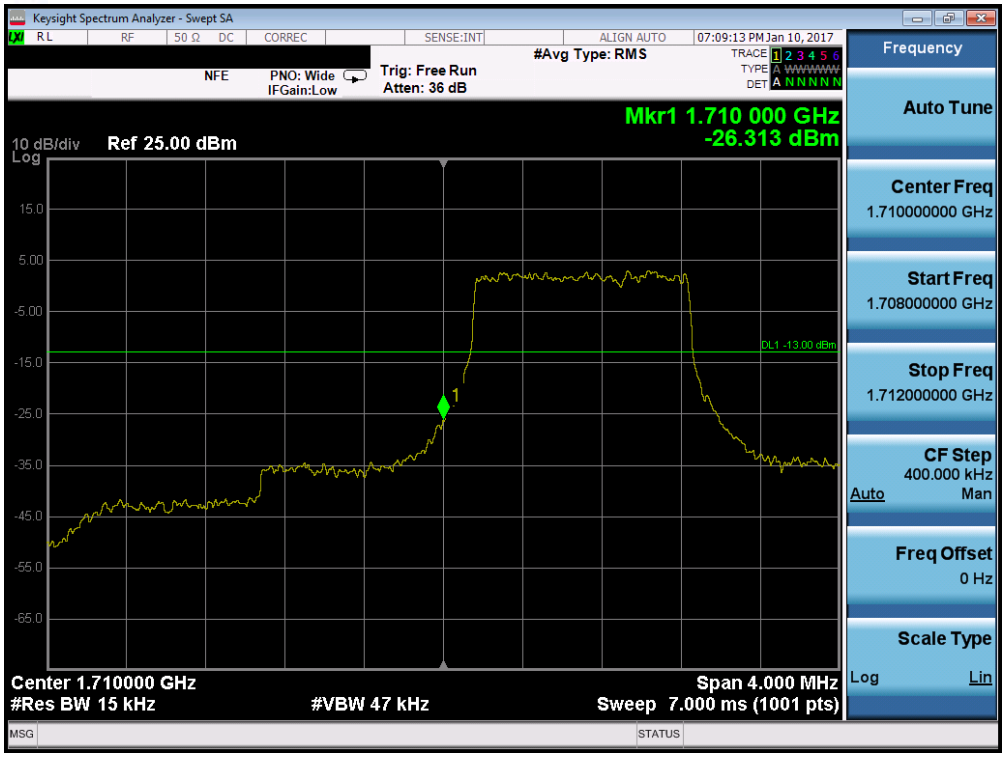


Plot 7-130. Lower Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

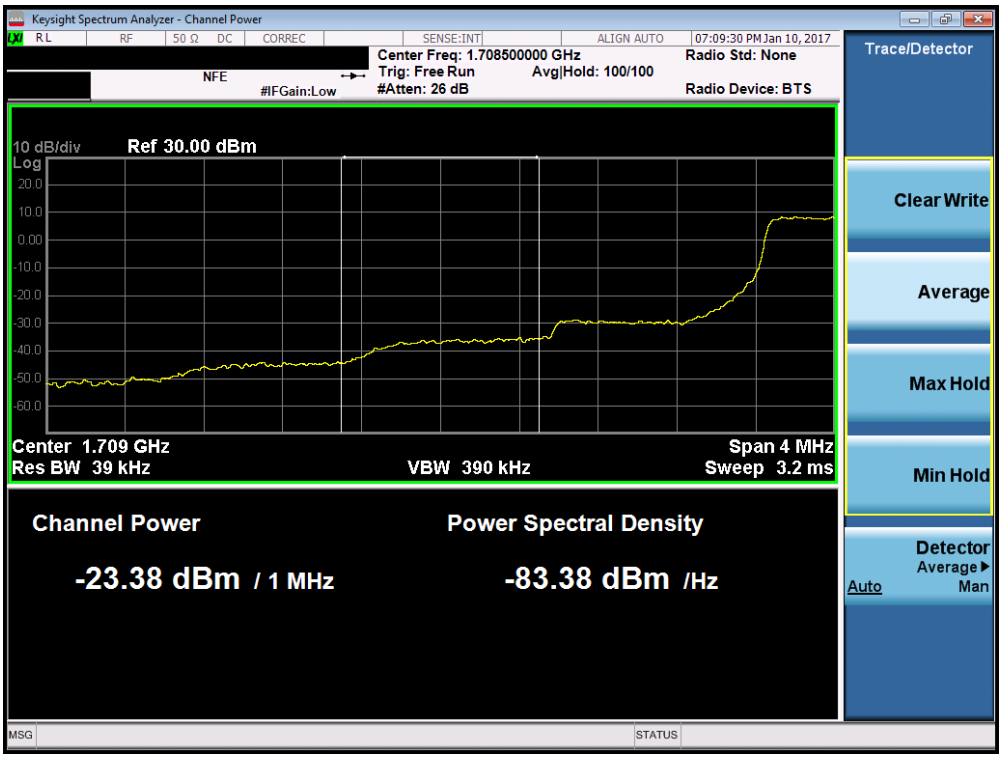


Plot 7-131. Upper Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.

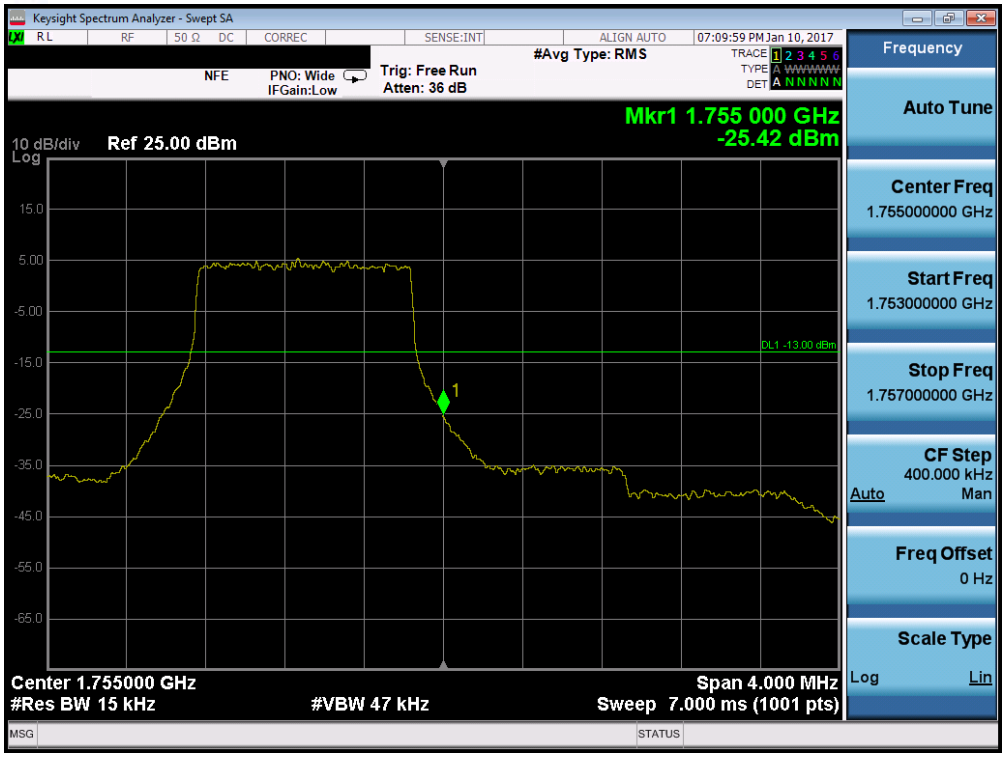


Plot 7-132. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

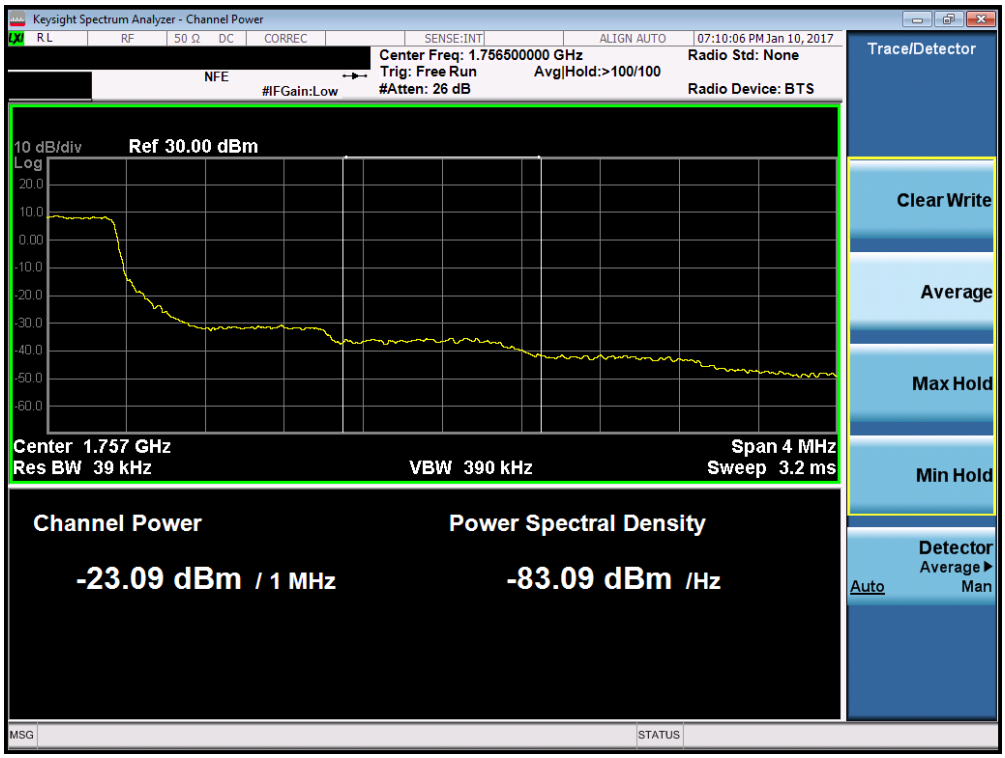


Plot 7-133. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.

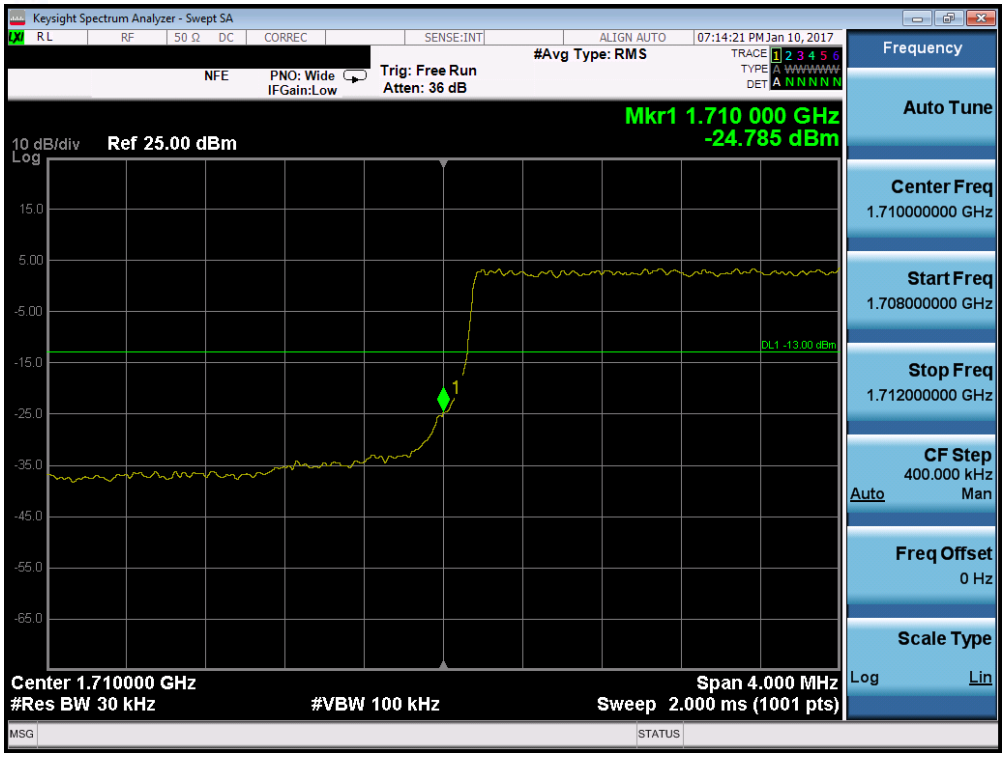


Plot 7-134. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

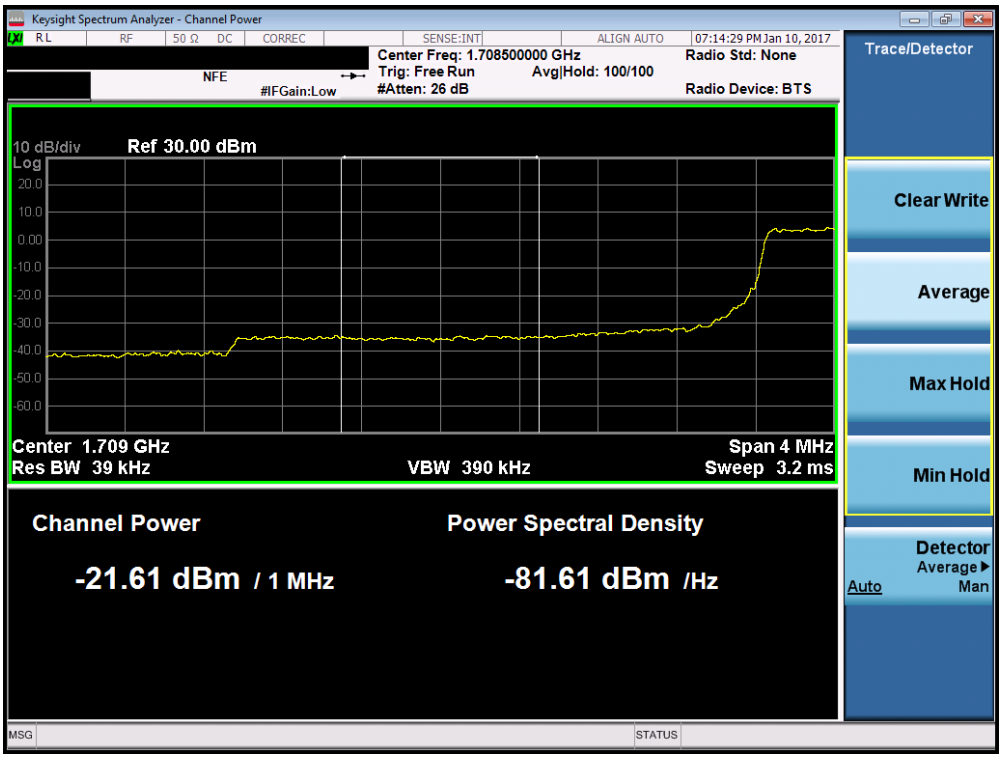


Plot 7-135. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.

