

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)

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 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 $\geq 1\%$ of the emission bandwidth
4. VBW $\geq 3 \times$ RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times$ Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

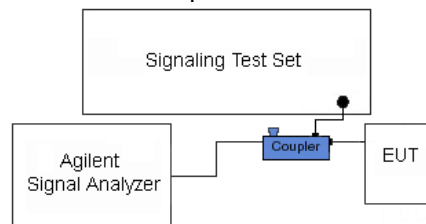


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

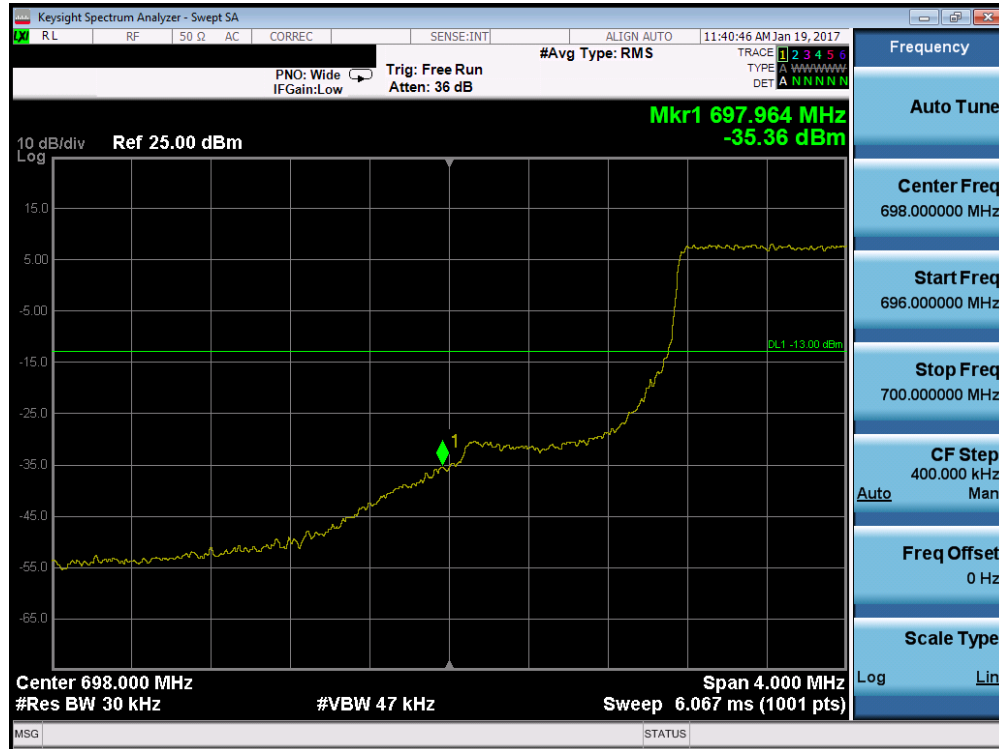
Per 22.917(b) 24.238(a) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions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

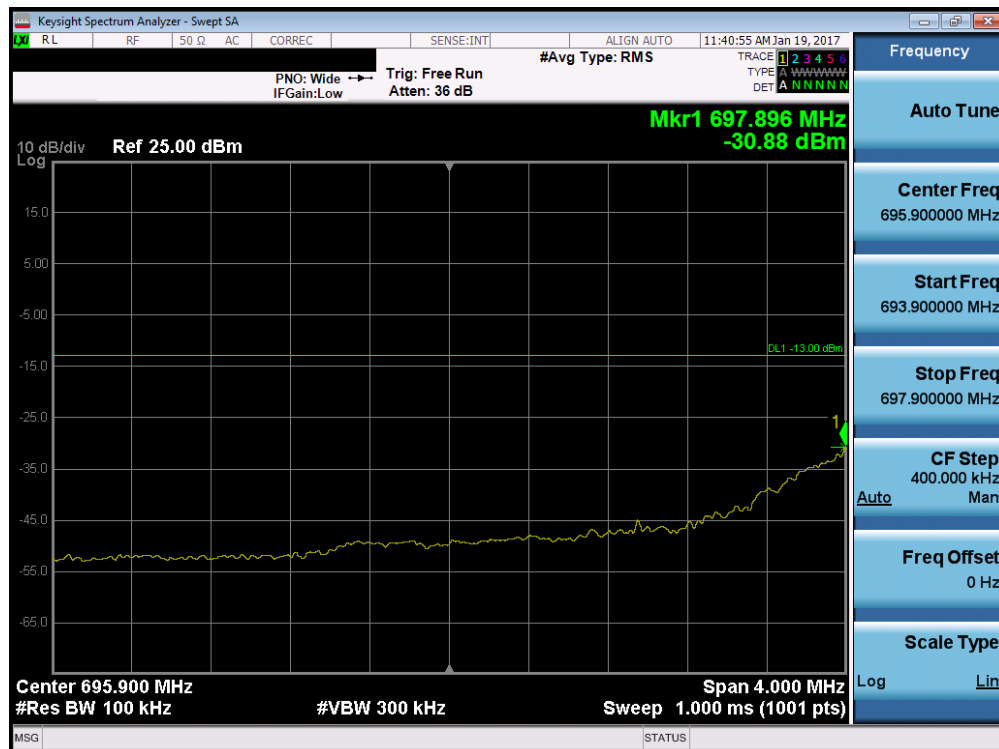
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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

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Plot 7-84. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-85. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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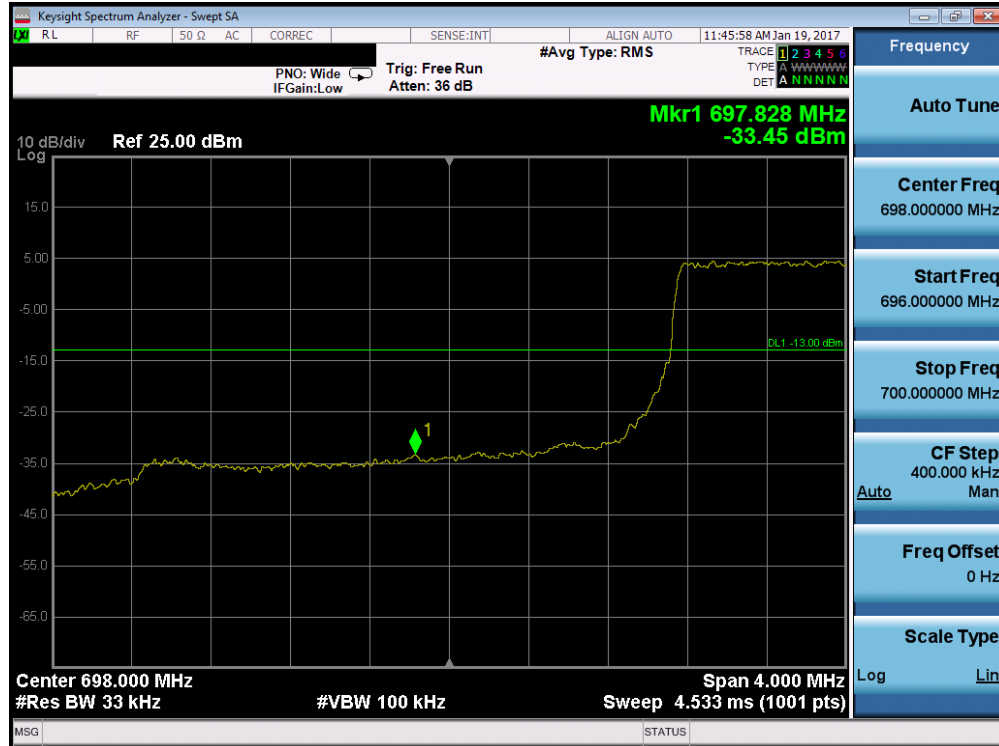


Plot 7-86. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

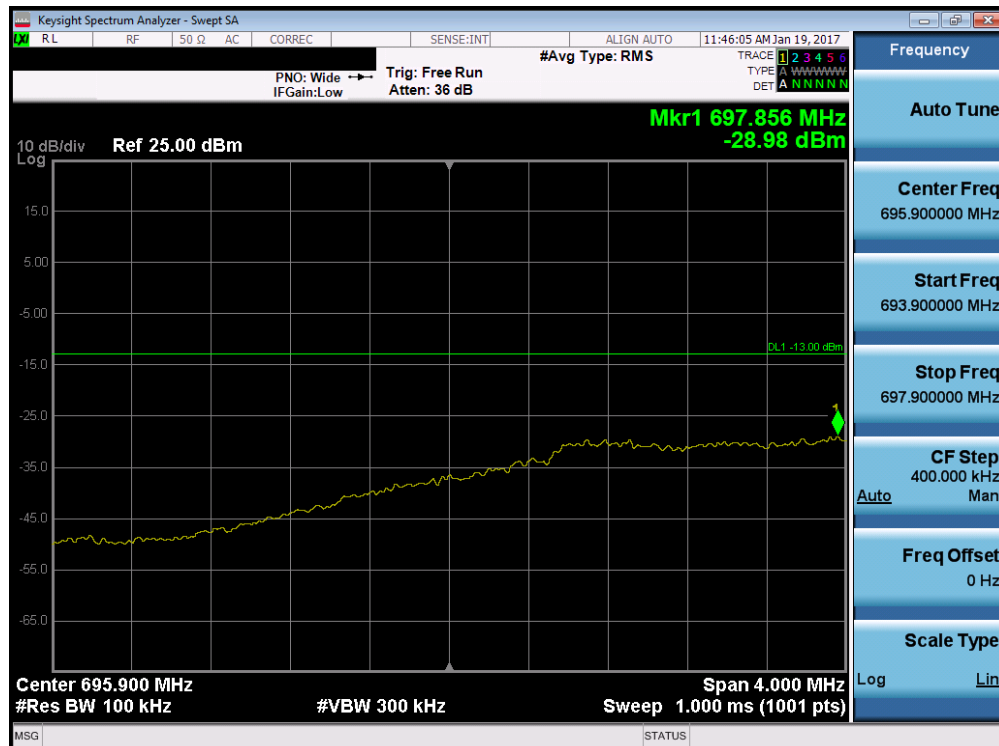


Plot 7-87. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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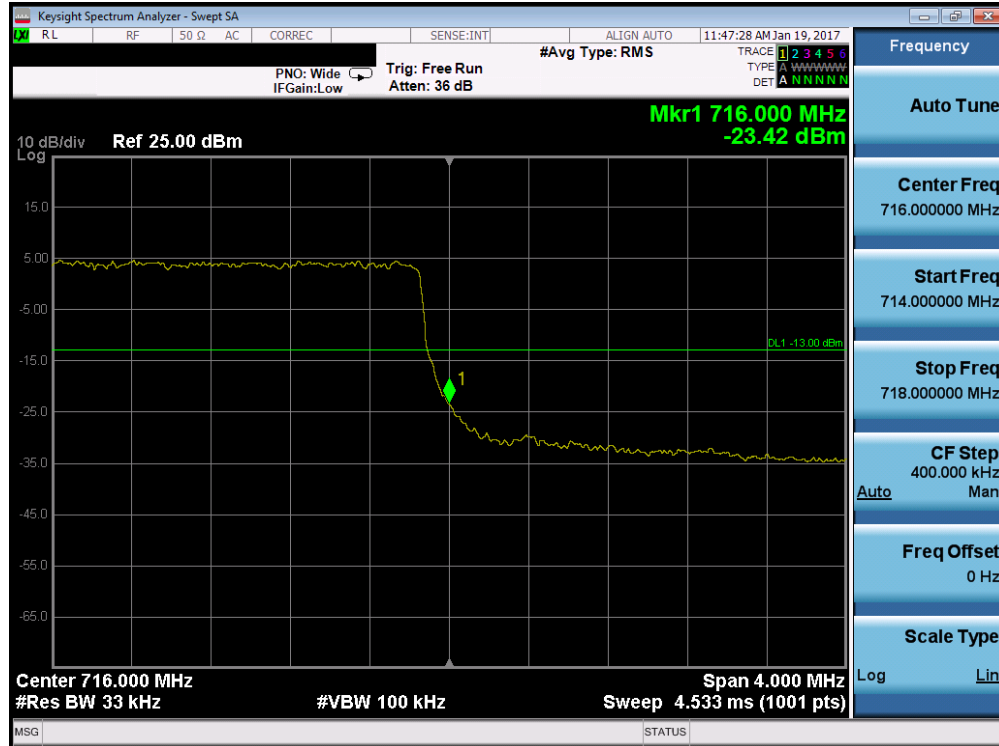


Plot 7-88. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-89. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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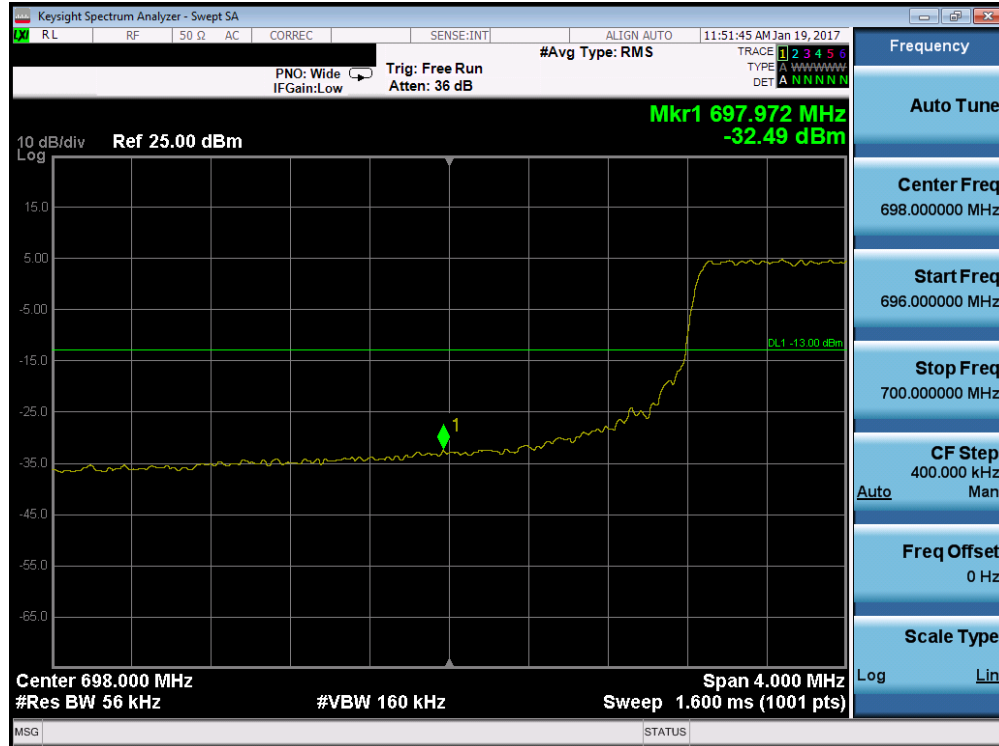


Plot 7-90. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

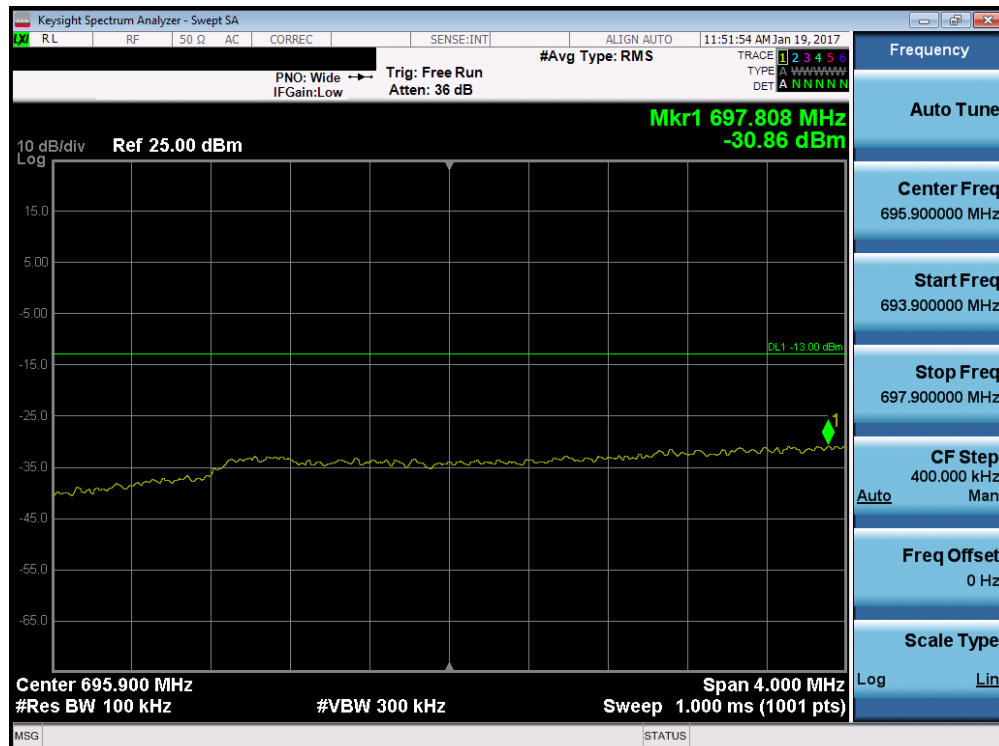


Plot 7-91. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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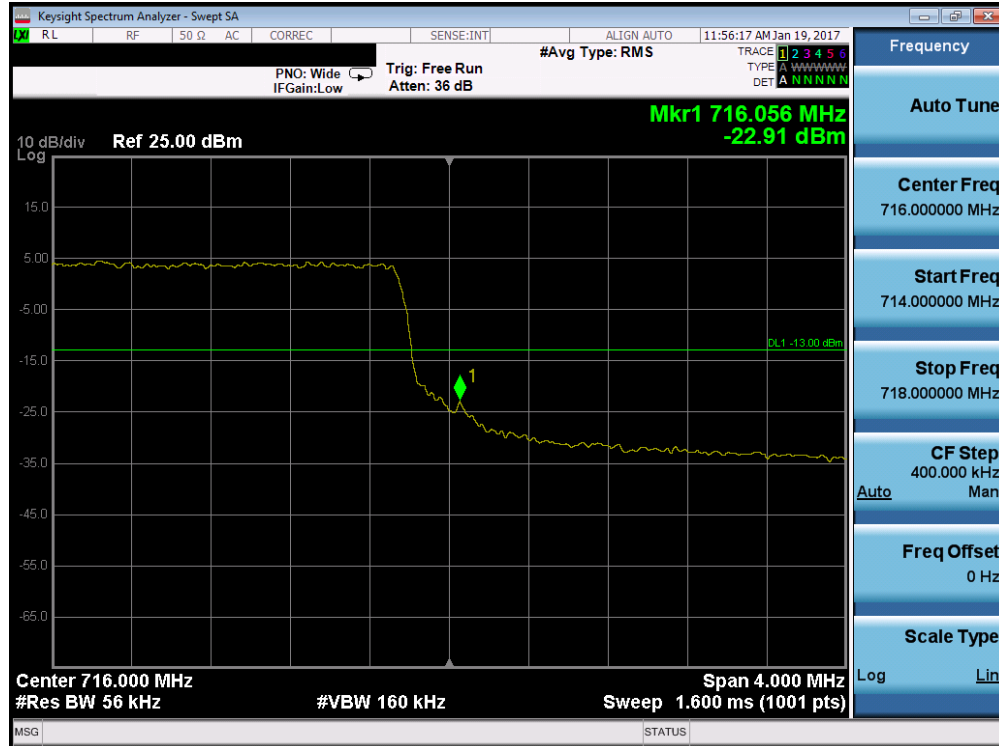


Plot 7-92. Lower Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

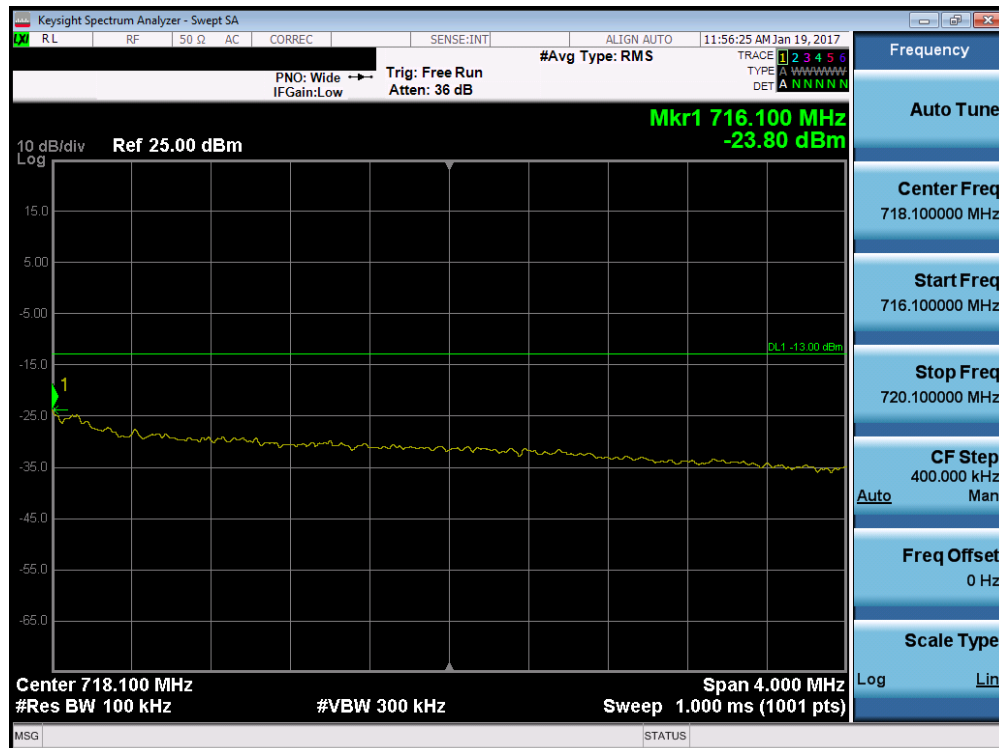


Plot 7-93. Lower Extended Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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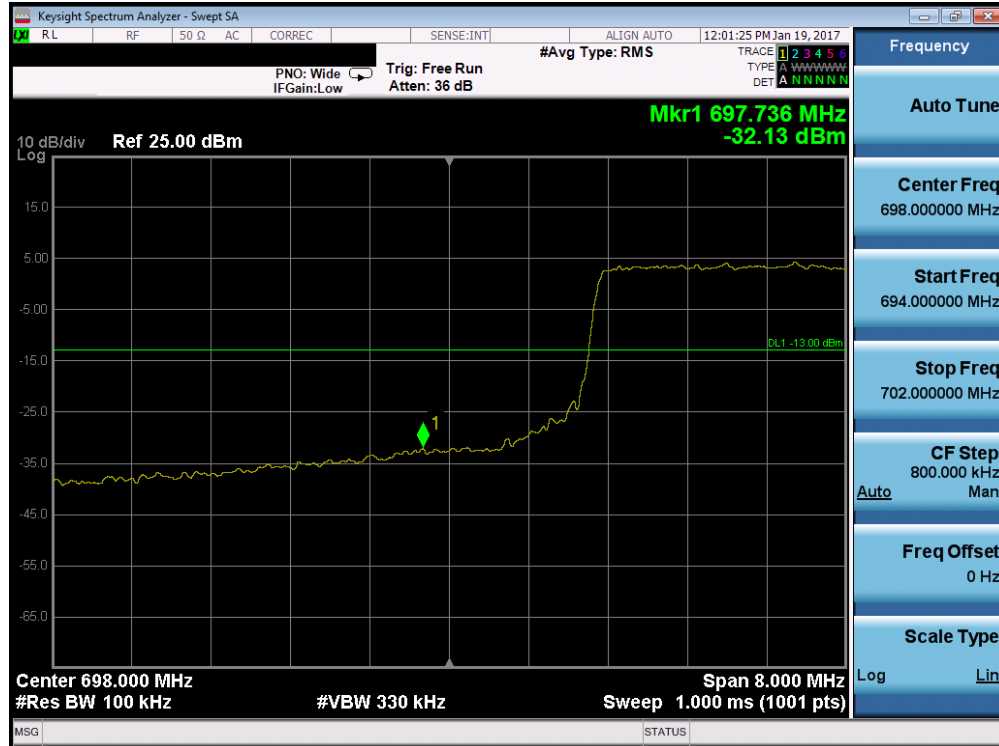