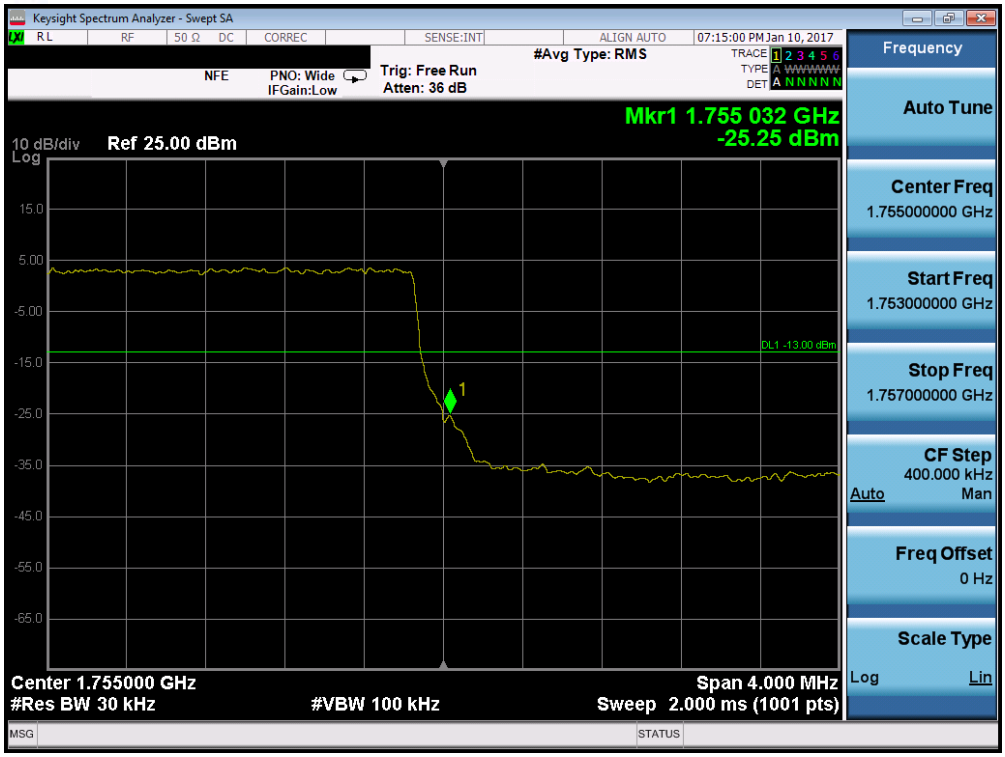


Plot 7-136. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

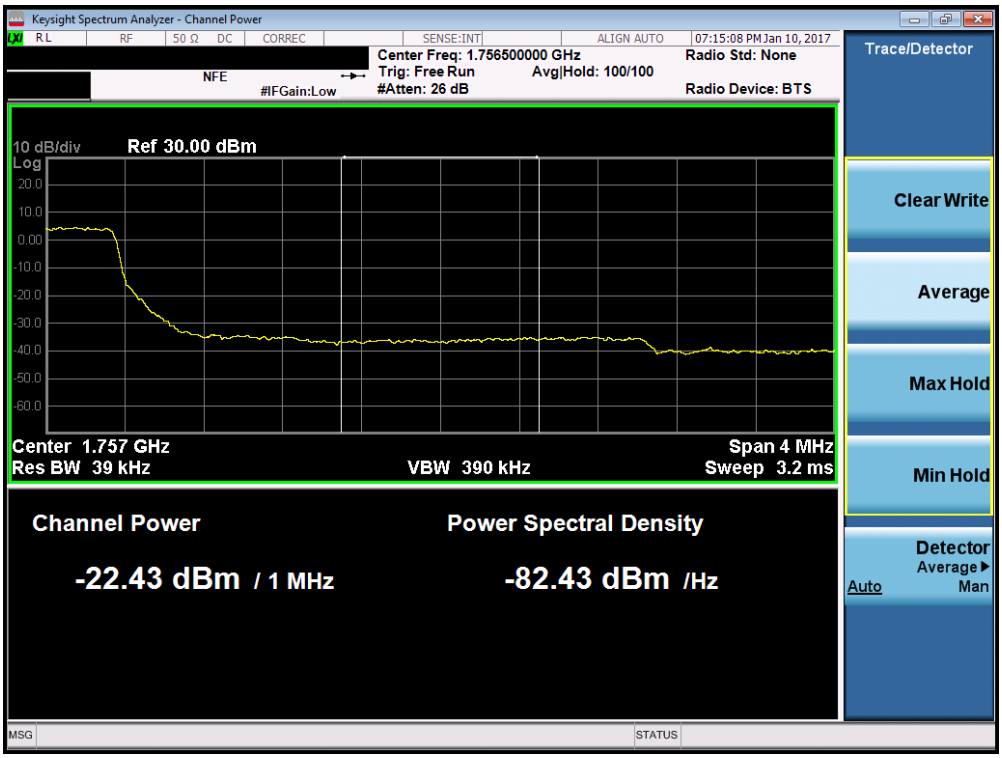


Plot 7-137. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

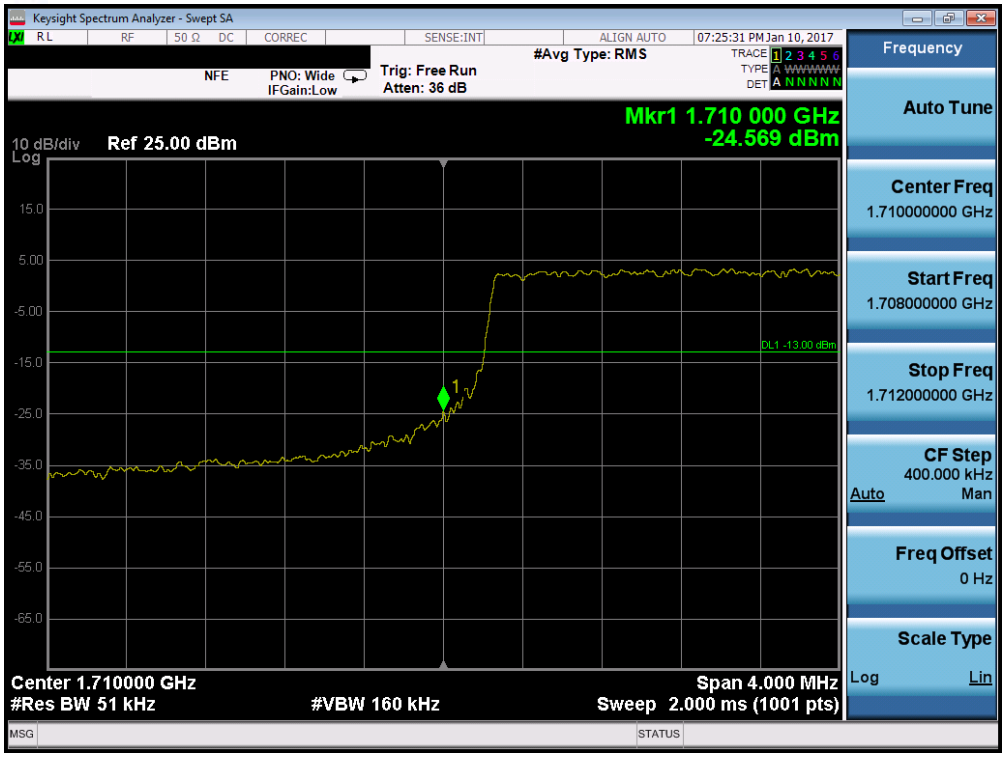


Plot 7-138. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

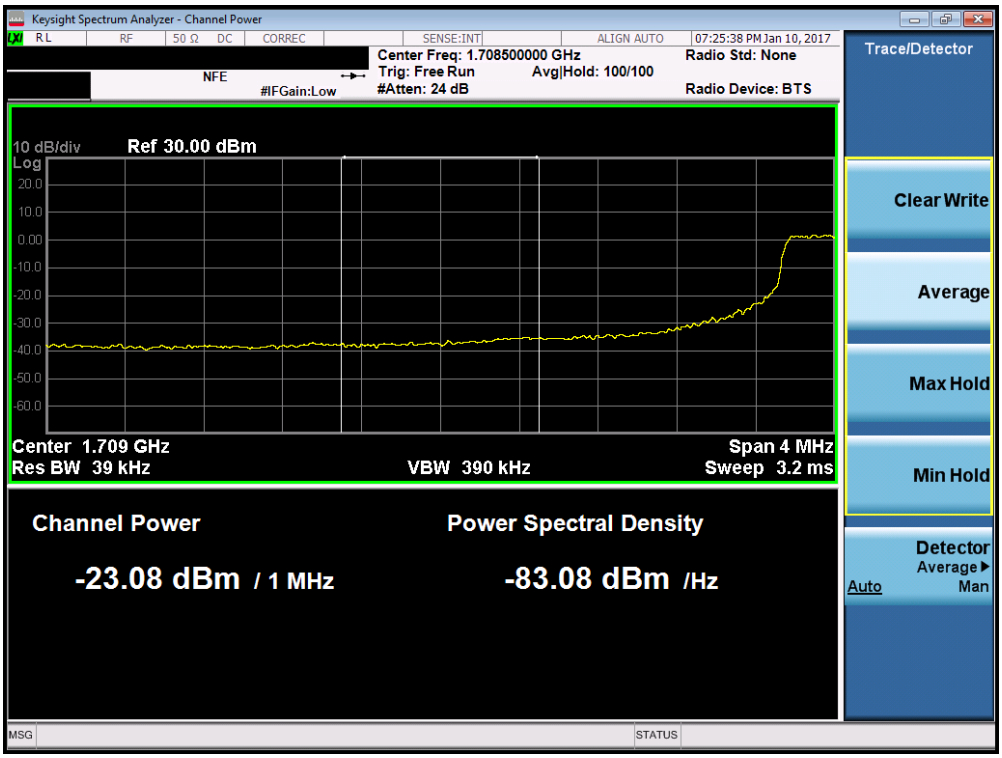


Plot 7-139. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

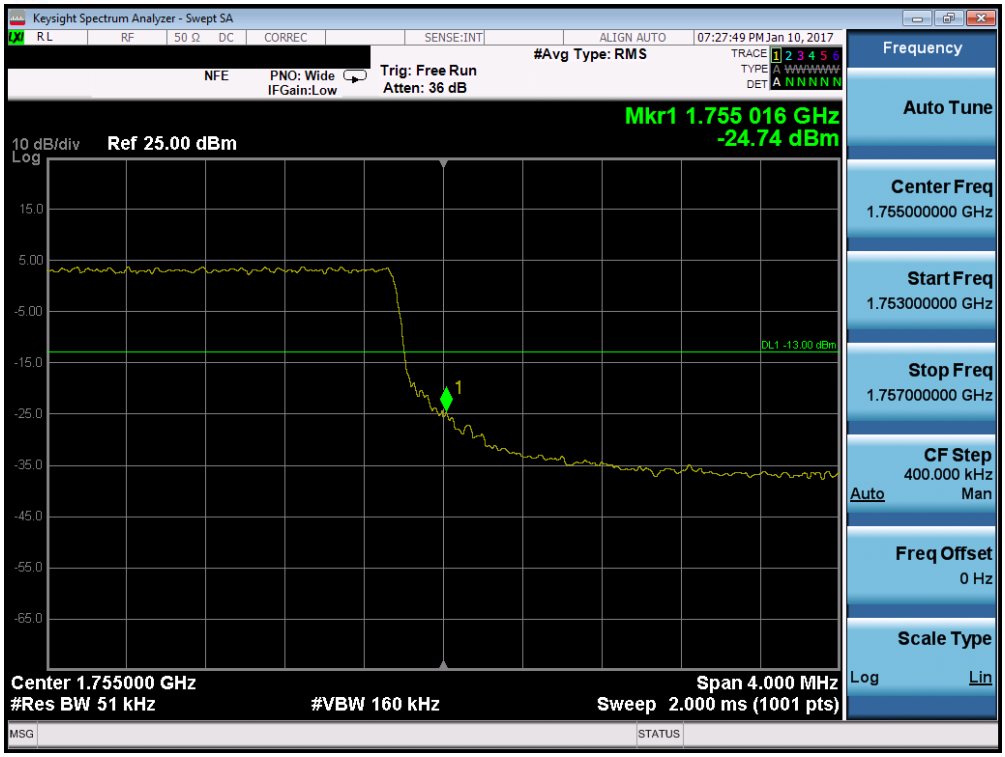


Plot 7-140. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

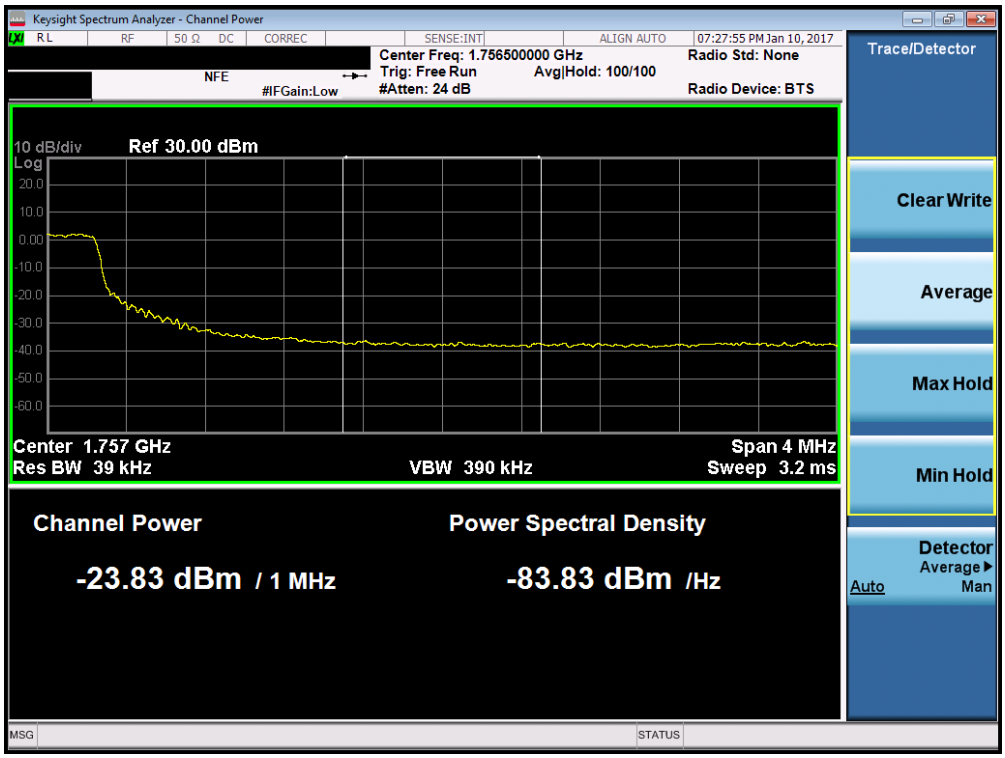


Plot 7-141. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

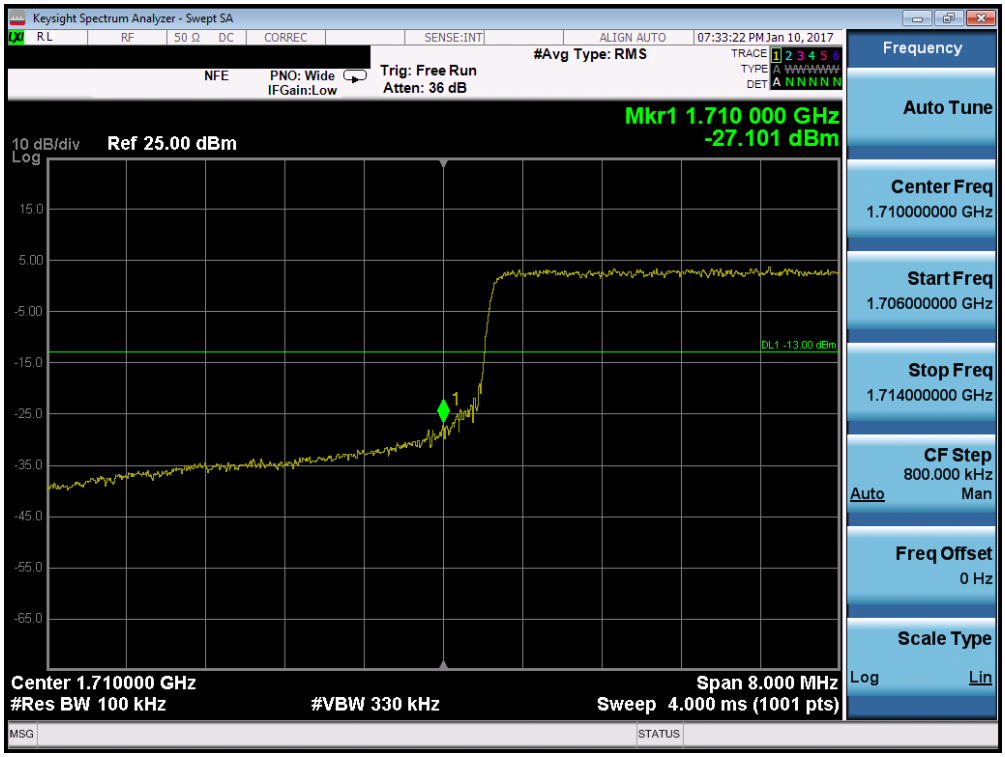


Plot 7-142. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

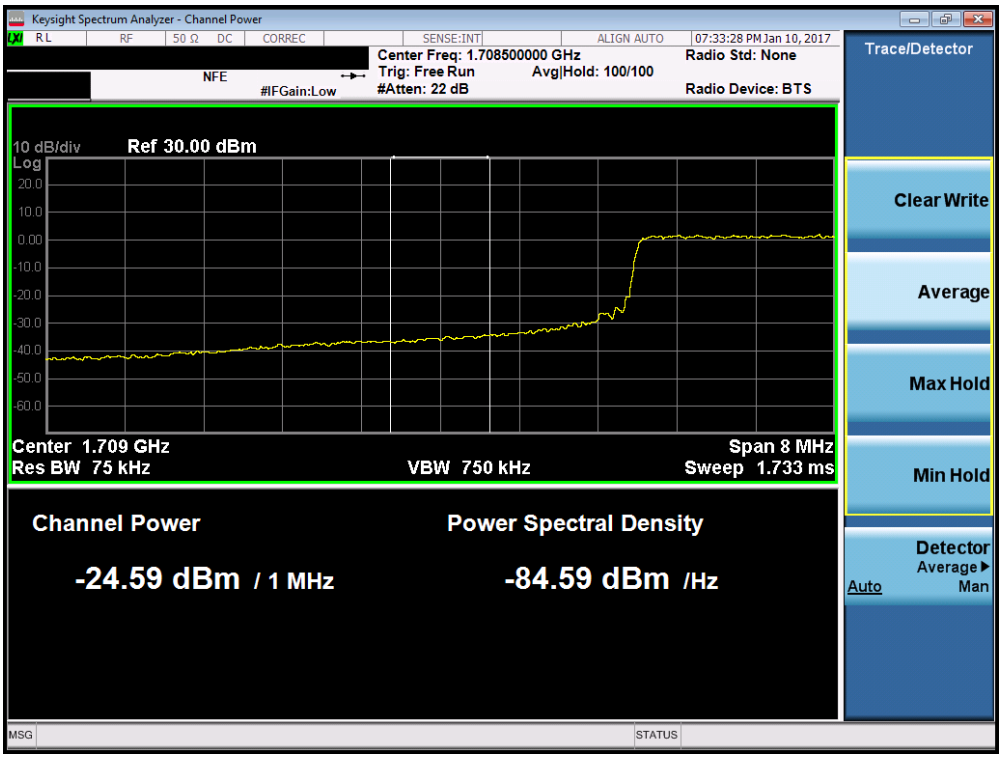


Plot 7-143. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

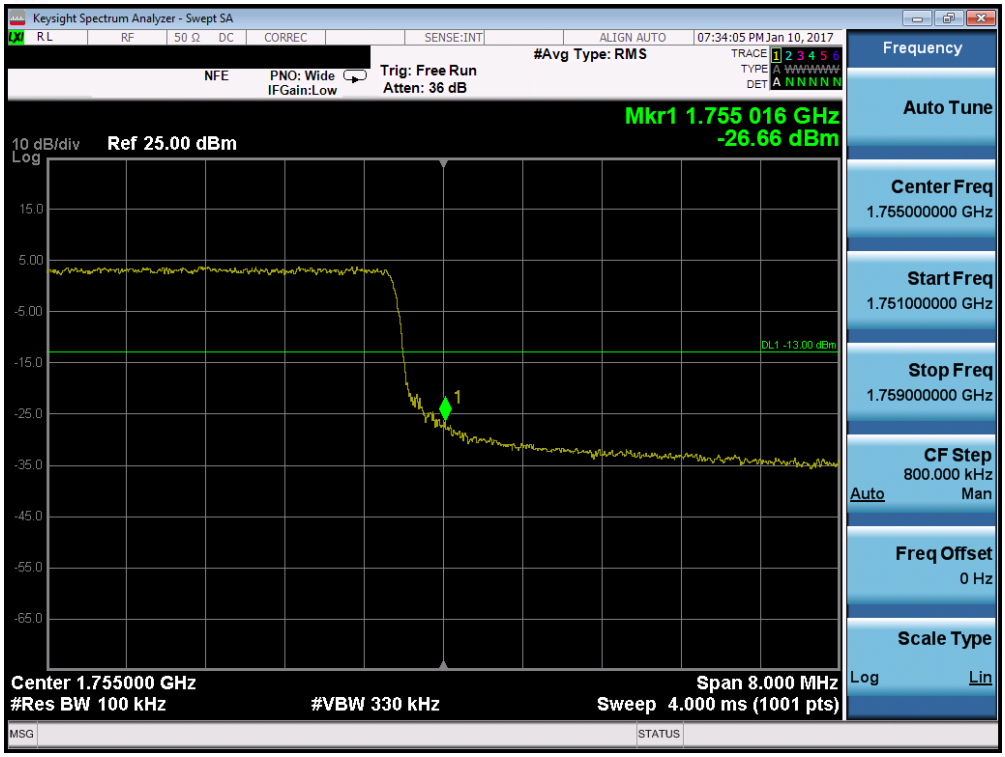


Plot 7-144. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

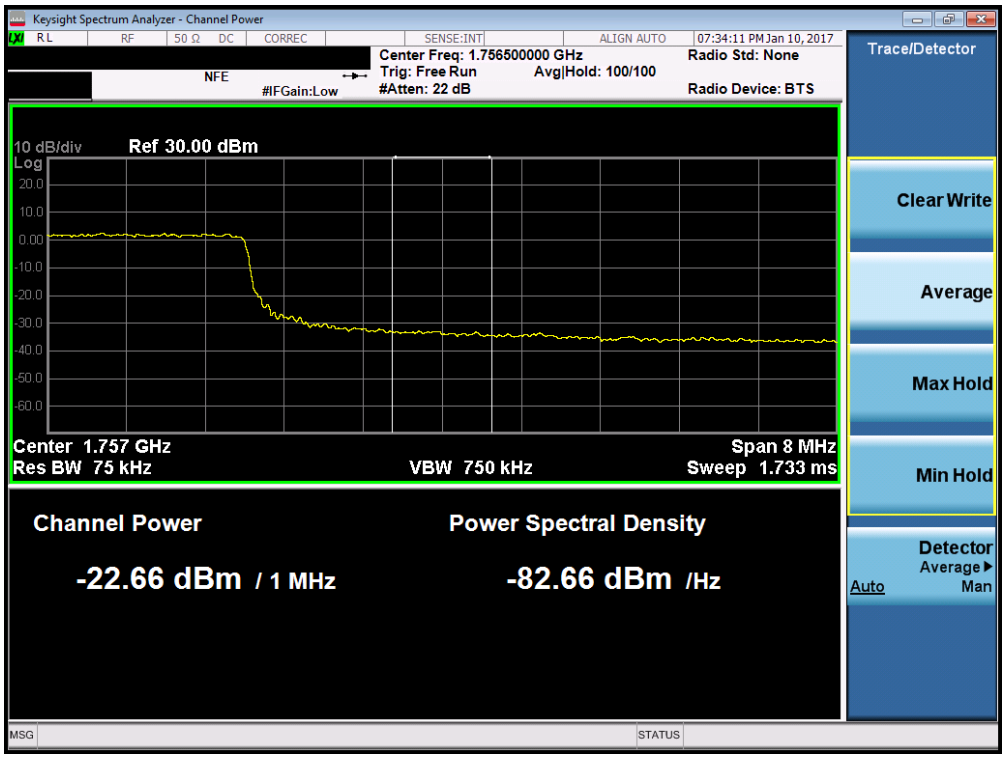


Plot 7-145. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

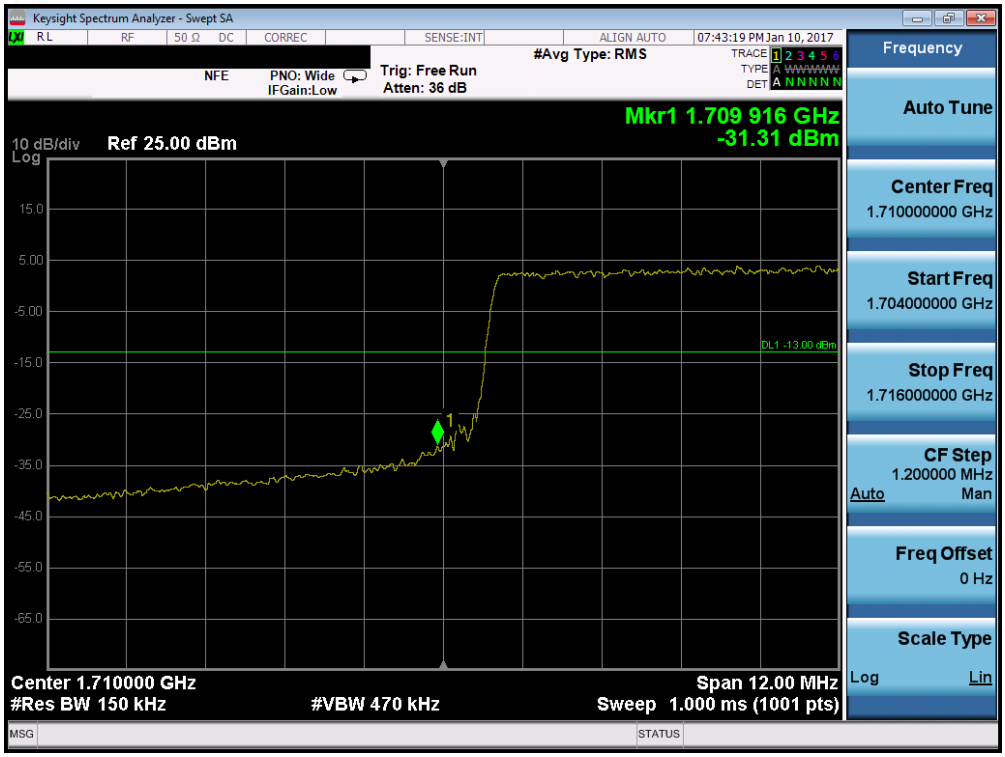


Plot 7-146. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

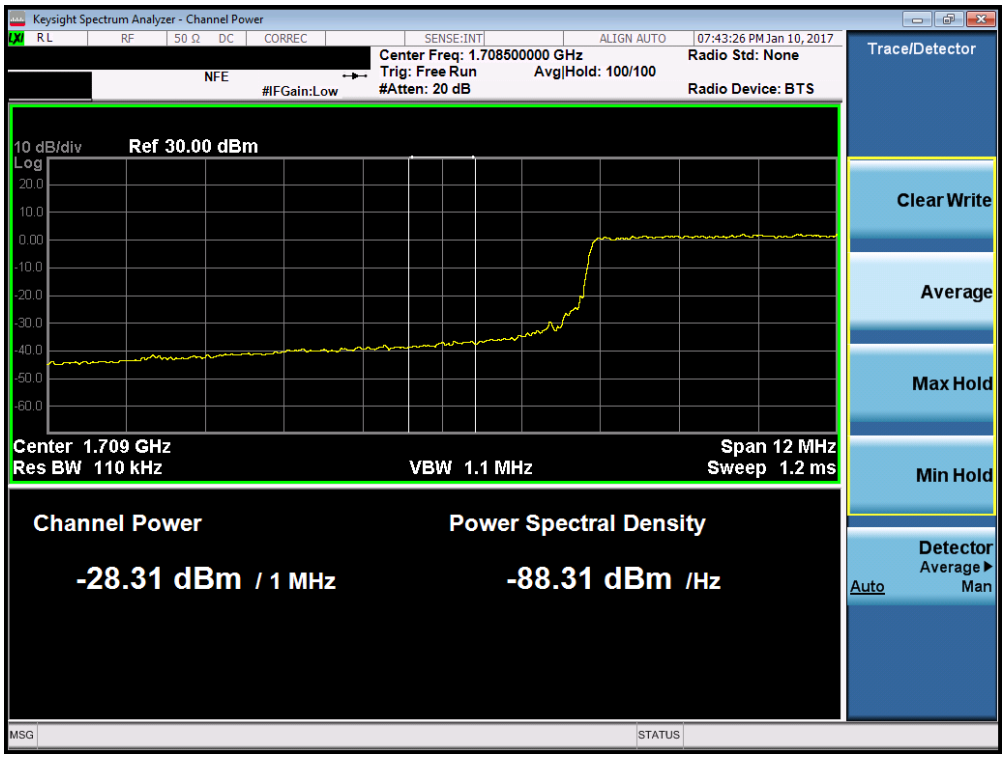


Plot 7-147. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

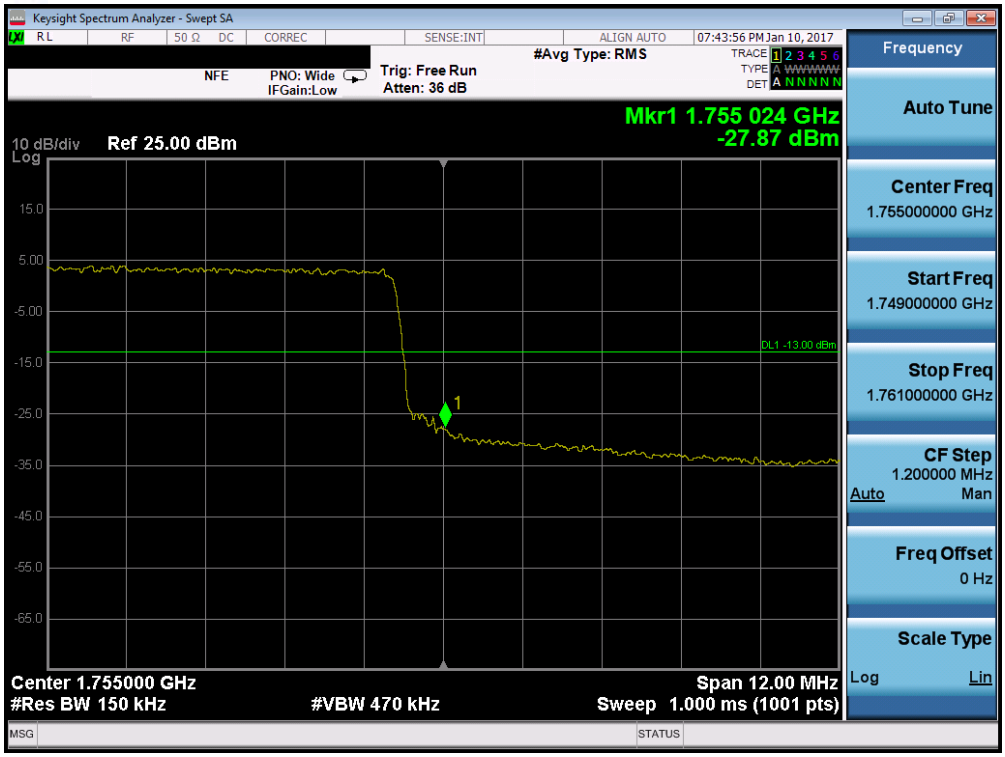


Plot 7-148. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

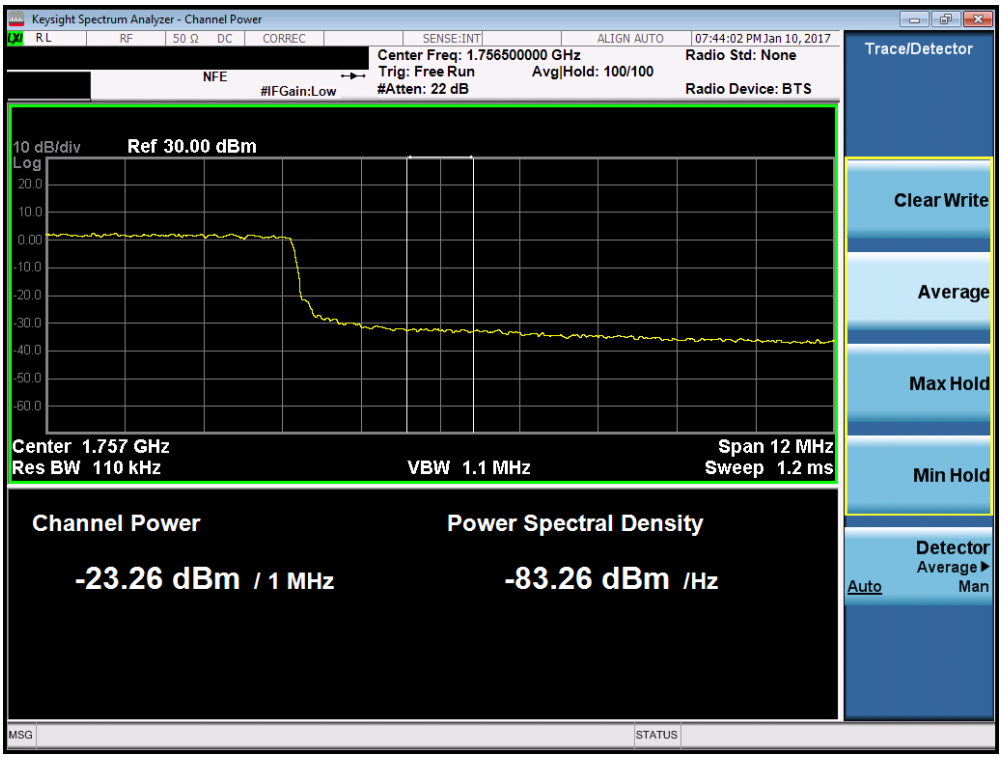


Plot 7-149. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.

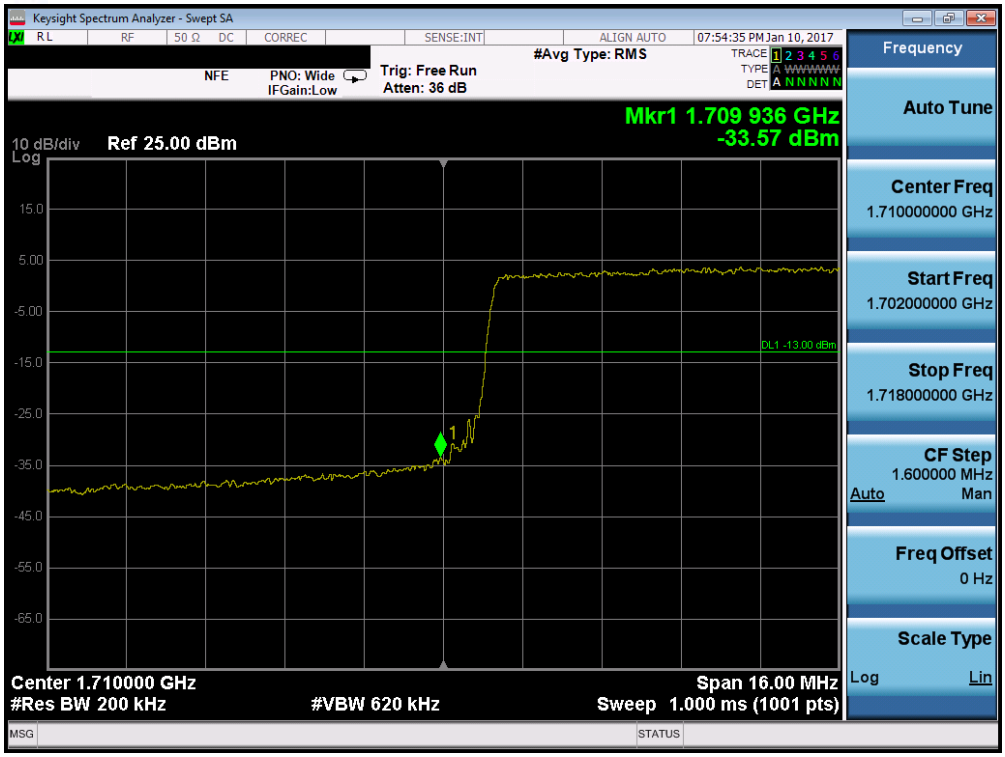


Plot 7-150. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

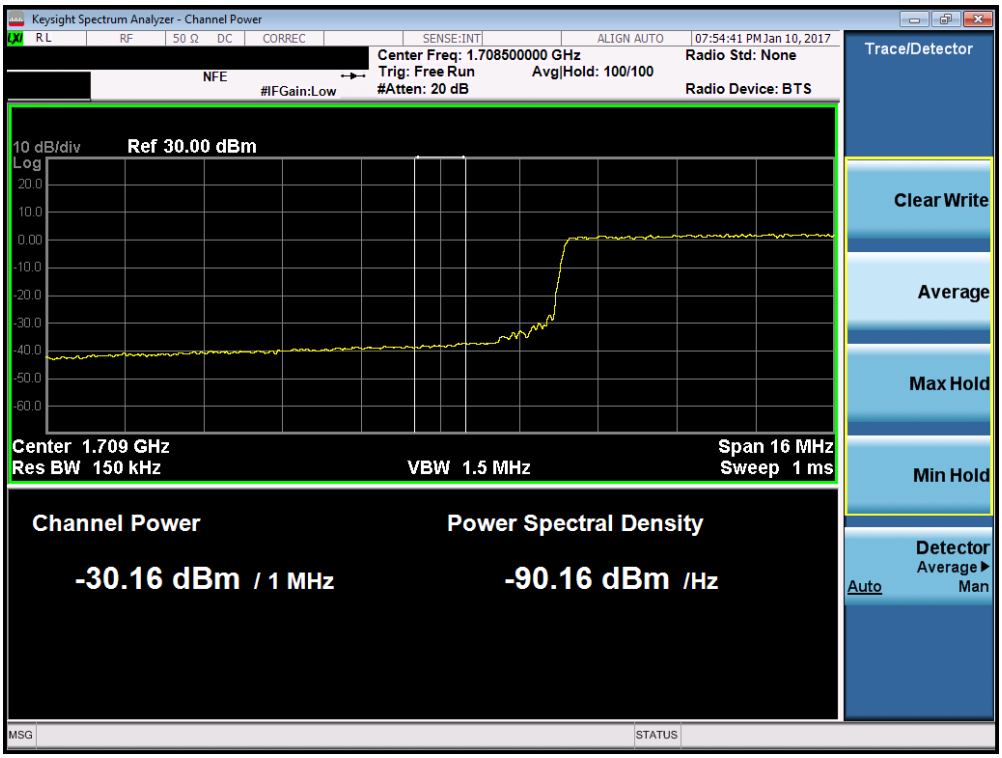


Plot 7-151. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.

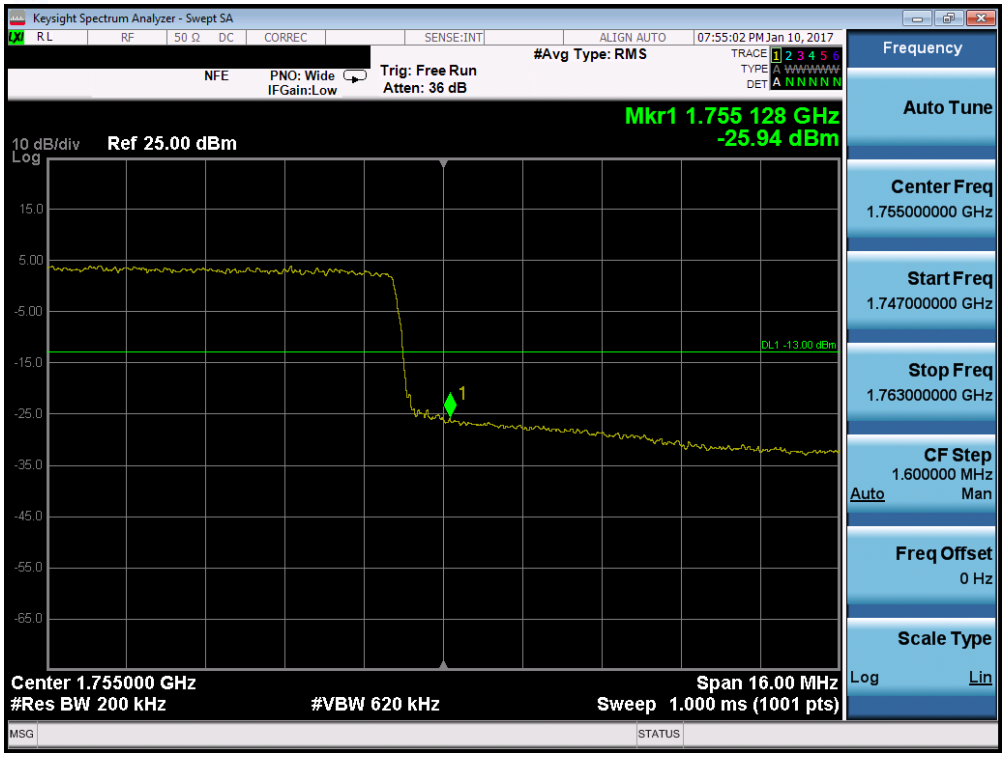


Plot 7-152. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

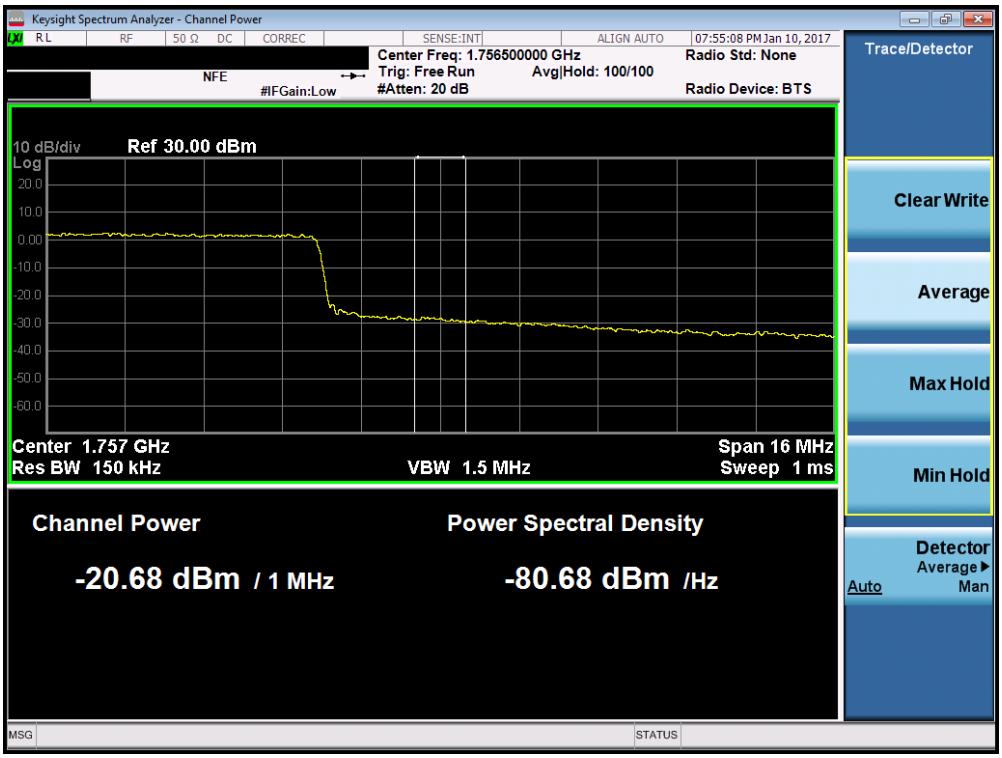


Plot 7-153. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

© 2017 PCTEST Engineering Laboratory, Inc.

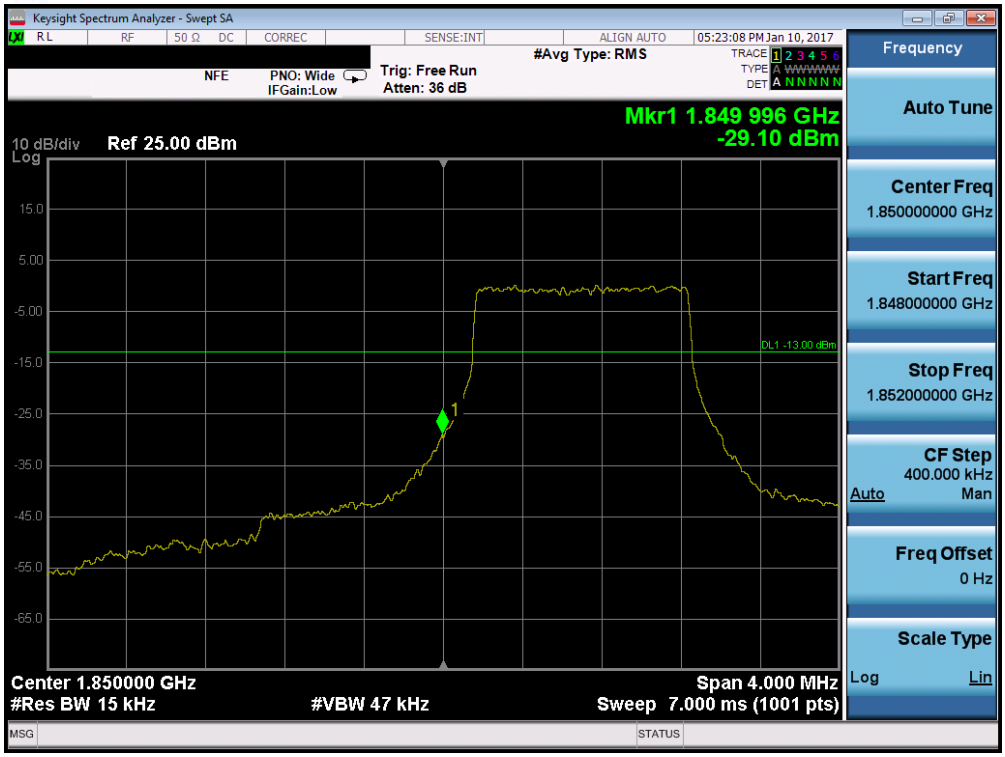


Plot 7-154. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

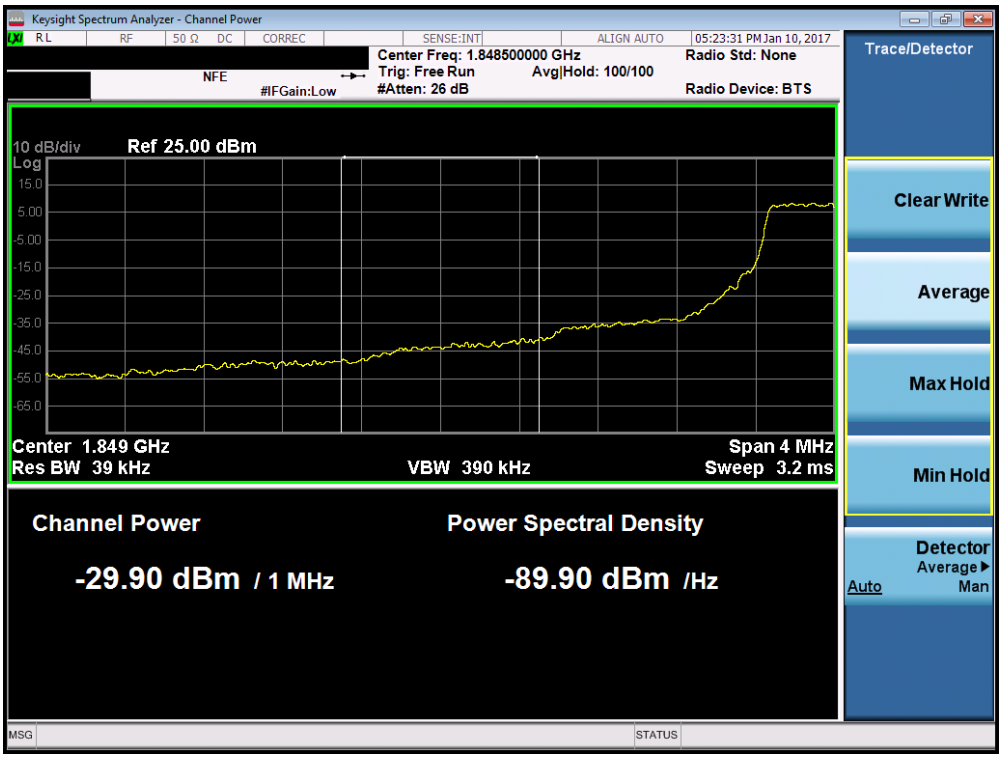


Plot 7-155. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

© 2017 PCTEST Engineering Laboratory, Inc.



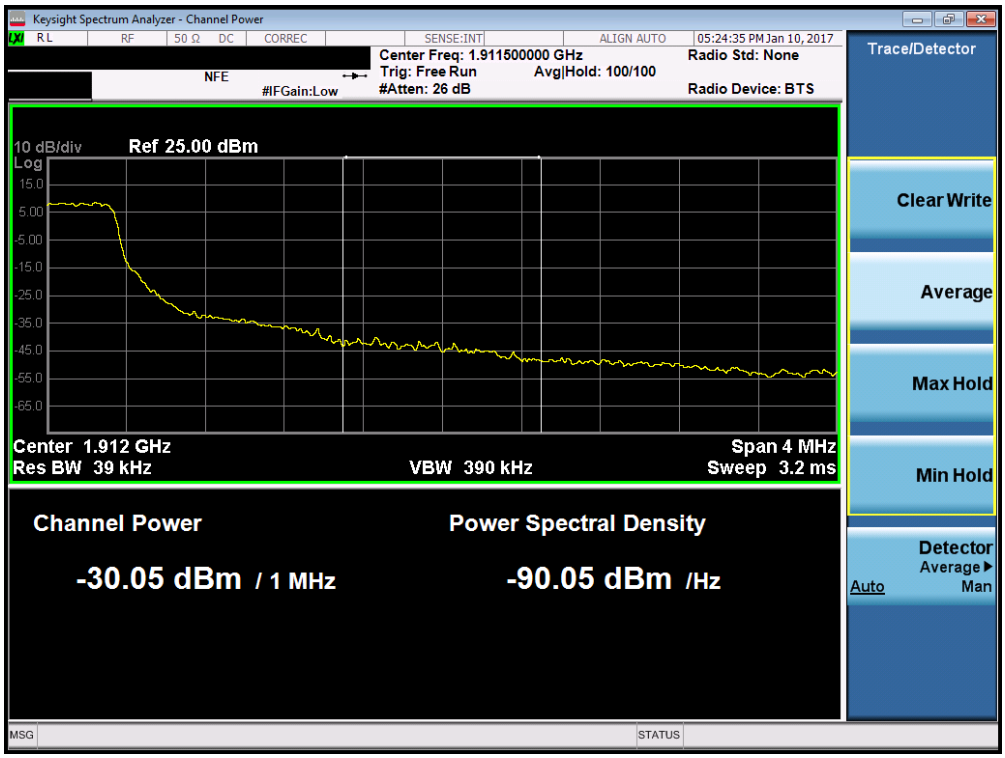
Plot 7-156. Lower Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



Plot 7-157. Lower Extended Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

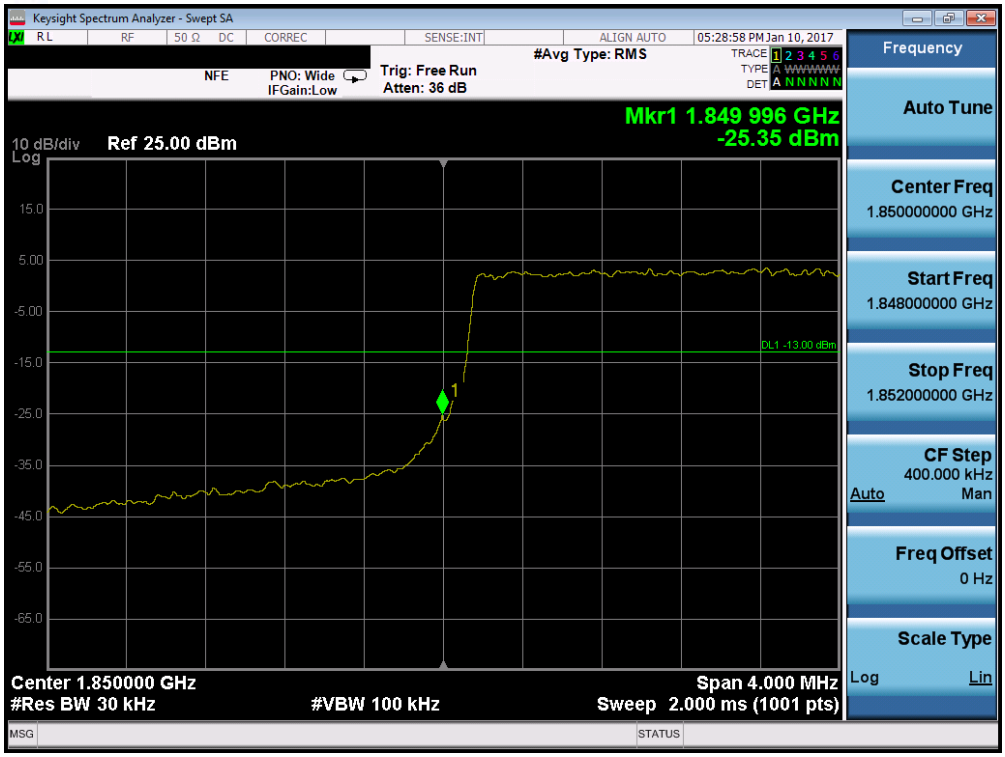
© 2017 PCTEST Engineering Laboratory, Inc.

Plot 7-158. Upper Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

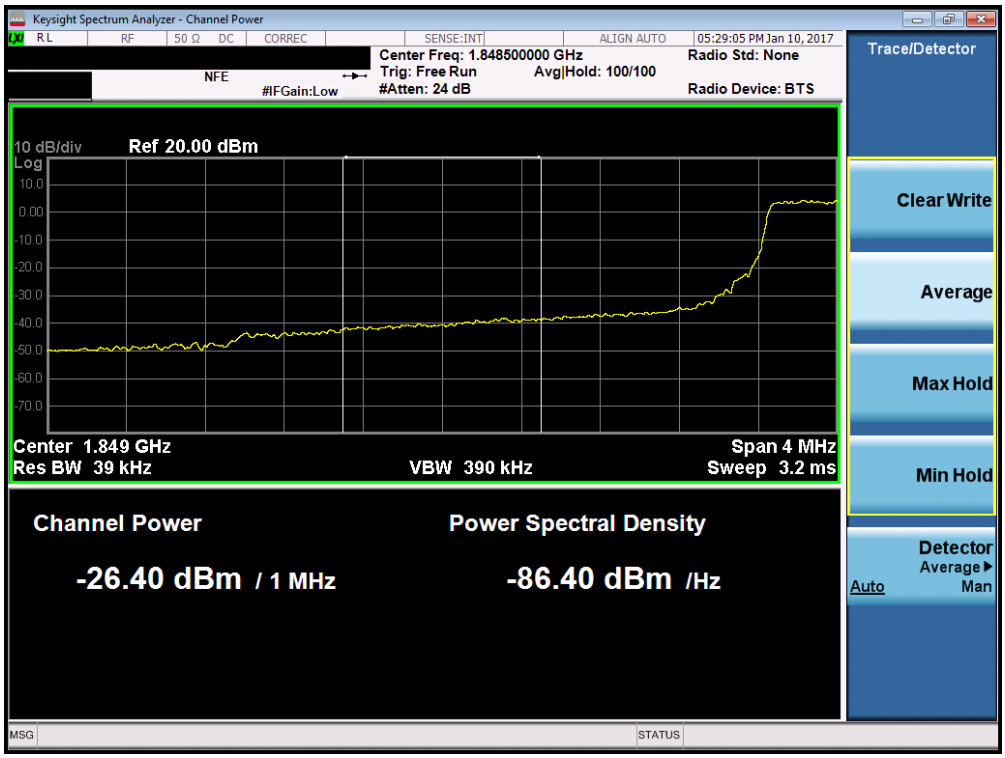


Plot 7-159. Upper Extended Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.

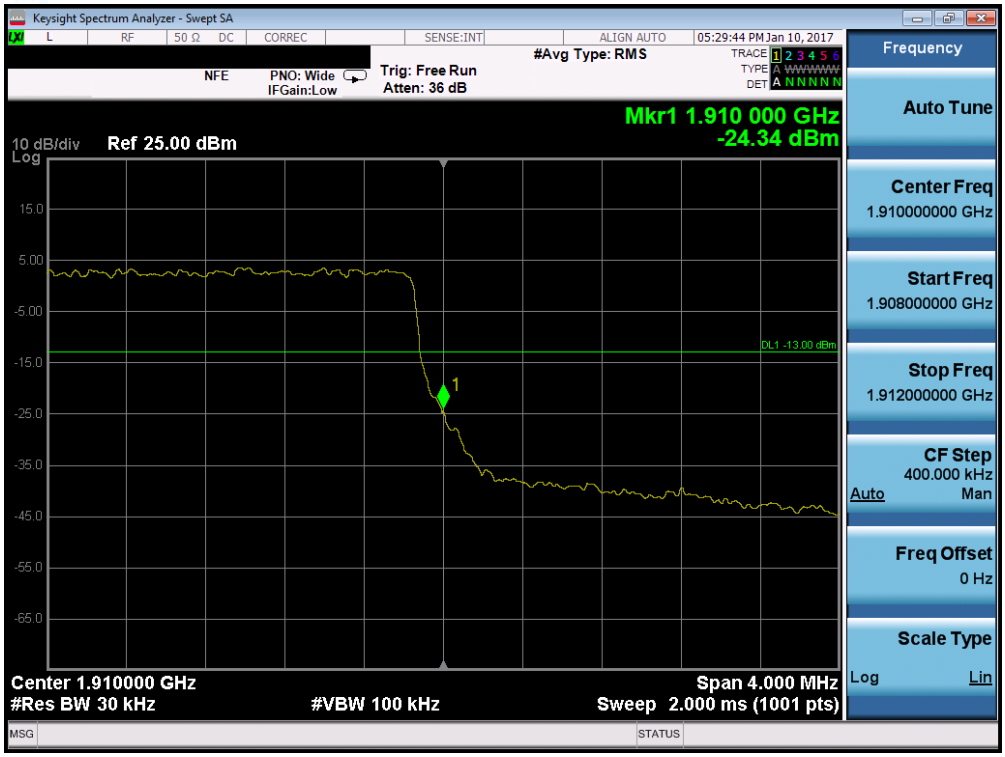


Plot 7-160. Lower Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

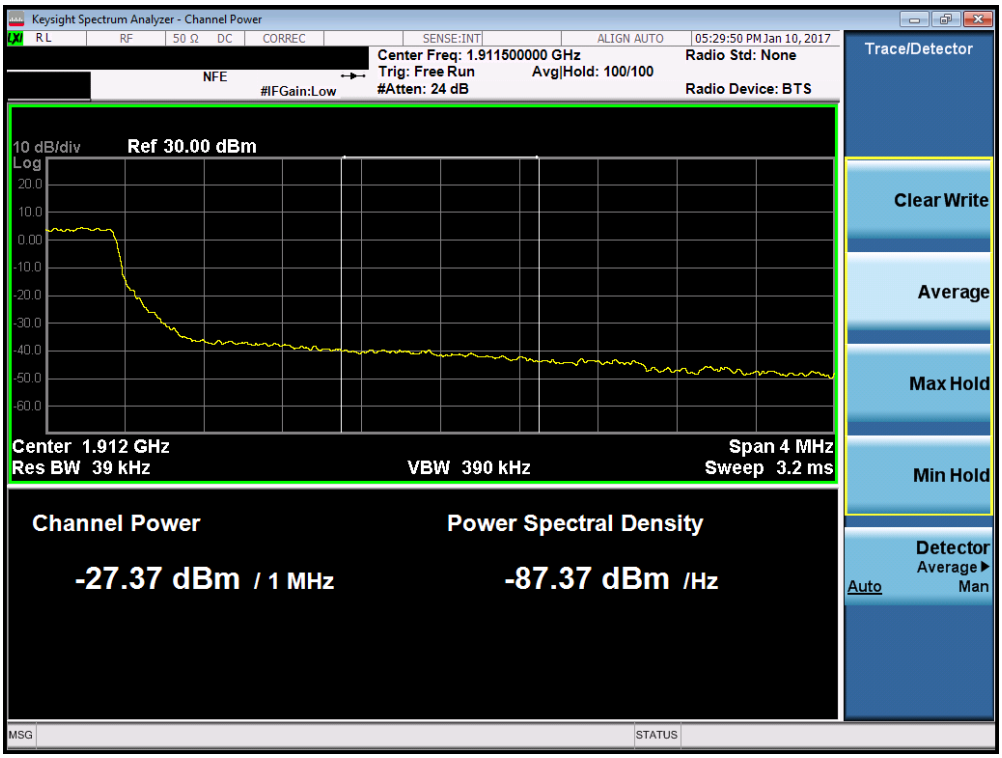


Plot 7-161. Lower Extended Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

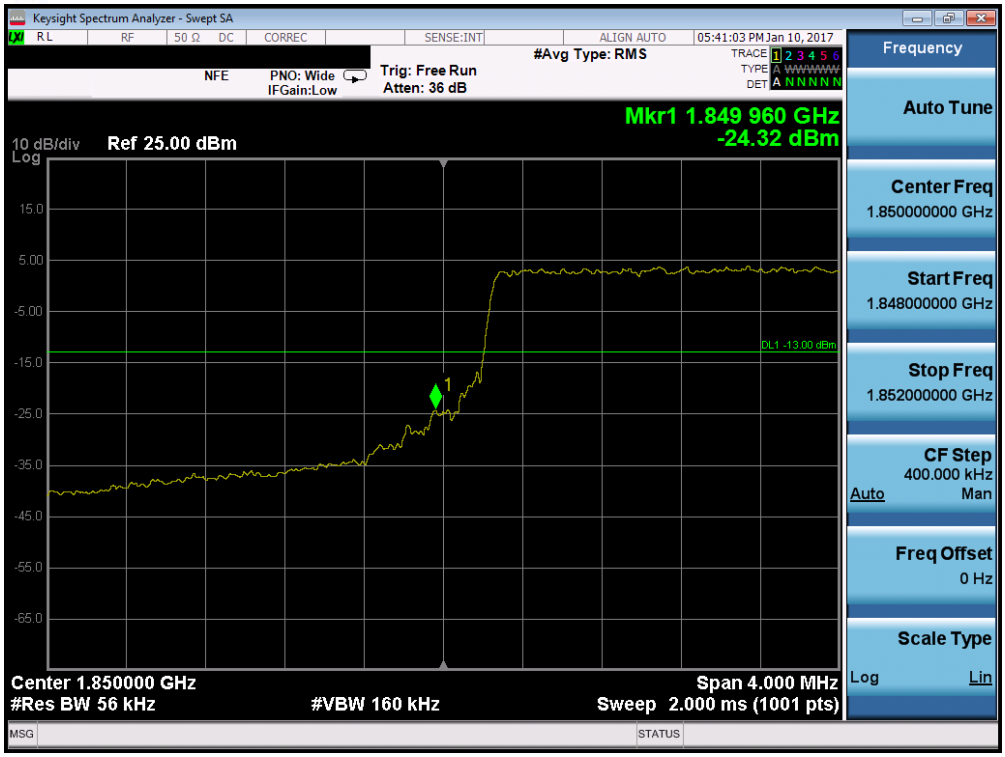


Plot 7-162. Upper Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

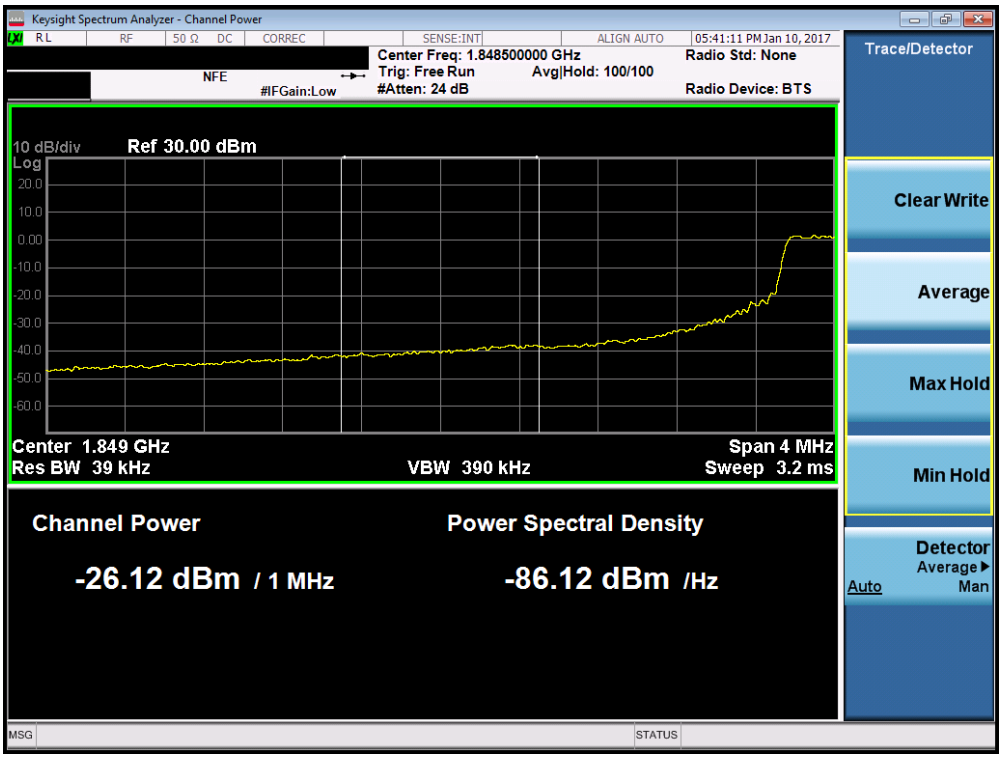


Plot 7-163. Upper Extended Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.



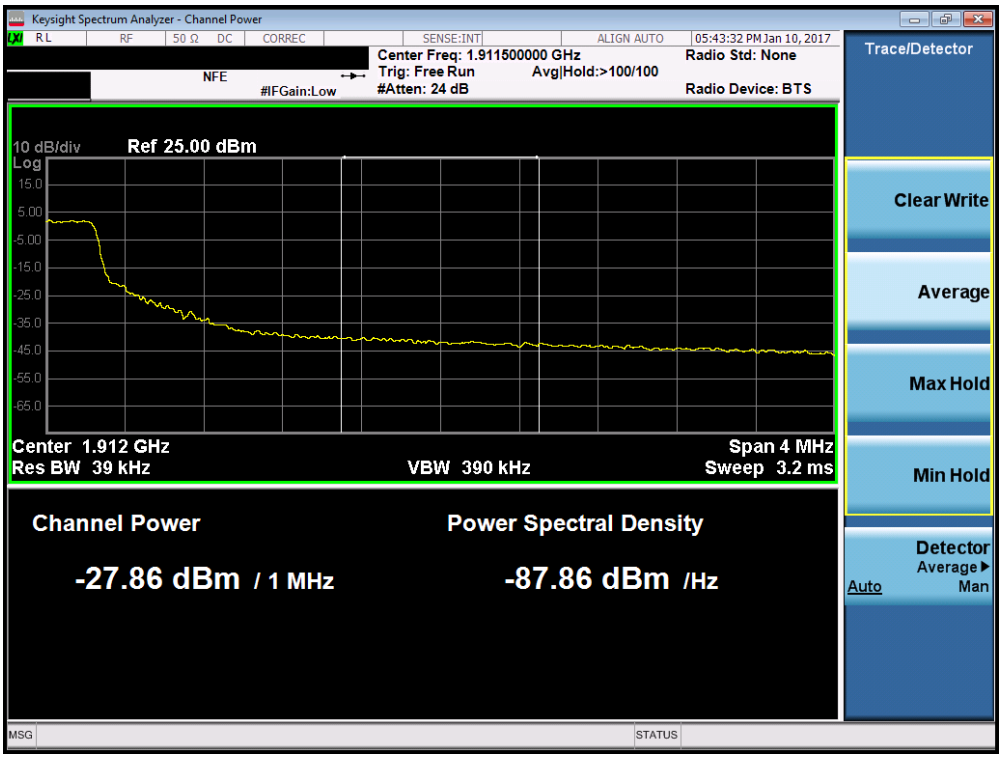
Plot 7-164. Lower Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



Plot 7-165. Lower Extended Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

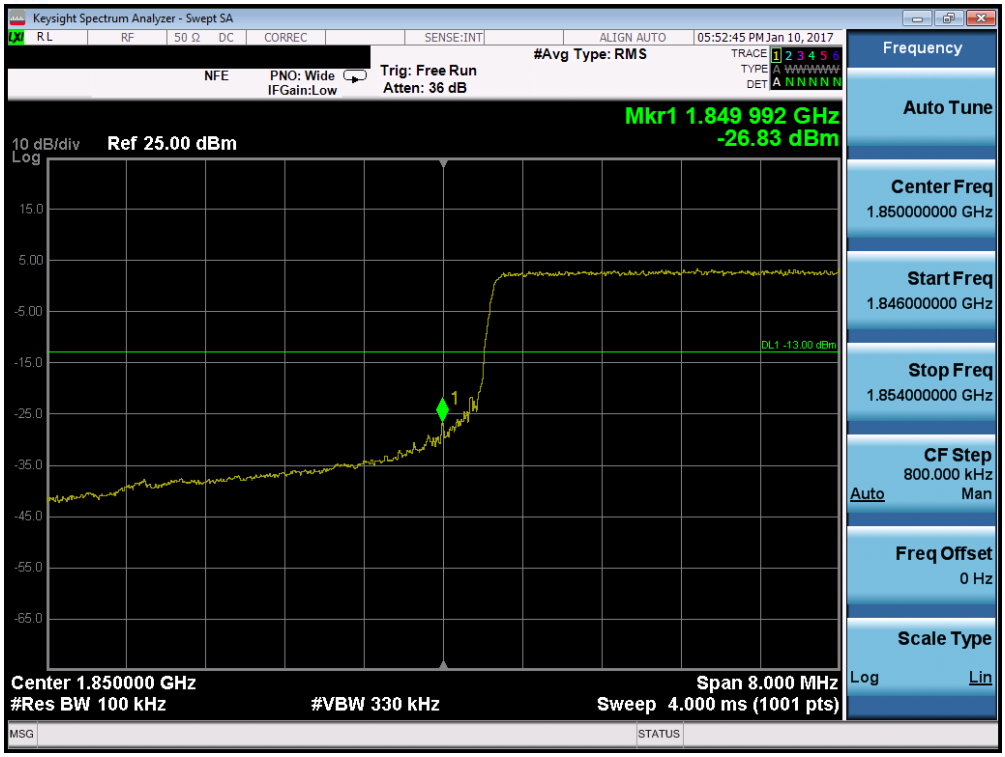
© 2017 PCTEST Engineering Laboratory, Inc.