Plot 7-94. Upper Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

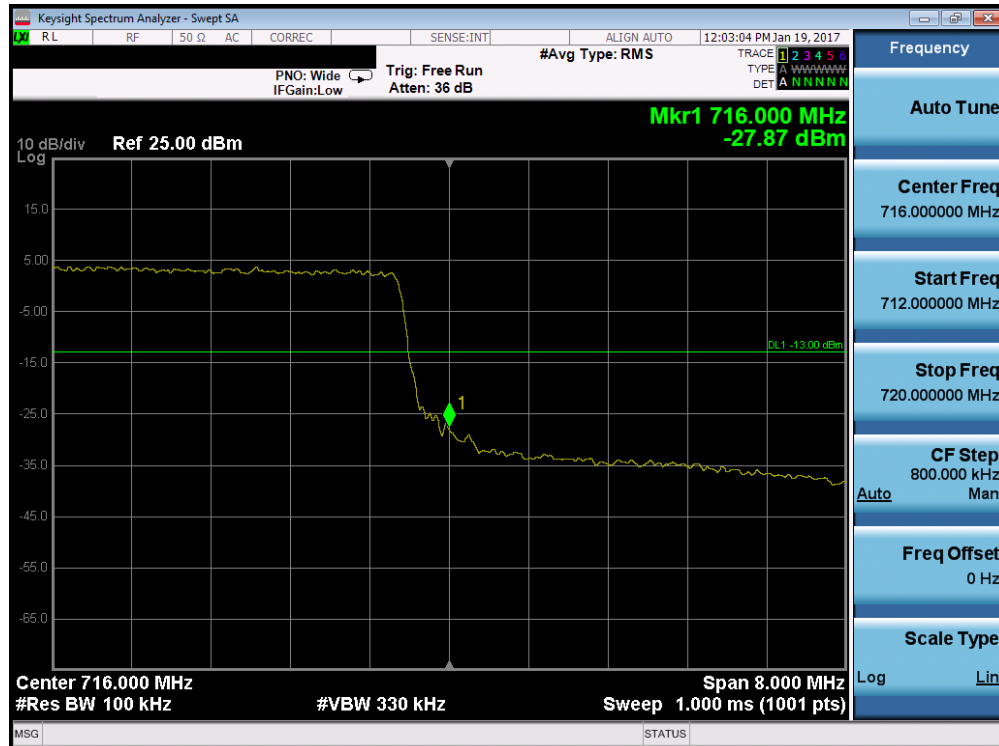


Plot 7-95. Upper Extended Band Edge Plot (Band 12/17 - 5.0MHz QPSK - RB Size 25)

FCC ID: A3LSMA520W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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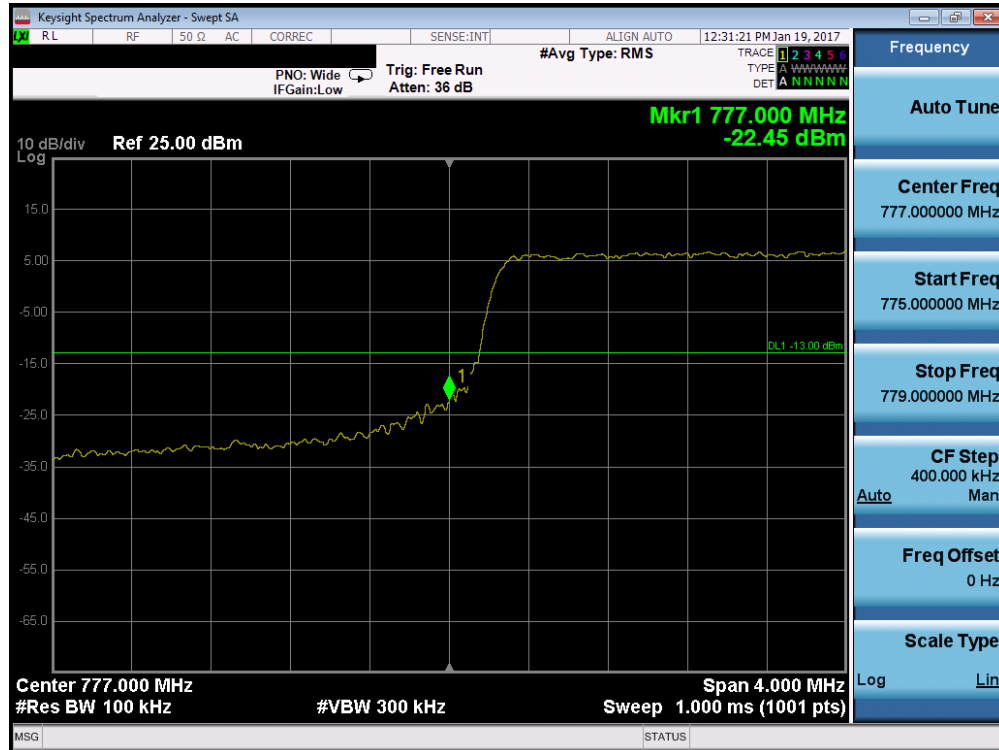


Plot 7-96. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

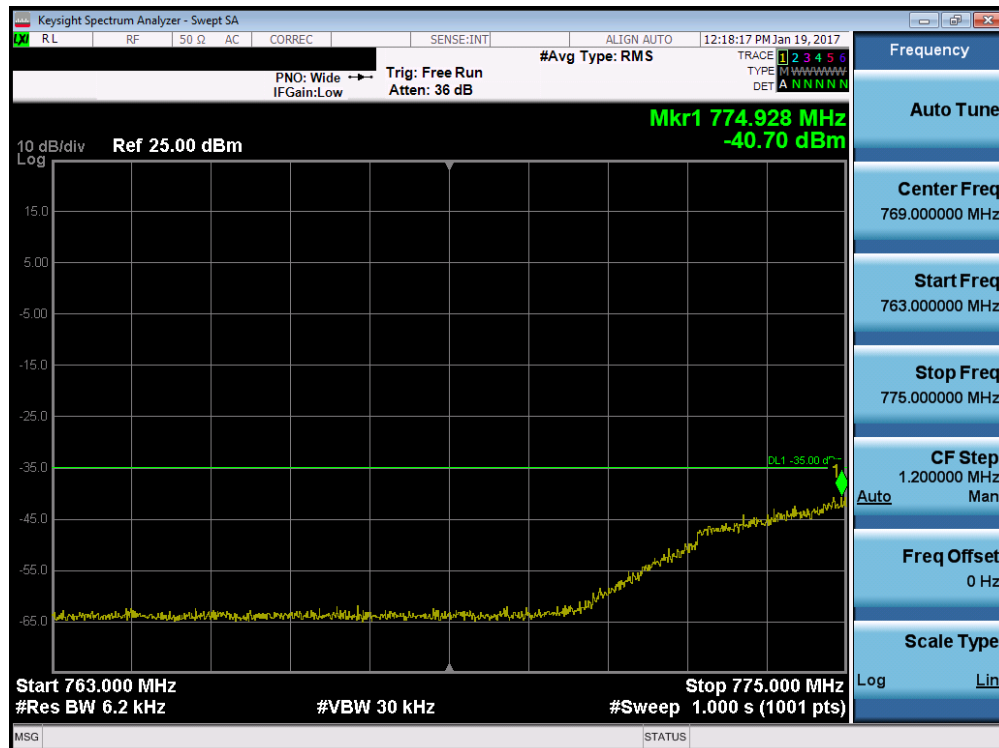


Plot 7-97. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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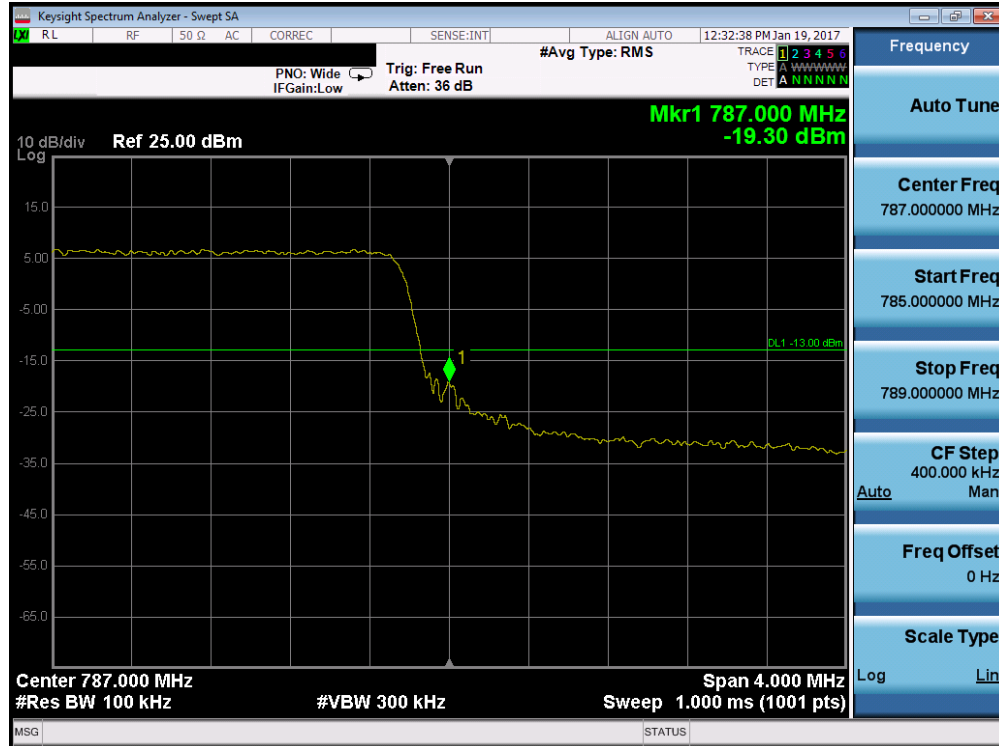


Plot 7-98. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

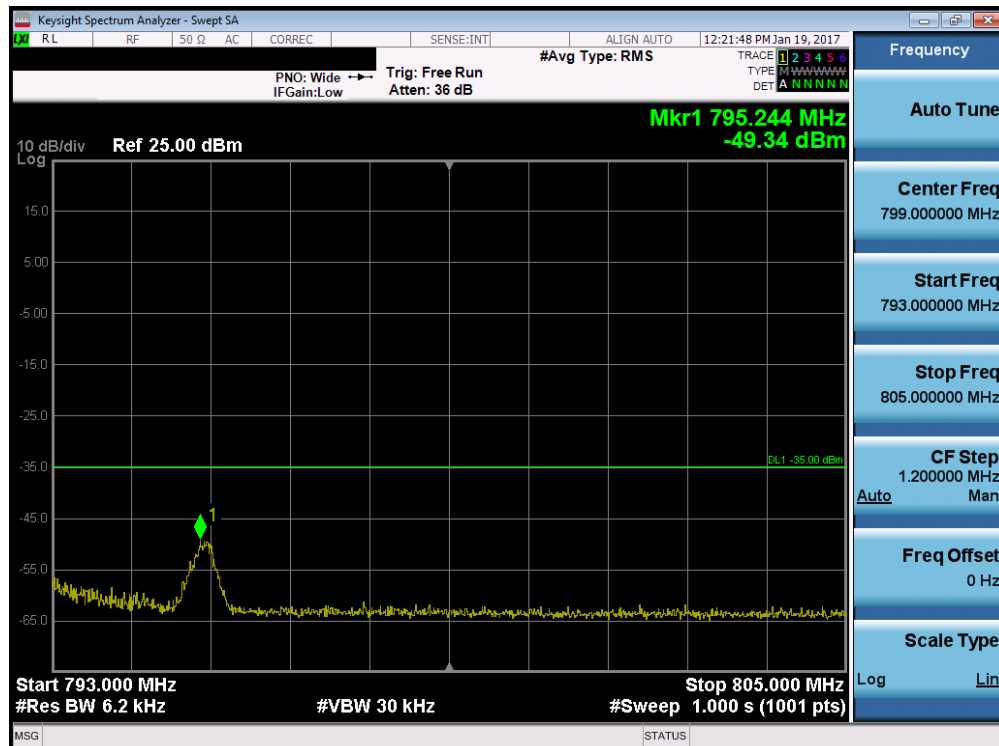


Plot 7-99. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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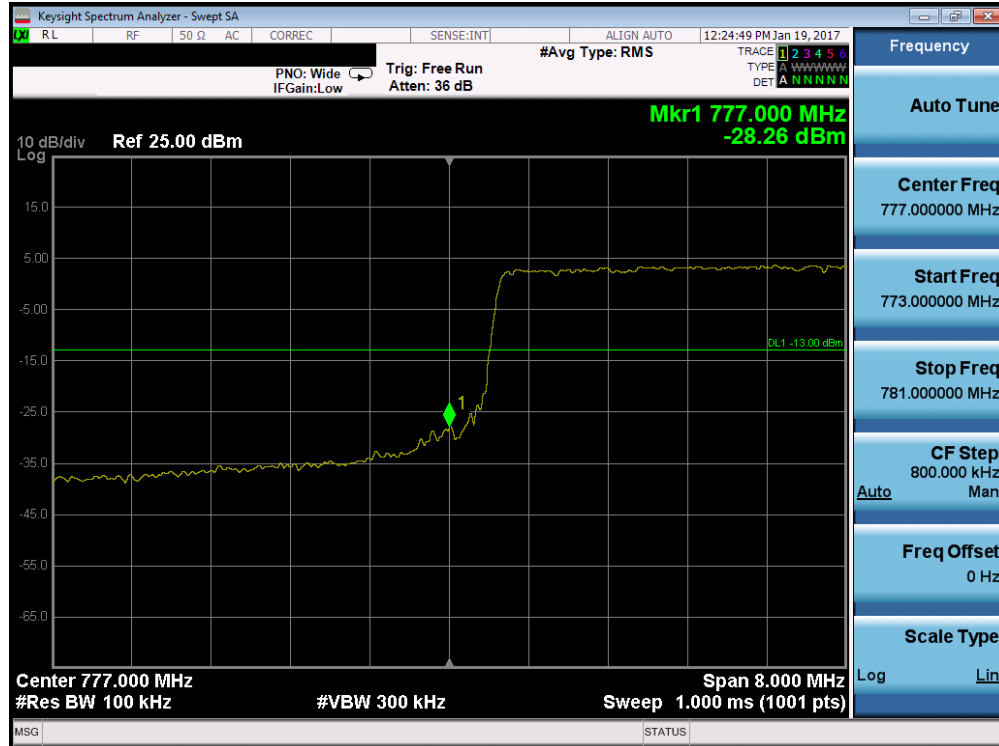


Plot 7-100. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

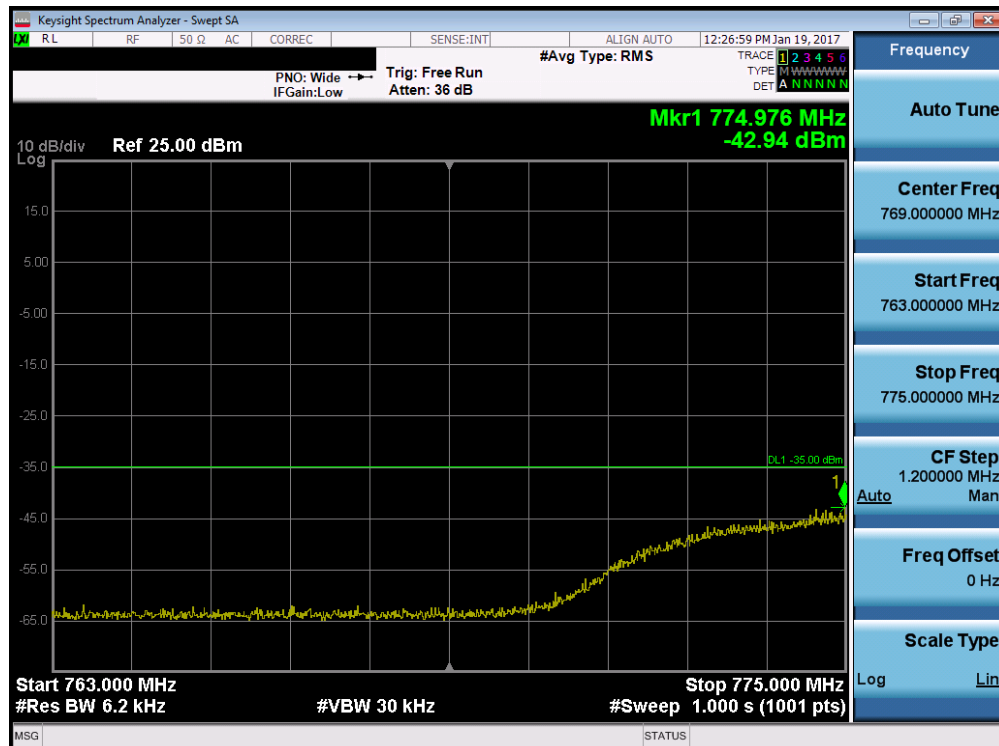


Plot 7-101. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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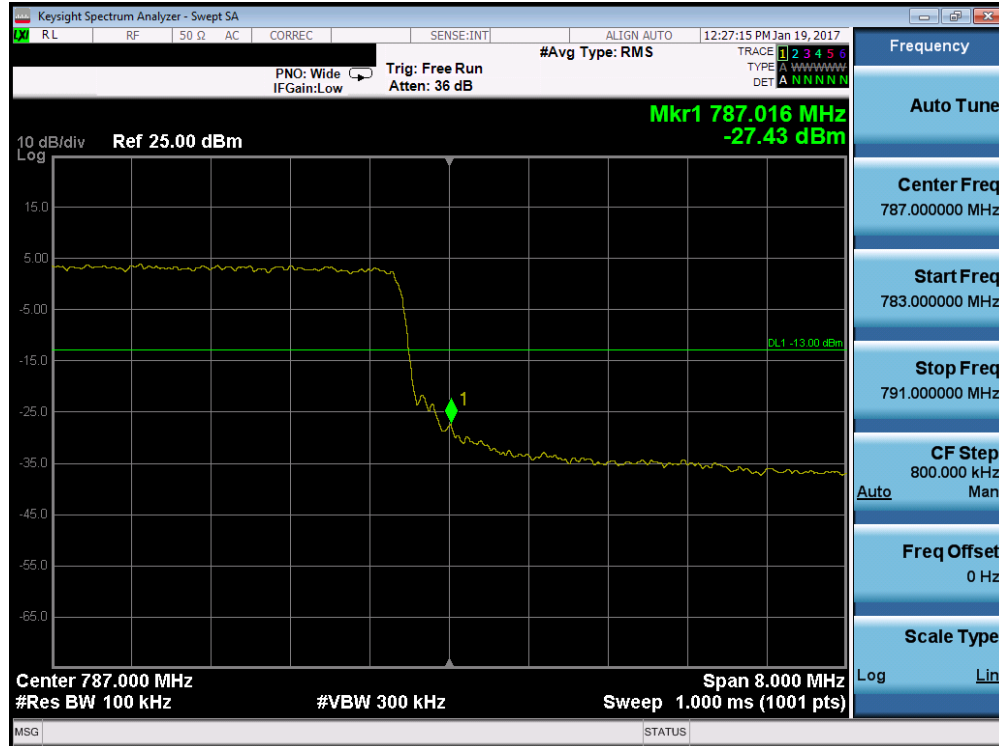


Plot 7-102. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

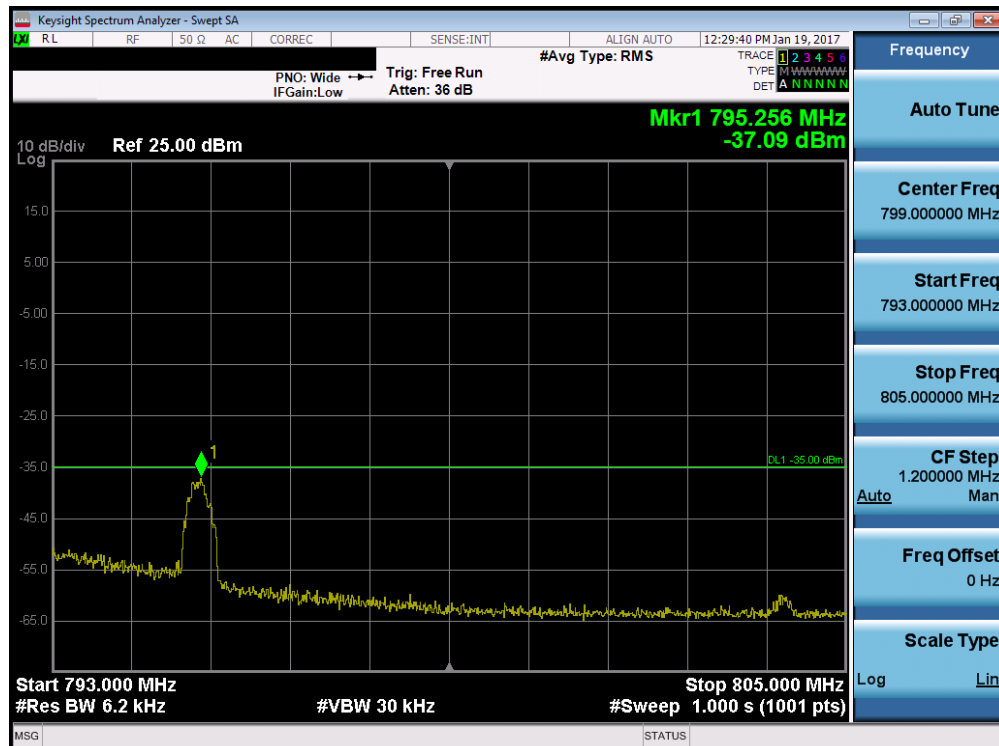


Plot 7-103. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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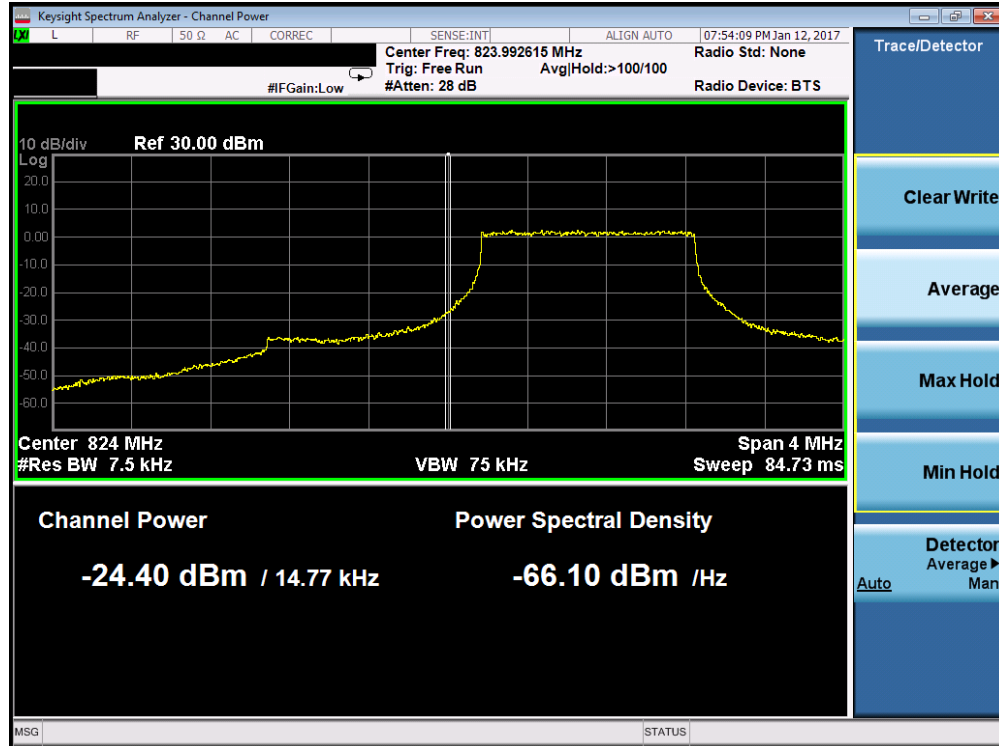