Plot 7-166. Upper Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

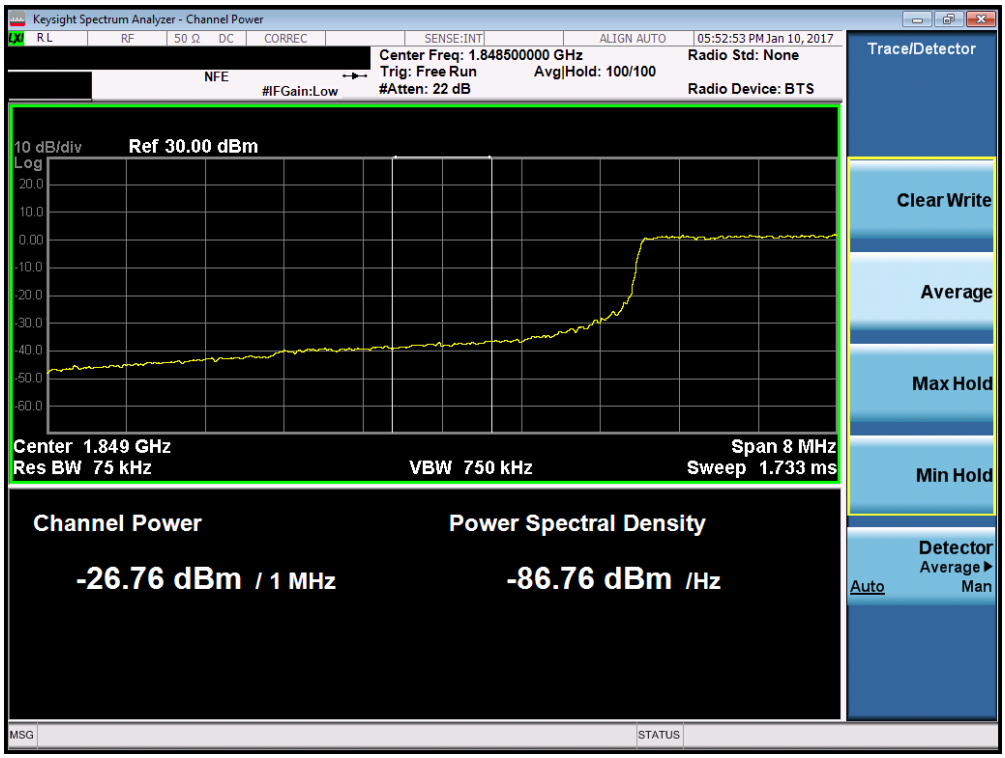


Plot 7-167. Upper Extended Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

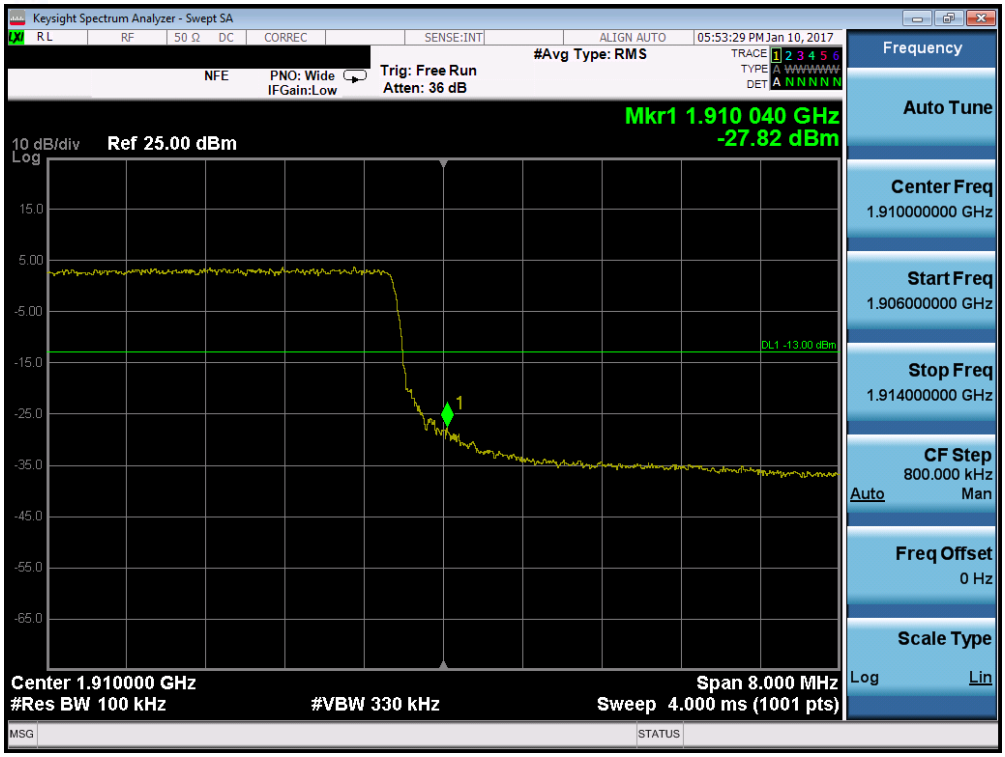


Plot 7-168. Lower Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

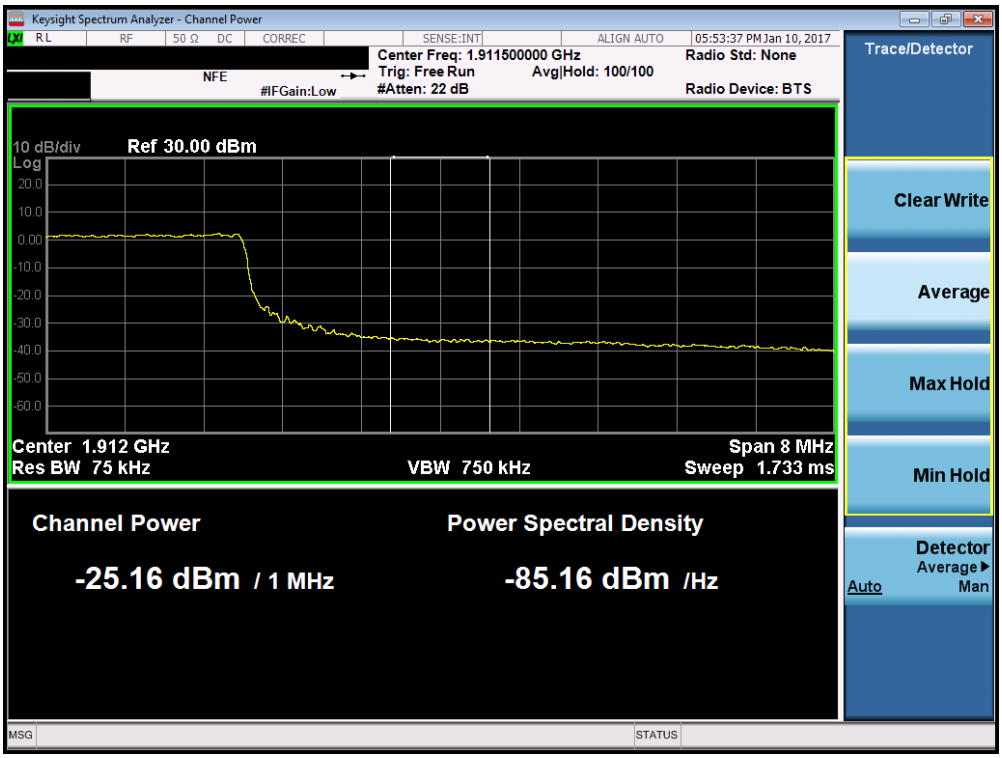


Plot 7-169. Lower Extended Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

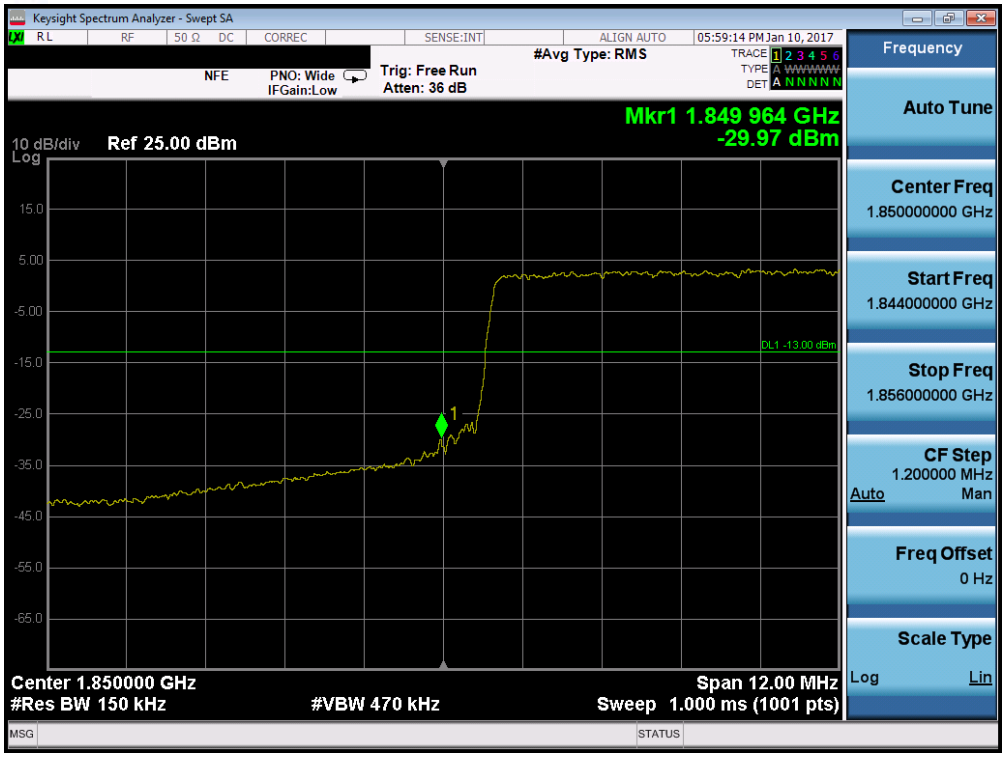


Plot 7-170. Upper Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

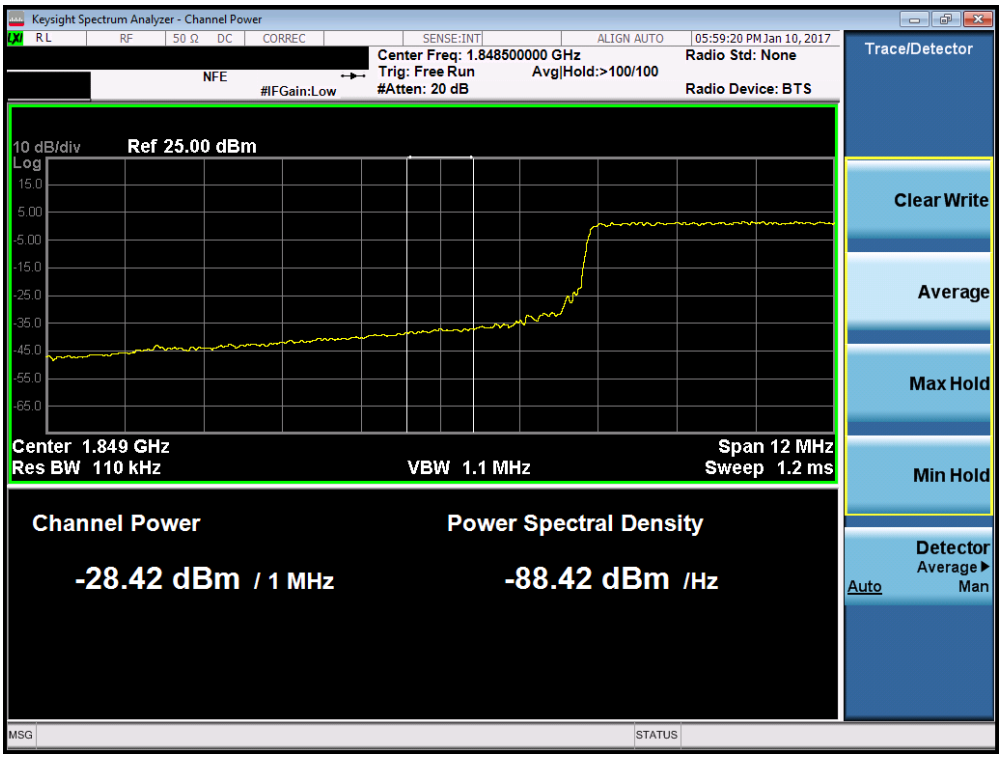


Plot 7-171. Upper Extended Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

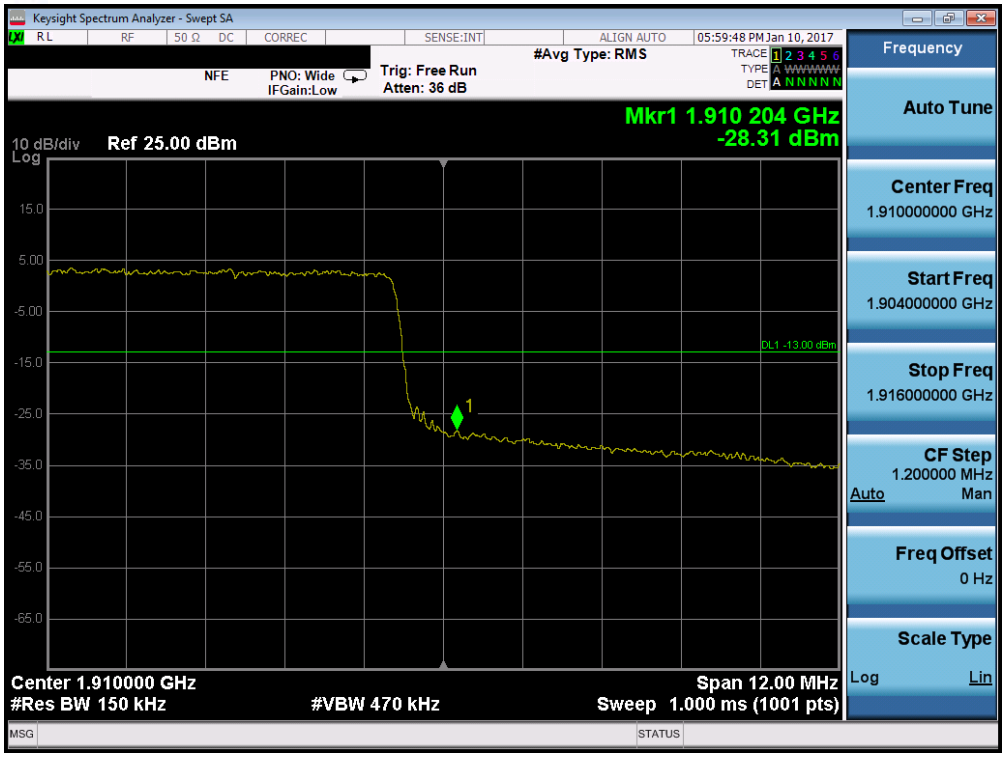


Plot 7-172. Lower Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

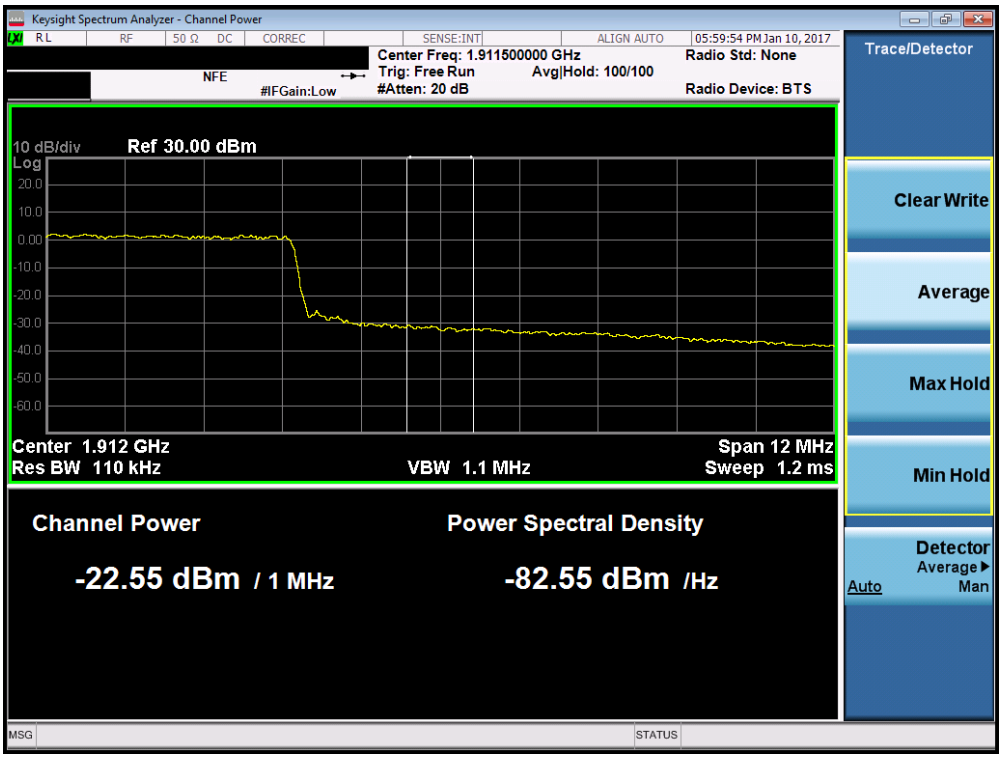


Plot 7-173. Lower Extended Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.

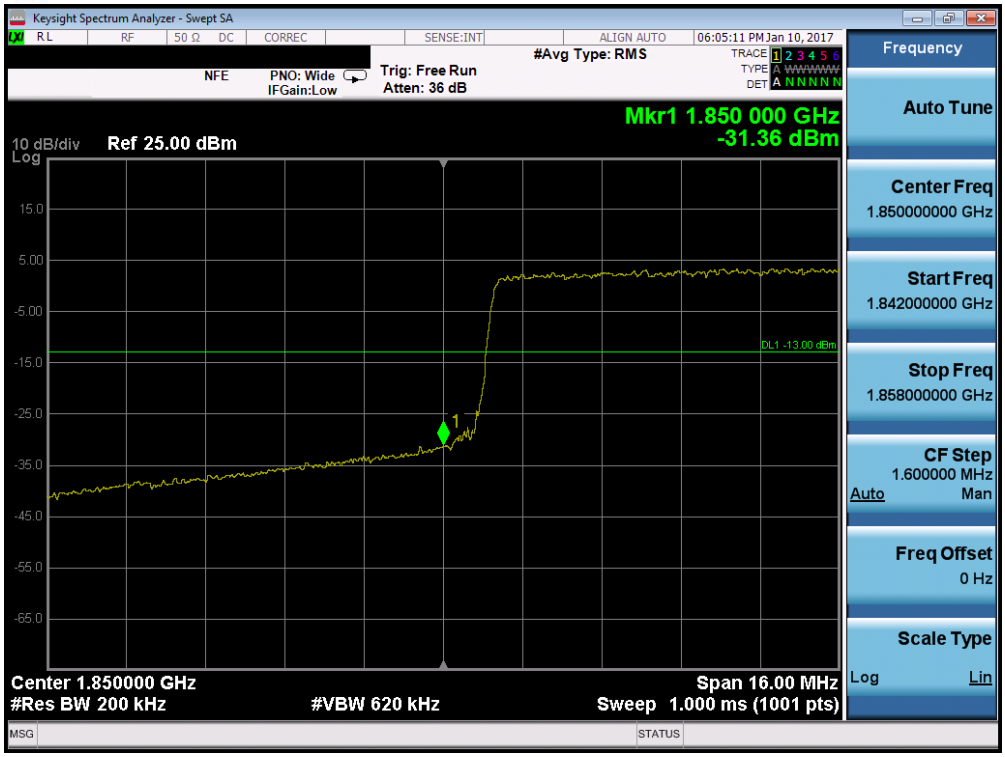


Plot 7-174. Upper Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

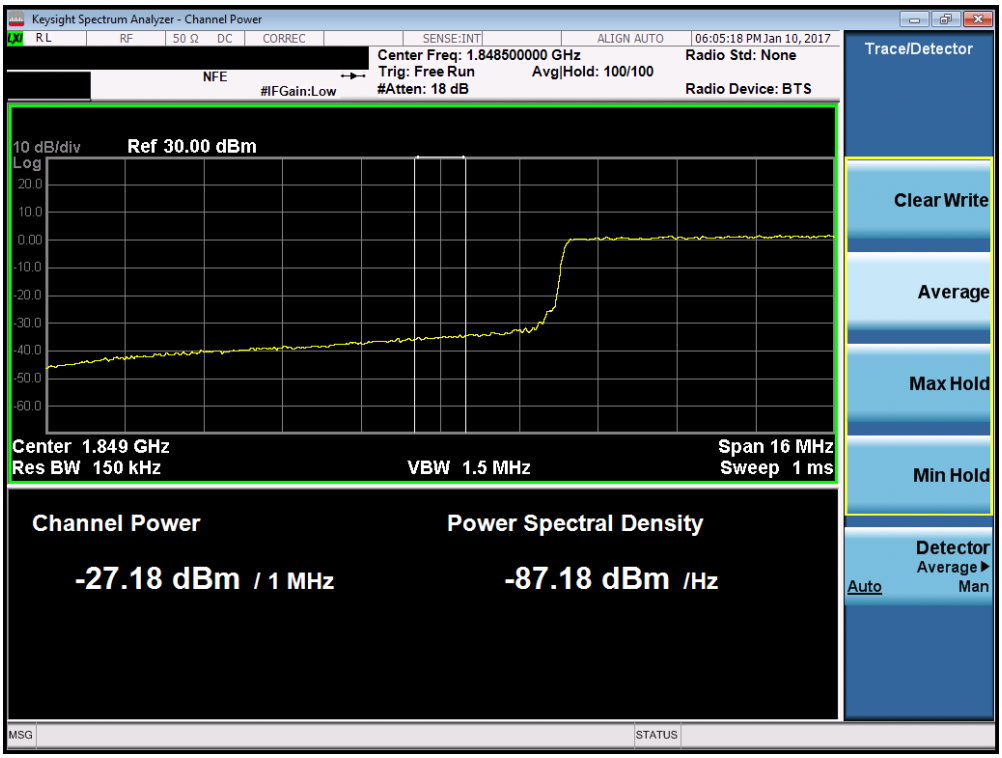


Plot 7-175. Upper Extended Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.

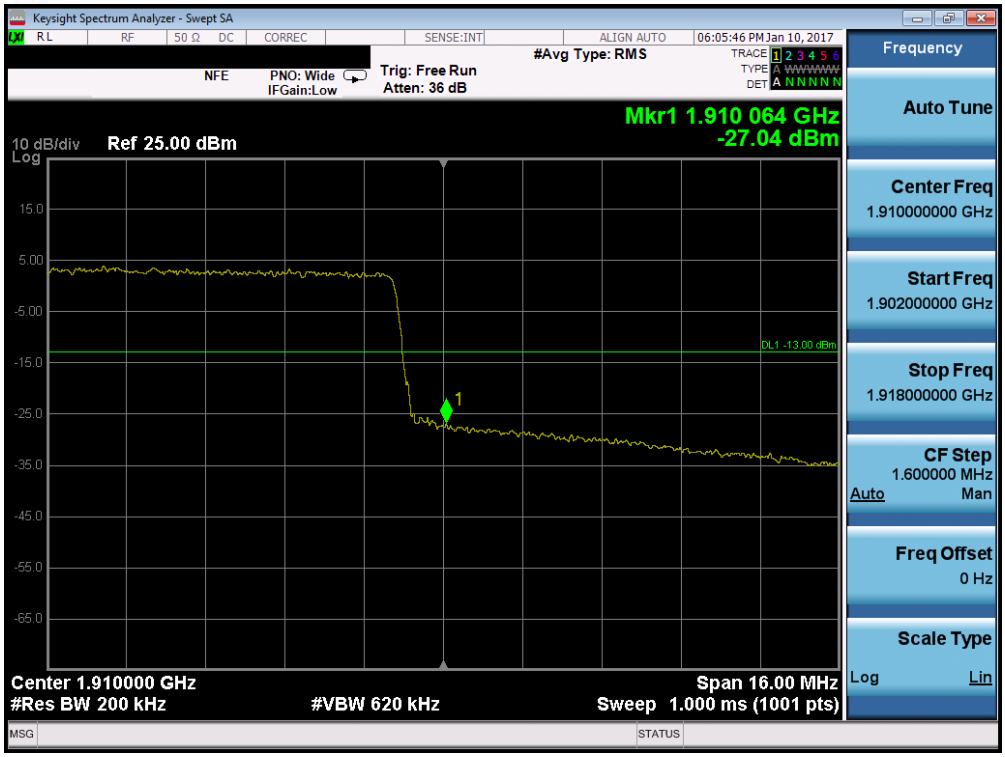


Plot 7-176. Lower Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

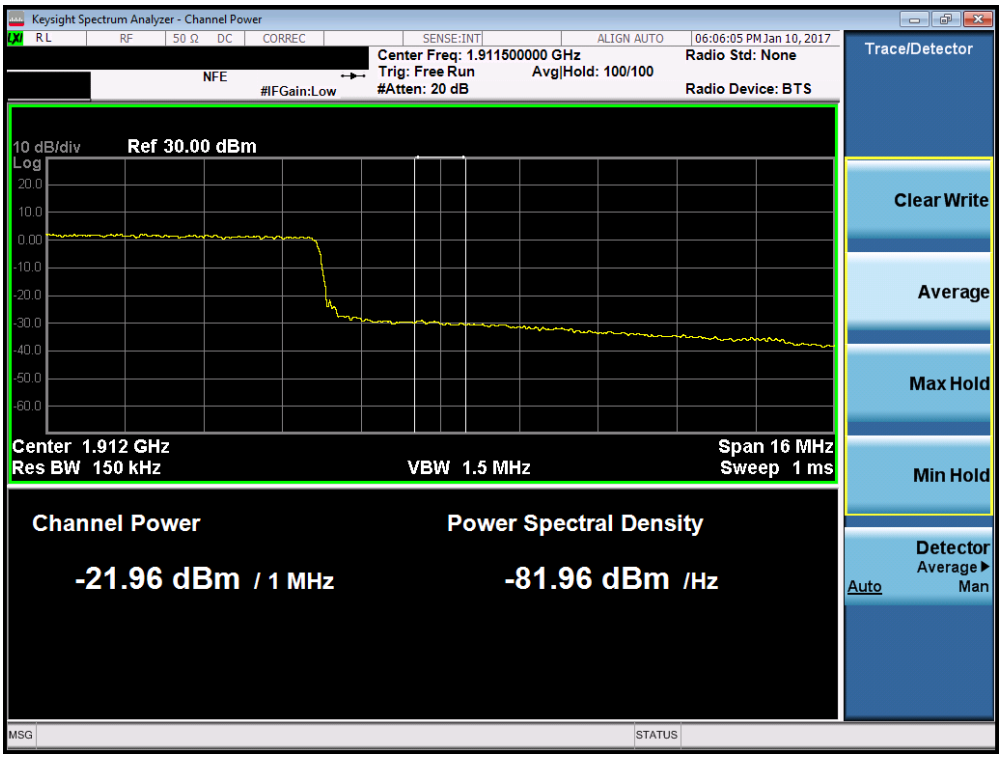


Plot 7-177. Lower Extended Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

© 2017 PCTEST Engineering Laboratory, Inc.

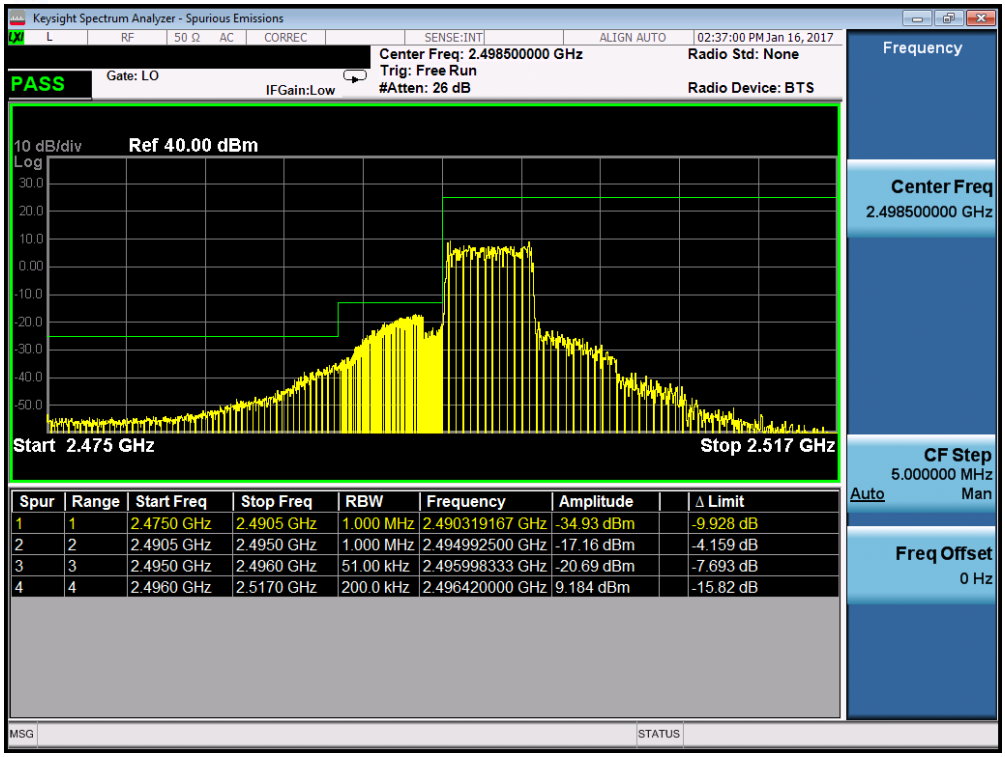


Plot 7-178. Upper Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



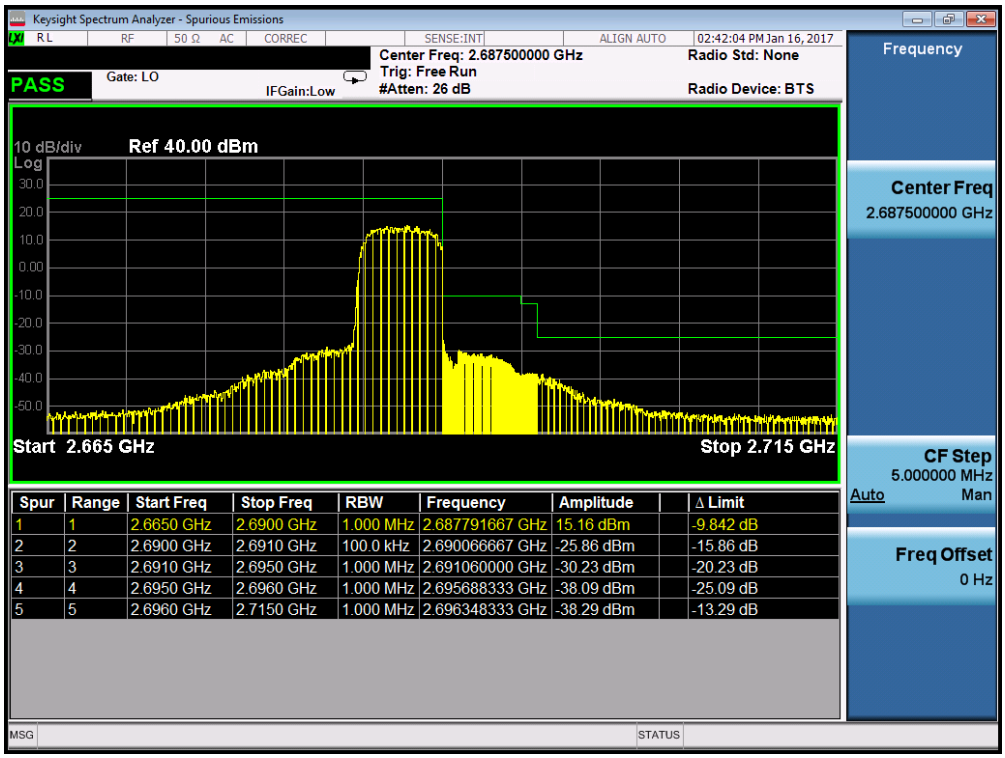
Plot 7-179. Upper Extended Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

© 2017 PCTEST Engineering Laboratory, Inc.



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490319167 GHz	-34.93 dBm	-9.928 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494992500 GHz	-17.16 dBm	-4.159 dB
3	3	2.4950 GHz	2.4960 GHz	51.00 kHz	2.495998333 GHz	-20.69 dBm	-7.693 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.496420000 GHz	9.184 dBm	-15.82 dB

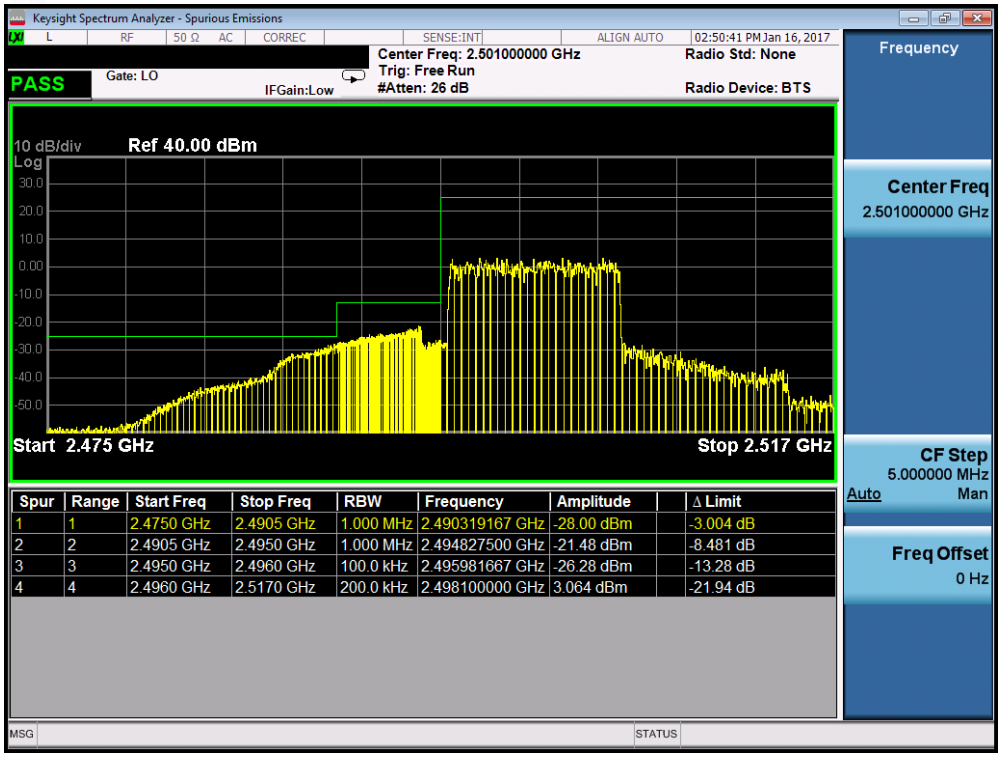
Plot 7-180. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.687791667 GHz	15.16 dBm	-9.842 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690066667 GHz	-25.86 dBm	-15.86 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691060000 GHz	-30.23 dBm	-20.23 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695688333 GHz	-38.09 dBm	-25.09 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696348333 GHz	-38.29 dBm	-13.29 dB

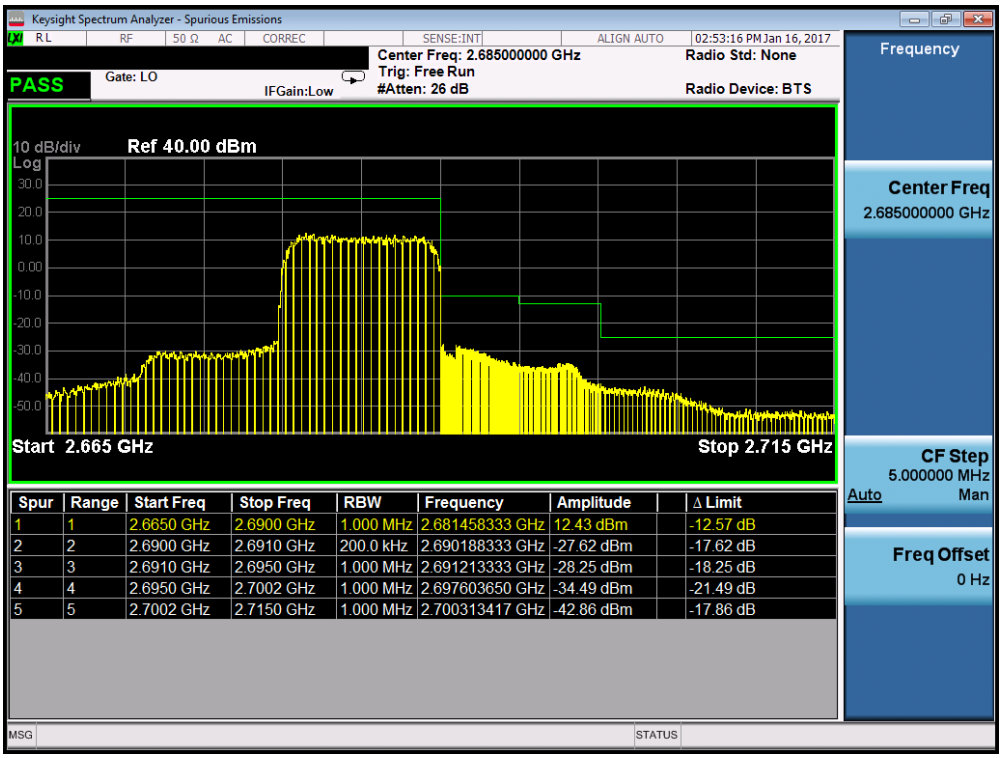
Plot 7-181. Upper ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490319167 GHz	-28.00 dBm		-3.004 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494827500 GHz	-21.48 dBm		-8.481 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495981667 GHz	-26.28 dBm		-13.28 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.498100000 GHz	3.064 dBm		-21.94 dB

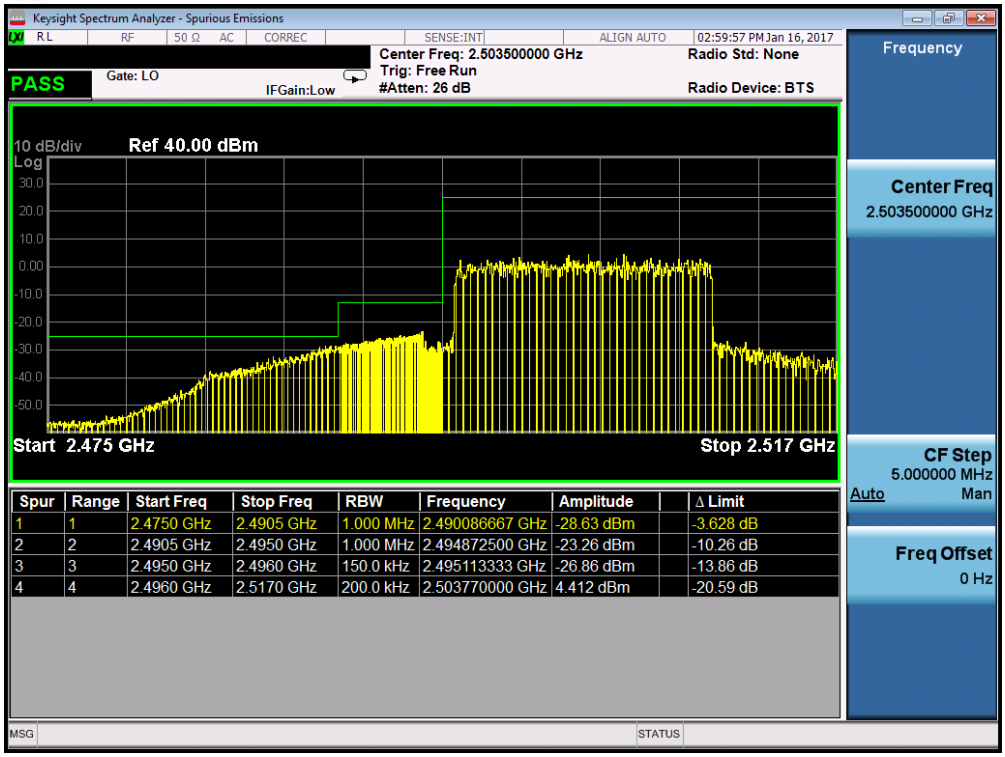
Plot 7-182. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.681458333 GHz	12.43 dBm		-12.57 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690188333 GHz	-27.62 dBm		-17.62 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691213333 GHz	-28.25 dBm		-18.25 dB
4	4	2.6950 GHz	2.7002 GHz	1.000 MHz	2.697603650 GHz	-34.49 dBm		-21.49 dB
5	5	2.7002 GHz	2.7150 GHz	1.000 MHz	2.700313417 GHz	-42.86 dBm		-17.86 dB

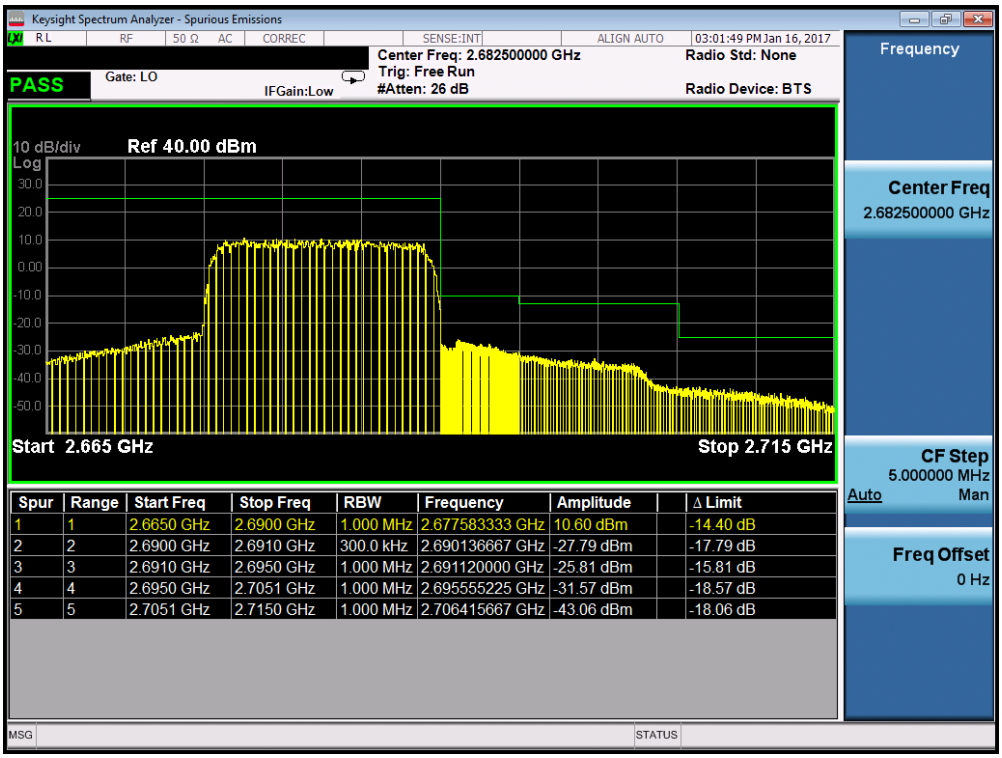
Plot 7-183. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490086667 GHz	-28.63 dBm	-3.628 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494872500 GHz	-23.26 dBm	-10.26 dB
3	3	2.4950 GHz	2.4960 GHz	150.0 kHz	2.495113333 GHz	-26.86 dBm	-13.86 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.503770000 GHz	4.412 dBm	-20.59 dB

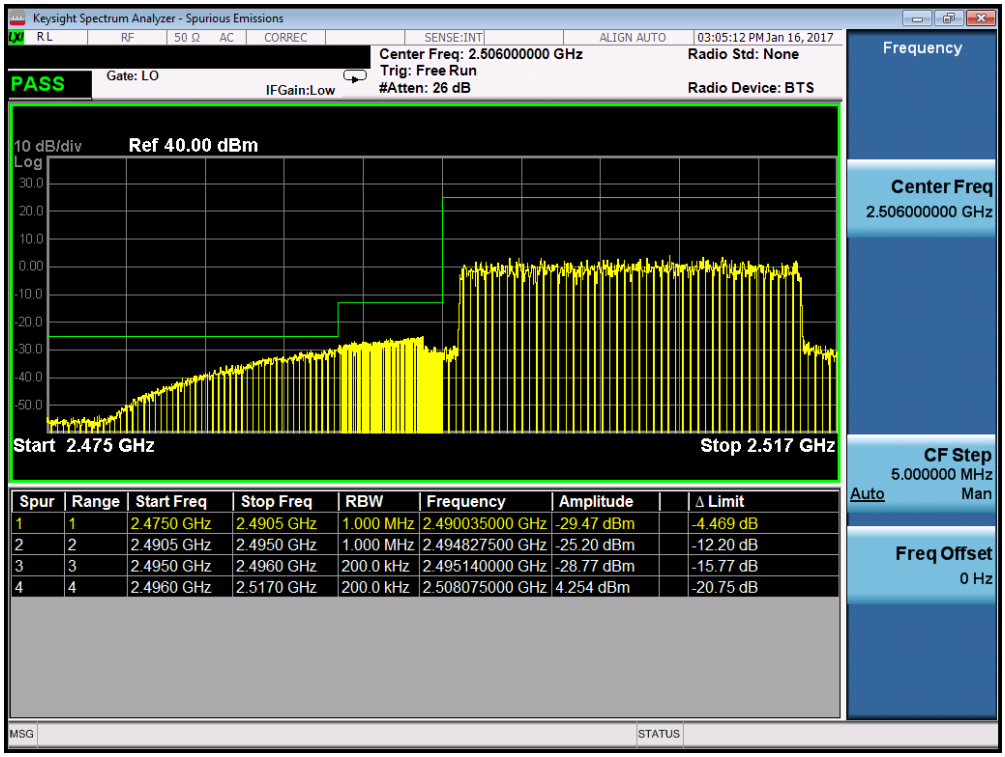
Plot 7-184. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.677583333 GHz	10.60 dBm	-14.40 dB
2	2	2.6900 GHz	2.6910 GHz	300.0 kHz	2.690136667 GHz	-27.79 dBm	-17.79 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691120000 GHz	-25.81 dBm	-15.81 dB
4	4	2.6950 GHz	2.7051 GHz	1.000 MHz	2.695555225 GHz	-31.57 dBm	-18.57 dB
5	5	2.7051 GHz	2.7150 GHz	1.000 MHz	2.706415667 GHz	-43.06 dBm	-18.06 dB

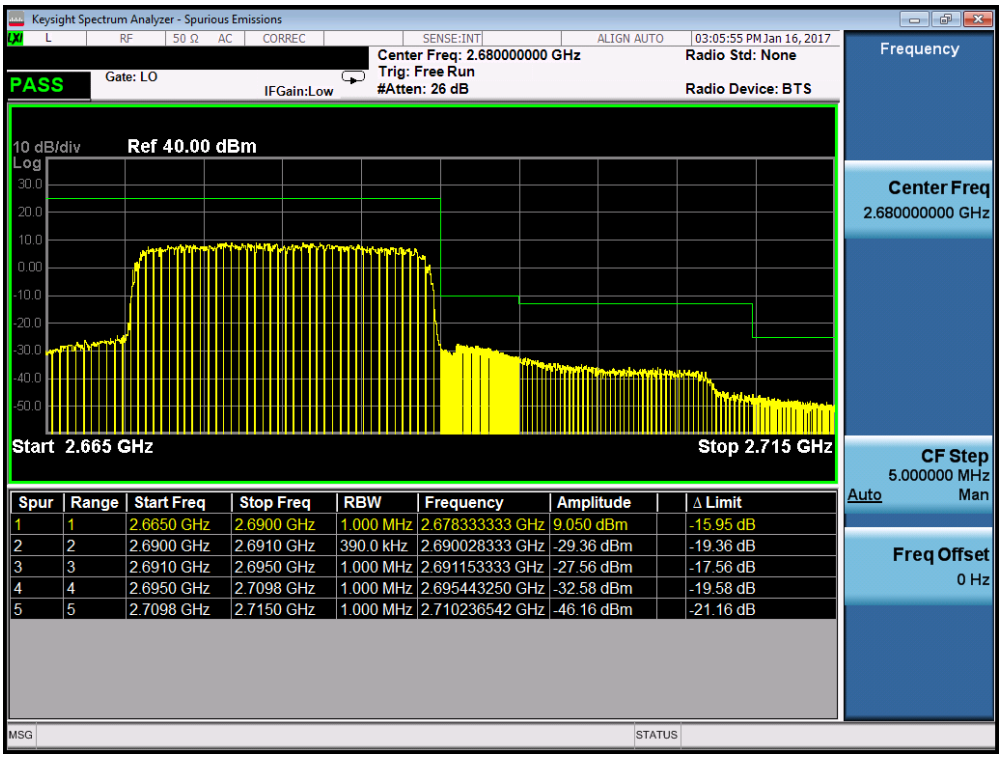
Plot 7-185. Upper ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490035000 GHz	-29.47 dBm		-4.469 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494827500 GHz	-25.20 dBm		-12.20 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495140000 GHz	-28.77 dBm		-15.77 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.508075000 GHz	4.254 dBm		-20.75 dB

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



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.678333333 GHz	9.050 dBm		-15.95 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690028333 GHz	-29.36 dBm		-19.36 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691153333 GHz	-27.56 dBm		-17.56 dB
4	4	2.6950 GHz	2.7098 GHz	1.000 MHz	2.695443250 GHz	-32.58 dBm		-19.58 dB
5	5	2.7098 GHz	2.7150 GHz	1.000 MHz	2.710236542 GHz	-46.16 dBm		-21.16 dB

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

© 2017 PCTEST Engineering Laboratory, Inc.

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.

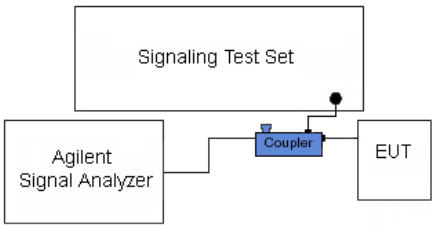
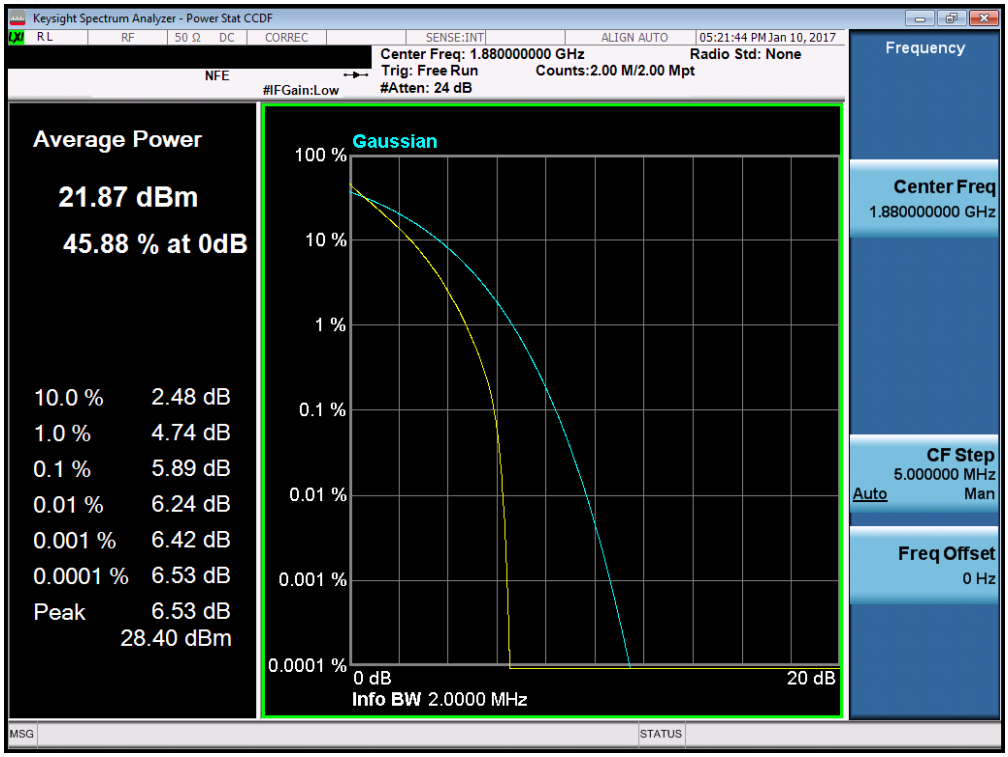


Figure 7-4. Test Instrument & Measurement Setup

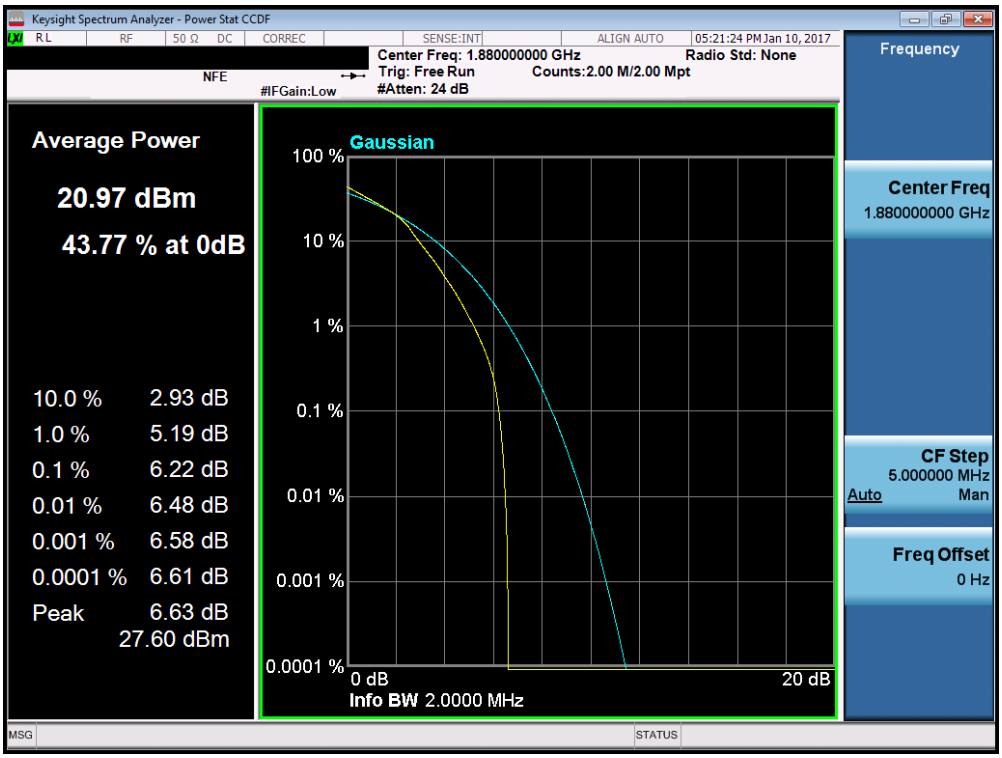
Test Notes

None.

© 2017 PCTEST Engineering Laboratory, Inc.

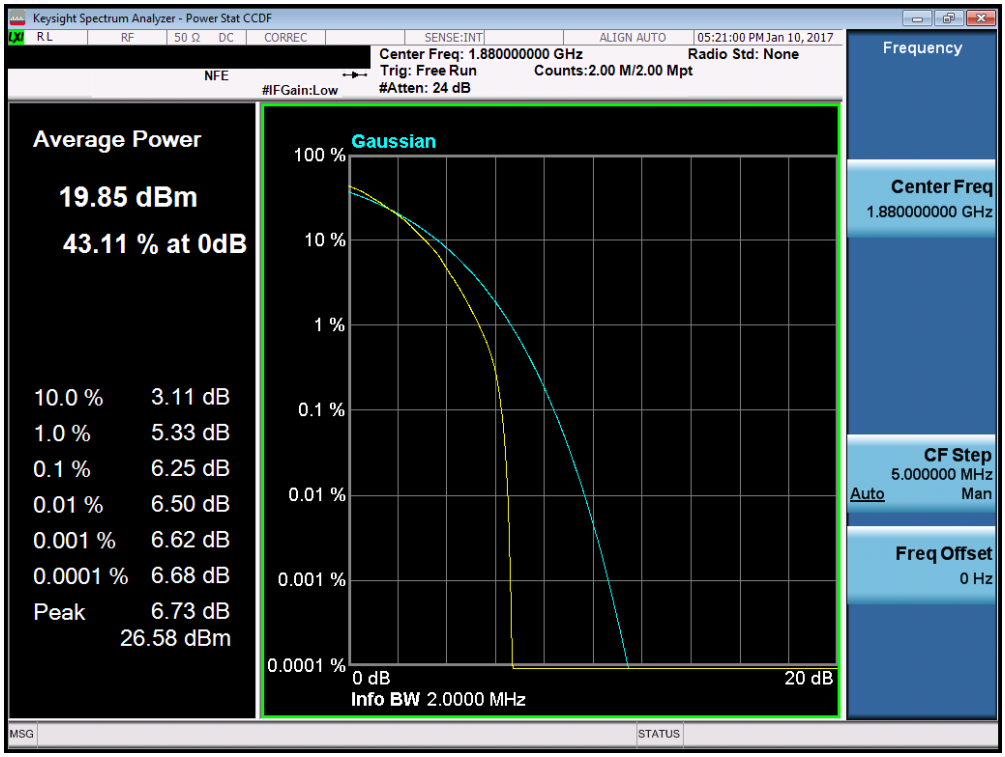


Plot 7-188. PAR Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

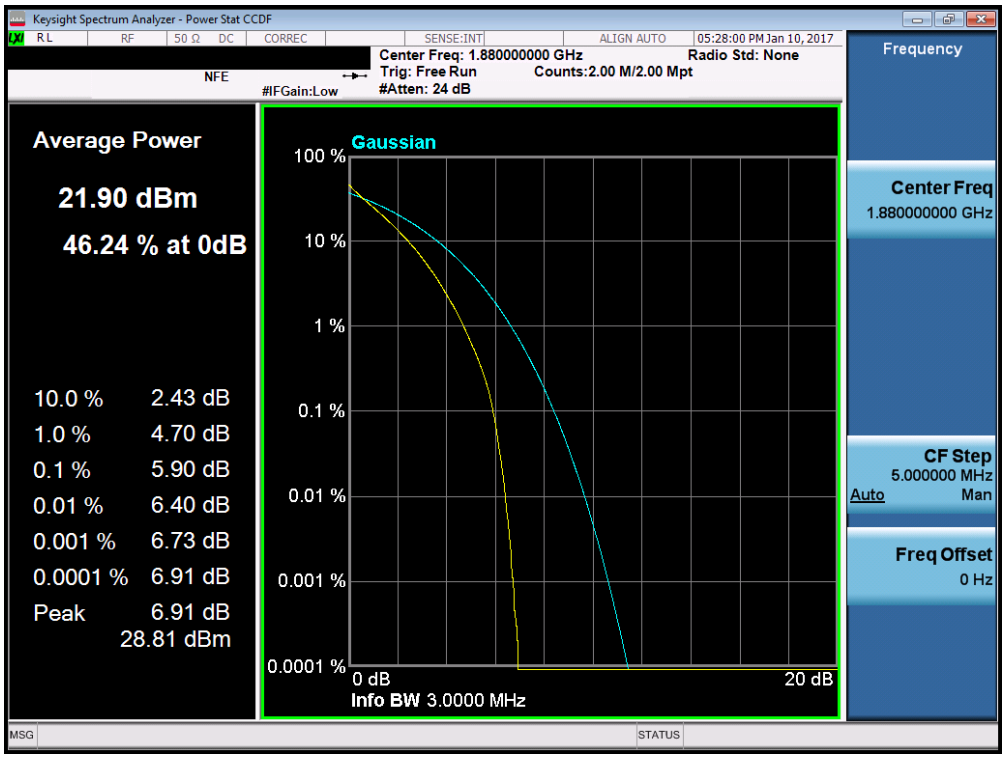


Plot 7-189. PAR Plot (Band 2/25 – 1.4MHz 16-QAM – RB Size 6)

© 2017 PCTEST Engineering Laboratory, Inc.