Plot 7-104. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

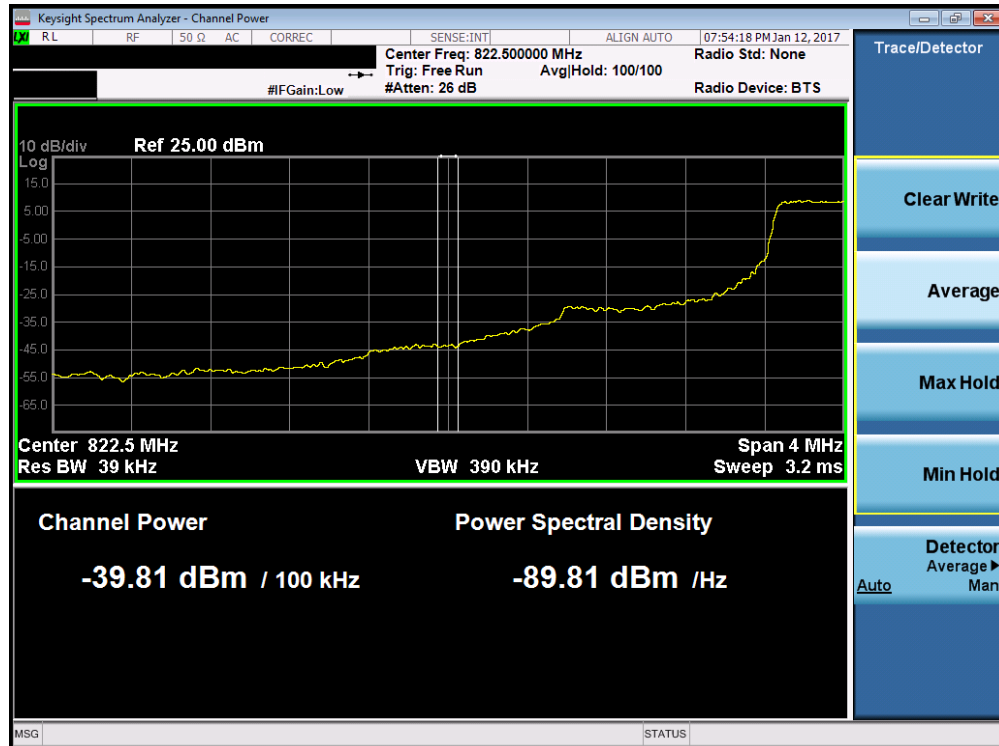


Plot 7-105. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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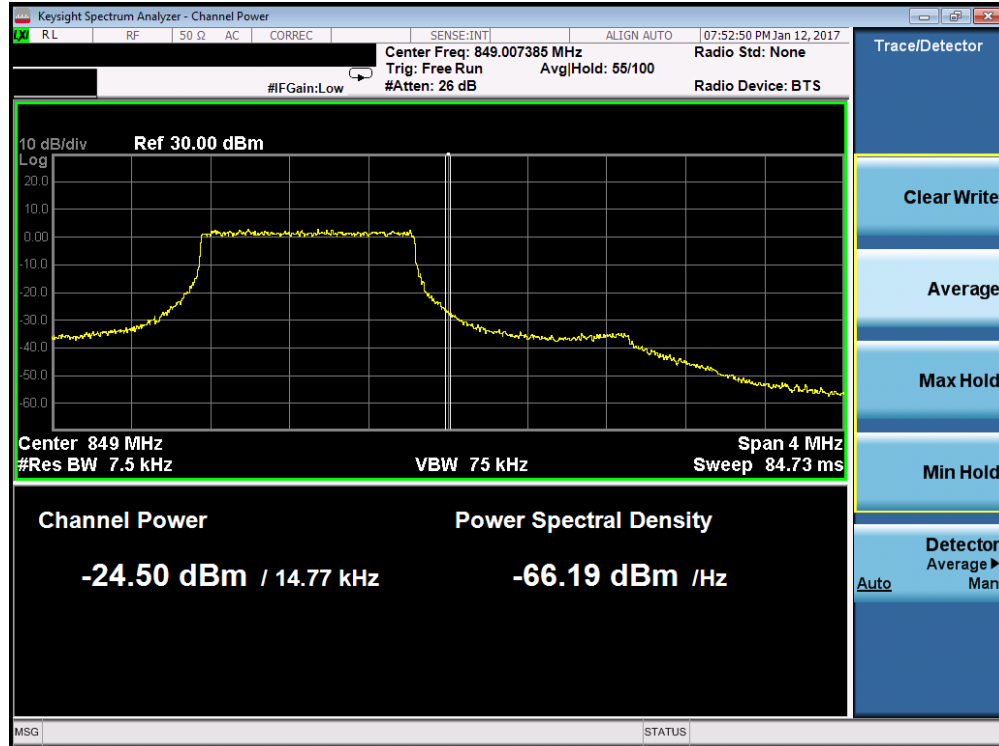


Plot 7-106. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

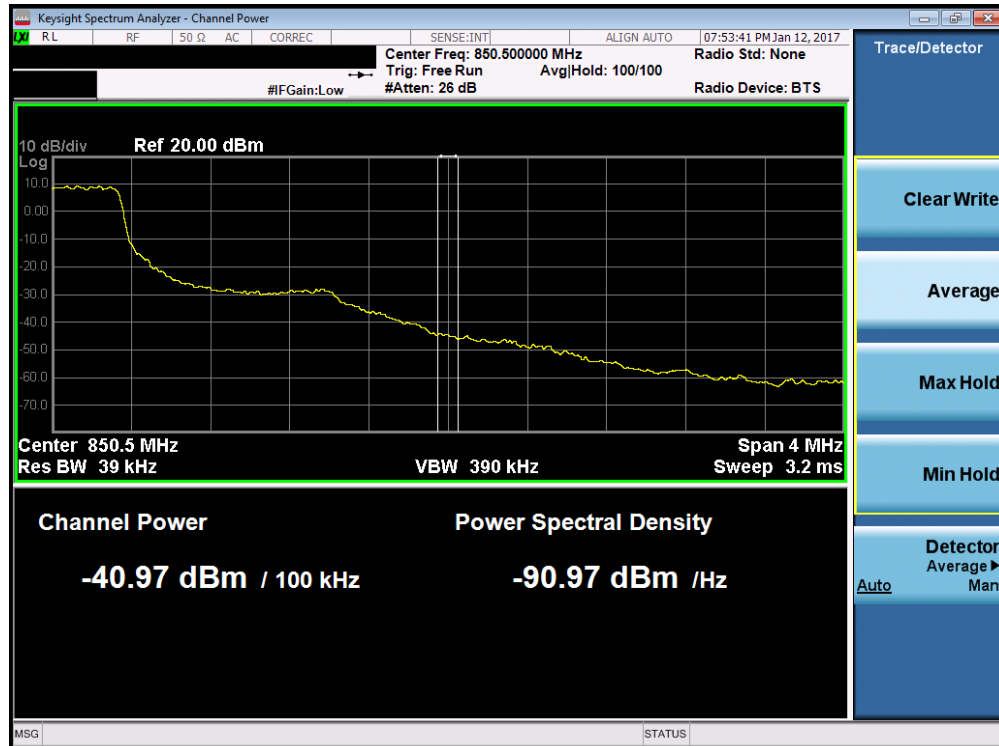


Plot 7-107. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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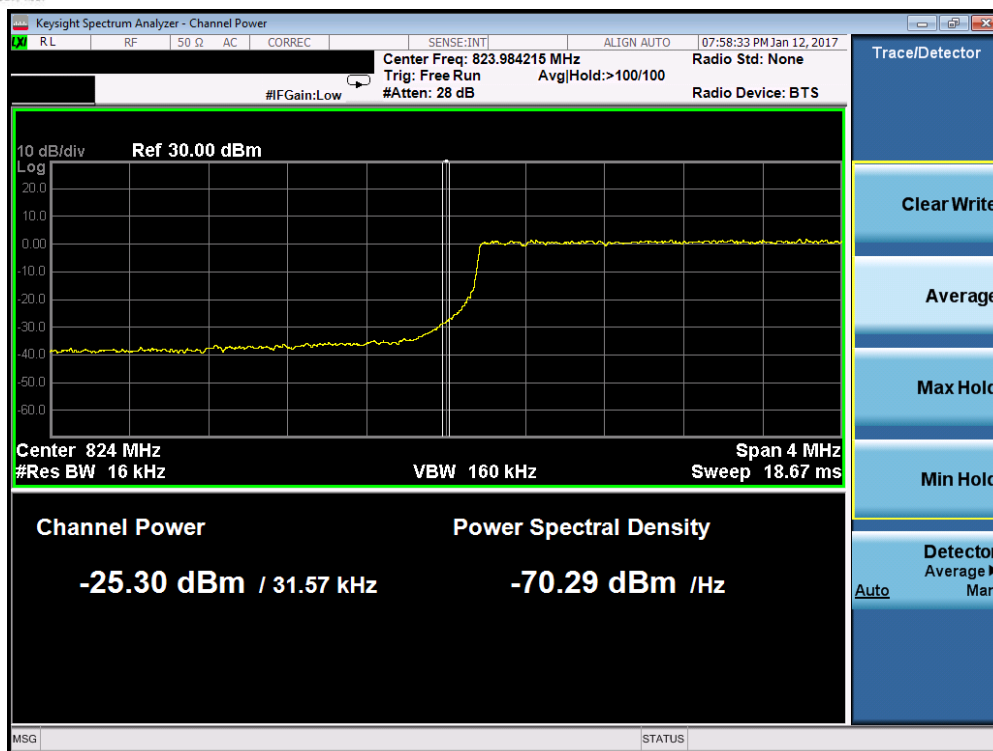


Plot 7-108. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

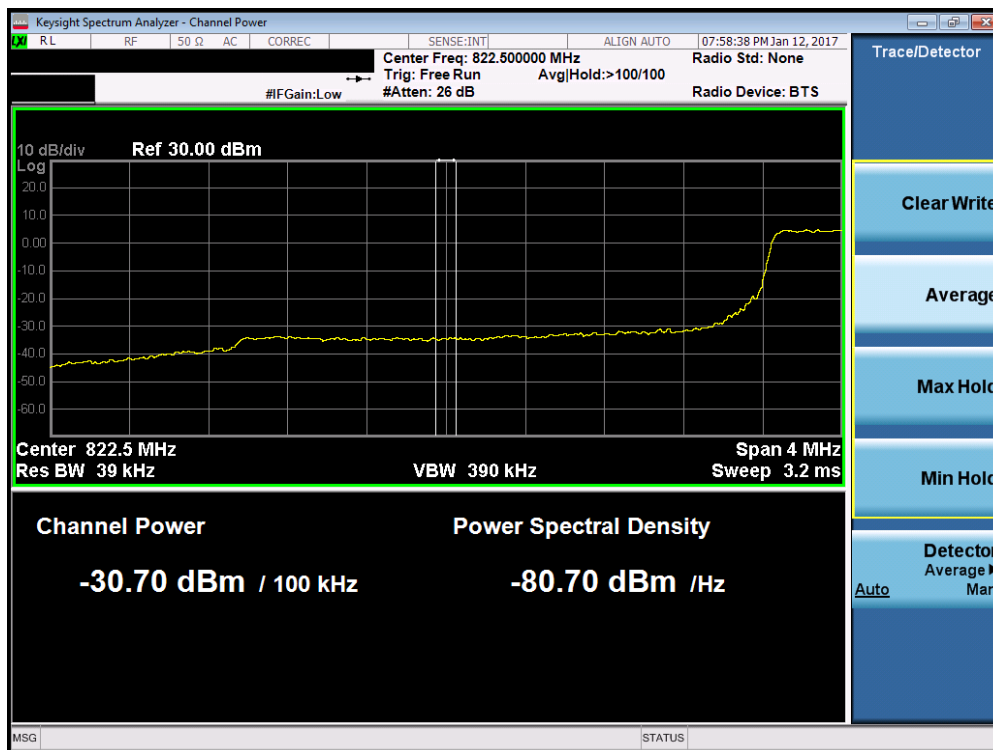


Plot 7-109. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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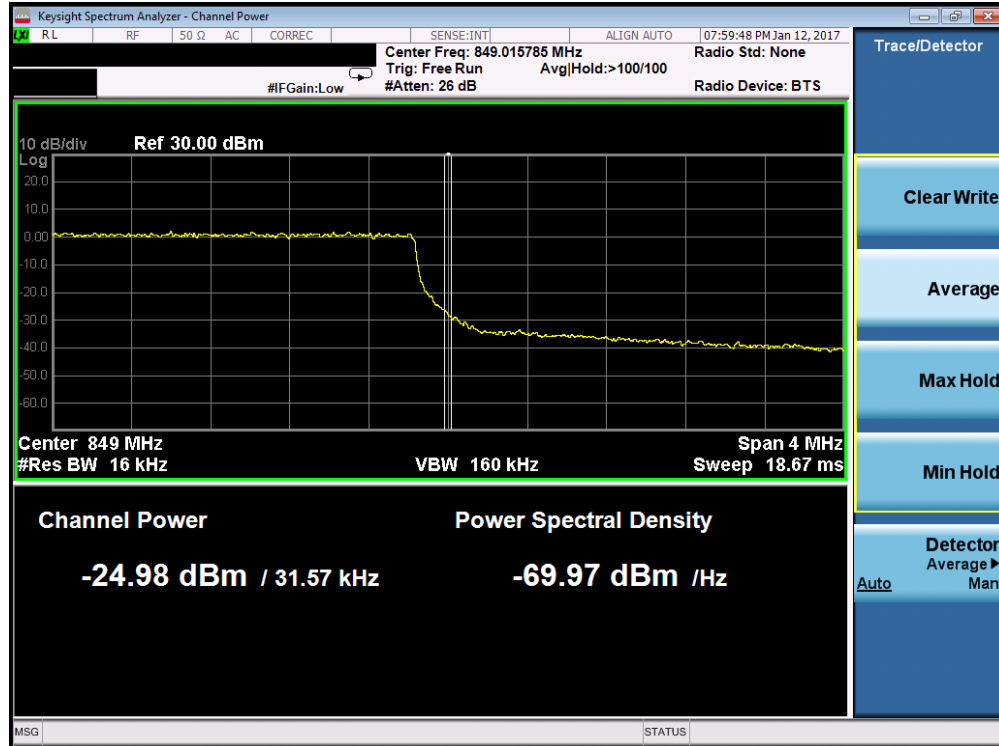


Plot 7-110. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-111. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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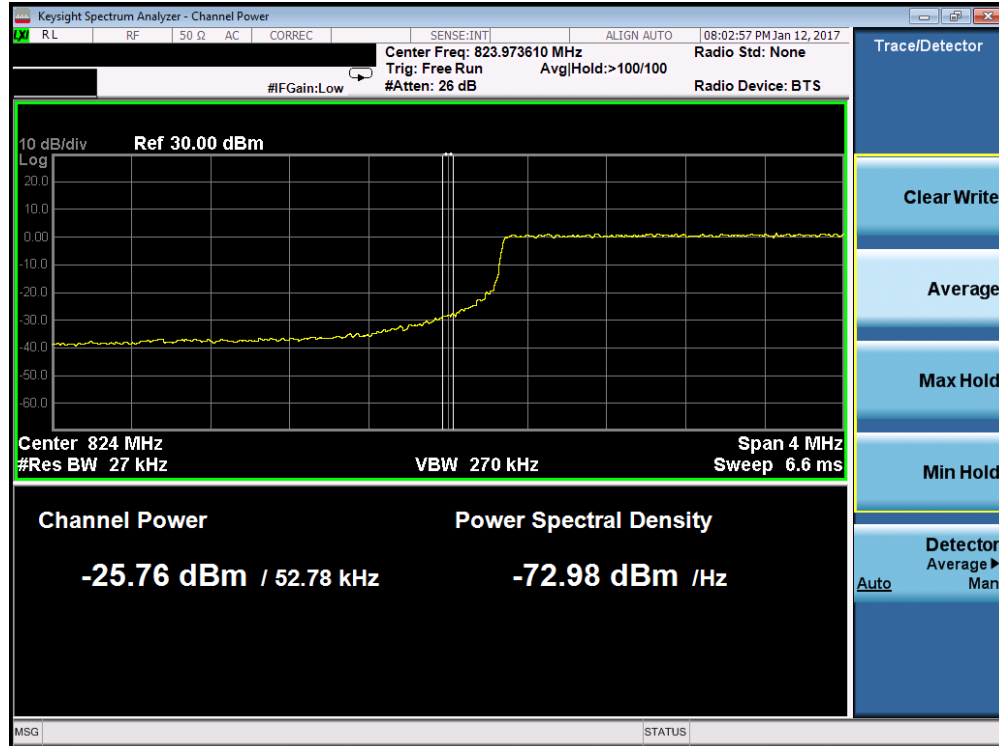


Plot 7-112. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

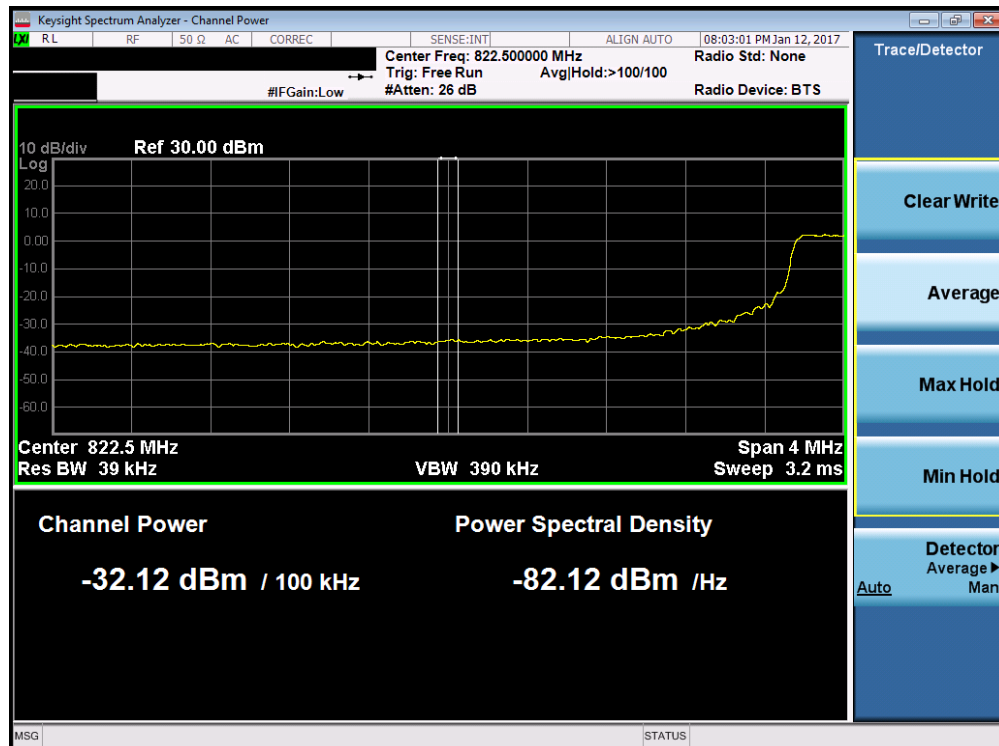


Plot 7-113. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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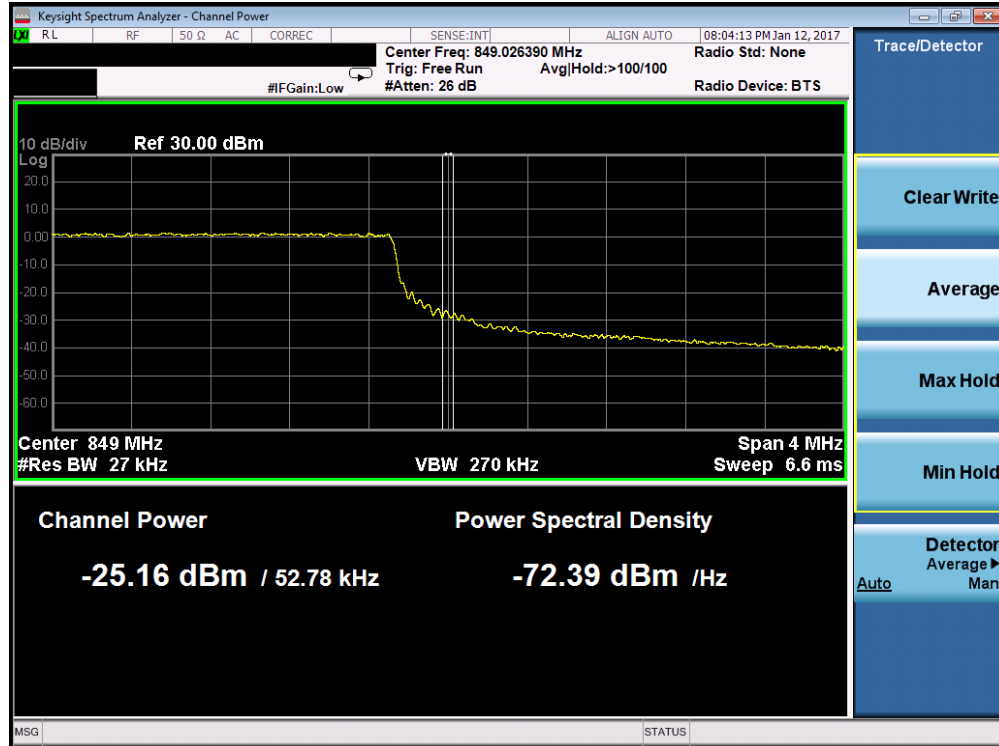


Plot 7-114. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-115. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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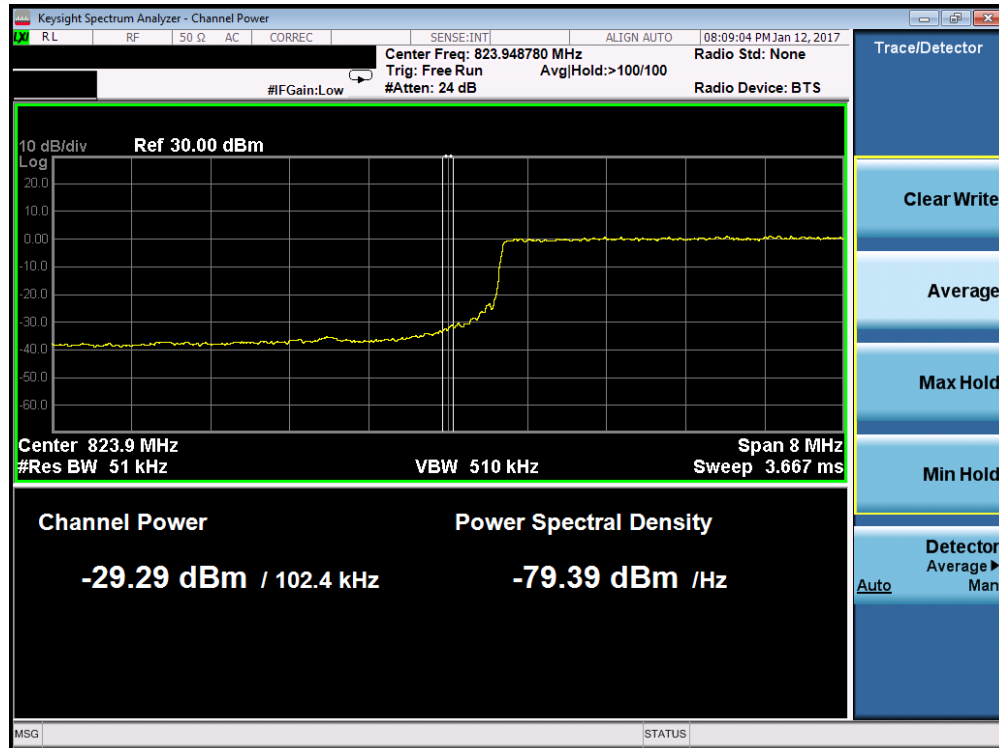