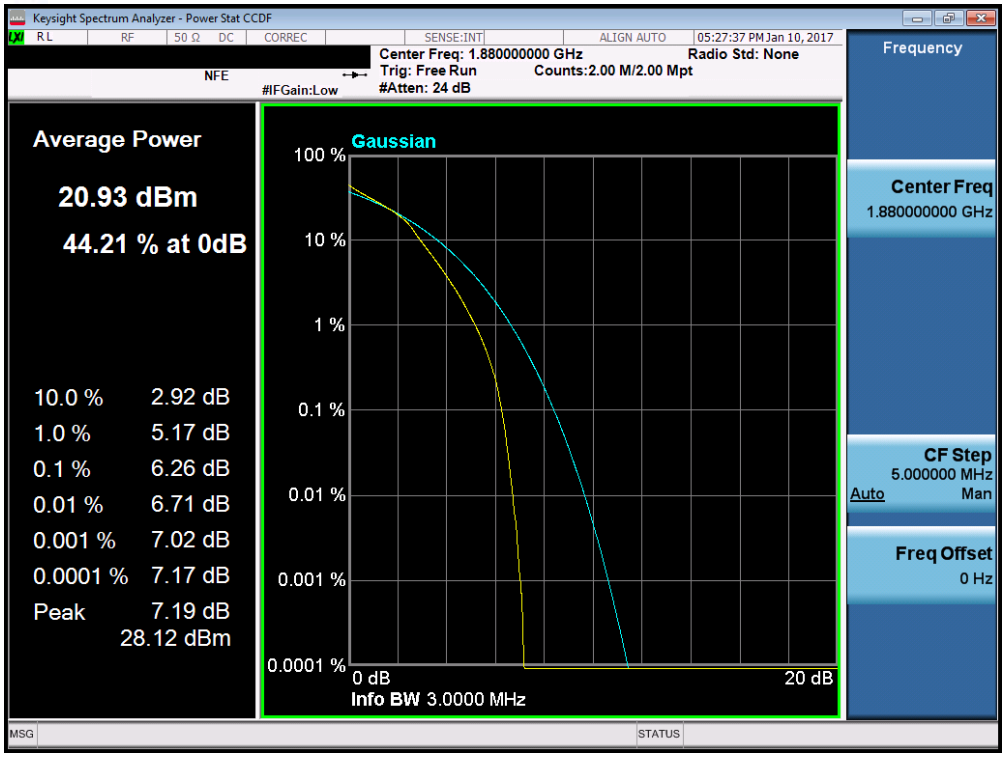


Plot 7-190. PAR Plot (Band 2/25 – 1.4MHz 64-QAM – RB Size 6)

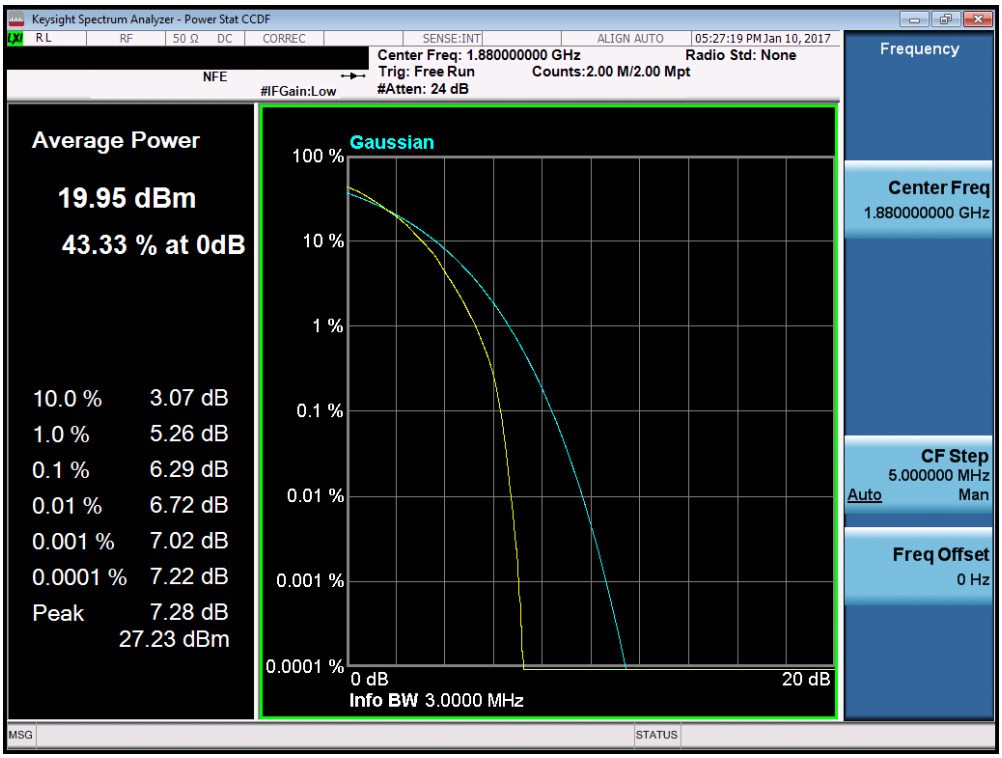


Plot 7-191. PAR Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

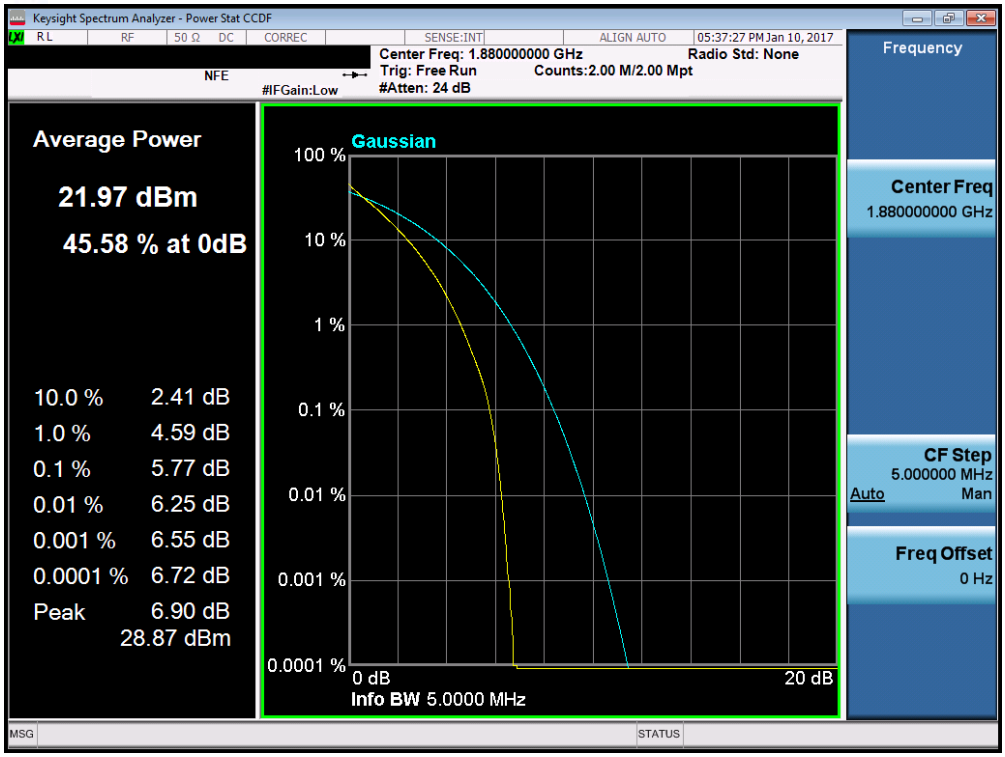


Plot 7-192. PAR Plot (Band 2/25 – 3.0MHz 16-QAM – RB Size 15)

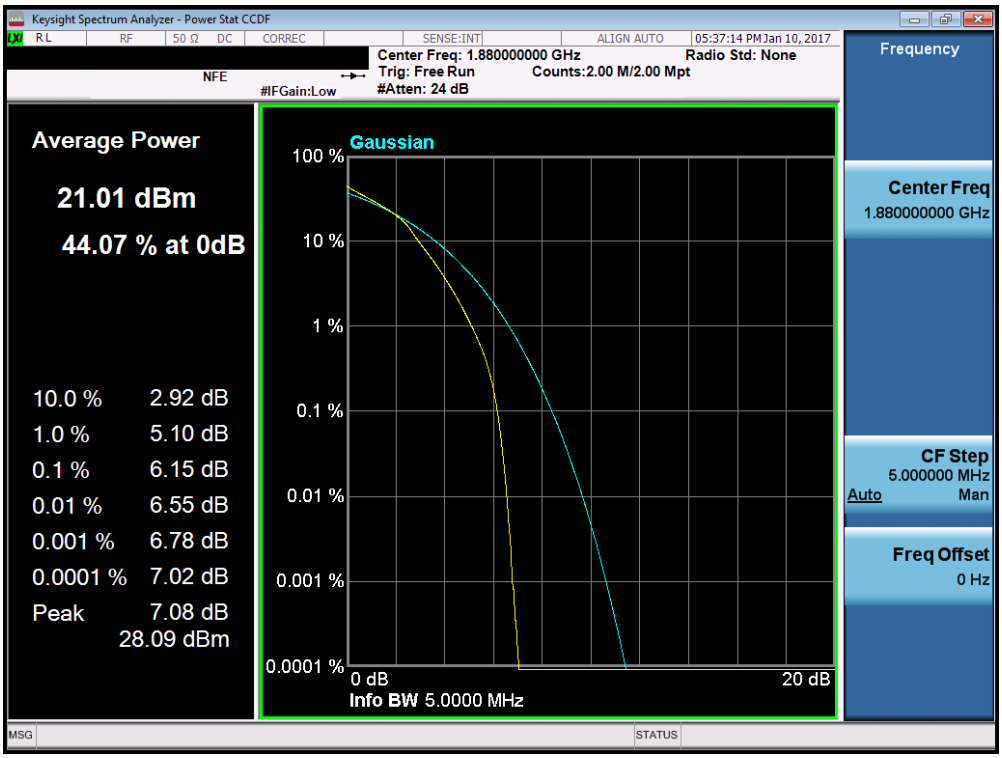


Plot 7-193. PAR Plot (Band 2/25 – 3.0MHz 64-QAM – RB Size 15)

© 2017 PCTEST Engineering Laboratory, Inc.

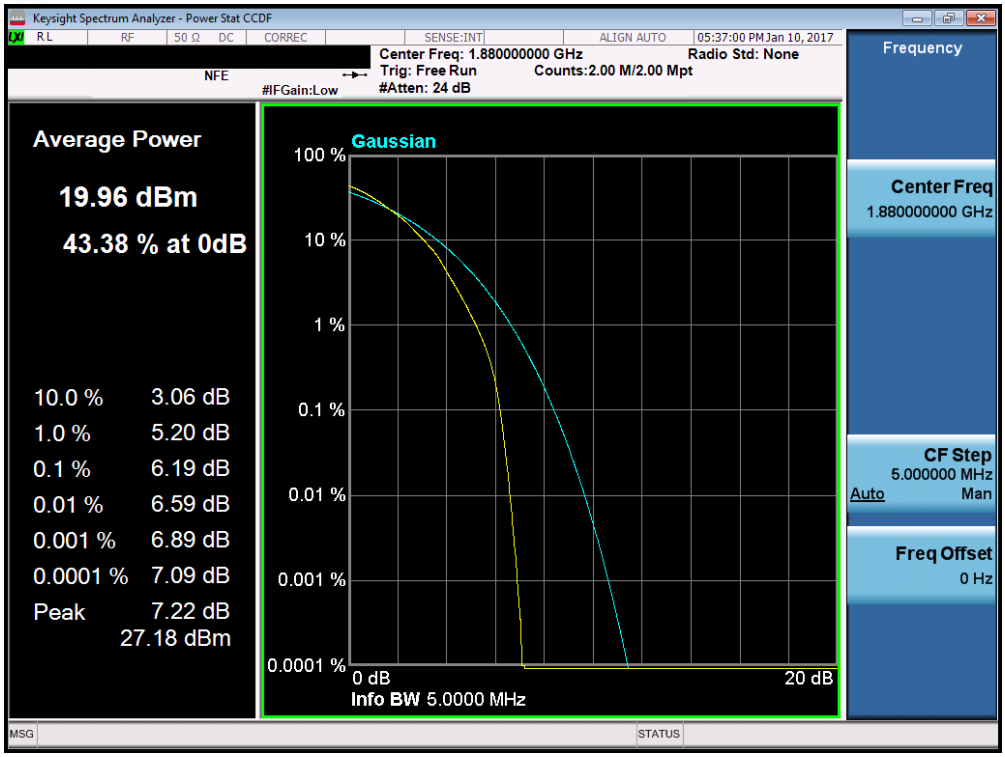


Plot 7-194. PAR Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

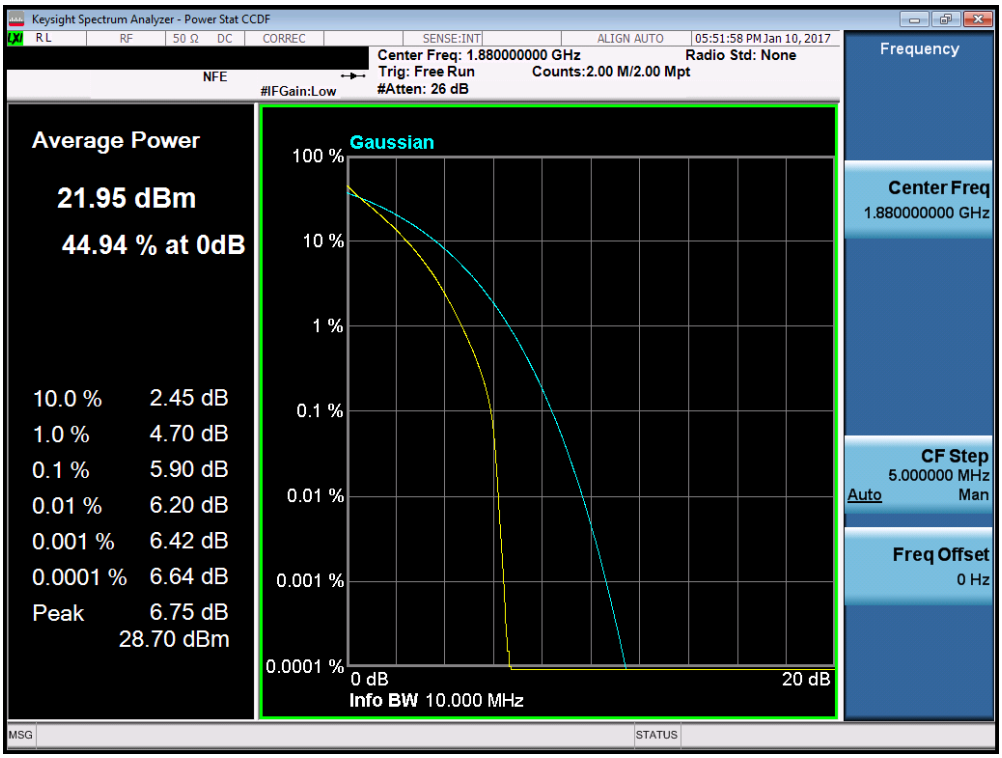


Plot 7-195. PAR Plot (Band 2/25 – 5.0MHz 16-QAM – RB Size 25)

© 2017 PCTEST Engineering Laboratory, Inc.

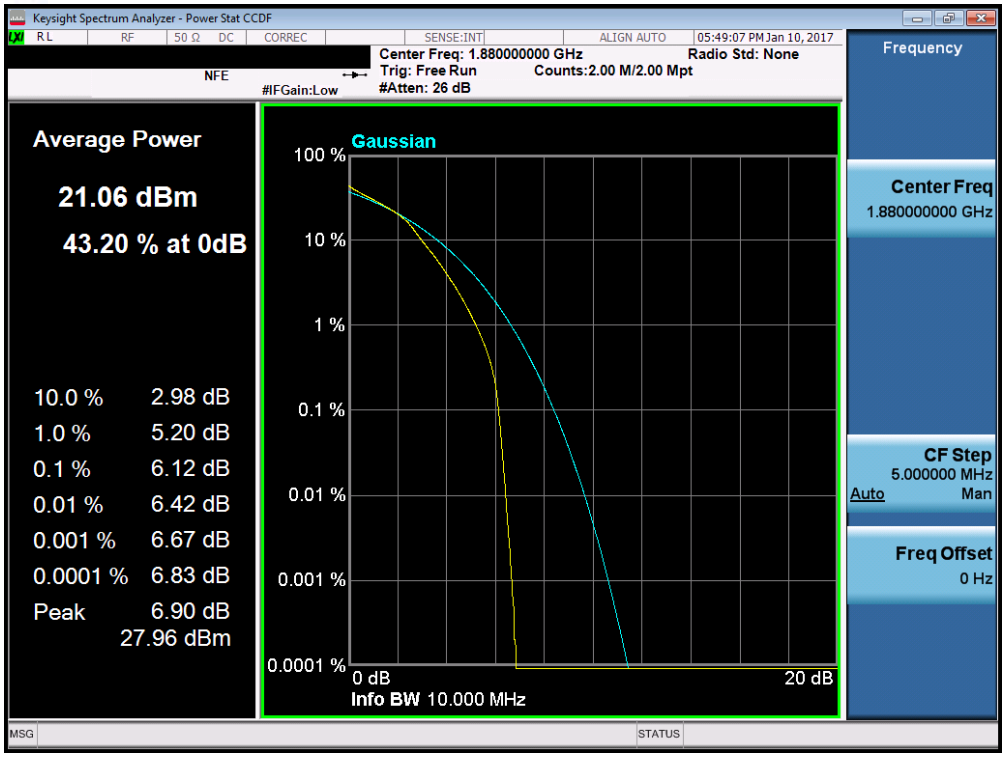


Plot 7-196. PAR Plot (Band 2/25 – 5.0MHz 64-QAM – RB Size 25)

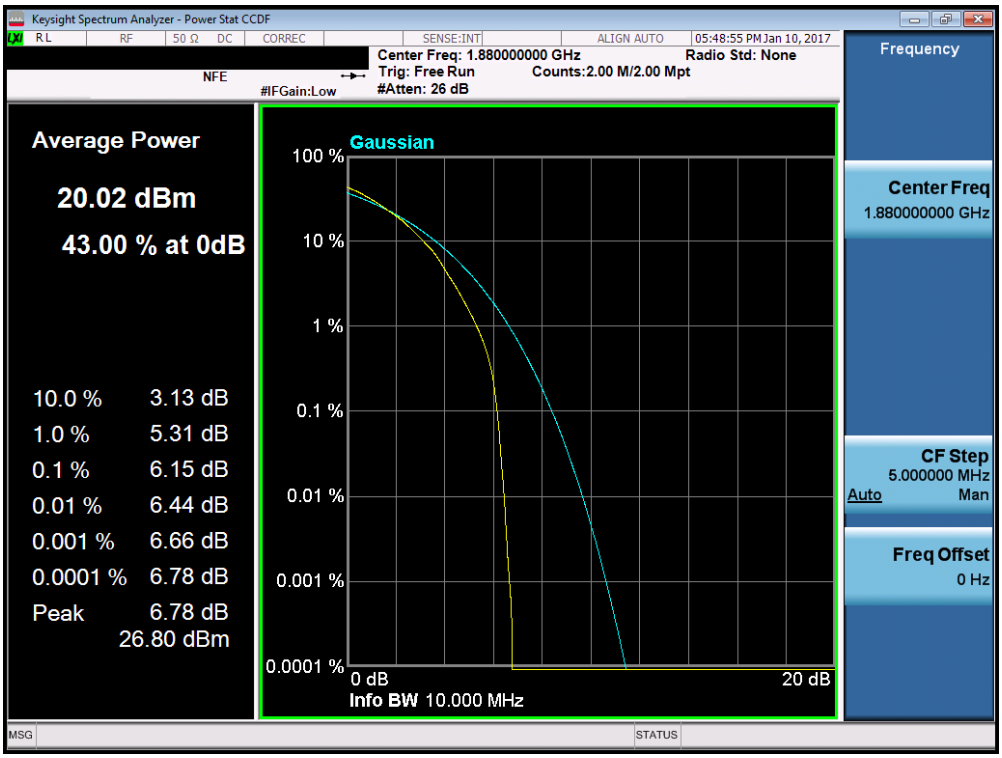


Plot 7-197. PAR Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

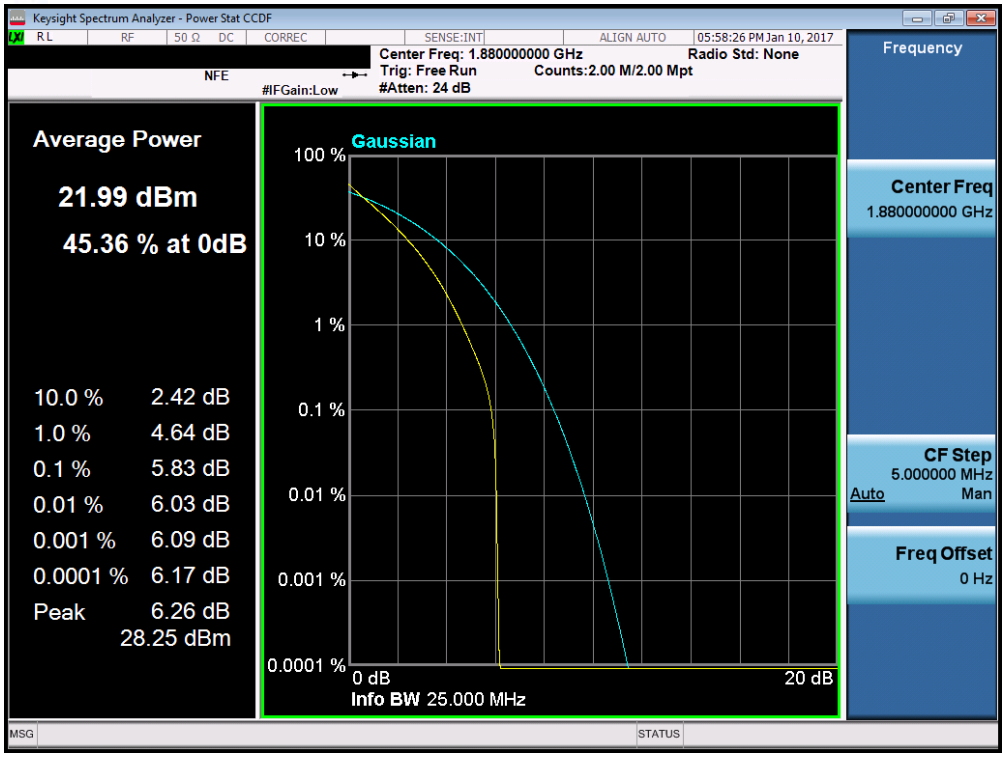


Plot 7-198. PAR Plot (Band 2/25 – 10.0MHz 16-QAM – RB Size 50)

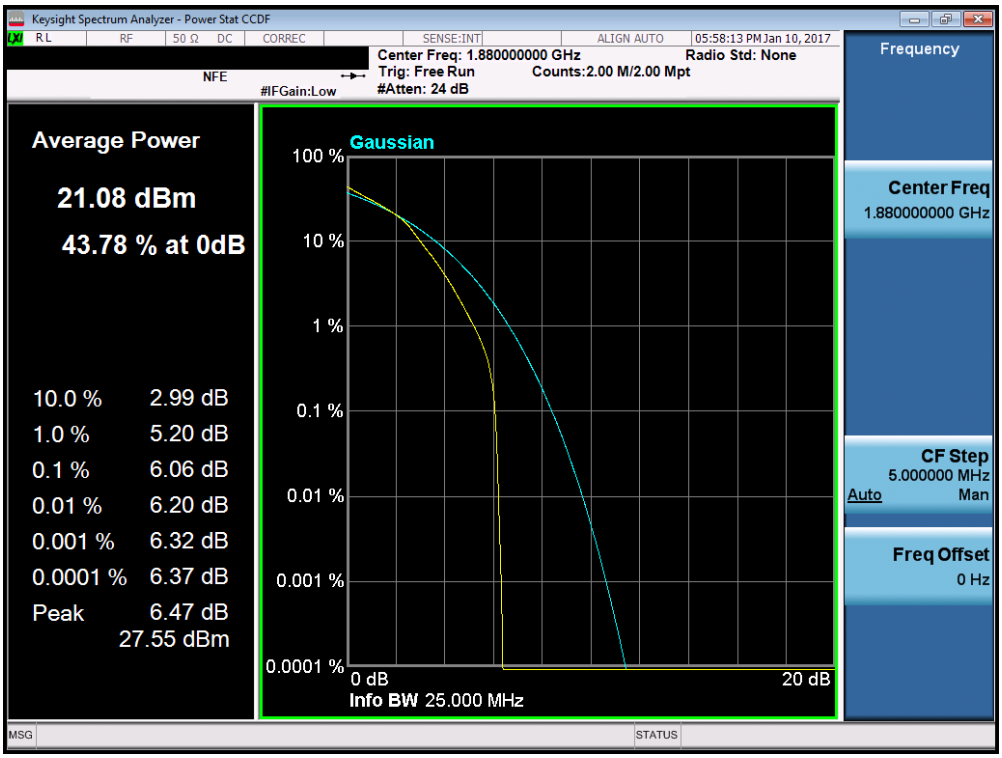


Plot 7-199. PAR Plot (Band 2/25 – 10.0MHz 64-QAM – RB Size 50)

© 2017 PCTEST Engineering Laboratory, Inc.

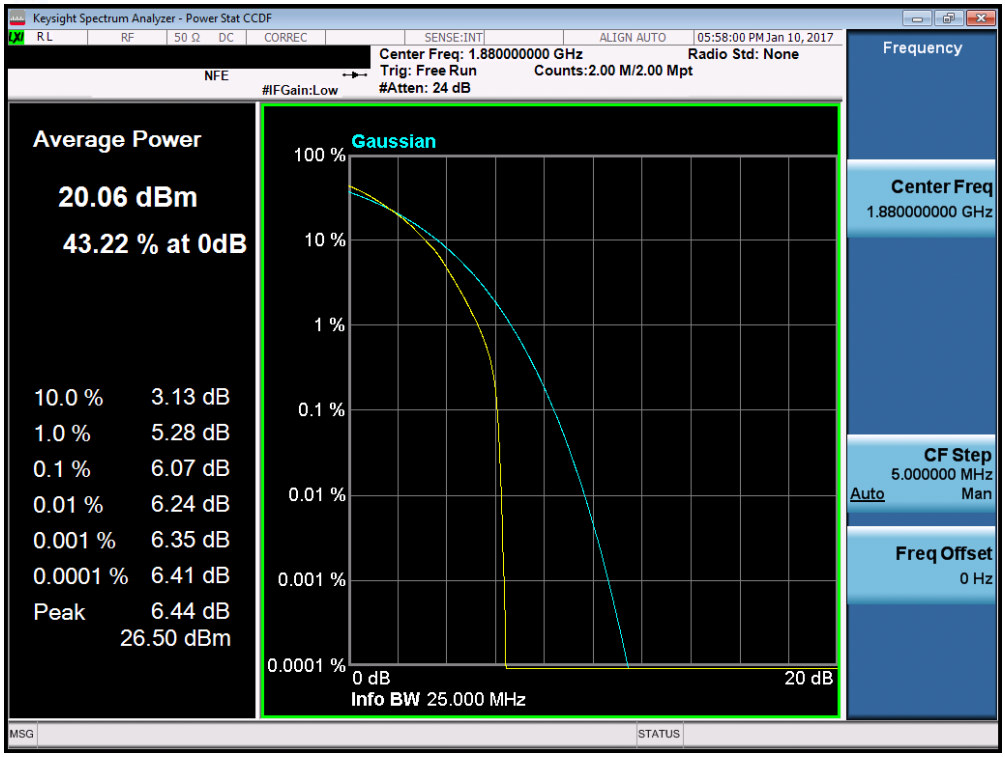


Plot 7-200. PAR Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

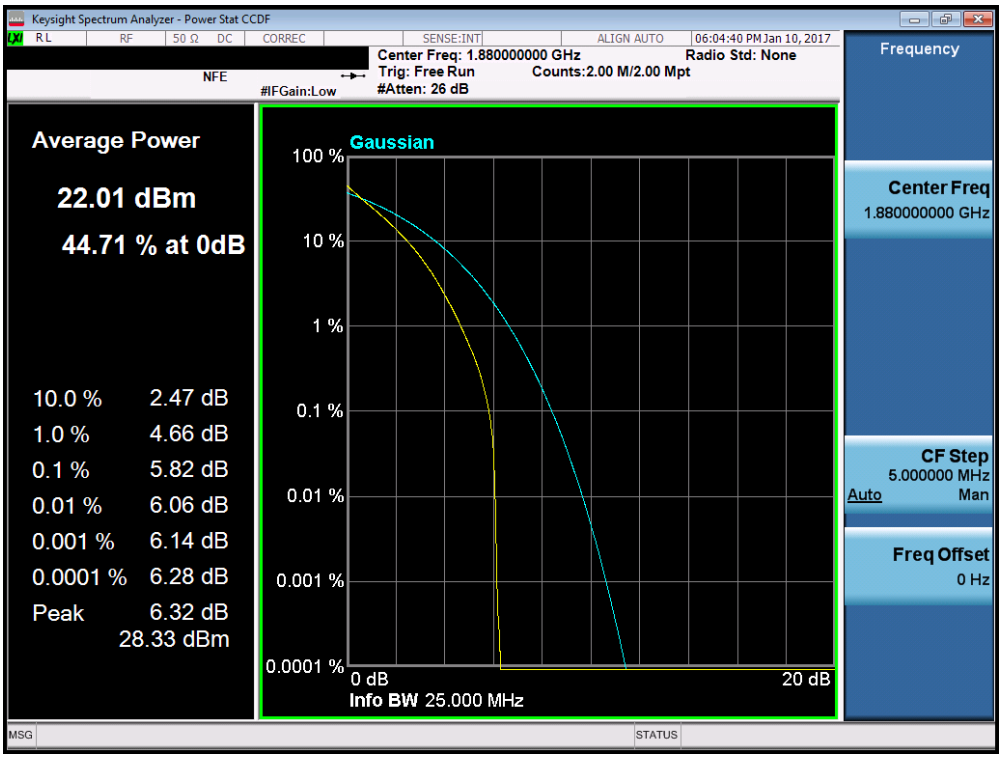


Plot 7-201. PAR Plot (Band 2/25 – 15.0MHz 16-QAM – RB Size 75)

© 2017 PCTEST Engineering Laboratory, Inc.