Plot 7-116. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

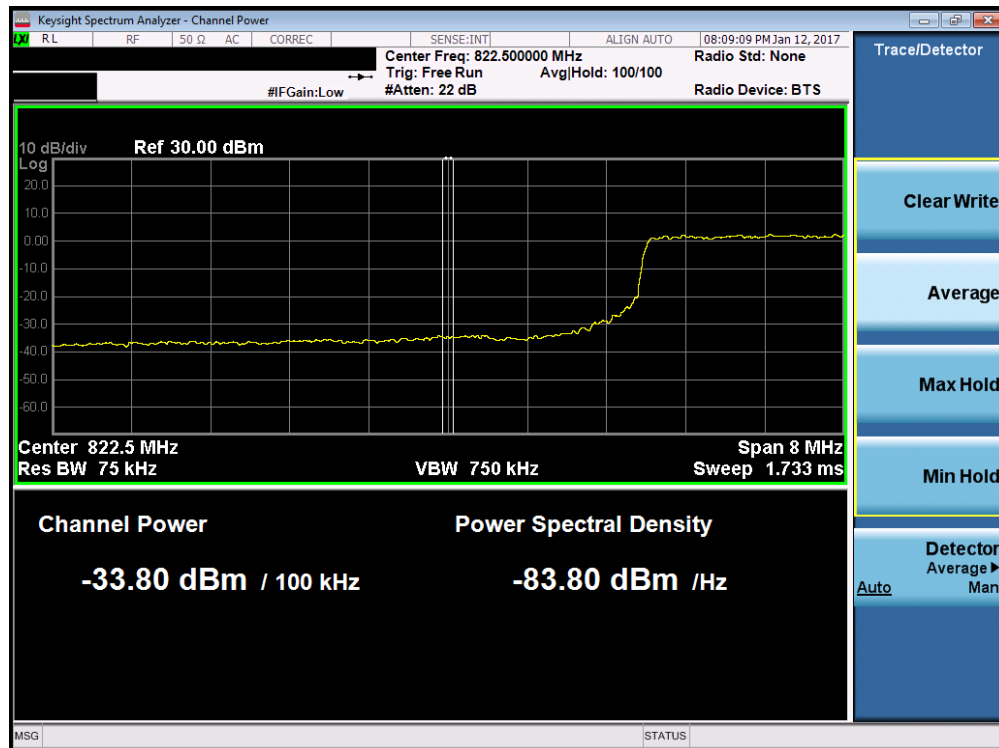


Plot 7-117. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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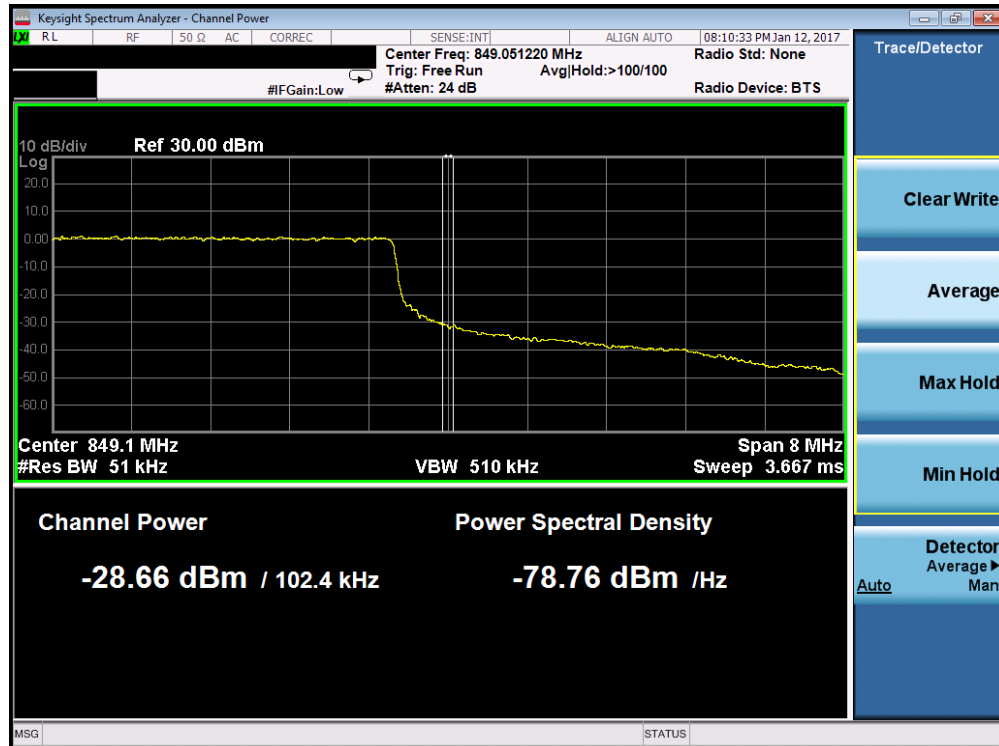


Plot 7-118. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



Plot 7-119. Lower Extended Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-120. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

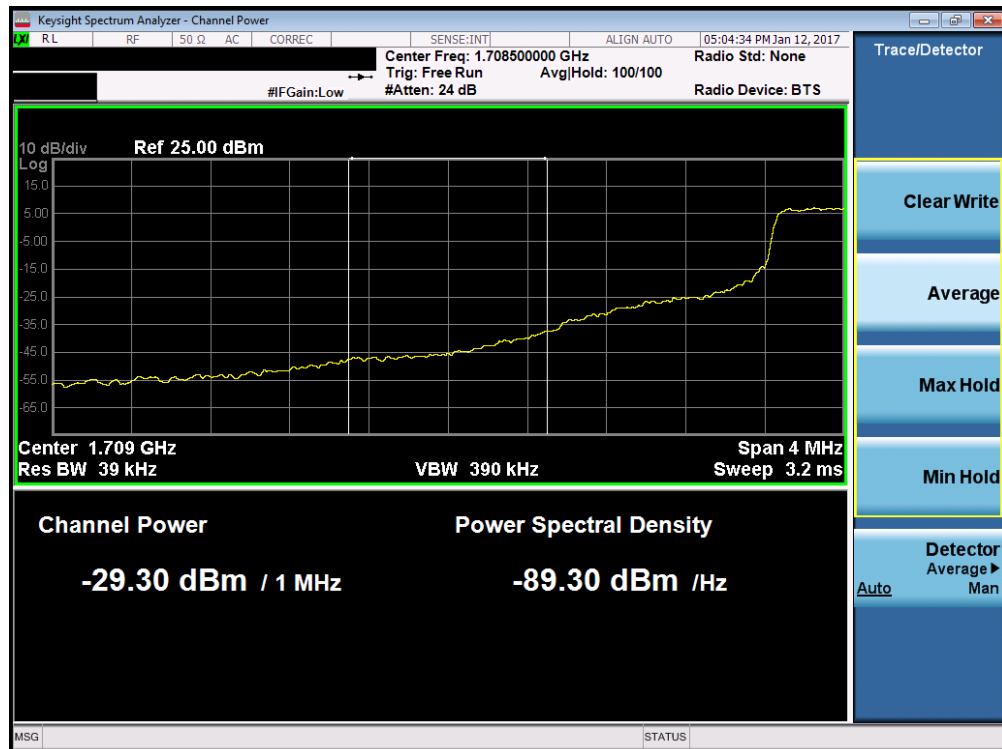


Plot 7-121. Upper Extended Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-122. Lower Band Edge Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

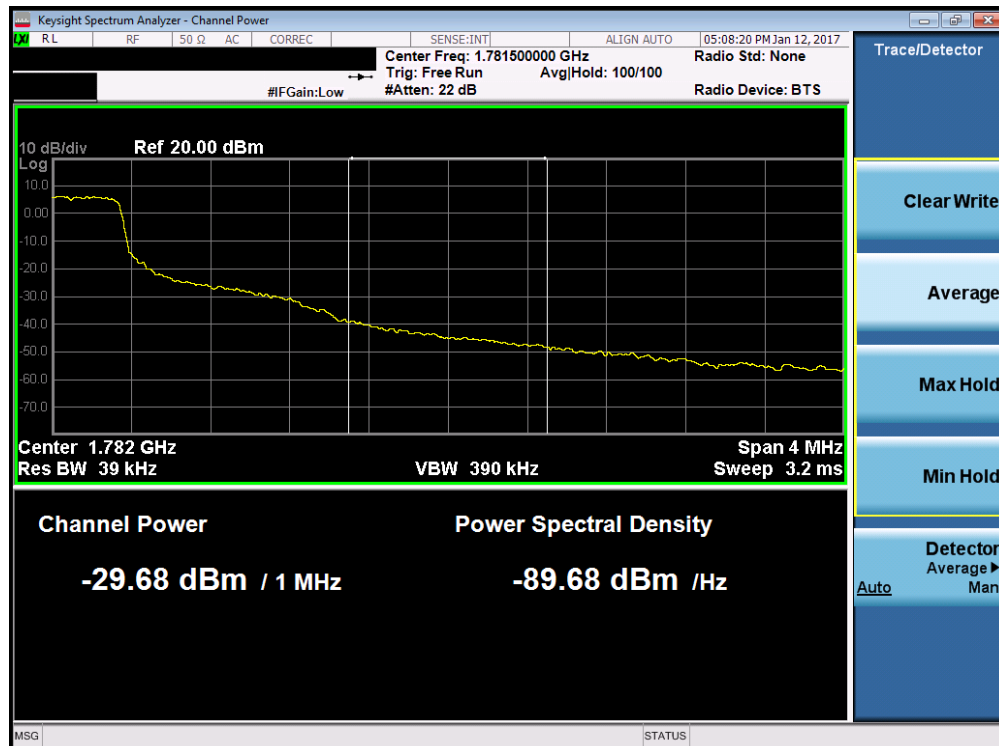


Plot 7-123. Lower Extended Band Edge Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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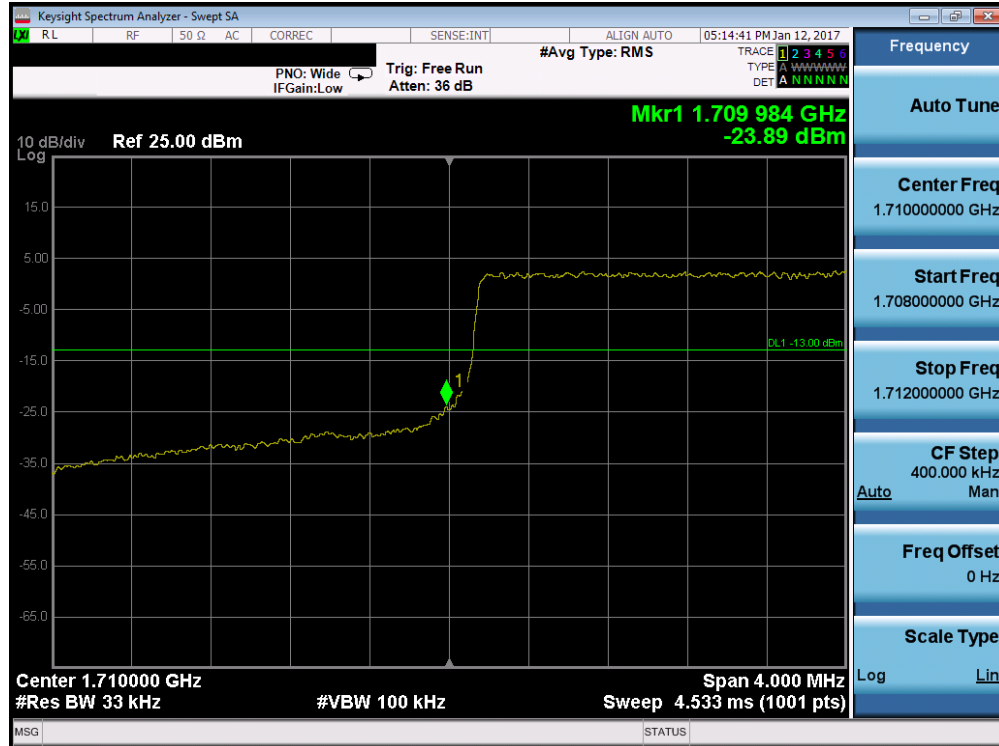


Plot 7-124. Upper Band Edge Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

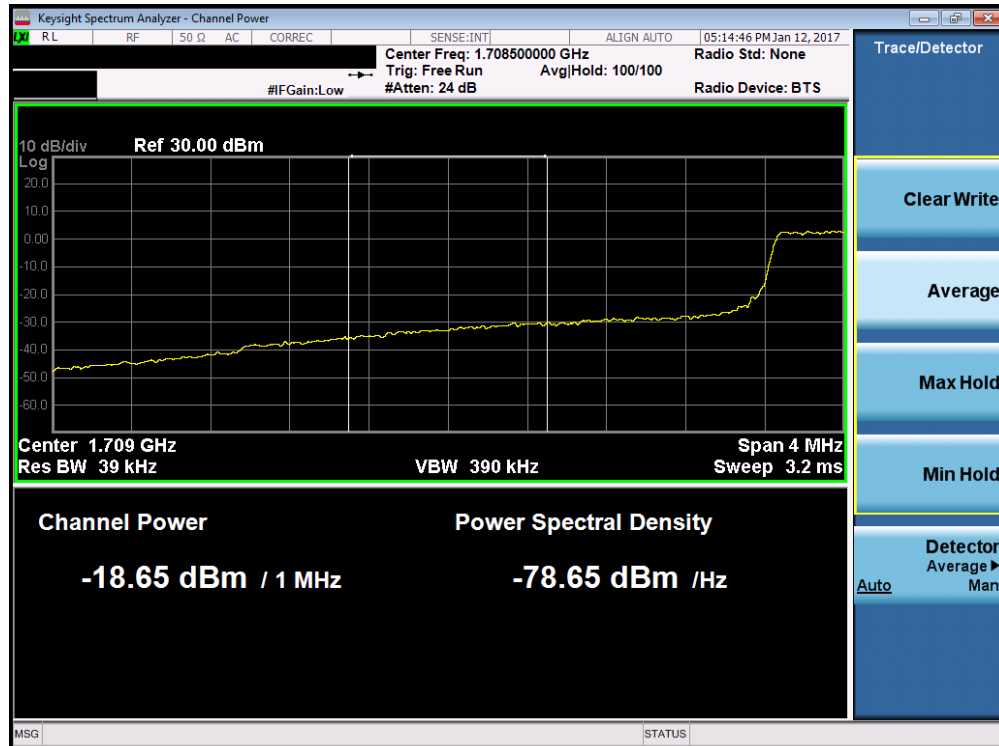


Plot 7-125. Upper Extended Band Edge Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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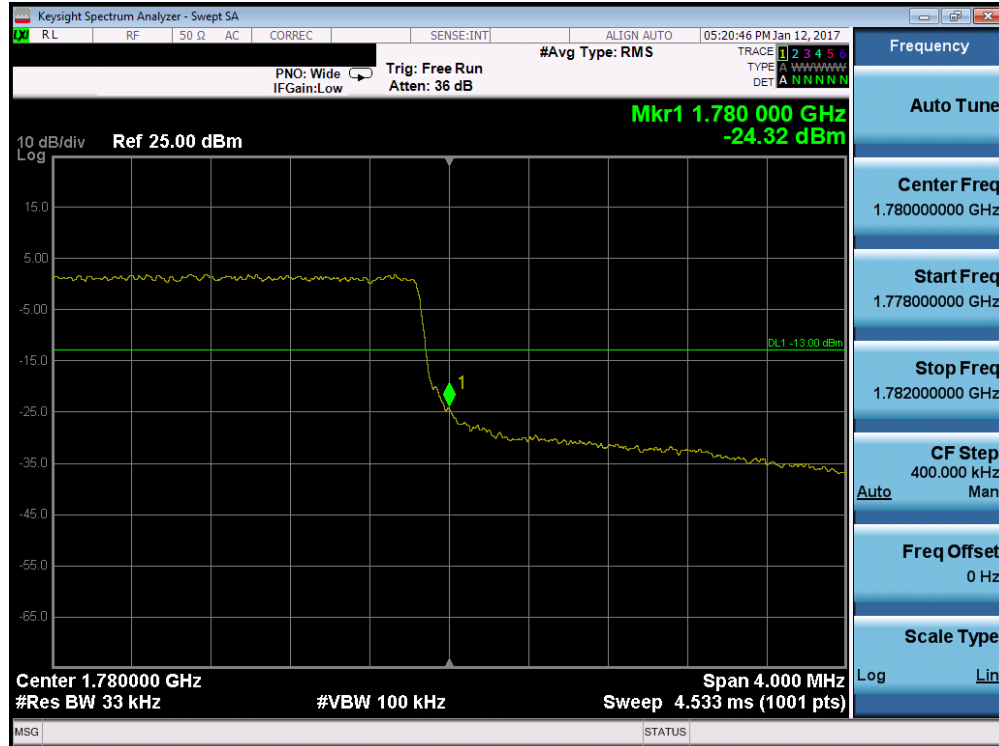


Plot 7-126. Lower Band Edge Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

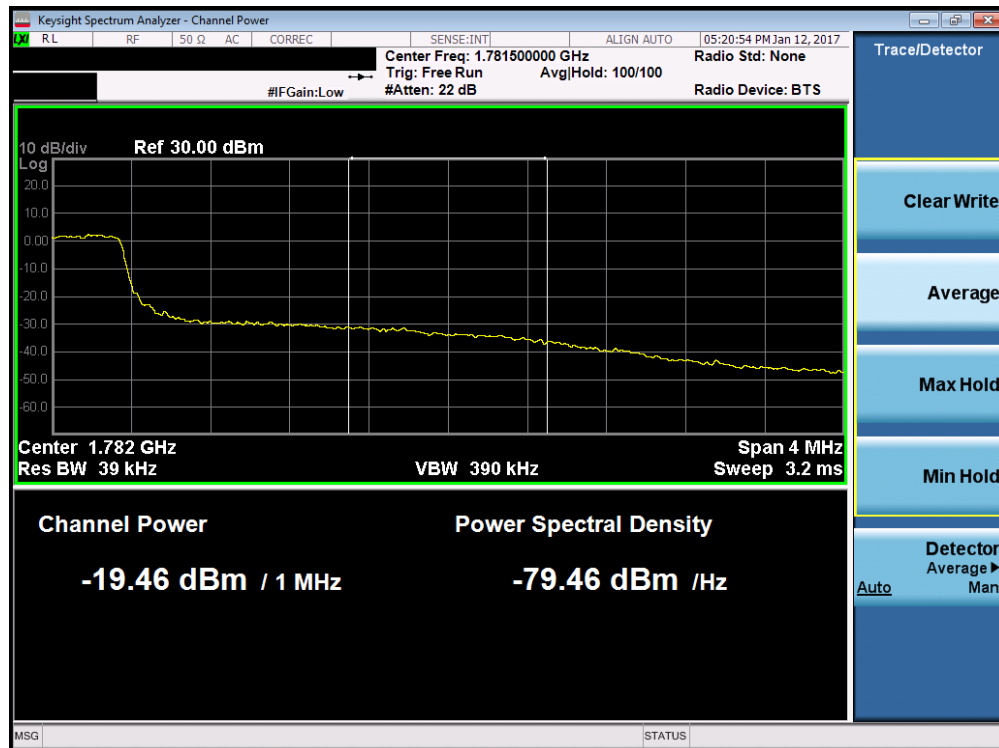


Plot 7-127. Lower Extended Band Edge Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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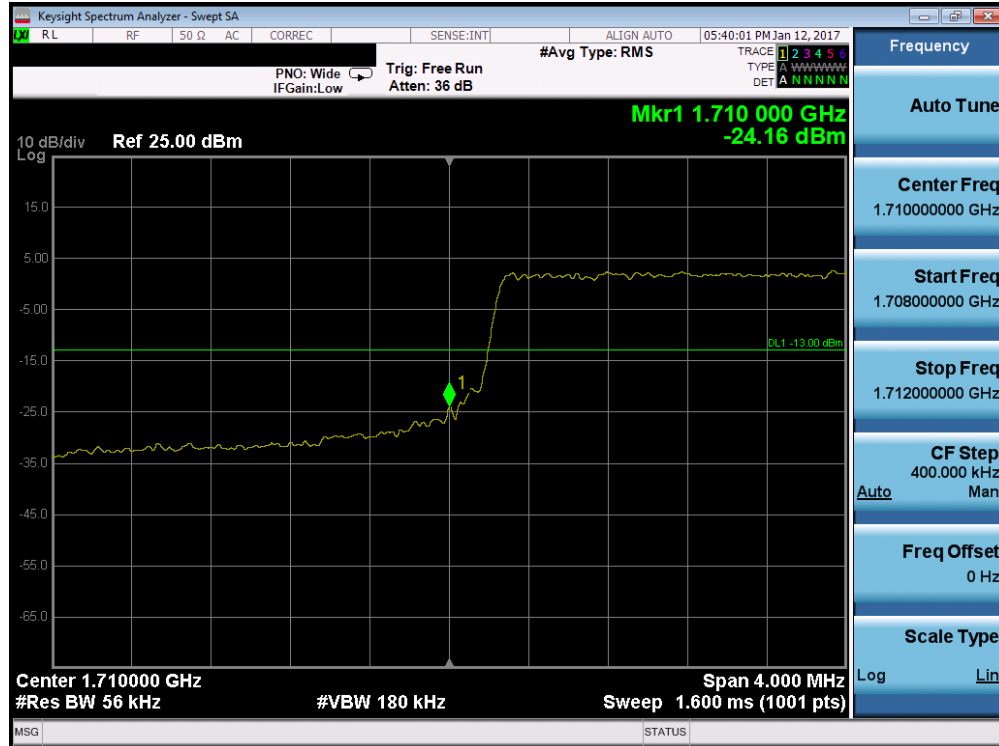


Plot 7-128. Upper Band Edge Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

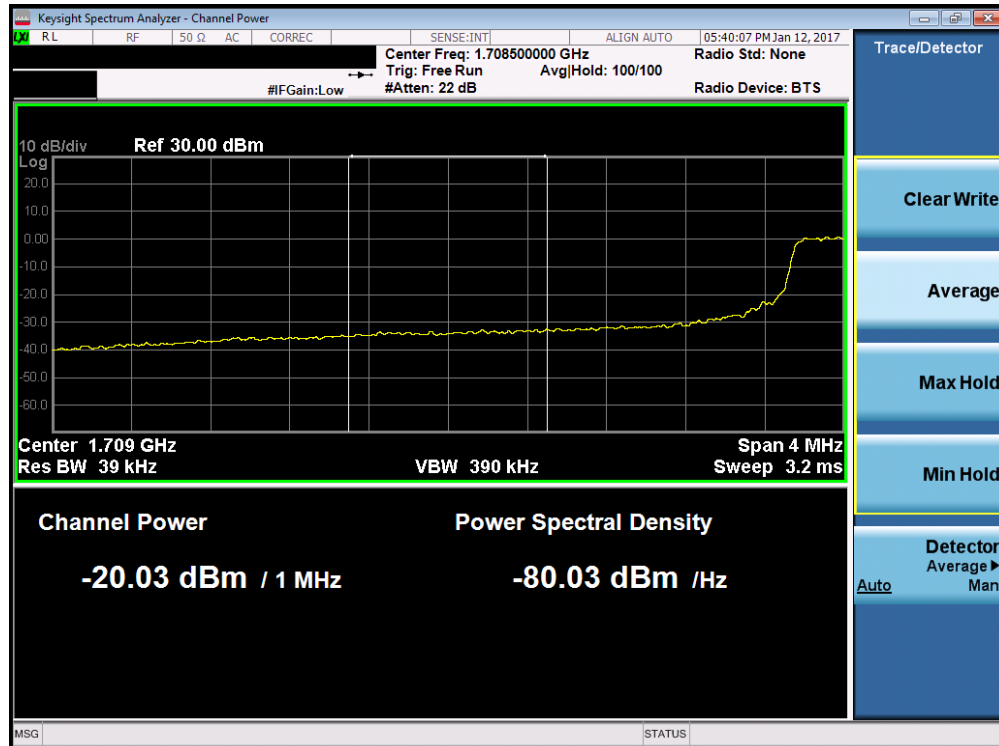


Plot 7-129. Upper Extended Band Edge Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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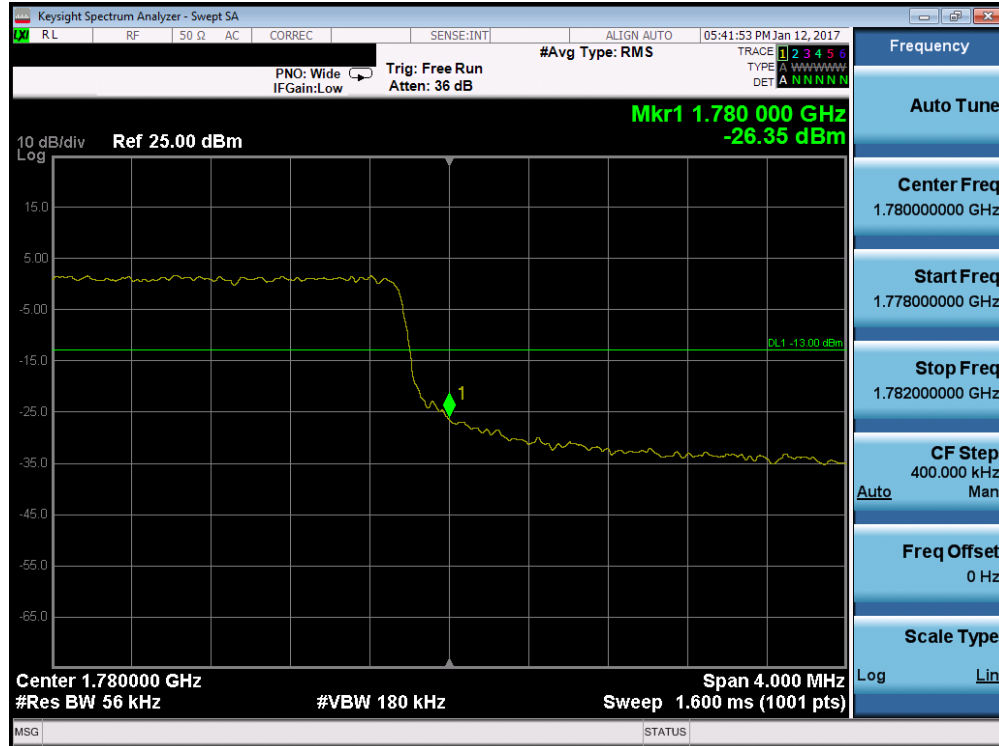


Plot 7-130. Lower Band Edge Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

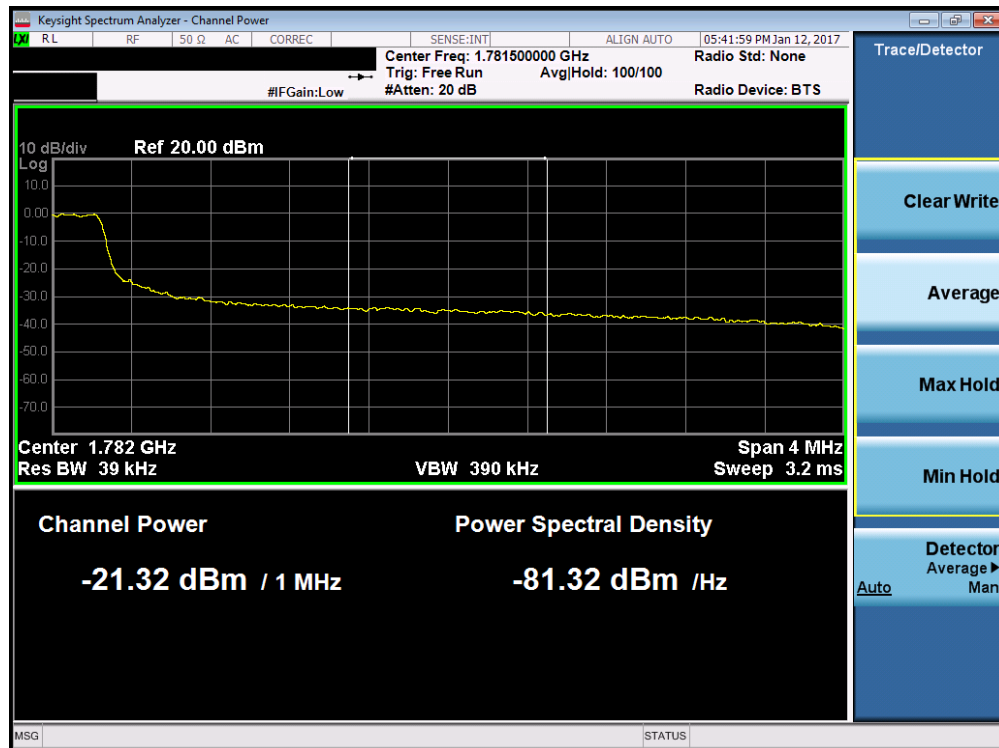


Plot 7-131. Lower Extended Band Edge Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 83 of 136

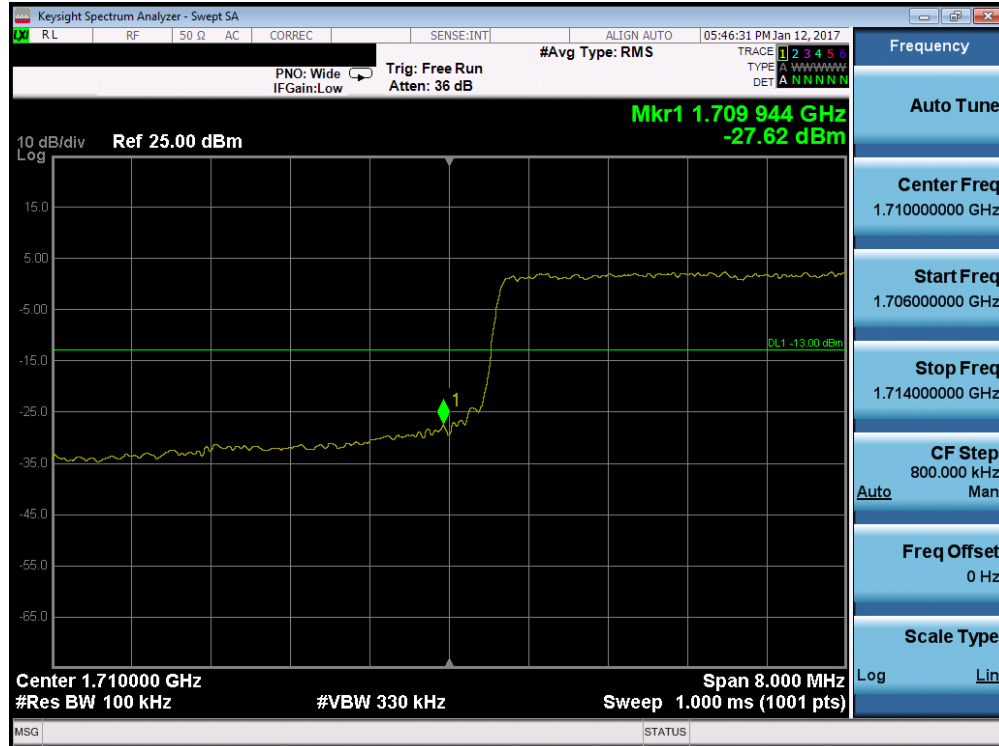


Plot 7-132. Upper Band Edge Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

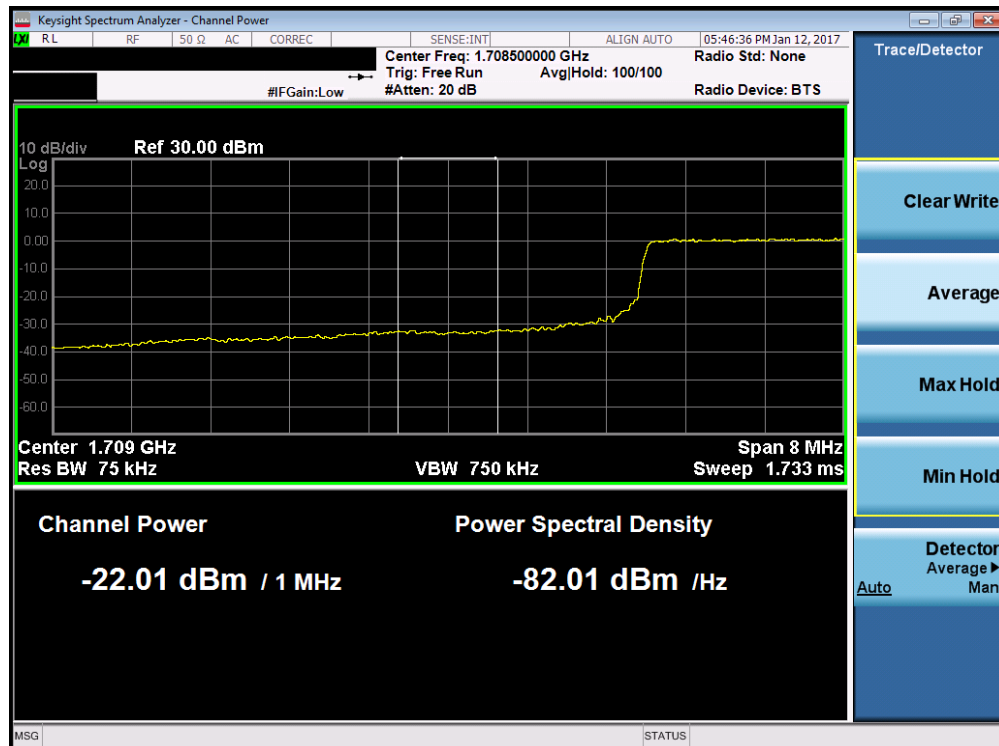


Plot 7-133. Upper Extended Band Edge Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 84 of 136

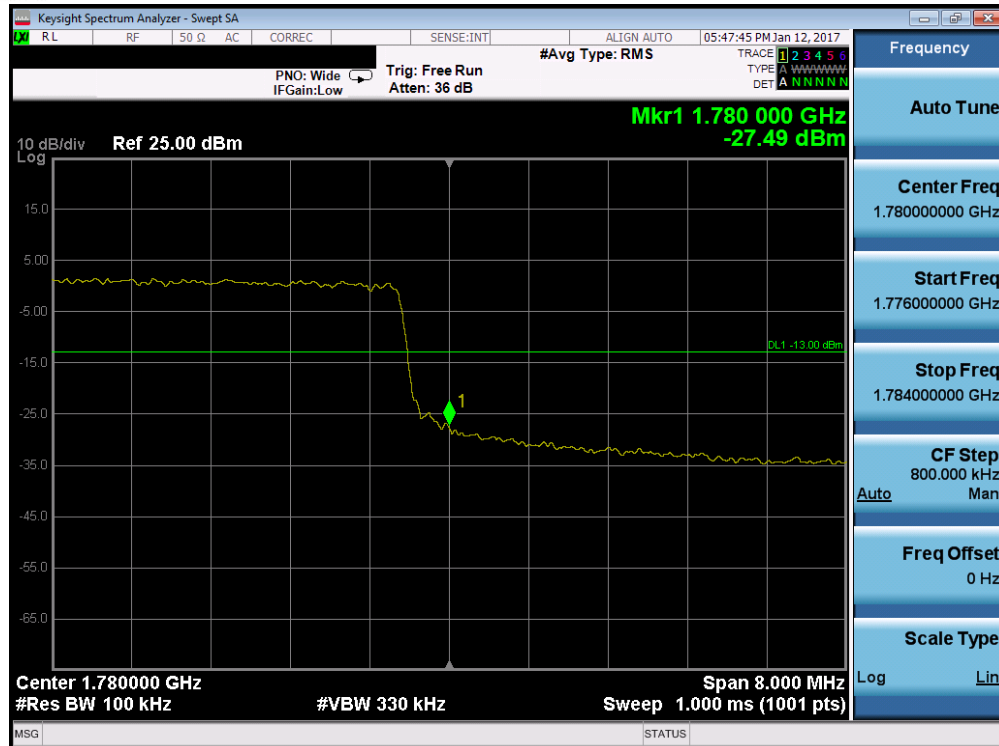


Plot 7-134. Lower Band Edge Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

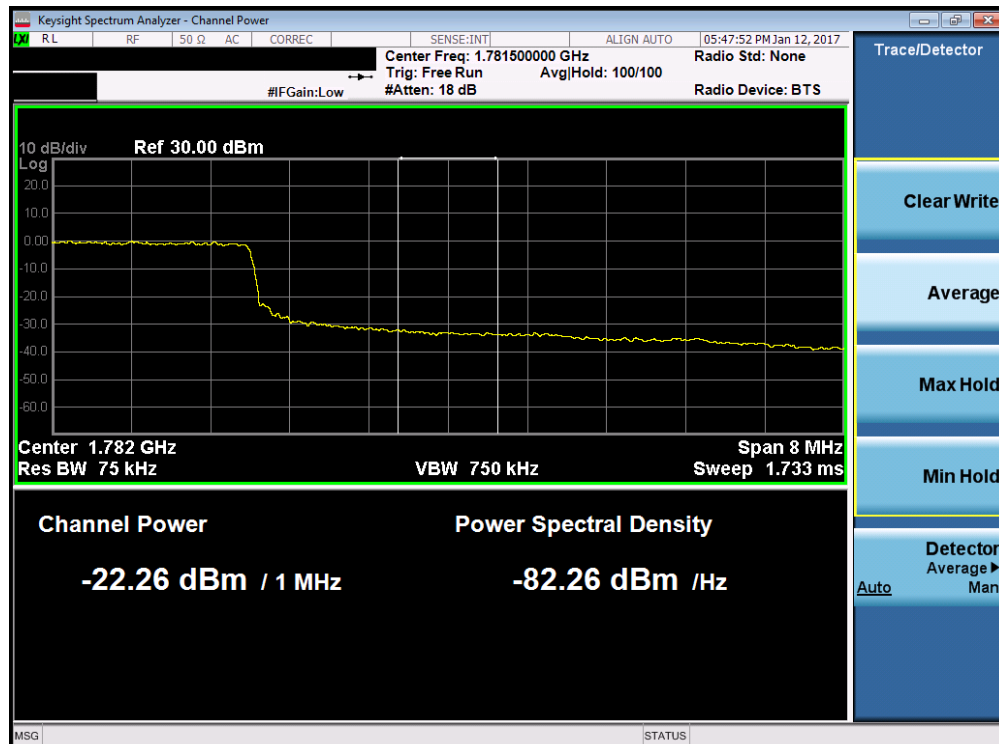


Plot 7-135. Lower Extended Band Edge Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 85 of 136

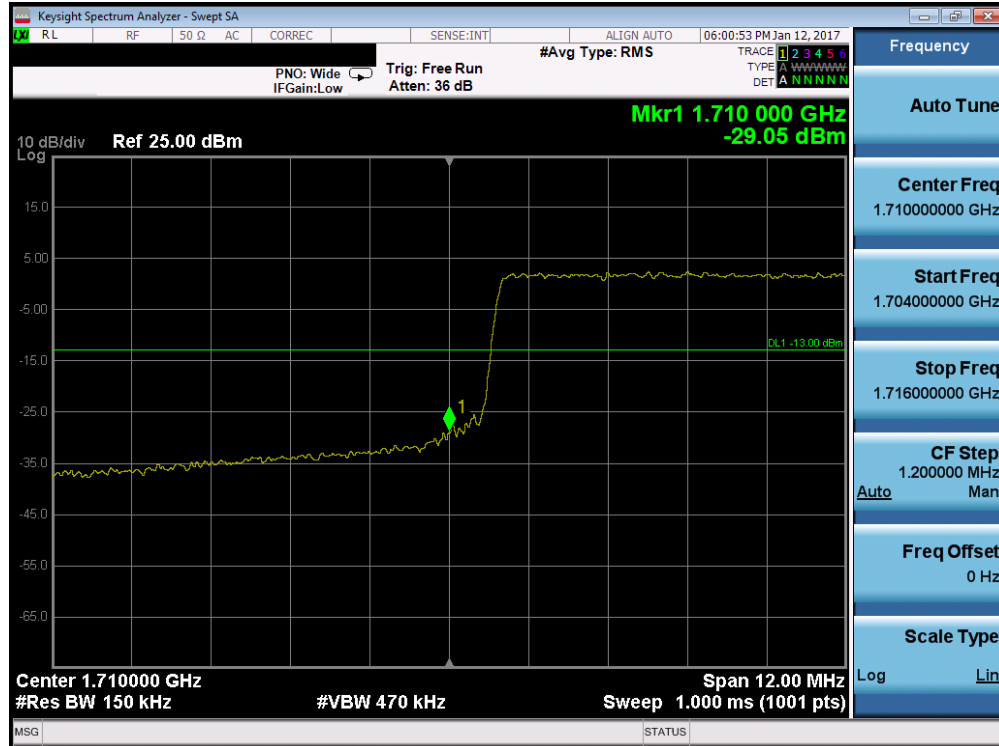


Plot 7-136. Upper Band Edge Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

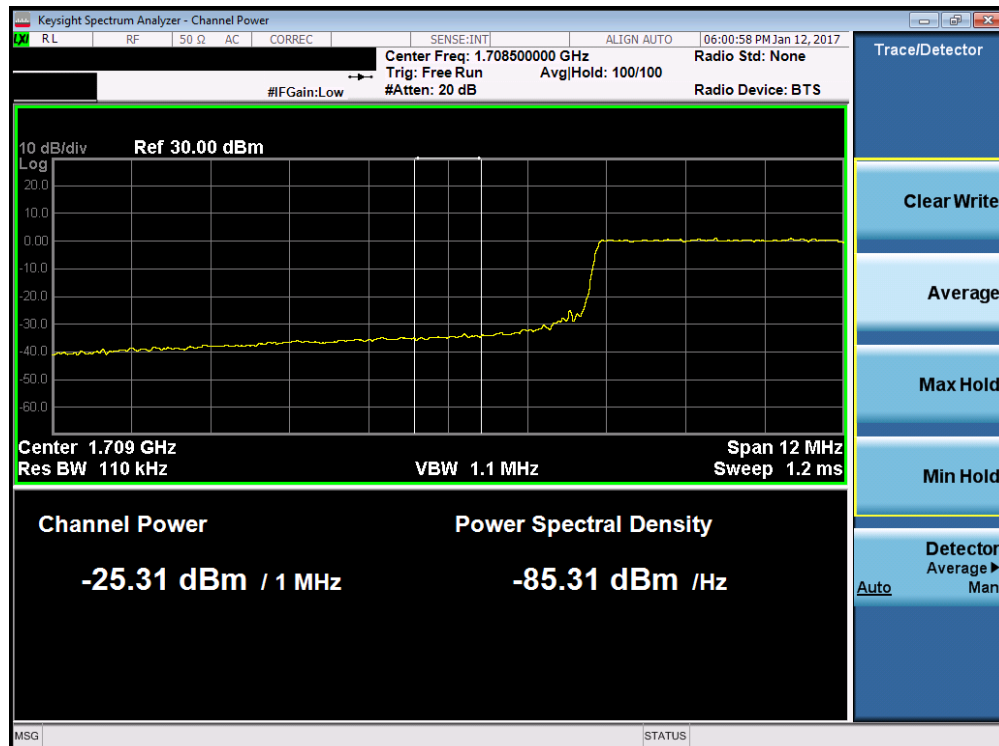


Plot 7-137. Upper Extended Band Edge Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-138. Lower Band Edge Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

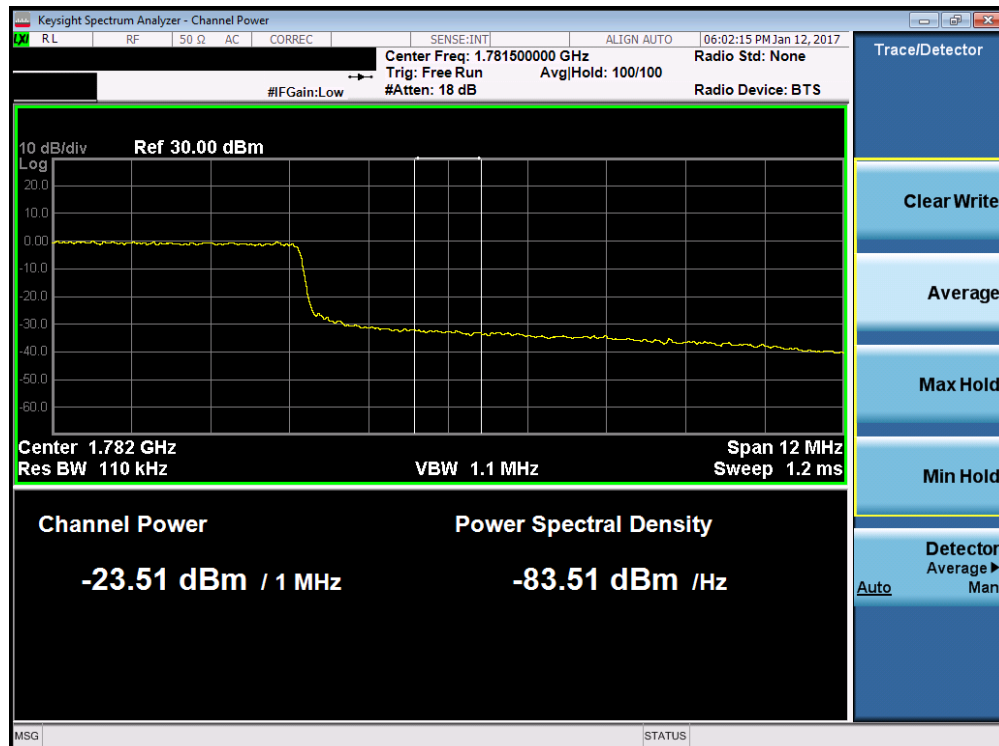


Plot 7-139. Lower Extended Band Edge Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 87 of 136

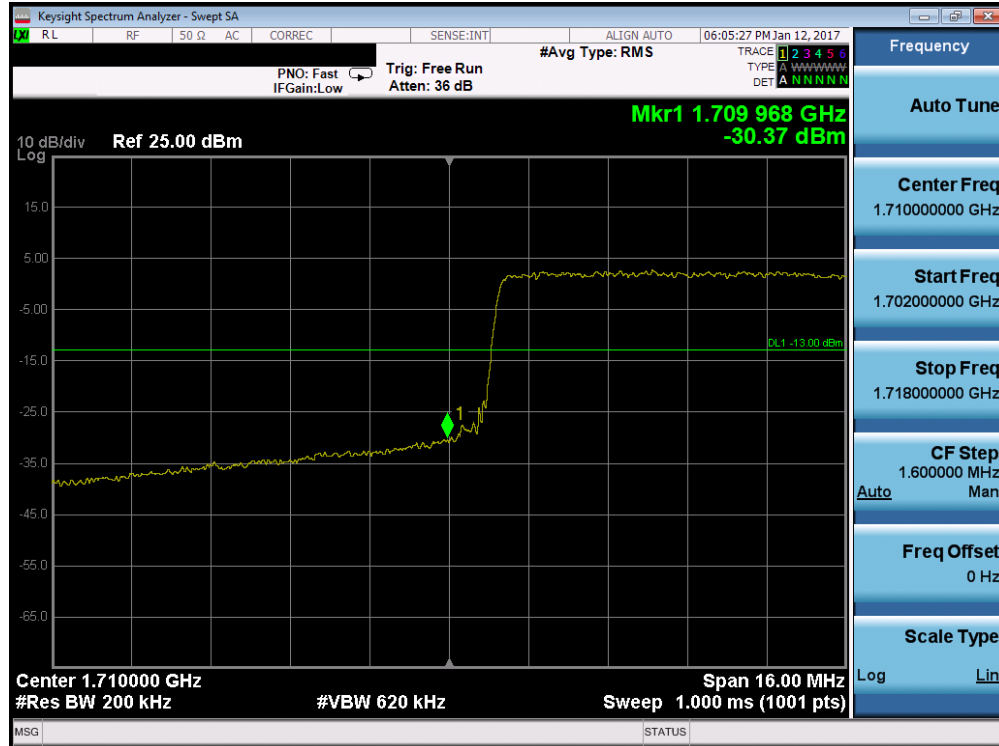


Plot 7-140. Upper Band Edge Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

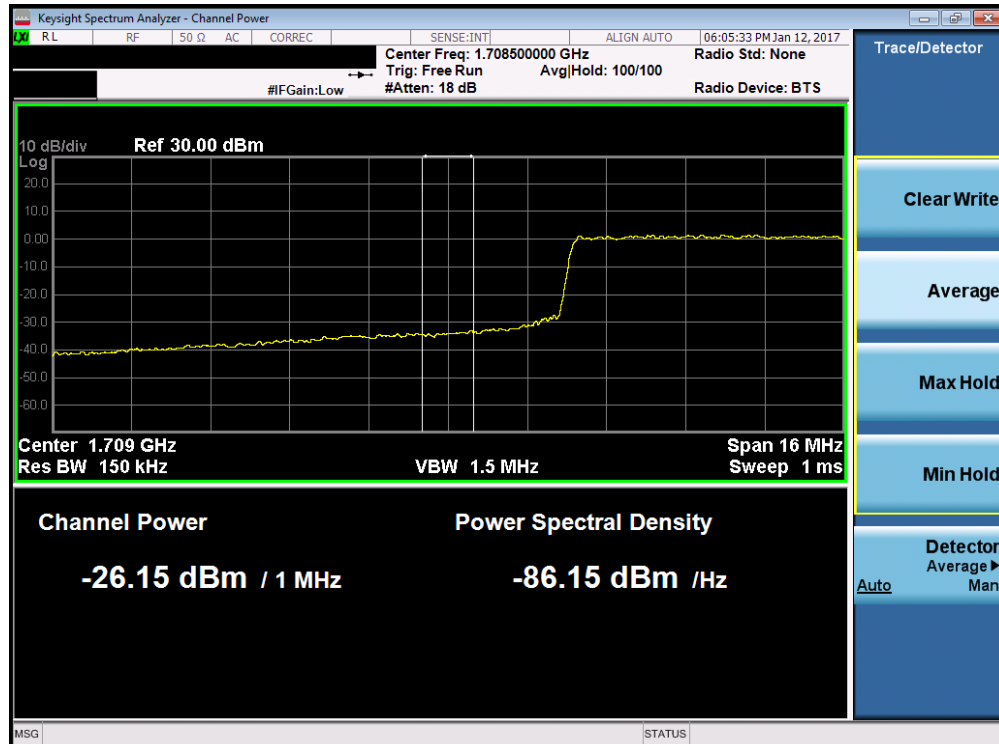


Plot 7-141. Upper Extended Band Edge Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 88 of 136