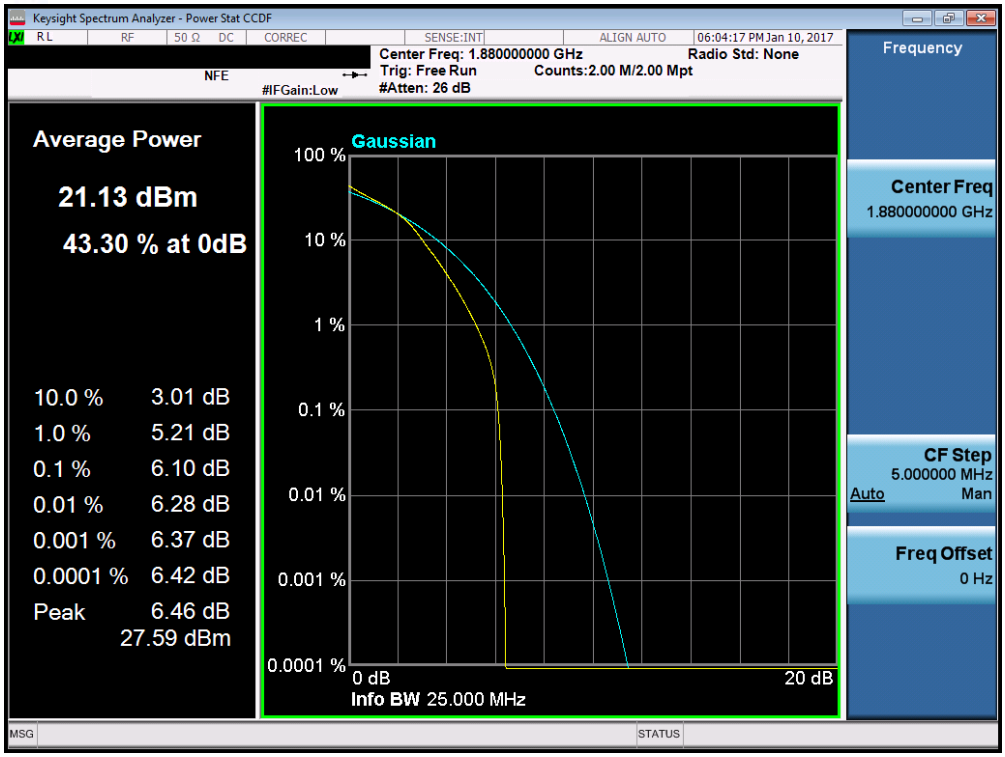


Plot 7-202. PAR Plot (Band 2/25 – 15.0MHz 64-QAM – RB Size 75)

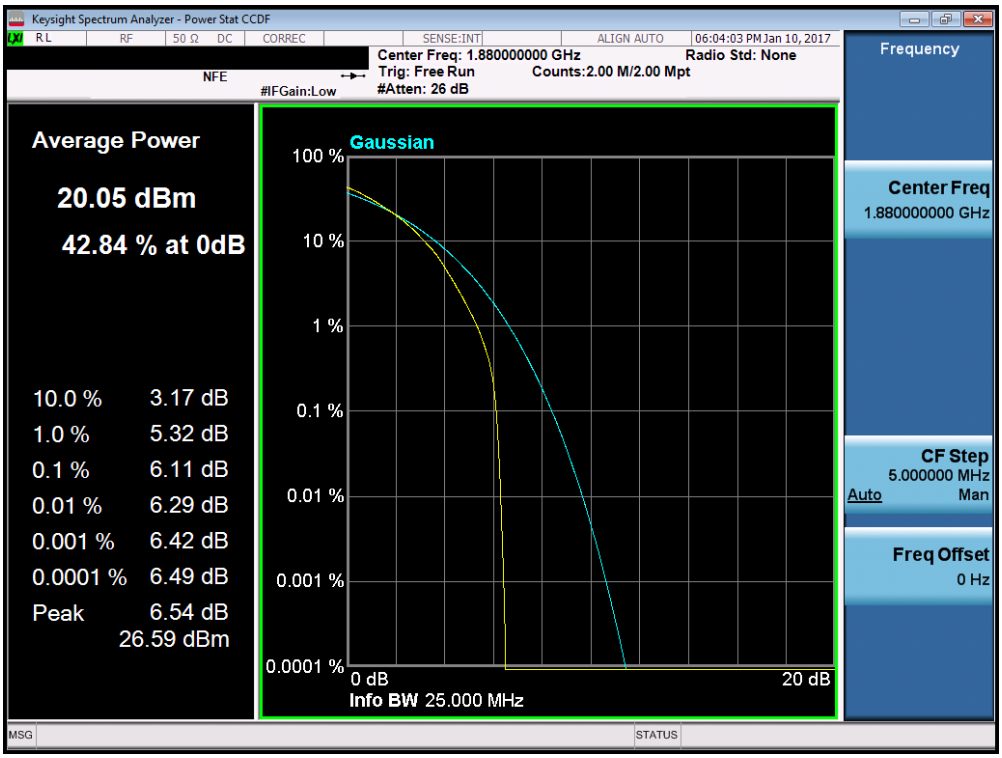


Plot 7-203. PAR Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

© 2017 PCTEST Engineering Laboratory, Inc.



Plot 7-204. PAR Plot (Band 2/25 – 20.0MHz 16-QAM – RB Size 100)



Plot 7-205. PAR Plot (Band 2/25 – 20.0MHz 64-QAM – RB Size 100)

© 2017 PCTEST Engineering Laboratory, Inc.

7.6 Radiated Power (ERP/EIRP)

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

© 2017 PCTEST Engineering Laboratory, Inc.

Test Setup

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

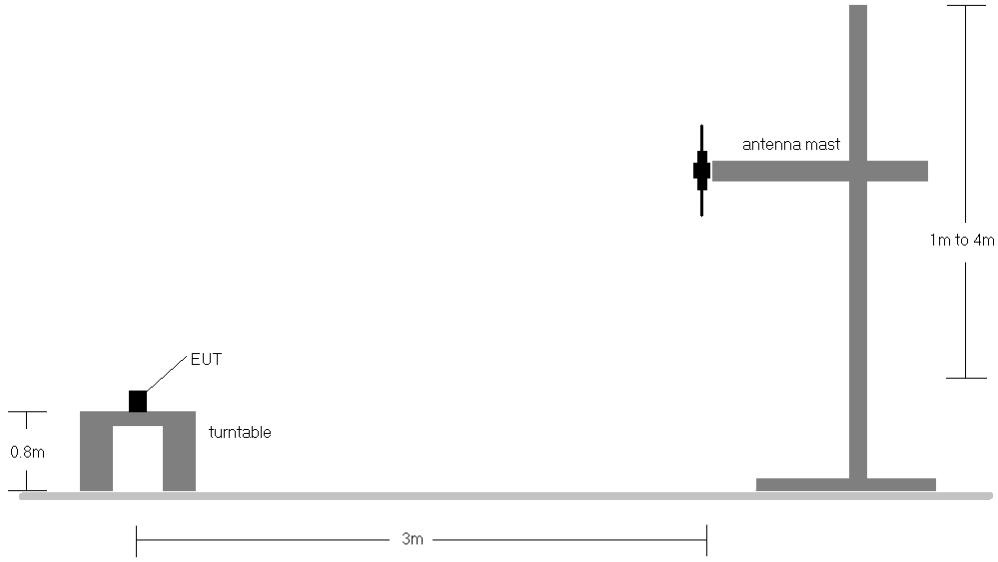


Figure 7-5. Radiated Test Setup <1GHz

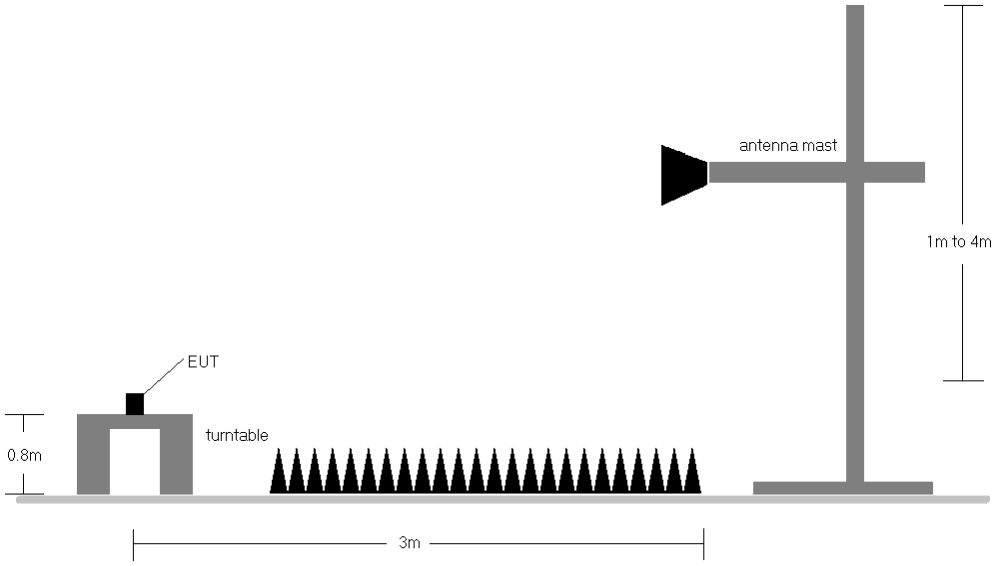


Figure 7-6. Radiated Test Setup >1GHz

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.

© 2017 PCTEST Engineering Laboratory, Inc.

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	286	78	1 / 0	11.36	2.85	14.21	34.77	-20.56
707.50	1.4	QPSK	H	286	75	1 / 0	11.21	2.99	14.20	34.77	-20.57
715.30	1.4	QPSK	H	290	73	1 / 0	10.37	3.06	13.43	34.77	-21.34
699.70	1.4	16-QAM	H	286	78	1 / 0	10.49	2.85	13.34	34.77	-21.43
700.50	3	QPSK	H	286	78	1 / 7	11.58	2.85	14.43	34.77	-20.34
707.50	3	QPSK	H	286	75	1 / 0	11.24	2.99	14.23	34.77	-20.54
714.50	3	QPSK	H	290	73	1 / 0	10.71	3.05	13.76	34.77	-21.01
700.50	3	16-QAM	H	286	78	1 / 7	10.62	2.85	13.47	34.77	-21.30

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	78	1 / 0	11.63	2.88	14.51	34.77	-20.27
707.50	5	QPSK	H	286	75	1 / 0	11.37	2.99	14.36	34.77	-20.41
713.50	5	QPSK	H	290	73	1 / 0	11.09	3.04	14.13	34.77	-20.64
701.50	5	16-QAM	H	286	78	1 / 0	10.53	2.88	13.41	34.77	-21.37
704.00	10	QPSK	H	286	78	1 / 25	11.39	2.94	14.33	34.77	-20.45
707.50	10	QPSK	H	286	75	1 / 0	11.29	2.99	14.28	34.77	-20.49
711.00	10	QPSK	H	290	73	1 / 25	11.29	3.02	14.31	34.77	-20.46
704.00	10	16-QAM	H	286	78	1 / 25	10.35	2.94	13.29	34.77	-21.49
701.50	5	QPSK	V	145	341	1 / 0	10.40	2.88	13.28	34.77	-21.50
701.50	5 (WCP)	QPSK	H	276	83	1 / 0	11.52	2.88	14.40	34.77	-20.38

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

© 2017 PCTEST Engineering Laboratory, Inc.

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]
779.50	5	QPSK	H	115	276	1 / 24	16.80	3.85	20.65	34.77	-14.12
782.00	5	QPSK	H	240	269	1 / 0	17.19	3.92	21.11	34.77	-13.66
784.50	5	QPSK	H	240	264	1 / 24	17.78	4.02	21.80	34.77	-12.97
784.50	5	16-QAM	H	240	264	1 / 24	16.71	4.02	20.73	34.77	-14.04
782.00	10	QPSK	H	237	263	1 / 25	17.14	3.92	21.06	34.77	-13.71
782.00	10	16-QAM	H	237	263	1 / 25	16.01	3.92	19.93	34.77	-14.84
784.50	5	QPSK	V	174	86	1 / 74	16.92	4.02	20.94	34.77	-13.83
784.50	5 (WCP)	QPSK	H	233	279	1 / 49	17.66	4.02	21.68	34.77	-13.09

Table 7-4. ERP Data (Band 13)

© 2017 PCTEST Engineering Laboratory, Inc.

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	197	262	1 / 3	16.09	5.36	21.45	38.45	-17.00
836.50	1.4	QPSK	H	203	265	1 / 0	14.49	5.15	19.64	38.45	-18.81
848.30	1.4	QPSK	H	202	269	1 / 3	14.61	5.16	19.77	38.45	-18.68
824.70	1.4	16-QAM	H	197	262	1 / 3	15.09	5.36	20.45	38.45	-18.00
825.50	3	QPSK	H	197	262	1 / 0	16.21	5.35	21.56	38.45	-16.89
836.50	3	QPSK	H	203	265	1 / 0	14.76	5.15	19.91	38.45	-18.54
847.50	3	QPSK	H	202	269	1 / 14	14.82	5.14	19.96	38.45	-18.49
825.50	3	16-QAM	H	197	262	1 / 0	15.24	5.35	20.59	38.45	-17.86
826.50	5	QPSK	H	197	262	1 / 0	16.33	5.34	21.67	38.45	-16.78
836.50	5	QPSK	H	203	265	1 / 0	14.99	5.15	20.14	38.45	-18.31
846.50	5	QPSK	H	202	269	1 / 24	14.93	5.13	20.06	38.45	-18.39
826.50	5	16-QAM	H	197	262	1 / 0	15.33	5.34	20.67	38.45	-17.78
829.00	10	QPSK	H	197	262	1 / 25	15.99	5.30	21.29	38.45	-17.16
836.50	10	QPSK	H	203	265	1 / 0	15.43	5.15	20.58	38.45	-17.87
844.00	10	QPSK	H	202	269	1 / 0	14.62	5.11	19.73	38.45	-18.72
829.00	10	16-QAM	H	197	262	1 / 25	15.04	5.30	20.34	38.45	-18.11
831.50	15	QPSK	H	195	260	1 / 0	15.94	5.25	21.19	38.45	-17.27
836.50	15	QPSK	H	200	261	1 / 0	15.35	5.15	20.50	38.45	-17.95
841.50	15	QPSK	H	200	270	1 / 0	14.73	5.11	19.84	38.45	-18.61
831.50	15	16-QAM	H	195	260	1 / 0	15.11	5.25	20.36	38.45	-18.10
826.50	5	QPSK	V	184	338	1 / 0	13.17	5.34	18.51	38.45	-19.94
826.50	5 (WCP)	QPSK	H	214	269	1 / 0	16.19	5.34	21.53	38.45	-16.92

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

© 2017 PCTEST Engineering Laboratory, Inc.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	100	153	1 / 0	12.47	9.62	22.09	30.00	-7.91
1732.50	1.4	QPSK	H	100	203	1 / 0	12.57	9.50	22.07	30.00	-7.93
1754.30	1.4	QPSK	H	100	202	1 / 0	12.41	9.38	21.79	30.00	-8.21
1710.70	1.4	16-QAM	H	100	153	1 / 0	11.49	9.62	21.11	30.00	-8.89
1711.50	3	QPSK	H	100	153	1 / 0	12.73	9.62	22.35	30.00	-7.65
1732.50	3	QPSK	H	100	203	1 / 0	12.62	9.50	22.12	30.00	-7.88
1753.50	3	QPSK	H	100	202	1 / 0	12.74	9.39	22.13	30.00	-7.87
1711.50	3	16-QAM	H	100	153	1 / 0	11.76	9.62	21.38	30.00	-8.62
1712.50	5	QPSK	H	100	159	1 / 0	12.86	9.61	22.47	30.00	-7.53
1732.50	5	QPSK	H	100	200	1 / 0	12.68	9.50	22.18	30.00	-7.82
1752.50	5	QPSK	H	100	202	1 / 24	13.11	9.39	22.50	30.00	-7.50
1752.50	5	16-QAM	H	100	202	1 / 24	12.10	9.39	21.49	30.00	-8.51
1715.00	10	QPSK	H	100	166	1 / 0	12.77	9.60	22.37	30.00	-7.63
1732.50	10	QPSK	H	100	204	1 / 0	12.59	9.50	22.09	30.00	-7.91
1750.00	10	QPSK	H	100	201	1 / 49	13.03	9.41	22.44	30.00	-7.56
1750.00	10	16-QAM	H	100	201	1 / 49	12.14	9.41	21.55	30.00	-8.45
1717.50	15	QPSK	H	100	159	1 / 0	12.51	9.58	22.09	30.00	-7.91
1732.50	15	QPSK	H	100	203	1 / 37	12.38	9.50	21.88	30.00	-8.12
1747.50	15	QPSK	H	100	202	1 / 74	12.40	9.42	21.82	30.00	-8.18
1717.50	15	16-QAM	H	100	159	1 / 0	11.54	9.58	21.12	30.00	-8.88
1720.00	20	QPSK	H	100	165	1 / 0	12.47	9.57	22.04	30.00	-7.96
1732.50	20	QPSK	H	100	200	1 / 0	12.34	9.50	21.84	30.00	-8.16
1745.00	20	QPSK	H	100	200	1 / 99	12.32	9.43	21.75	30.00	-8.25
1720.00	20	16-QAM	H	100	165	1 / 0	11.69	9.57	21.26	30.00	-8.74
1752.50	5	QPSK	V	144	124	1 / 0	12.53	9.39	21.92	30.00	-8.08
1752.50	5 (WCP)	QPSK	H	100	196	1 / 0	12.98	9.39	22.37	30.00	-7.63

Table 7-6. EIRP Data (Band 4)

© 2017 PCTEST Engineering Laboratory, Inc.

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	110	51	1 / 0	12.03	8.97	21.00	33.01	-12.01
1880.00	1.4	QPSK	V	110	55	1 / 0	12.51	8.99	21.50	33.01	-11.51
1909.30	1.4	QPSK	V	110	151	1 / 0	11.77	8.98	20.75	33.01	-12.26
1880.00	1.4	16-QAM	V	110	55	1 / 0	11.80	8.99	20.79	33.01	-12.22
1851.50	3	QPSK	V	110	60	1 / 0	9.30	8.97	18.27	33.01	-14.74
1880.00	3	QPSK	V	110	53	1 / 0	12.60	8.99	21.59	33.01	-11.42
1908.50	3	QPSK	V	110	161	1 / 0	11.73	8.98	20.71	33.01	-12.30
1880.00	3	16-QAM	V	110	53	1 / 0	11.89	8.99	20.88	33.01	-12.13
1852.50	5	QPSK	V	110	65	1 / 0	12.14	8.97	21.11	33.01	-11.90
1880.00	5	QPSK	V	110	69	1 / 0	12.50	8.99	21.49	33.01	-11.52
1907.50	5	QPSK	V	110	150	1 / 0	11.60	8.99	20.59	33.01	-12.42
1880.00	5	16-QAM	V	110	69	1 / 0	10.80	8.99	19.79	33.01	-13.22
1855.00	10	QPSK	V	110	81	1 / 0	12.18	8.97	21.15	33.01	-11.86
1880.00	10	QPSK	V	110	80	1 / 0	12.45	8.99	21.44	33.01	-11.57
1905.00	10	QPSK	V	110	142	1 / 0	11.55	8.99	20.54	33.01	-12.47
1880.00	10	16-QAM	V	110	80	1 / 0	10.87	8.99	19.86	33.01	-13.15
1857.50	15	QPSK	V	110	85	1 / 0	12.13	8.97	21.10	33.01	-11.91
1880.00	15	QPSK	V	110	79	1 / 0	11.41	8.99	20.40	33.01	-12.61
1902.50	15	QPSK	V	110	122	1 / 0	11.39	9.00	20.39	33.01	-12.62
1857.50	15	16-QAM	V	110	85	1 / 0	11.22	8.97	20.19	33.01	-12.82
1860.00	20	QPSK	V	110	79	1 / 99	12.19	8.98	21.17	33.01	-11.84
1880.00	20	QPSK	V	110	69	1 / 50	12.36	8.99	21.35	33.01	-11.66
1900.00	20	QPSK	V	110	166	1 / 0	12.09	9.00	21.09	33.01	-11.92
1880.00	20	16-QAM	V	110	69	1 / 50	11.32	8.99	20.31	33.01	-12.70
1880.00	3	QPSK	H	110	233	1 / 0	11.47	8.99	20.46	33.01	-12.55
1880.00	3 (WCP)	QPSK	H	110	174	1 / 0	11.55	8.99	20.54	33.01	-12.47

Table 7-7. EIRP Data (Band 2/25)

© 2017 PCTEST Engineering Laboratory, Inc.

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	112	211	1 / 0	13.40	8.39	21.79	33.01	-11.22
2593.00	5	QPSK	H	108	214	1 / 0	13.49	8.74	22.23	33.01	-10.78
2687.50	5	QPSK	H	100	22	1 / 0	13.25	8.73	21.98	33.01	-11.03
2593.00	5	16-QAM	H	108	214	1 / 0	12.93	8.74	21.67	33.01	-11.34
2501.00	10	QPSK	H	100	230	1 / 0	13.26	8.38	21.64	33.01	-11.37
2593.00	10	QPSK	H	108	217	1 / 0	13.42	8.74	22.16	33.01	-10.85
2685.00	10	QPSK	H	100	224	1 / 0	13.23	8.73	21.96	33.01	-11.05
2593.00	10	16-QAM	H	108	217	1 / 0	12.80	8.74	21.54	33.01	-11.47
2503.50	15	QPSK	H	100	211	1 / 0	13.19	8.39	21.58	33.01	-11.43
2593.00	15	QPSK	H	100	209	1 / 0	13.36	8.74	22.10	33.01	-10.91
2682.50	15	QPSK	H	100	219	1 / 0	13.29	8.73	22.02	33.01	-10.99
2593.00	15	16-QAM	H	100	209	1 / 0	12.66	8.74	21.40	33.01	-11.61
2506.00	20	QPSK	H	100	208	1 / 0	13.25	8.40	21.65	33.01	-11.36
2593.00	20	QPSK	H	100	211	1 / 0	13.34	8.74	22.08	33.01	-10.93
2680.00	20	QPSK	H	100	211	1 / 0	13.30	8.73	22.03	33.01	-10.98
2680.00	20	16-QAM	H	100	211	1 / 0	12.75	8.73	21.48	33.01	-11.53
2593.00	5	QPSK	V	166	87	1 / 0	12.34	8.74	21.08	33.01	-11.93
2593.00	5 (WCP)	QPSK	H	100	222	1 / 0	13.43	8.74	22.17	33.01	-10.84

Table 7-8. EIRP Data (Band 41)

© 2017 PCTEST Engineering Laboratory, Inc.

7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §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

© 2017 PCTEST Engineering Laboratory, Inc.

Test Setup

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

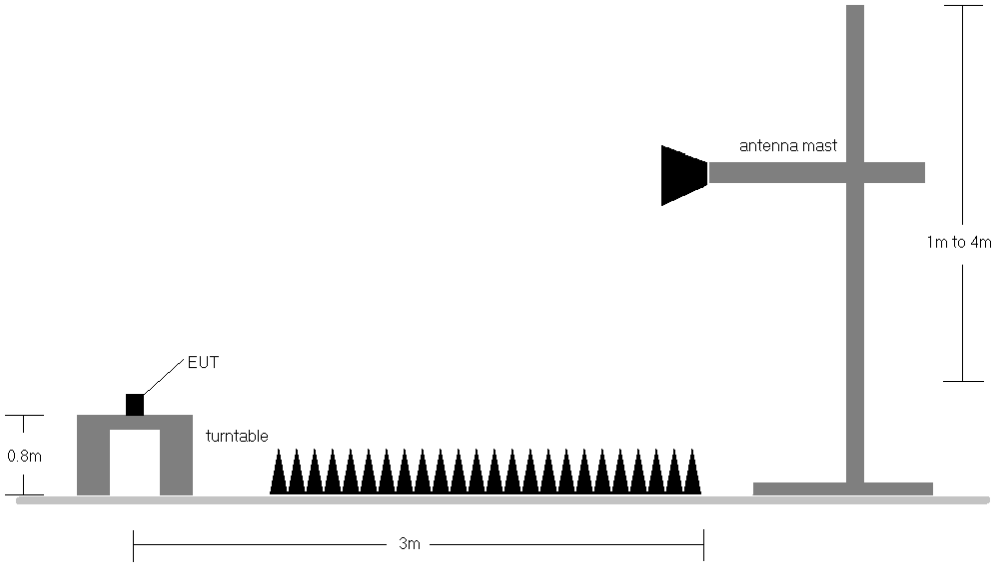


Figure 7-7. Test Instrument & Measurement Setup

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.