Plot 7-142. Lower Band Edge Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

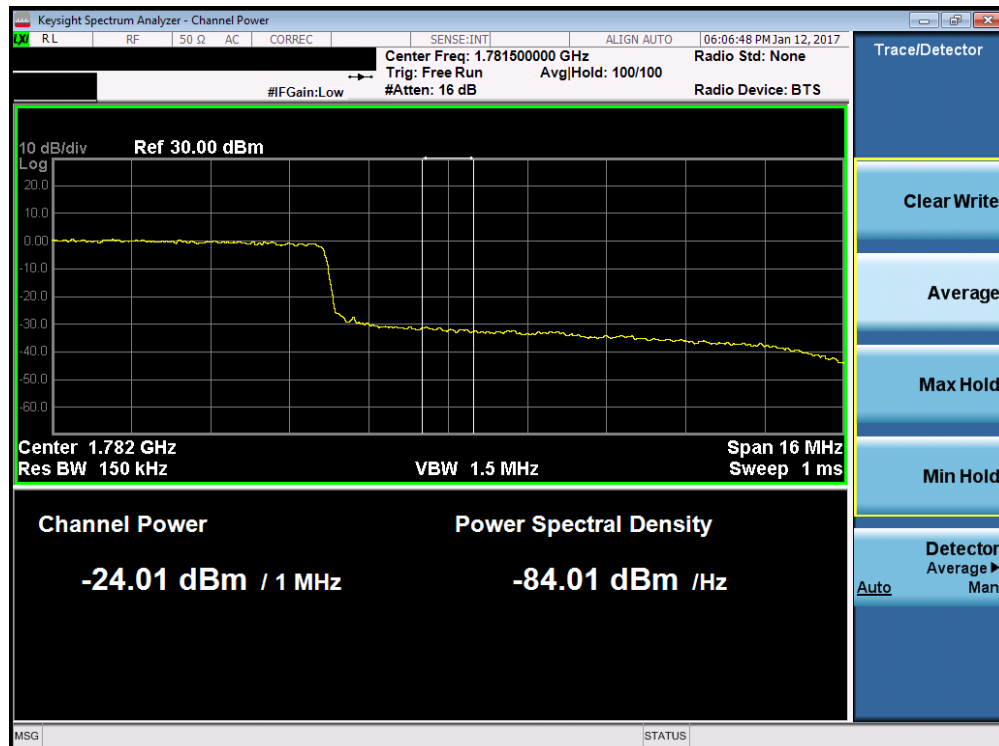


Plot 7-143. Lower Extended Band Edge Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 89 of 136

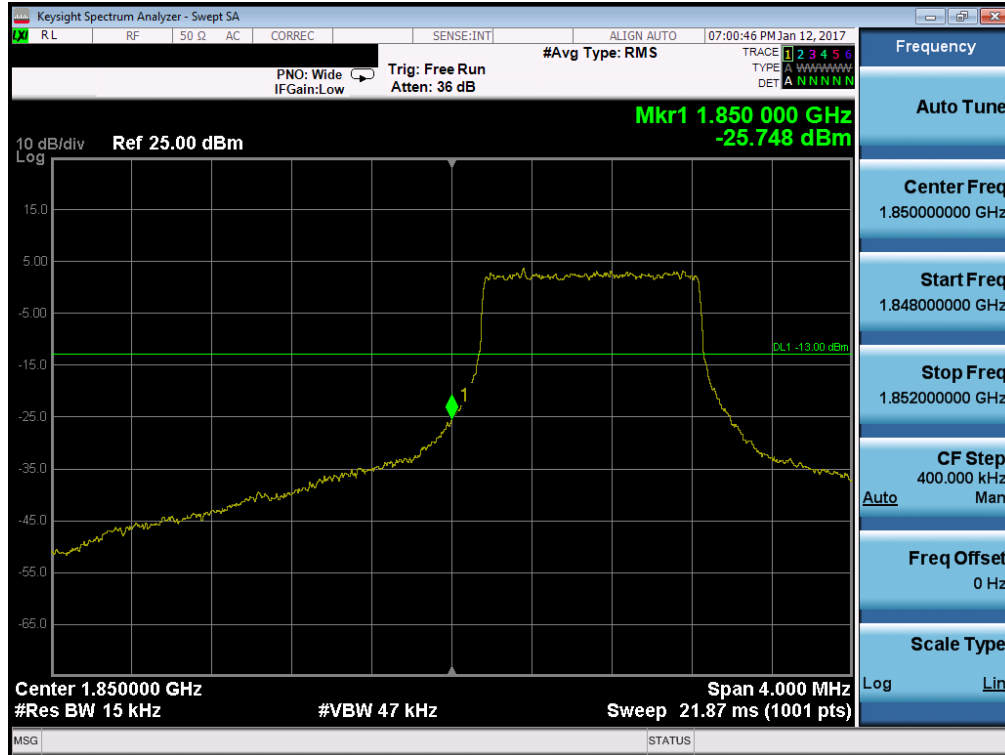


Plot 7-144. Upper Band Edge Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

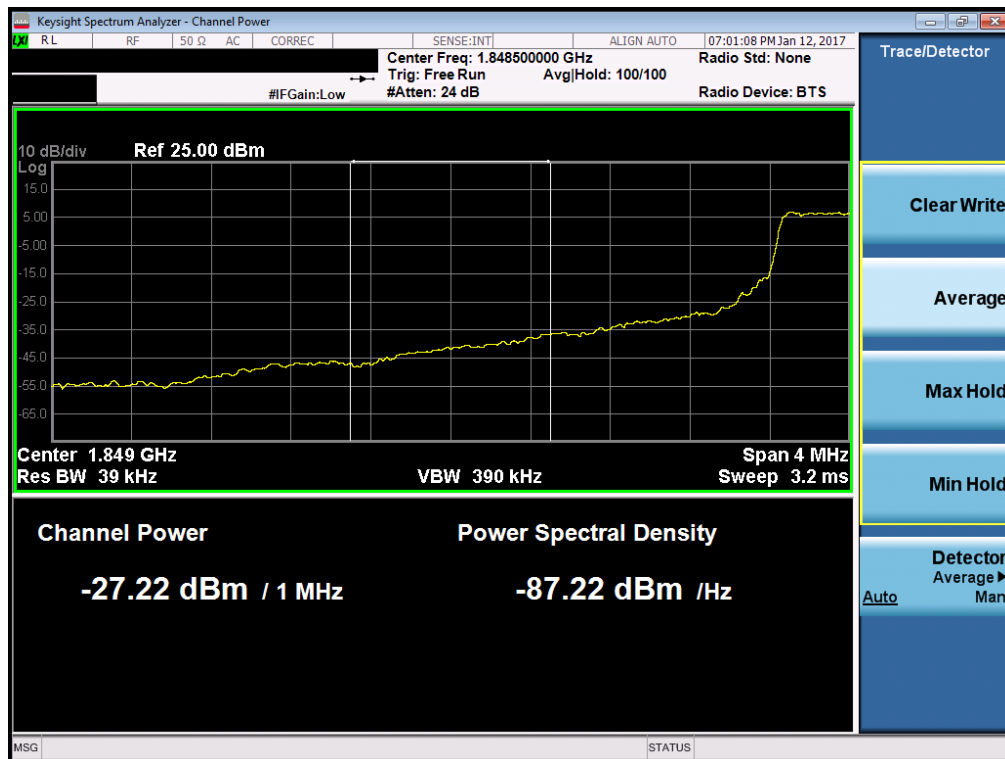


Plot 7-145. Upper Extended Band Edge Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 90 of 136

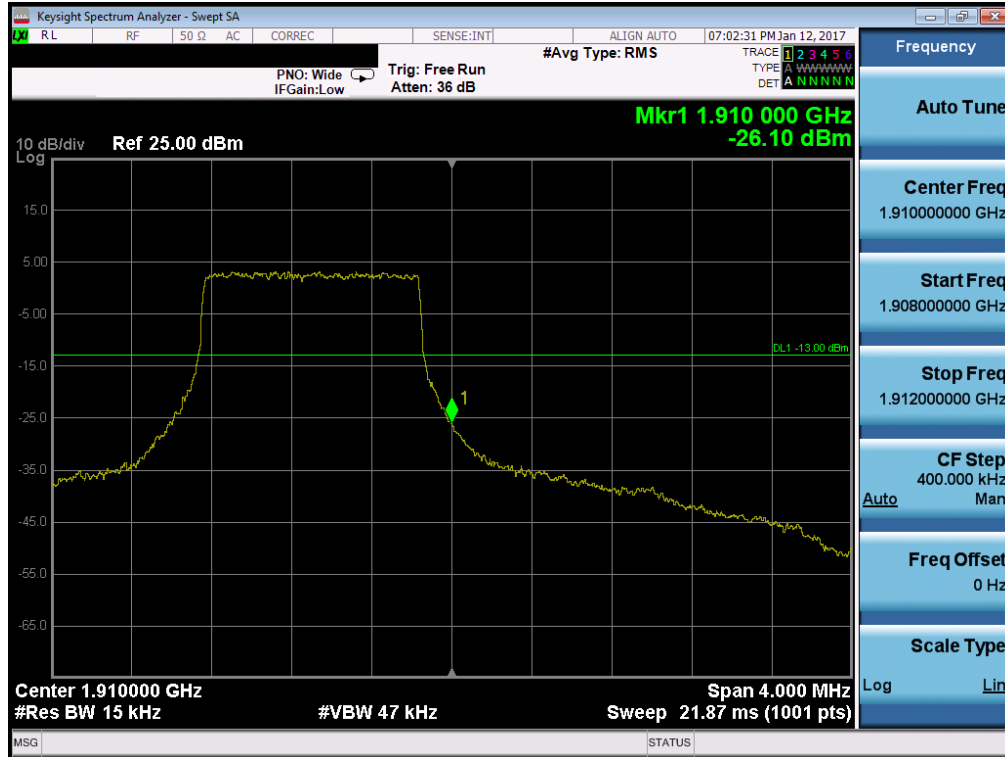


Plot 7-146. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

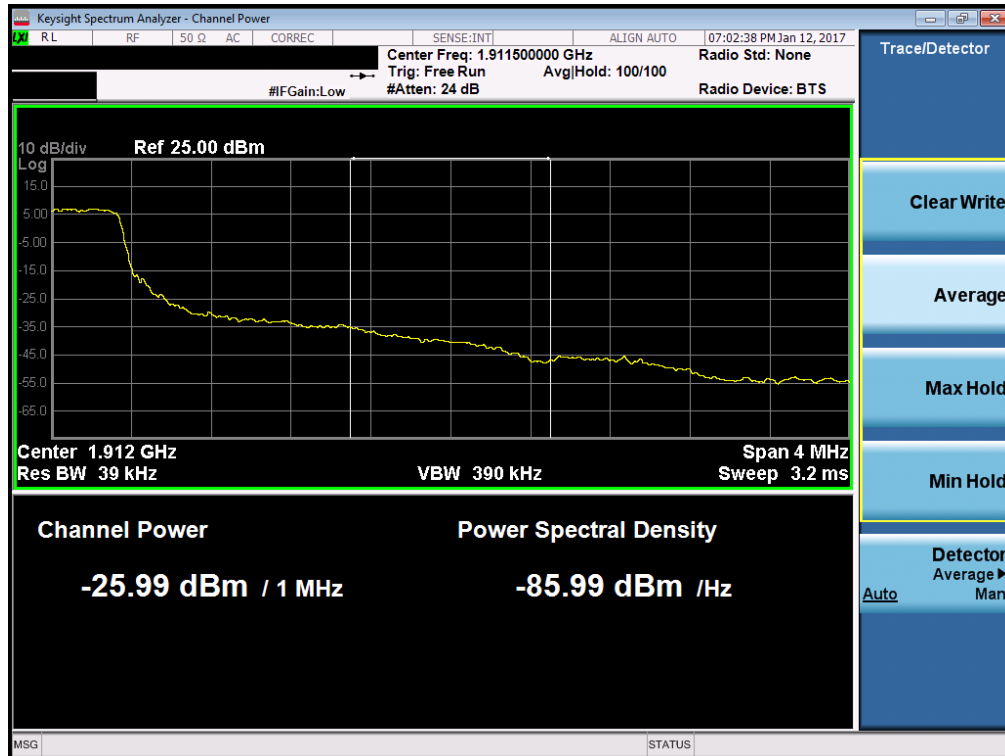


Plot 7-147. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 91 of 136

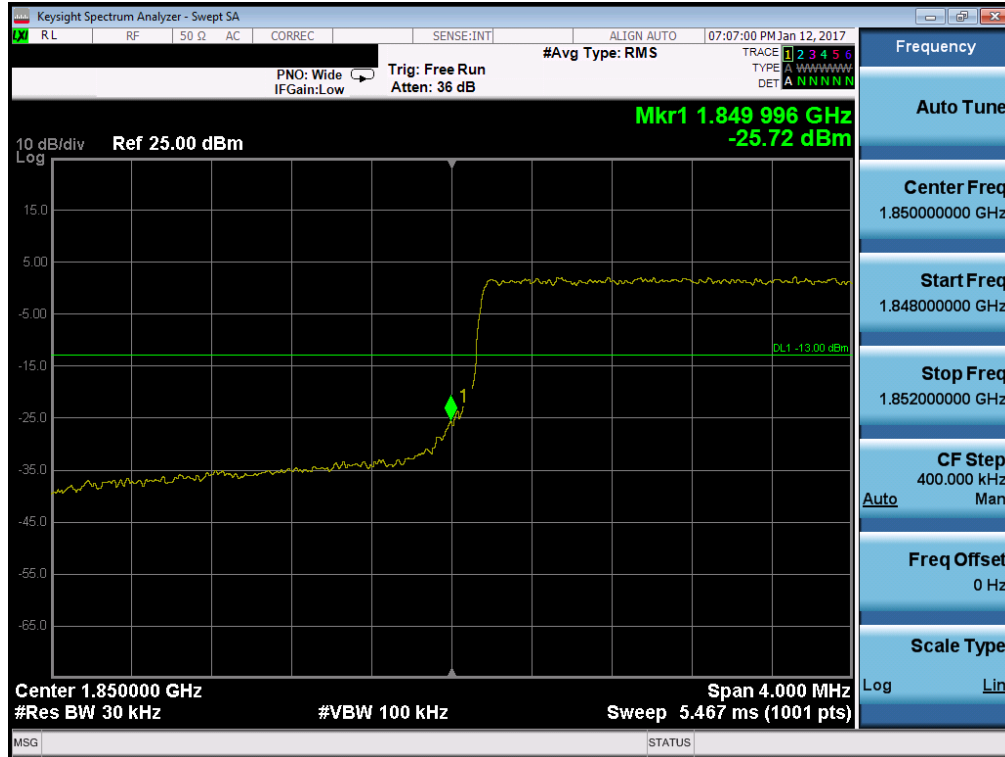


Plot 7-148. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

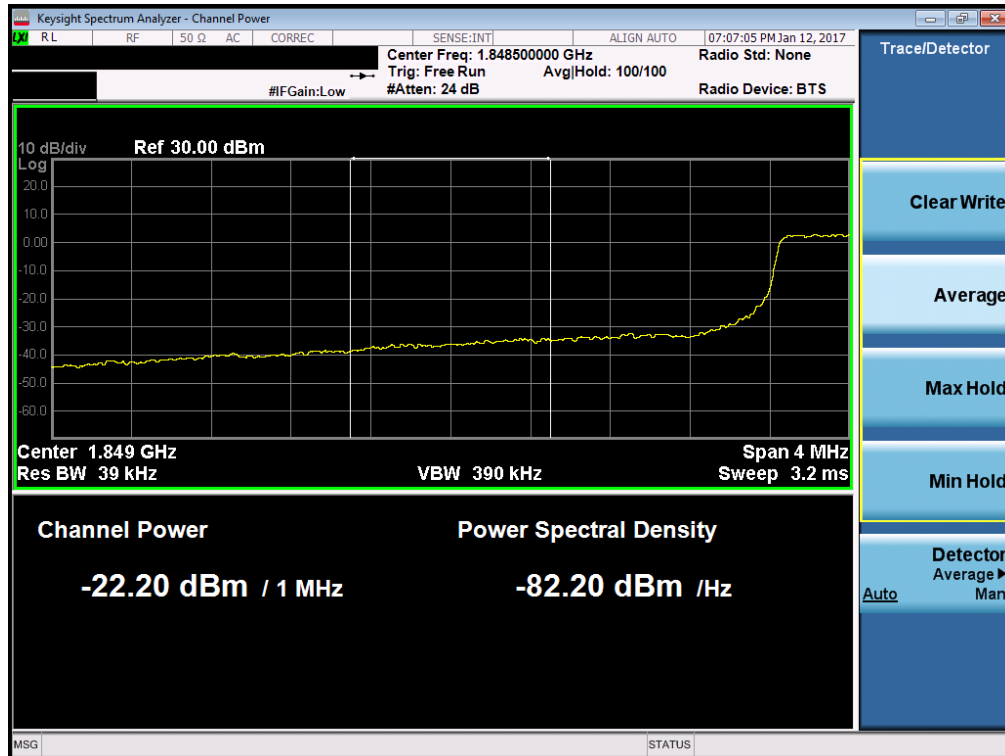


Plot 7-149. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 92 of 136

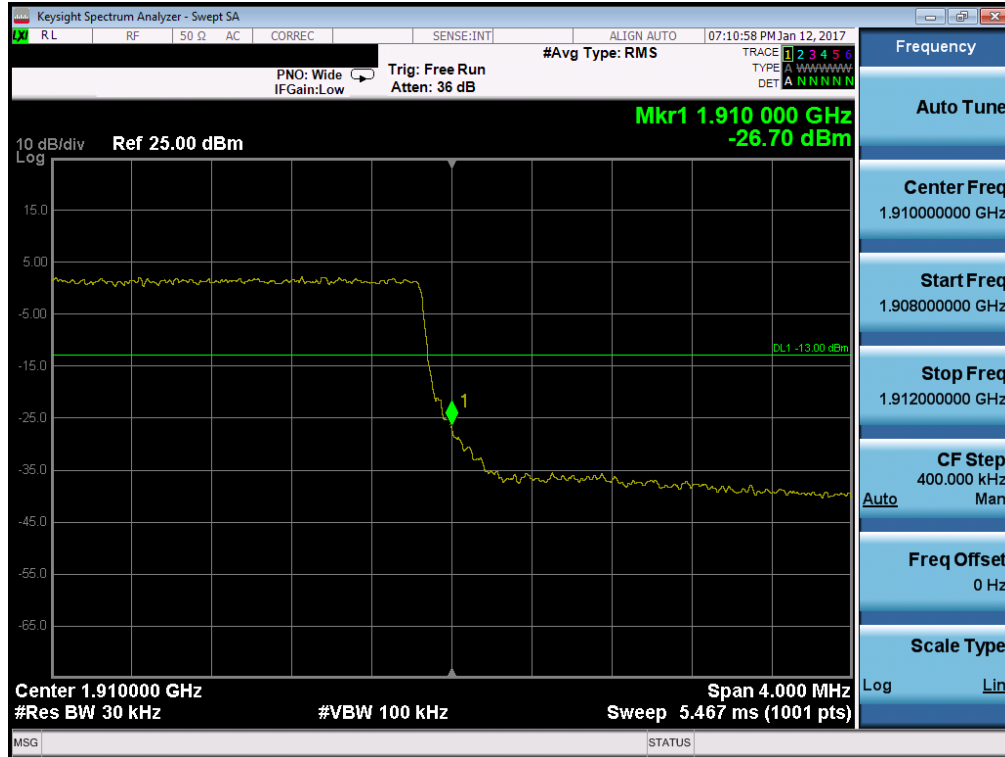


Plot 7-150. Lower Band Edge Plot (Band 2 – 3MHz QPSK – RB Size 15)

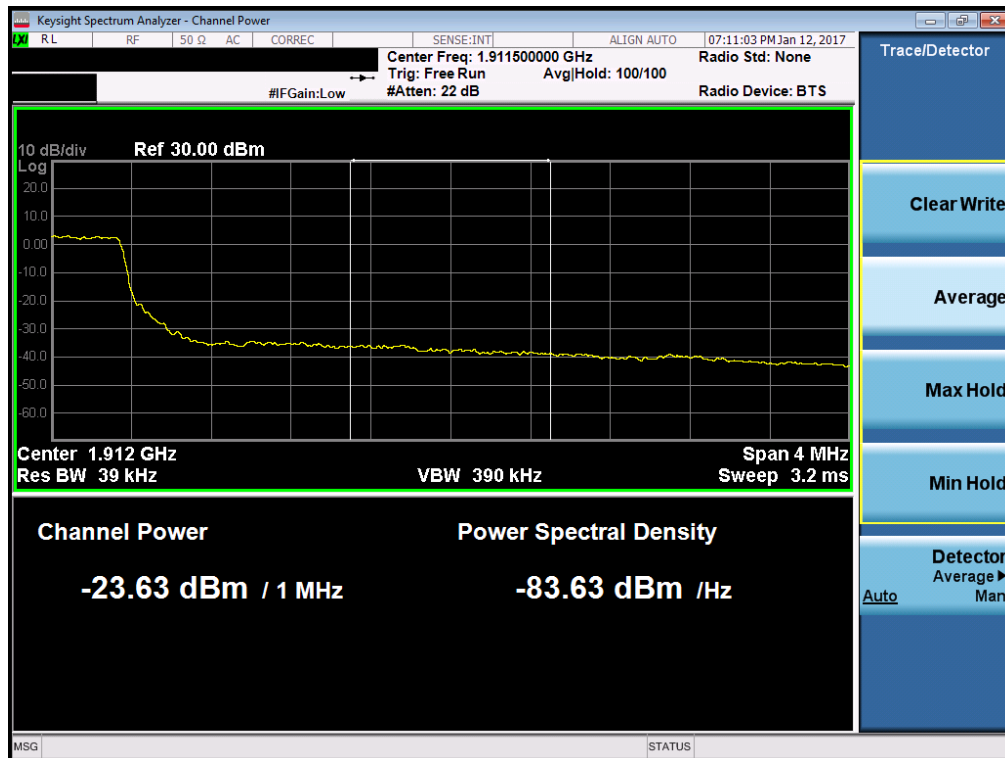


Plot 7-151. Lower Extended Band Edge Plot (Band 2 – 3MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 93 of 136