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	701.50	MHz		
CHANNEL:	23035			
MEASURED OUTPUT POWER:	14.51	dBm	=	0.028 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	27.51	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	110	195	-65.83	5.60	-60.23	74.7
2104.50	H	-	-	-68.31	6.67	-61.63	76.1
2806.00	H	-	-	-67.14	7.92	-59.22	73.7

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

OPERATING FREQUENCY:	707.50	MHz		
CHANNEL:	23095			
MEASURED OUTPUT POWER:	14.36	dBm	=	0.027 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	27.36	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	-	-	-69.69	5.69	-63.99	78.4
2122.50	H	110	64	-64.52	6.75	-57.77	72.1
2830.00	H	-	-	-67.12	7.90	-59.22	73.6

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

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	713.50	MHz		
CHANNEL:	23155			
MEASURED OUTPUT POWER:	14.13	dBm	=	0.026 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	27.13	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	H	110	195	-66.51	5.79	-60.72	74.9
2140.50	H	-	-	-65.96	6.82	-59.14	73.3
2854.00	H	-	-	-66.19	7.88	-58.31	72.4

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

OPERATING FREQUENCY:	701.50	MHz		
CHANNEL:	23035			
MEASURED OUTPUT POWER:	14.40	dBm	=	0.028 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	27.40	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	110	204	-67.05	5.60	-61.45	75.8
2104.50	H	-	-	-70.26	6.67	-63.58	78.0
2806.00	H	-	-	-69.35	7.92	-61.43	75.8

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

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	779.50	MHz		
CHANNEL:	23205			
MEASURED OUTPUT POWER:	20.65	dBm	=	0.116 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.65	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]
2338.50	H	-	-	-70.53	7.35	-63.18	83.8
3118.00	H	-	-	-66.77	7.19	-59.58	80.2
3897.50	H	-	-	-65.01	7.31	-57.70	78.3

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

OPERATING FREQUENCY:	782.00	MHz		
CHANNEL:	23230			
MEASURED OUTPUT POWER:	21.11	dBm	=	0.129 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.11	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]
2346.00	H	-	-	-68.70	7.33	-61.38	82.5
3128.00	H	-	-	-64.37	7.20	-57.17	78.3
3910.00	H	-	-	-62.66	7.34	-55.32	76.4

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

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	784.50	MHz		
CHANNEL:	23255			
MEASURED OUTPUT POWER:	21.80	dBm	=	0.151 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.80	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]
2353.50	H	-	-	-68.07	7.30	-60.77	82.6
3138.00	H	-	-	-64.60	7.21	-57.39	79.2
3922.50	H	-	-	-62.36	7.37	-54.99	76.8

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	H	-	-	-70.73	6.55	-64.17	-24.2
1564.00	H	-	-	-70.64	6.57	-64.07	-24.1
1569.00	H	-	-	-70.33	6.59	-63.74	-23.7

Table 7-16. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	784.50	MHz		
CHANNEL:	23255			
MEASURED OUTPUT POWER:	21.68	dBm	=	0.147 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.68	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2353.50	H	-	-	-68.74	7.30	-61.44	83.1
3138.00	H	-	-	-64.69	7.21	-57.48	79.2
3922.50	H	-	-	-62.97	7.37	-55.60	77.3

Table 7-17. Radiated Spurious Data with WCP (Band 13 – High Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1569.00	H	-	-	-70.14	6.59	-63.55	-23.6

Table 7-18. Radiated Spurious Data with WCP (Band 13 – 1559-1610MHz Band)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	826.50	MHz		
CHANNEL:	20425			
MEASURED OUTPUT POWER:	21.67	dBm	=	0.147 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.67	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]
1653.00	H	-	-	-70.50	6.70	-63.81	85.5
2479.50	H	-	-	-66.57	7.54	-59.03	80.7
3306.00	H	-	-	-63.91	7.38	-56.53	78.2

Table 7-19. Radiated Spurious Data (Band 5/26 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz		
CHANNEL:	20525			
MEASURED OUTPUT POWER:	20.14	dBm	=	0.103 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.14	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	-	-	-70.56	6.70	-63.87	84.0
2509.50	H	-	-	-67.61	7.63	-59.98	80.1
3346.00	H	-	-	-64.90	7.51	-57.39	77.5

Table 7-20. Radiated Spurious Data (Band 5/26 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	846.50	MHz		
CHANNEL:	20625			
MEASURED OUTPUT POWER:	20.06	dBm	=	0.101 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.06	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]
1693.00	H	110	265	-67.88	6.70	-61.18	81.2
2539.50	H	-	-	-67.46	7.60	-59.86	79.9
3386.00	H	-	-	-64.83	7.65	-57.18	77.2

Table 7-21. Radiated Spurious Data (Band 5/26 – High Channel)

OPERATING FREQUENCY:	826.50	MHz		
CHANNEL:	20425			
MEASURED OUTPUT POWER:	21.53	dBm	=	0.142 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.53	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]
1653.00	H	180	212	-58.25	6.70	-51.56	73.1
2479.50	H	-	-	-68.38	7.63	-60.75	82.3
3306.00	H	-	-	-64.75	7.51	-57.24	78.8

Table 7-22. Radiated Spurious Data with WCP (Band 5/26 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	1712.50	MHz		
CHANNEL:	19975			
MEASURED OUTPUT POWER:	22.47	dBm	=	0.177 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.47	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]
3425.00	H	110	200	-62.12	9.87	-52.25	74.7
5137.50	H	-	-	-65.22	10.76	-54.47	76.9
6850.00	H	-	-	-59.84	11.67	-48.17	70.6

Table 7-23. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY:	1732.50	MHz		
CHANNEL:	20175			
MEASURED OUTPUT POWER:	22.18	dBm	=	0.165 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.18	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]
3465.00	H	110	218	-59.30	9.91	-49.39	71.6
5197.50	H	-	-	-64.76	10.75	-54.02	76.2
6930.00	H	-	-	-60.23	11.76	-48.47	70.7

Table 7-24. Radiated Spurious Data (Band 4 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	1752.50	MHz		
CHANNEL:	20375			
MEASURED OUTPUT POWER:	22.50	dBm	=	0.178 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.50	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]
3505.00	H	110	228	-60.54	9.95	-50.59	73.1
5257.50	H	-	-	-65.05	10.71	-54.34	76.8
7010.00	H	-	-	-59.48	11.83	-47.65	70.2

Table 7-25. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY:	1752.50	MHz		
CHANNEL:	20375			
MEASURED OUTPUT POWER:	22.37	dBm	=	0.173 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.37	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]
3505.00	H	110	230	-61.23	9.95	-51.28	73.7
5257.50	H	-	-	-64.94	10.71	-54.23	76.6
7010.00	H	-	-	-59.41	11.83	-47.58	70.0

Table 7-26. Radiated Spurious Data with WCP (Band 4 – High Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	1851.50	MHz		
CHANNEL:	18615			
MEASURED OUTPUT POWER:	18.27	dBm	=	0.067 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.27	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]
3703.00	H	225	182	-61.55	9.52	-52.02	70.3
5554.50	H	-	-	-65.37	11.02	-54.35	72.6
7406.00	H	-	-	-57.51	10.95	-46.56	64.8

Table 7-27. Radiated Spurious Data (Band 2/25 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz		
CHANNEL:	18900			
MEASURED OUTPUT POWER:	21.59	dBm	=	0.144 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.59	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	H	110	187	-62.75	9.39	-53.37	75.0
5640.00	H	-	-	-65.26	11.22	-54.04	75.6
7520.00	H	-	-	-57.45	11.10	-46.35	67.9

Table 7-28. Radiated Spurious Data (Band 2/25 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	1908.50	MHz		
CHANNEL:	19185			
MEASURED OUTPUT POWER:	20.71	dBm	=	0.118 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.71	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]
3817.00	H	110	190	-62.28	9.32	-52.96	73.7
5725.50	H	-	-	-64.96	11.36	-53.60	74.3
7634.00	H	-	-	-57.63	11.33	-46.30	67.0

Table 7-29. Radiated Spurious Data (Band 2/25 – High Channel)

OPERATING FREQUENCY:	1880.00	MHz		
CHANNEL:	18900			
MEASURED OUTPUT POWER:	20.54	dBm	=	0.113 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.54	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	H	110	207	-62.61	9.39	-53.23	73.8
5640.00	H	-	-	-65.16	11.22	-53.94	74.5
7520.00	H	-	-	-57.61	11.10	-46.51	67.1

Table 7-30. Radiated Spurious Data with WCP (Band 2/25 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	2498.50	MHz		
CHANNEL:	39675			
MEASURED OUTPUT POWER:	21.79	dBm	=	0.151 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	46.79	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
4997.00	H	-	-	-61.98	11.19	-50.79	72.6
7495.50	H	-	-	-54.85	11.14	-43.71	65.5
9994.00	H	-	-	-53.63	12.55	-41.08	62.9

Table 7-31. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz		
CHANNEL:	40620			
MEASURED OUTPUT POWER:	22.23	dBm	=	0.167 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	47.23	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	100	218	-56.99	10.83	-46.16	68.4
7779.00	H	-	-	-54.27	11.60	-42.68	64.9
10372.00	H	-	-	-53.50	12.74	-40.76	63.0

Table 7-32. Radiated Spurious Data (Band 41 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

OPERATING FREQUENCY:	2687.50	MHz		
CHANNEL:	41565			
MEASURED OUTPUT POWER:	21.98	dBm	=	0.158 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	46.98	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
5375.00	H	100	28	-45.61	11.10	-34.52	56.5
8062.50	H	100	29	-43.69	11.56	-32.13	54.1
10750.00	H	-	-	-53.02	13.03	-39.99	62.0

Table 7-33. Radiated Spurious Data (Band 41 – High Channel)

OPERATING FREQUENCY:	2593.00	MHz		
CHANNEL:	40620			
MEASURED OUTPUT POWER:	22.17	dBm	=	0.165 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	47.17	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	100	206	-48.35	10.83	-37.52	59.7
7779.00	H	-	-	-54.90	11.60	-43.31	65.5
10372.00	H	-	-	-53.92	12.74	-41.18	63.4

Table 7-34. Radiated Spurious Data with WCP (Band 41 – Mid Channel)

© 2017 PCTEST Engineering Laboratory, Inc.

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

© 2017 PCTEST Engineering Laboratory, Inc.

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)	707,499,949	-51	-0.0000072
100 %		- 30	707,500,066	66	0.0000093
100 %		- 20	707,499,667	-333	-0.0000471
100 %		- 10	707,499,786	-214	-0.0000302
100 %		0	707,499,674	-326	-0.0000461
100 %		+ 10	707,500,262	262	0.0000370
100 %		+ 20	707,500,106	106	0.0000150
100 %		+ 30	707,500,104	104	0.0000147
100 %		+ 40	707,499,921	-79	-0.0000112
100 %		+ 50	707,499,896	-104	-0.0000147
BATT. ENDPOINT	3.45	+ 20	707,499,543	-457	-0.0000646

Table 7-35. Frequency Stability Data (Band 12/17)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

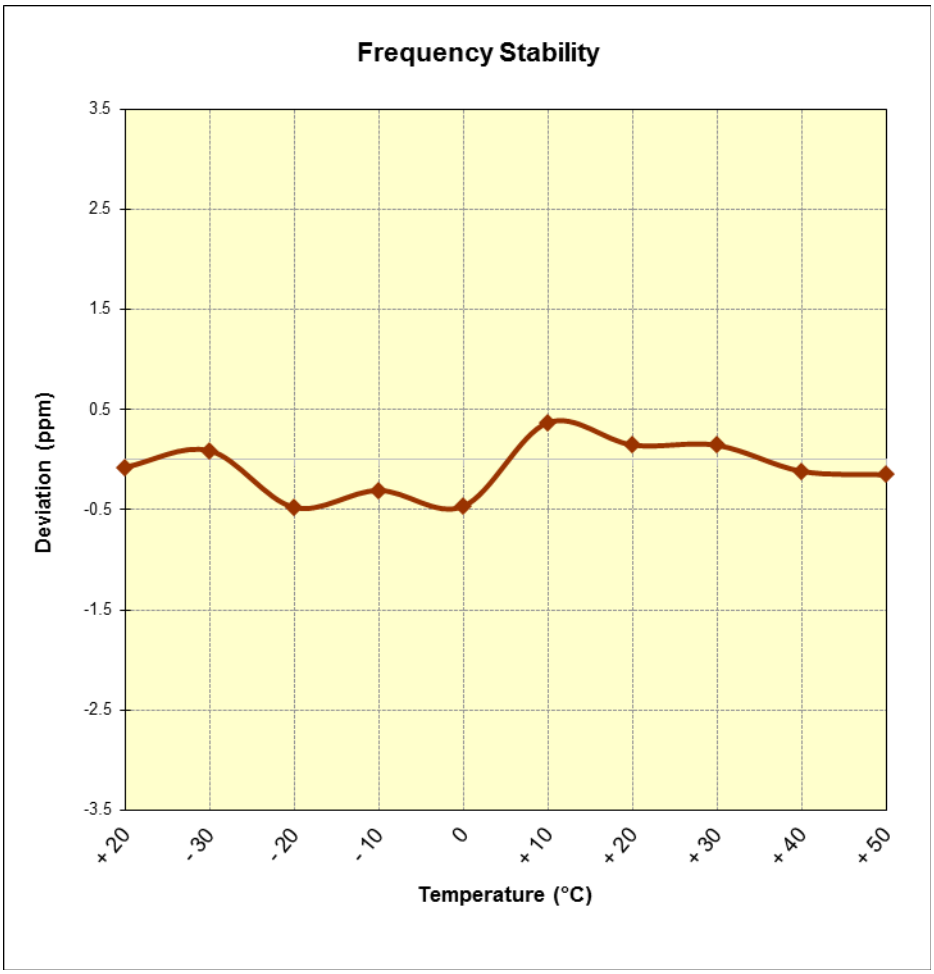


Figure 7-8. Frequency Stability Graph (Band 12/17)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 13 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY: 782,000,000 Hz

CHANNEL: 23230

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	781,999,921	-79	-0.0000101
100 %		- 30	781,999,944	-56	-0.0000072
100 %		- 20	782,000,073	73	0.0000093
100 %		- 10	781,999,871	-129	-0.0000165
100 %		0	782,000,231	231	0.0000295
100 %		+ 10	782,000,247	247	0.0000316
100 %		+ 20	781,999,794	-206	-0.0000263
100 %		+ 30	782,000,030	30	0.0000038
100 %		+ 40	782,000,096	96	0.0000123
100 %		+ 50	781,999,831	-169	-0.0000216
BATT. ENDPOINT	3.45	+ 20	781,999,781	-219	-0.0000280

Table 7-36. Frequency Stability Data (Band 13)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 13 Frequency Stability Measurements

§2.1055 §27.54

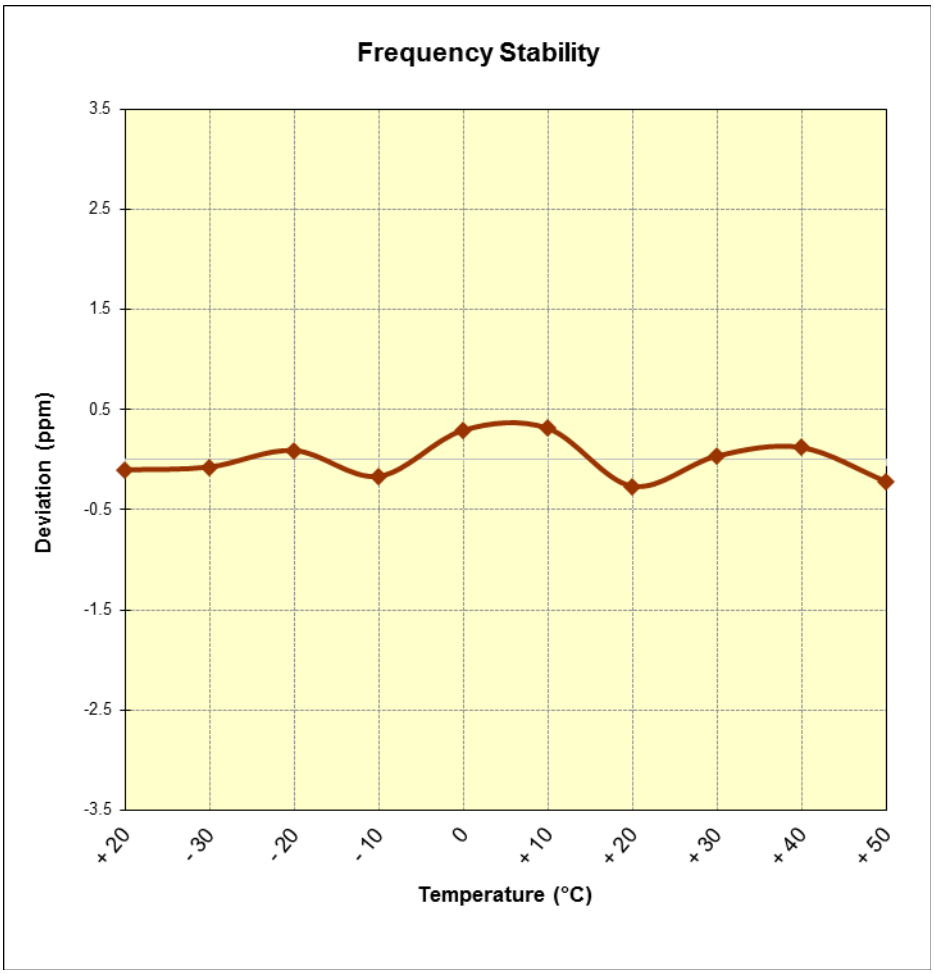


Figure 7-9. Frequency Stability Graph (Band 13)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 5/26 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)	836,500,338	338	0.0000404
100 %		- 30	836,500,013	13	0.0000016
100 %		- 20	836,500,251	251	0.0000300
100 %		- 10	836,500,277	277	0.0000331
100 %		0	836,499,979	-21	-0.0000025
100 %		+ 10	836,499,830	-170	-0.0000203
100 %		+ 20	836,499,713	-287	-0.0000343
100 %		+ 30	836,499,775	-225	-0.0000269
100 %		+ 40	836,499,885	-115	-0.0000137
100 %		+ 50	836,499,836	-164	-0.0000196
BATT. ENDPOINT	3.45	+ 20	836,500,000	0	0.0000000

Table 7-37. Frequency Stability Data (Band 5/26)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355

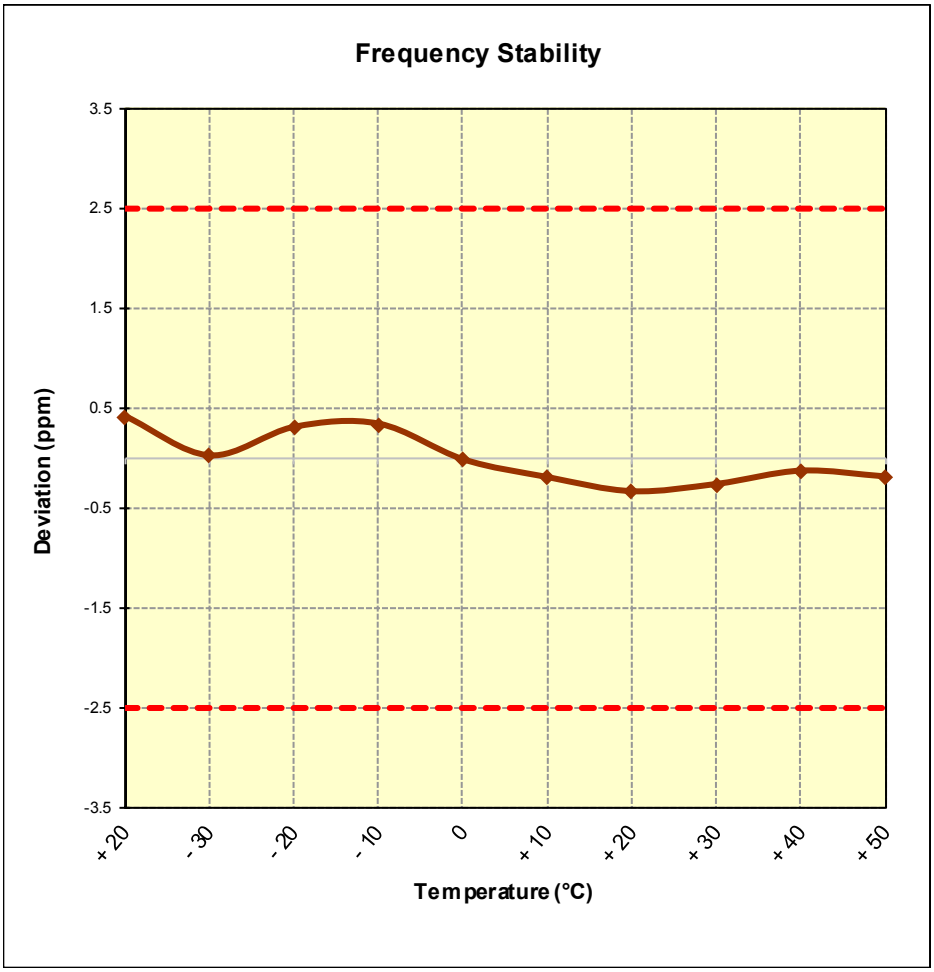


Figure 7-10. Frequency Stability Graph (Band 5/26)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 4 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY:	1,732,500,000	Hz
CHANNEL:	20175	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,499,741	-259	-0.0000149
100 %		- 30	1,732,499,863	-137	-0.0000079
100 %		- 20	1,732,500,002	2	0.0000001
100 %		- 10	1,732,500,109	109	0.0000063
100 %		0	1,732,500,033	33	0.0000019
100 %		+ 10	1,732,500,211	211	0.0000122
100 %		+ 20	1,732,499,971	-29	-0.0000017
100 %		+ 30	1,732,499,641	-359	-0.0000207
100 %		+ 40	1,732,500,050	50	0.0000029
100 %		+ 50	1,732,500,024	24	0.0000014
BATT. ENDPOINT	3.45	+ 20	1,732,499,863	-137	-0.0000079

Table 7-38. 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.

© 2017 PCTEST Engineering Laboratory, Inc.

Band 4 Frequency Stability Measurements

§2.1055 §§27.54

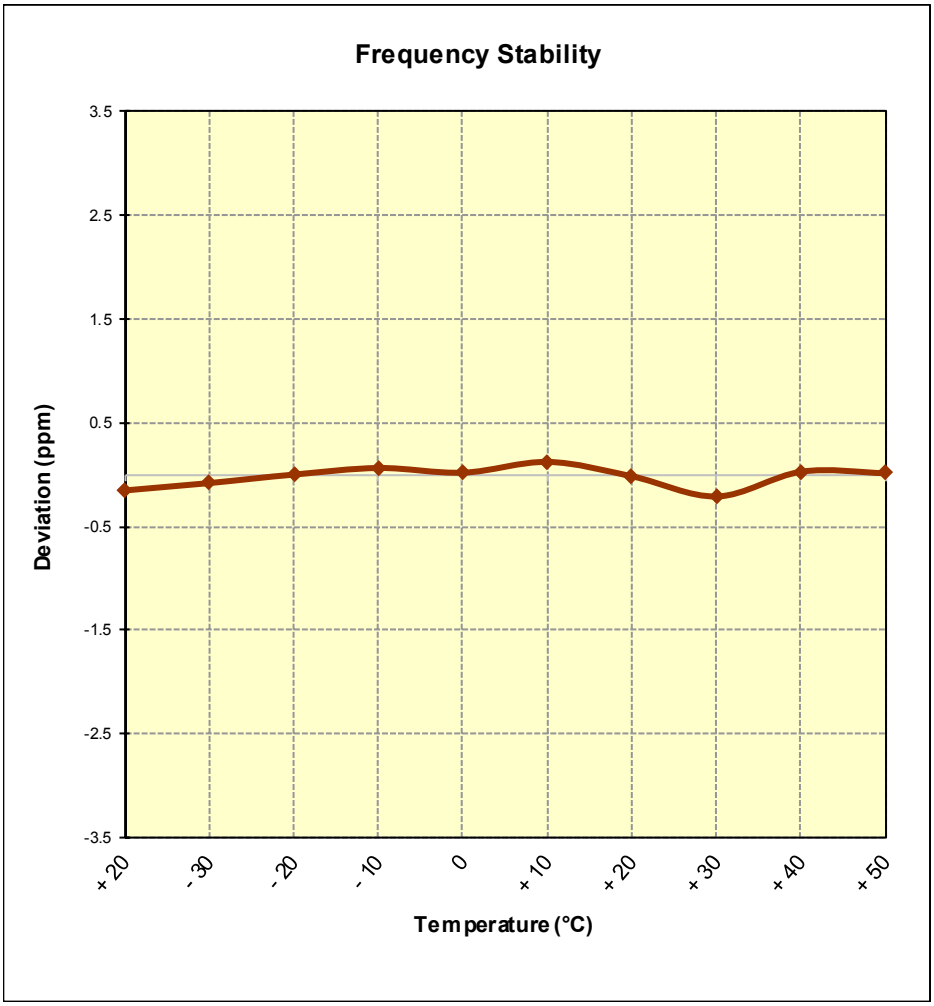


Figure 7-11. Frequency Stability Graph (Band 4)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 2/25 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)	1,880,000,295	295	0.0000157
100 %		- 30	1,879,999,553	-447	-0.0000238
100 %		- 20	1,879,999,911	-89	-0.0000047
100 %		- 10	1,880,000,038	38	0.0000020
100 %		0	1,879,999,868	-132	-0.0000070
100 %		+ 10	1,880,000,174	174	0.0000093
100 %		+ 20	1,880,000,225	225	0.0000120
100 %		+ 30	1,879,999,815	-185	-0.0000098
100 %		+ 40	1,880,000,184	184	0.0000098
100 %		+ 50	1,880,000,254	254	0.0000135
BATT. ENDPOINT	3.45	+ 20	1,880,000,137	137	0.0000073

Table 7-39. Frequency Stability Data (Band 2/25)

Note:

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

© 2017 PCTEST Engineering Laboratory, Inc.

Band 2/25 Frequency Stability Measurements

§2.1055 §24.235

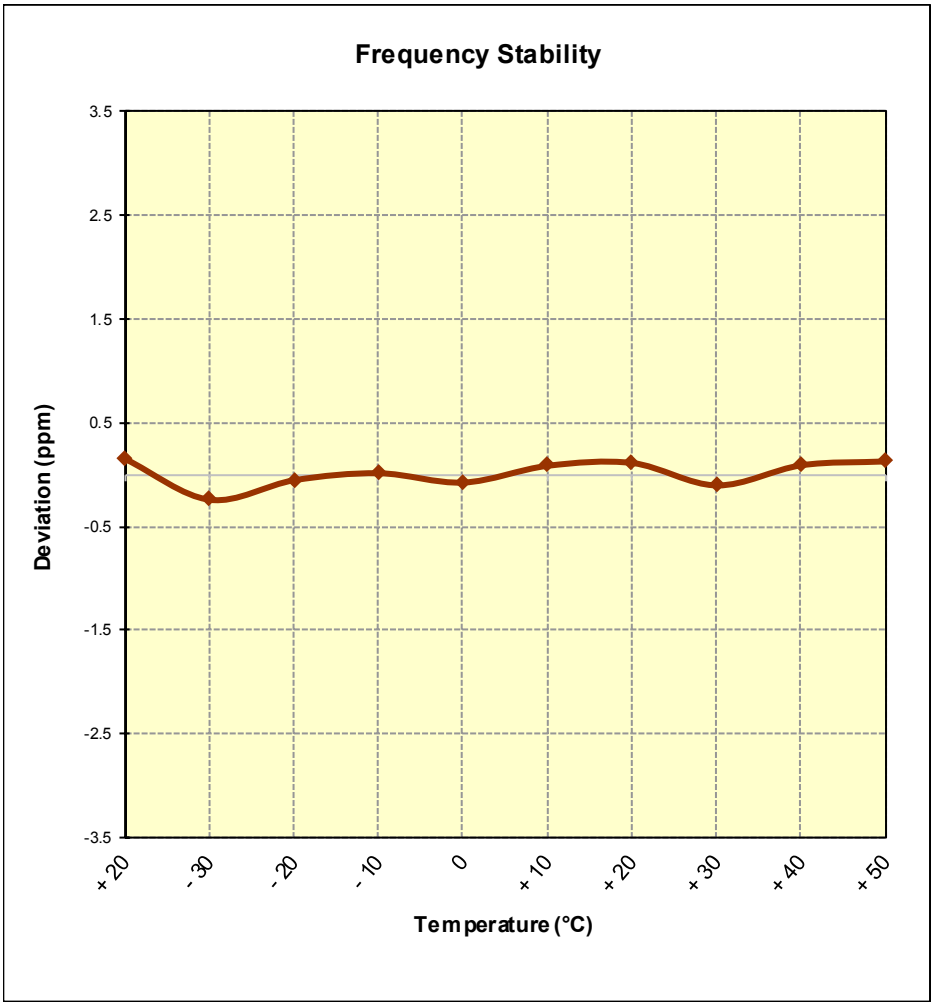


Figure 7-12. Frequency Stability Graph (Band 2/25)

© 2017 PCTEST Engineering Laboratory, Inc.

Band 41 Frequency Stability Measurements

§2.1055 §27.54

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,593,000,282	282	0.0000109
100 %		- 30	2,592,999,903	-97	-0.0000037
100 %		- 20	2,593,000,255	255	0.0000098
100 %		- 10	2,592,999,793	-207	-0.0000080
100 %		0	2,593,000,184	184	0.0000071
100 %		+ 10	2,592,999,921	-79	-0.0000030
100 %		+ 20	2,593,000,216	216	0.0000083
100 %		+ 30	2,593,000,060	60	0.0000023
100 %		+ 40	2,593,000,353	353	0.0000136
100 %		+ 50	2,592,999,928	-72	-0.0000028
BATT. ENDPOINT	3.45	+ 20	2,593,000,179	179	0.0000069

Table 7-40. 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.

© 2017 PCTEST Engineering Laboratory, Inc.

Band 41 Frequency Stability Measurements

§2.1055 §27.54

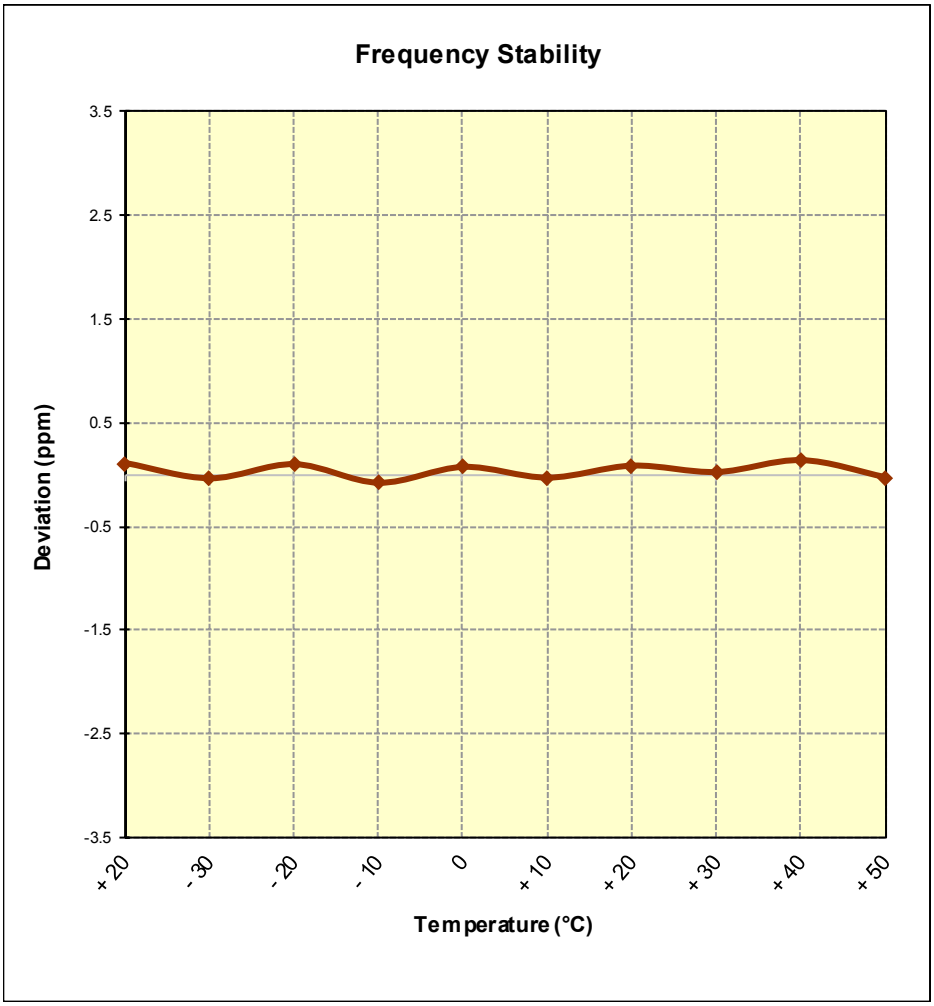


Figure 7-13. Frequency Stability Graph (Band 41)

© 2017 PCTEST Engineering Laboratory, Inc.

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG950N** complies with all the requirements of Parts of the FCC rules for LTE operation only.

© 2017 PCTEST Engineering Laboratory, Inc.