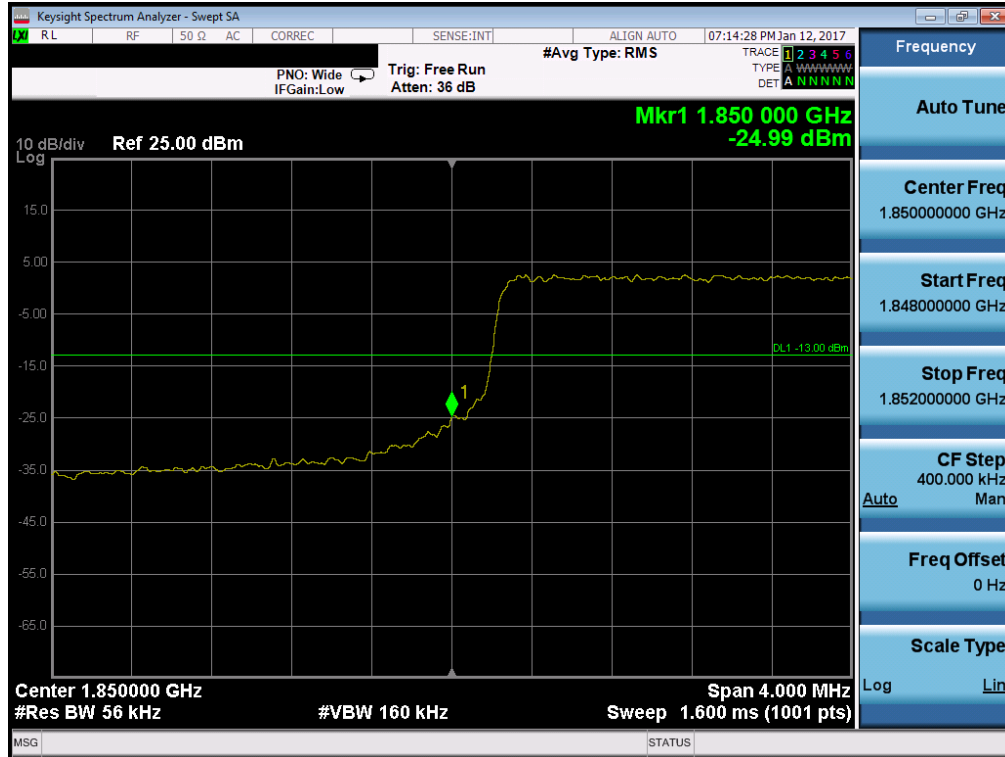


Plot 7-152. Upper Band Edge Plot (Band 2 – 3MHz QPSK – RB Size 15)

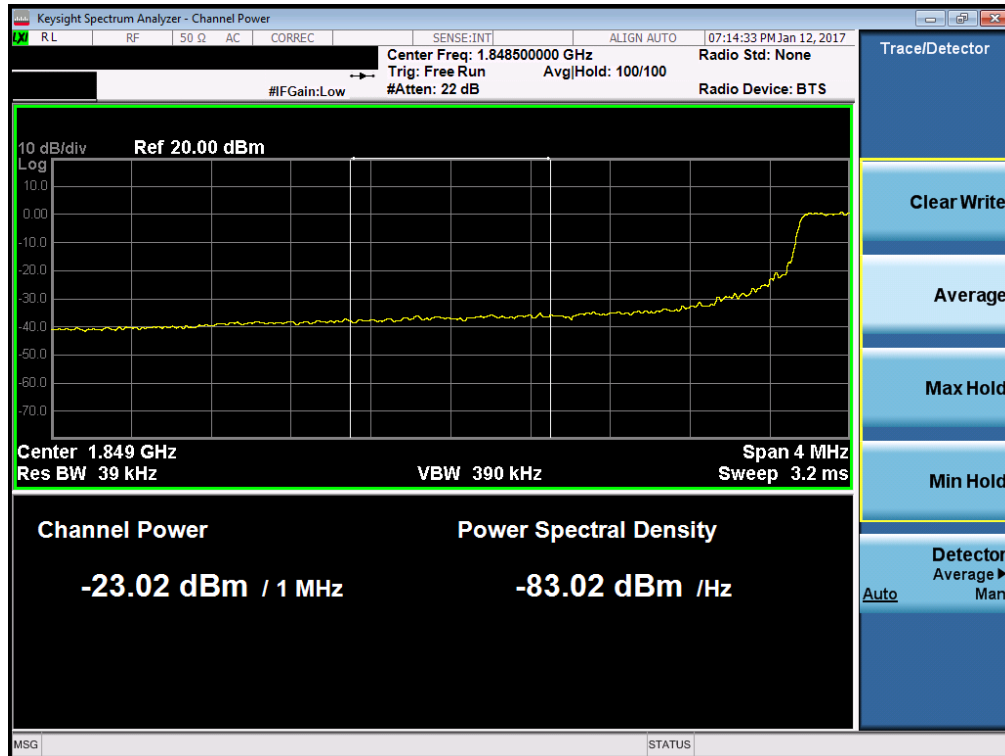


Plot 7-153. Upper Extended Band Edge Plot (Band 2 – 3MHz QPSK – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 94 of 136

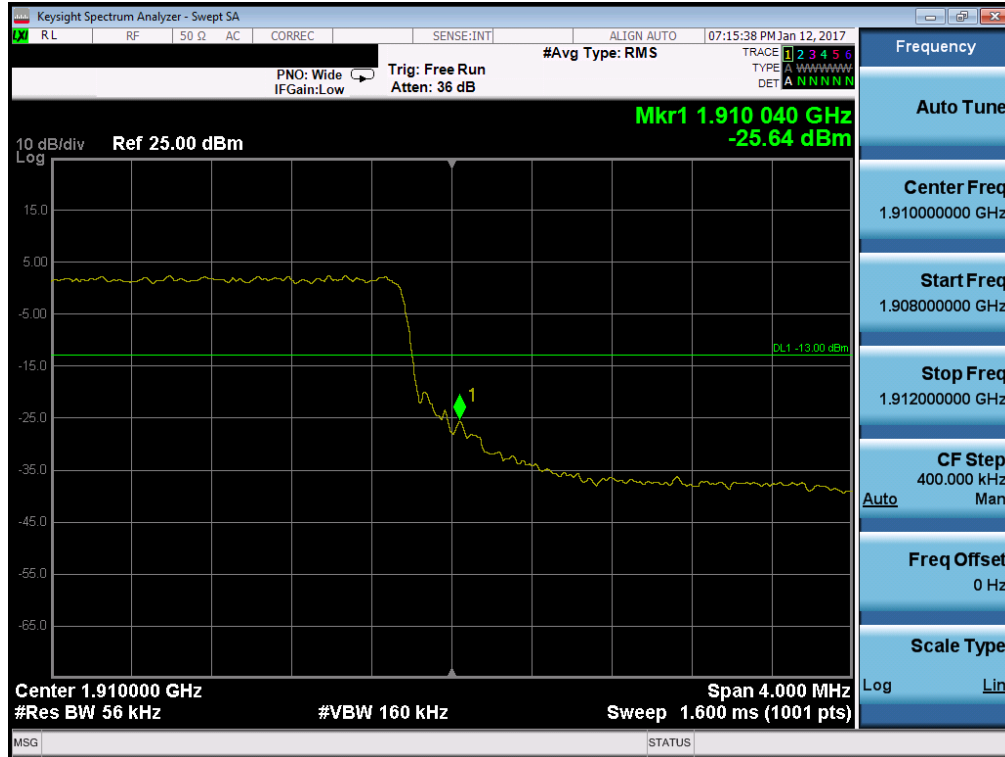


Plot 7-154. Lower Band Edge Plot (Band 2 – 5MHz QPSK – RB Size 25)

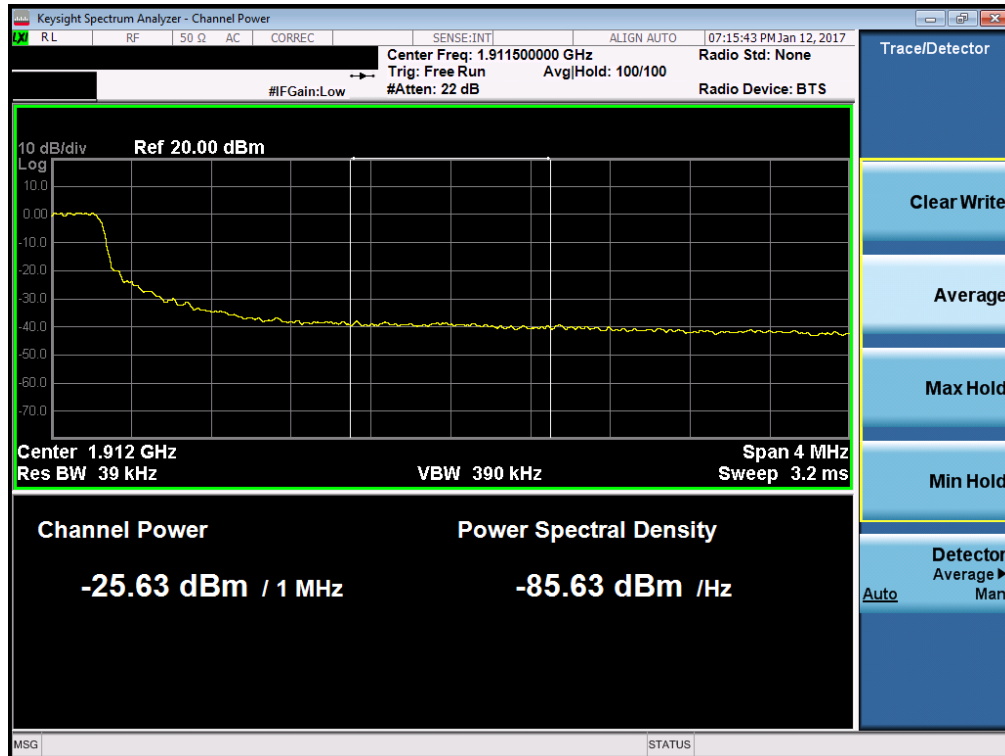


Plot 7-155. Lower Extended Band Edge Plot (Band 2 – 5MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 95 of 136

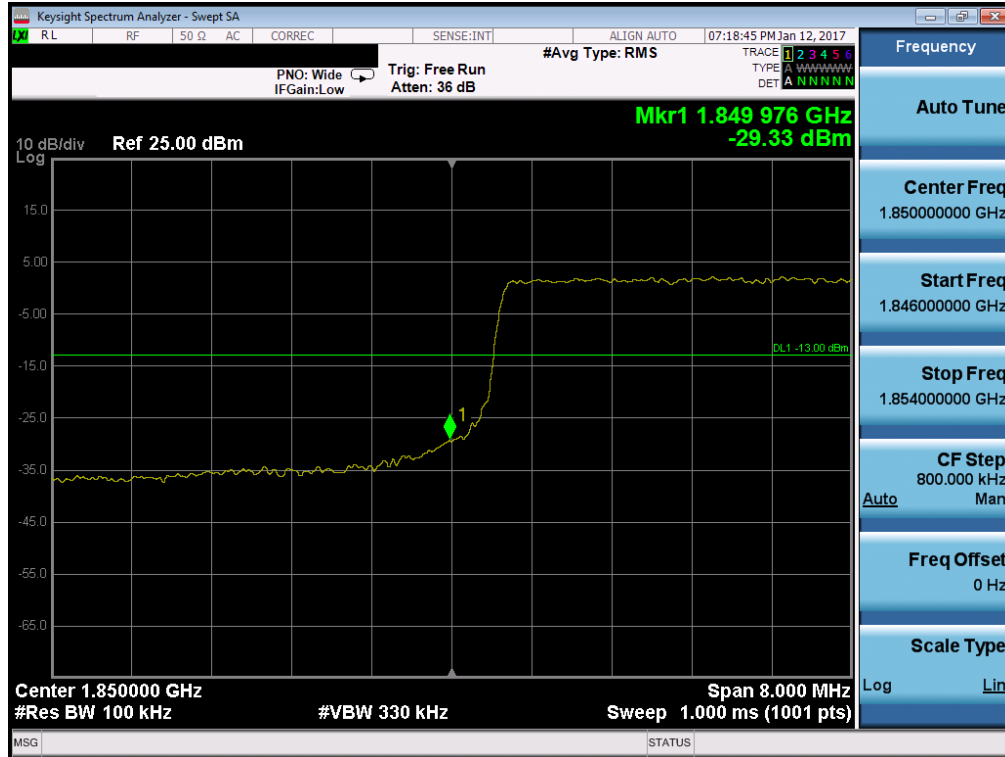


Plot 7-156. Upper Band Edge Plot (Band 2 – 5MHz QPSK – RB Size 25)

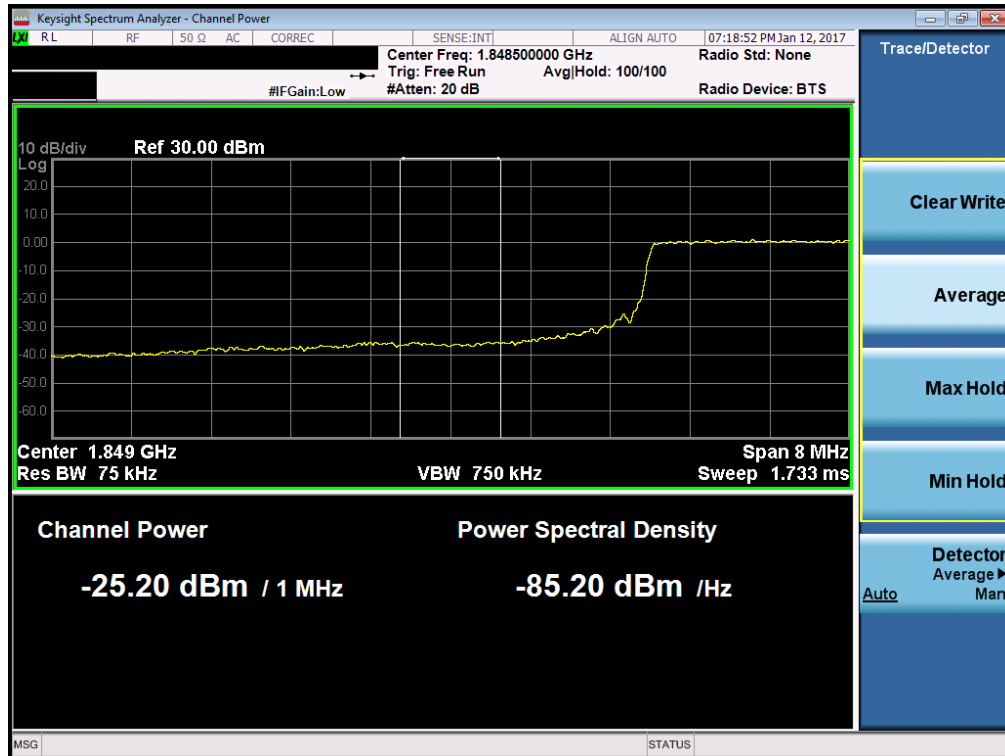


Plot 7-157. Upper Extended Band Edge Plot (Band 2 – 5MHz QPSK – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 96 of 136

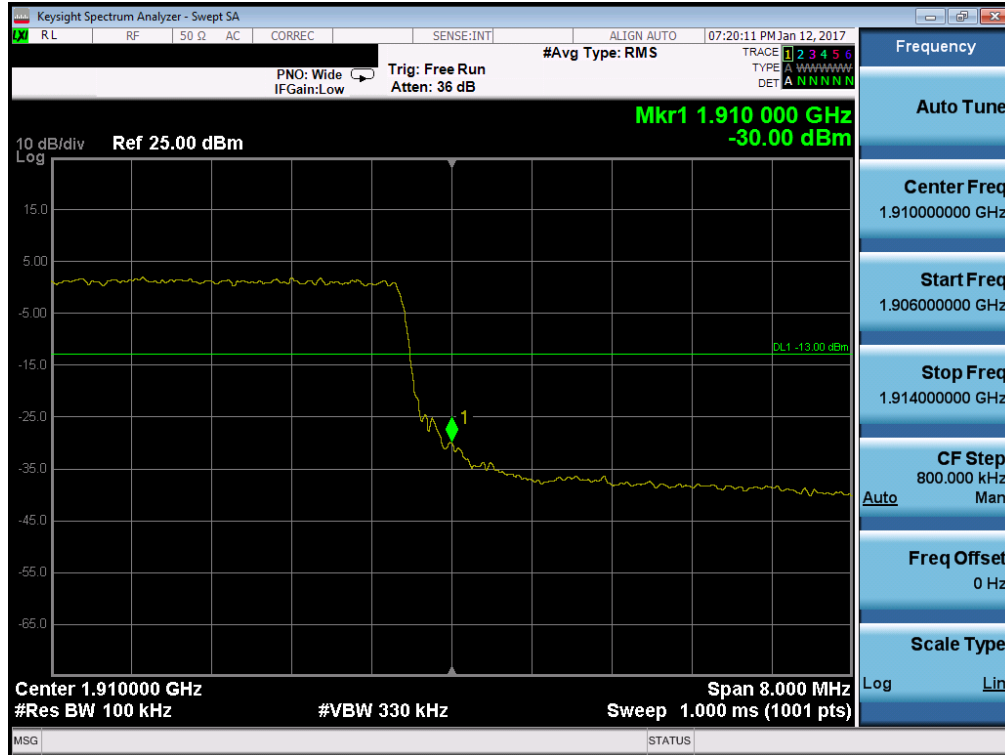


Plot 7-158. Lower Band Edge Plot (Band 2 – 10MHz QPSK – RB Size 50)

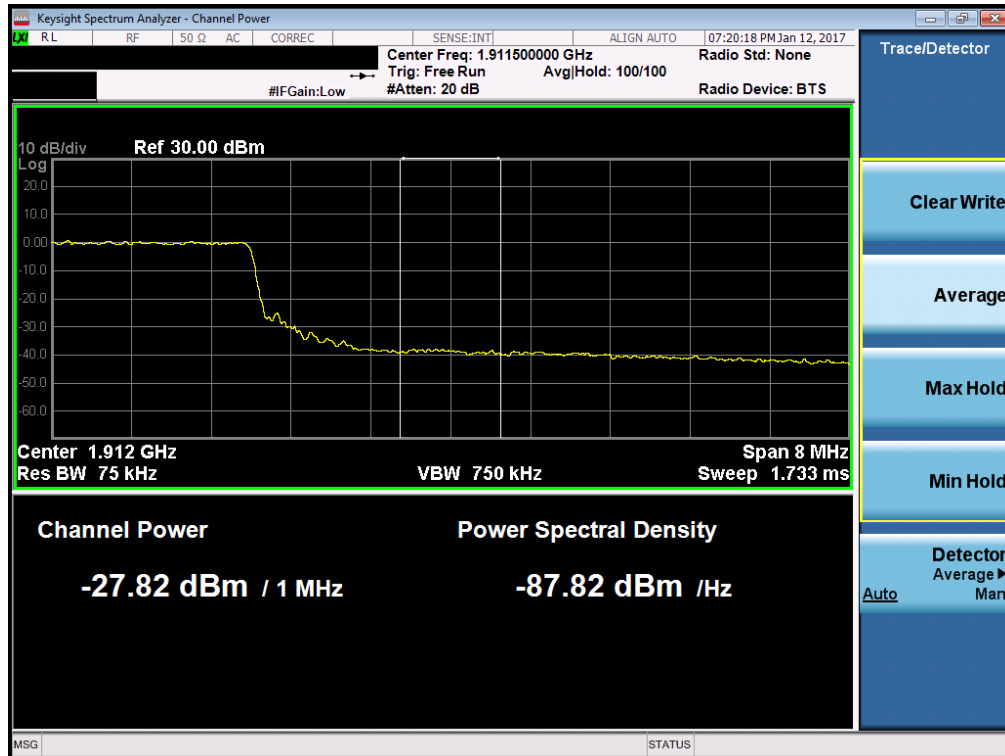


Plot 7-159. Lower Extended Band Edge Plot (Band 2 – 10MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 97 of 136

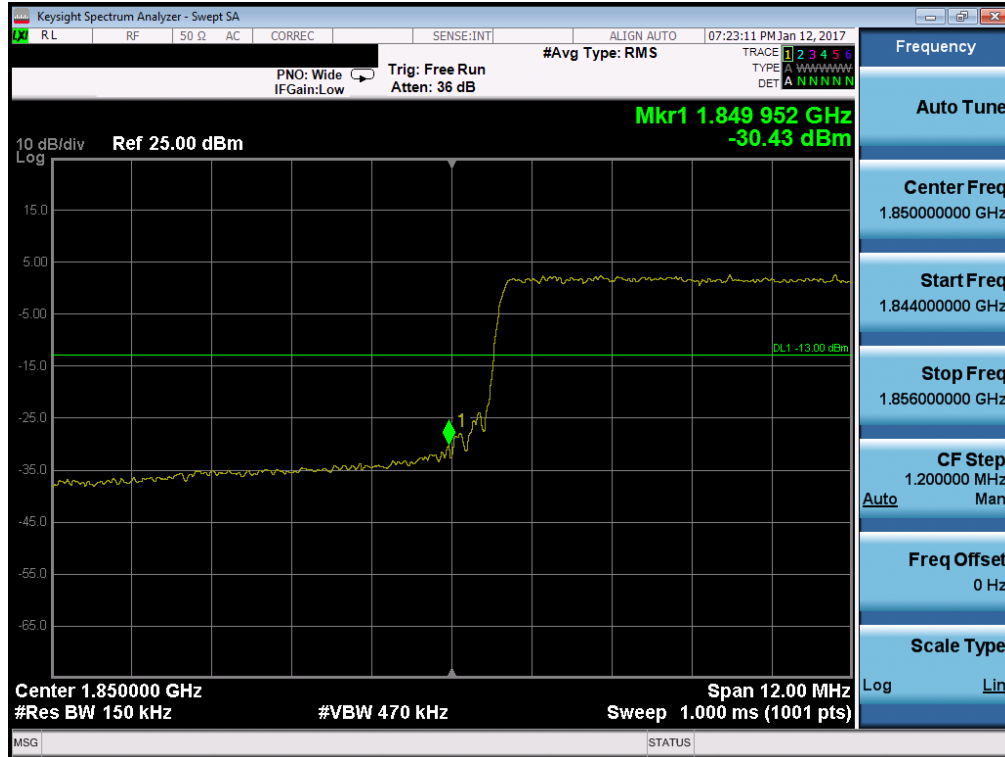


Plot 7-160. Upper Band Edge Plot (Band 2 – 10MHz QPSK – RB Size 50)

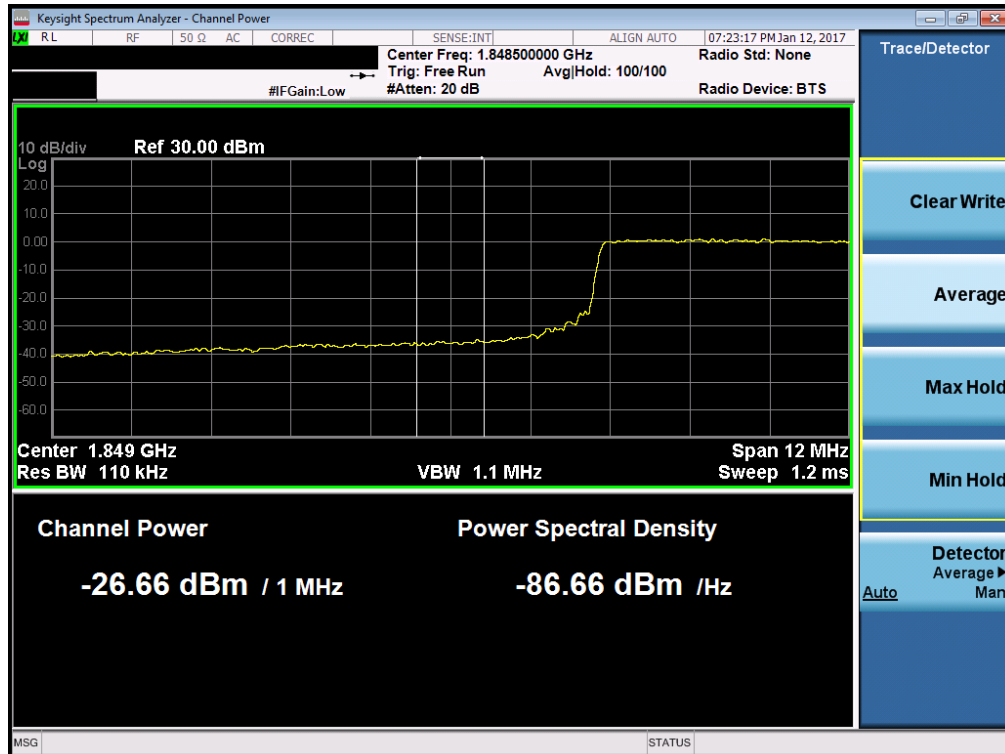


Plot 7-161. Upper Extended Band Edge Plot (Band 2 – 10MHz QPSK – RB Size 50)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 98 of 136

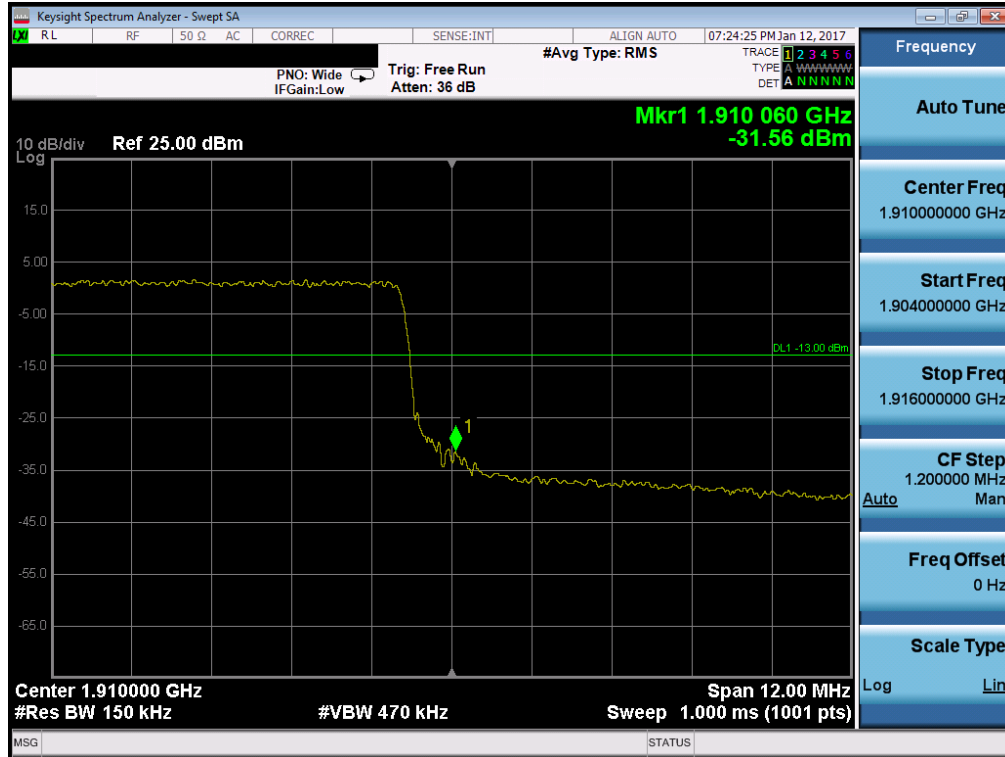


Plot 7-162. Lower Band Edge Plot (Band 2 – 15MHz QPSK – RB Size 75)

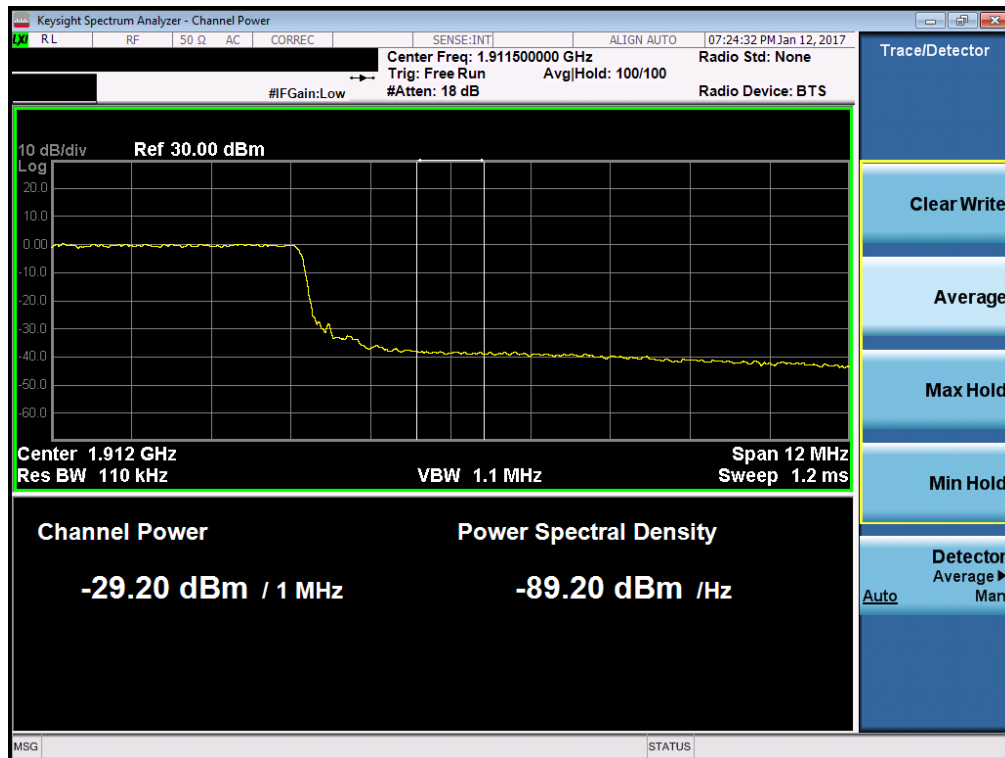


Plot 7-163. Lower Extended Band Edge Plot (Band 2 – 15MHz QPSK – RB Size 75)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 99 of 136

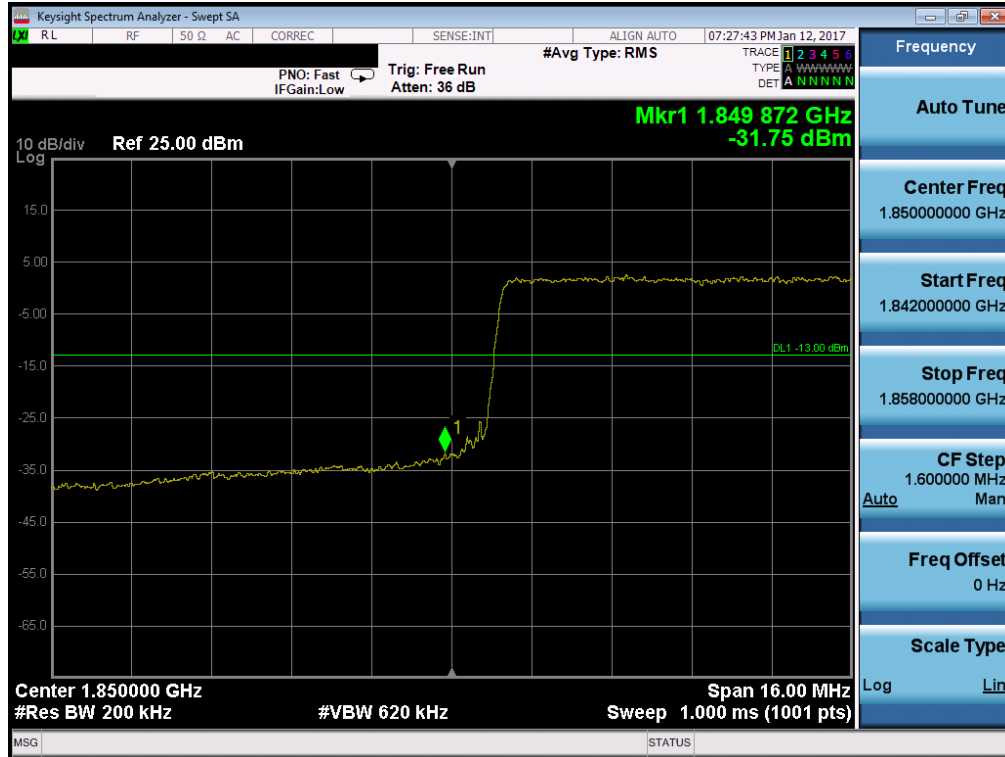


Plot 7-164. Upper Band Edge Plot (Band 2 – 15MHz QPSK – RB Size 75)

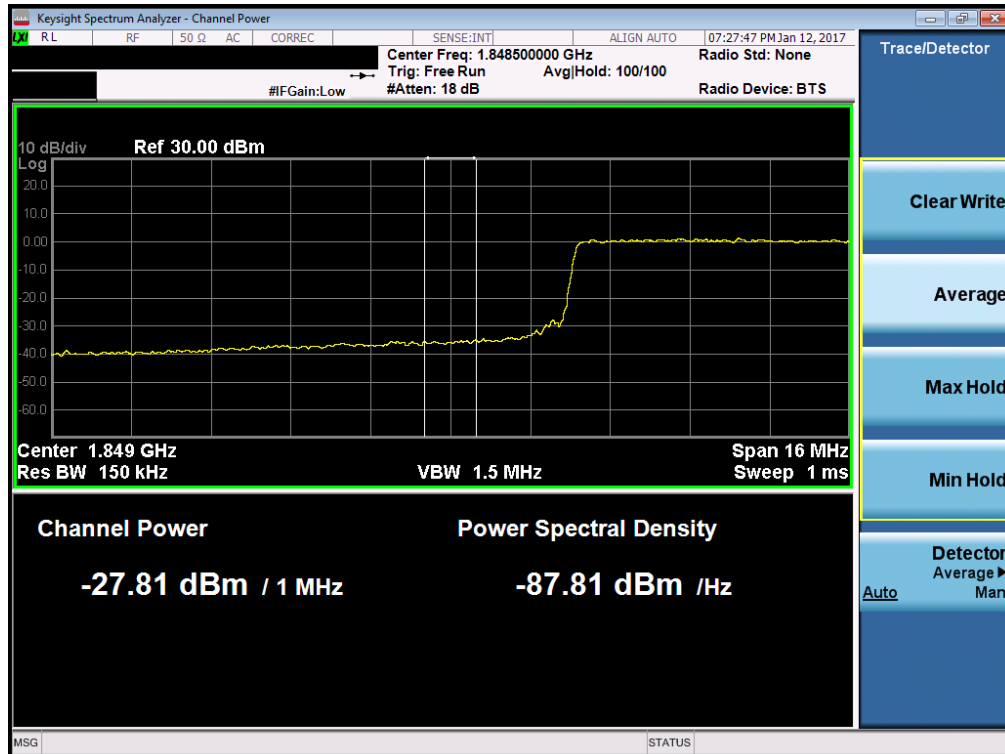


Plot 7-165. Upper Extended Band Edge Plot (Band 2 – 15MHz QPSK – RB Size 75)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 100 of 136



Plot 7-166. Lower Band Edge Plot (Band 2 – 20MHz QPSK – RB Size 100)

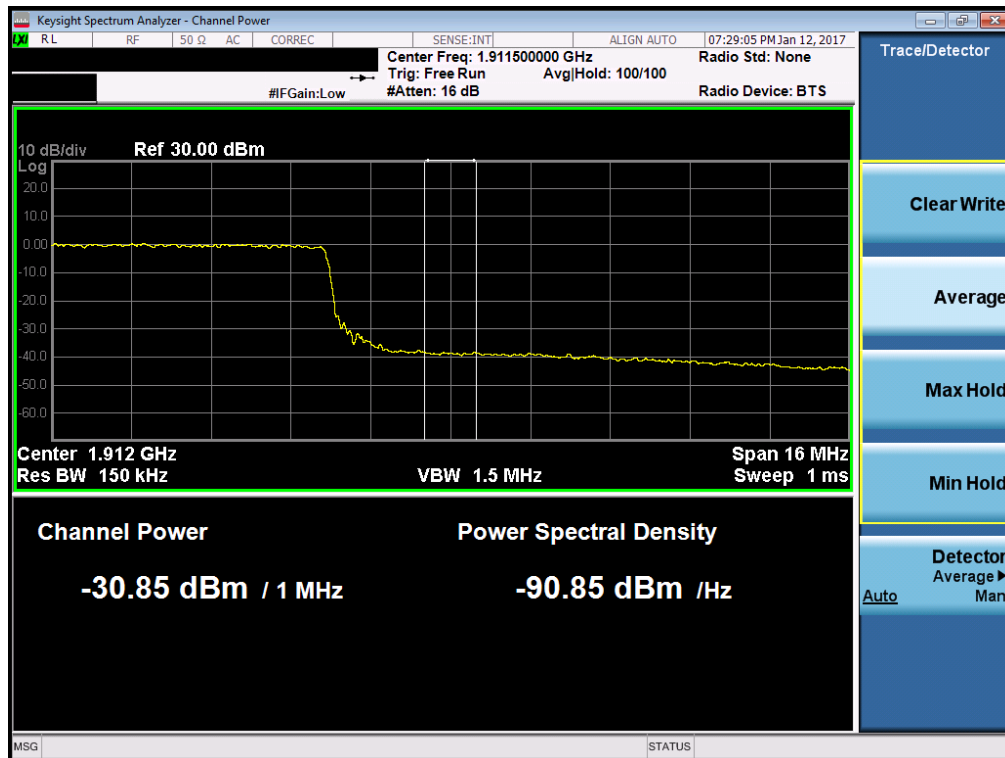


Plot 7-167. Lower Extended Band Edge Plot (Band 2 – 20MHz QPSK – RB Size 100)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-168. Upper Band Edge Plot (Band 2 – 20MHz QPSK – RB Size 100)



Plot 7-169. Upper Extended Band Edge Plot (Band 2 – 20MHz QPSK – RB Size 100)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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7.5 Peak-Average Ratio

§24.232(d)

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v02r02 – Section 5.7.1

Test Settings

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

Test Setup

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

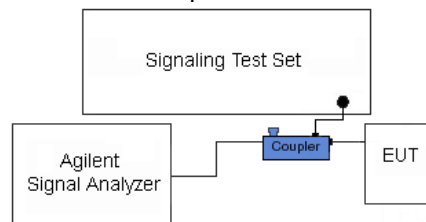
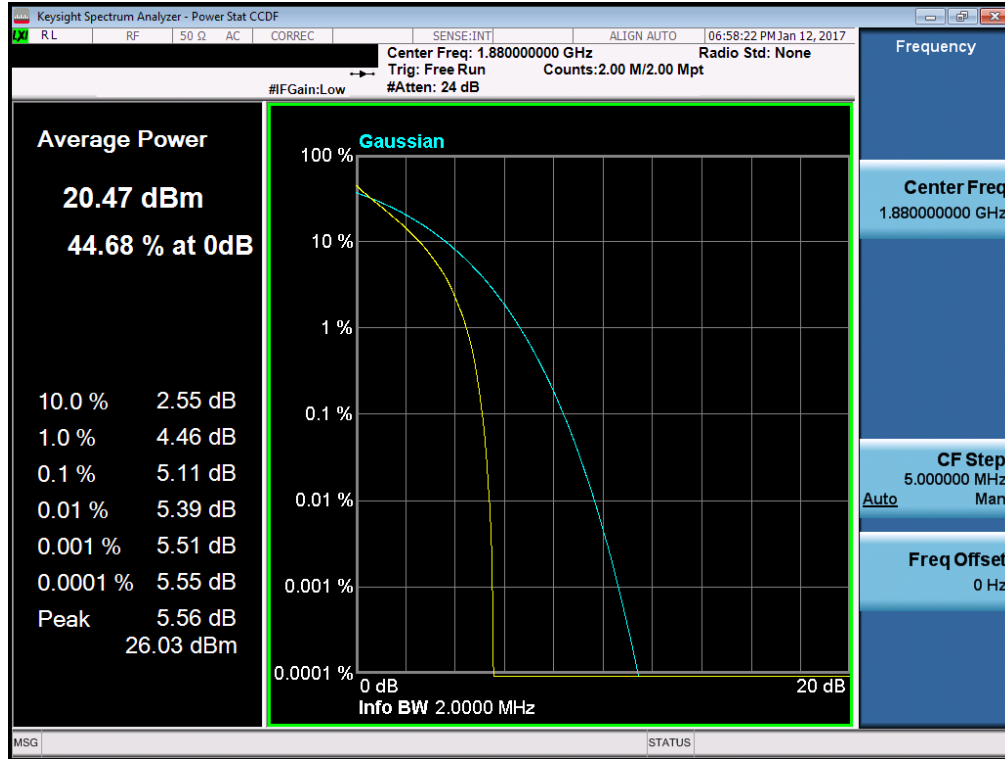


Figure 7-4. Test Instrument & Measurement Setup

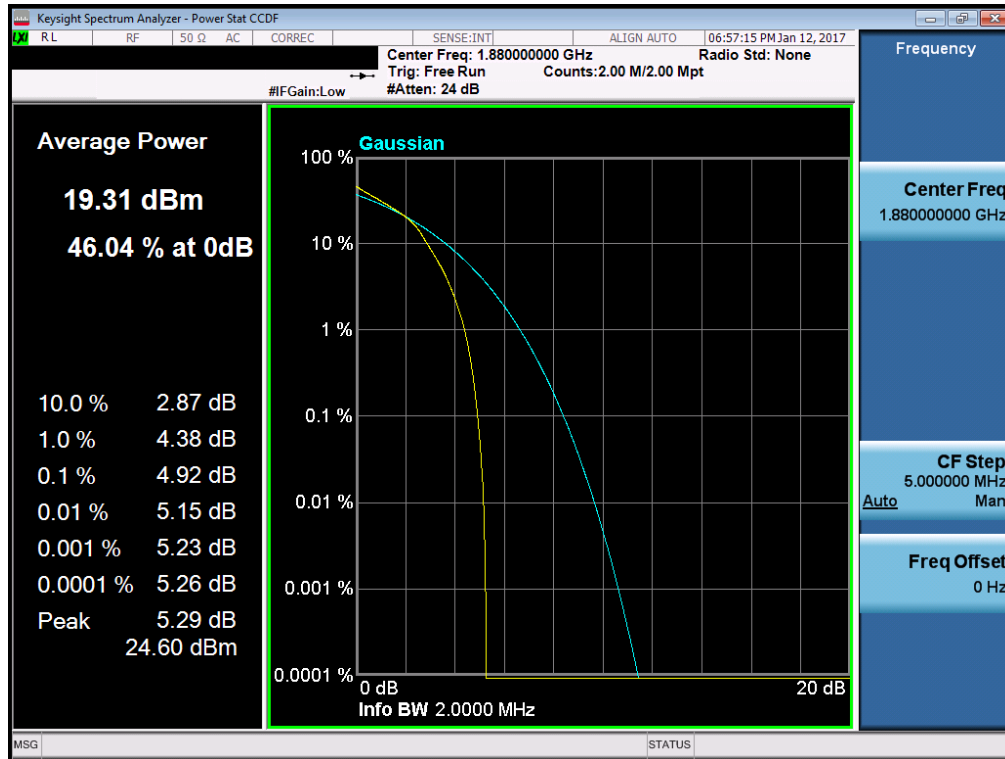
Test Notes

None.

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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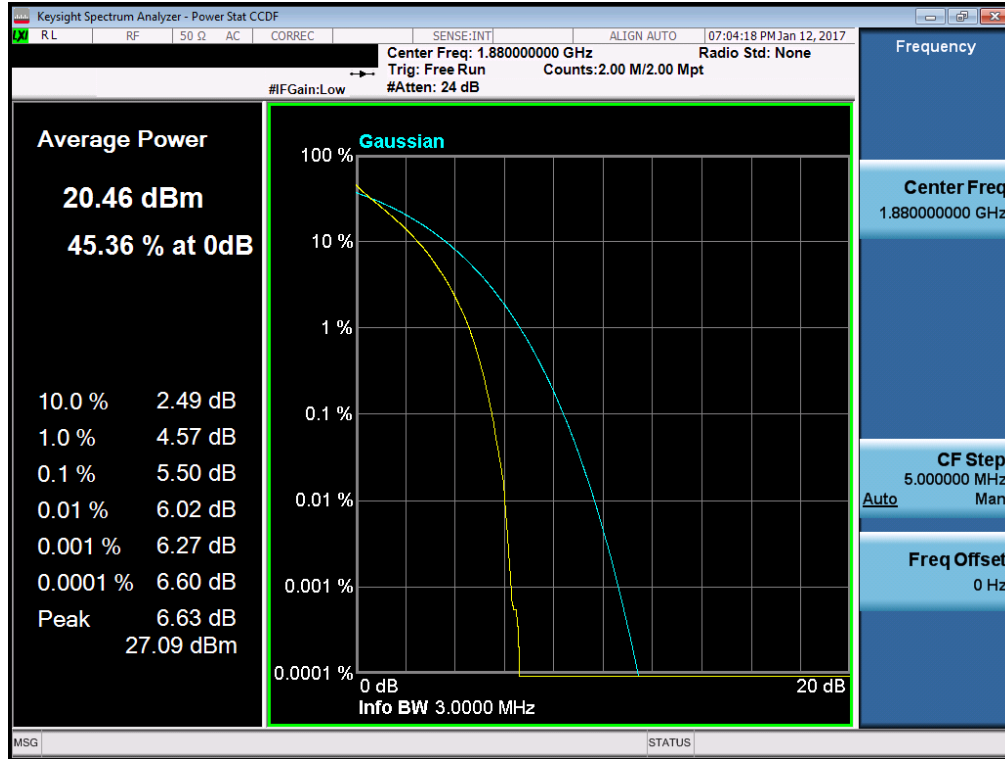


Plot 7-170. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

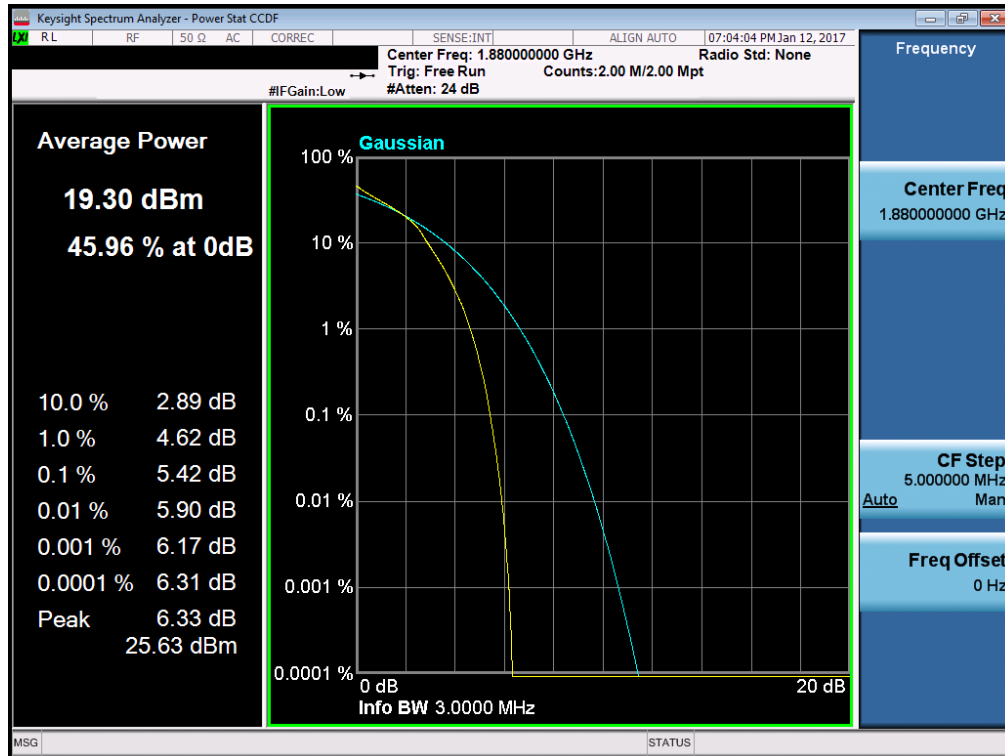


Plot 7-171. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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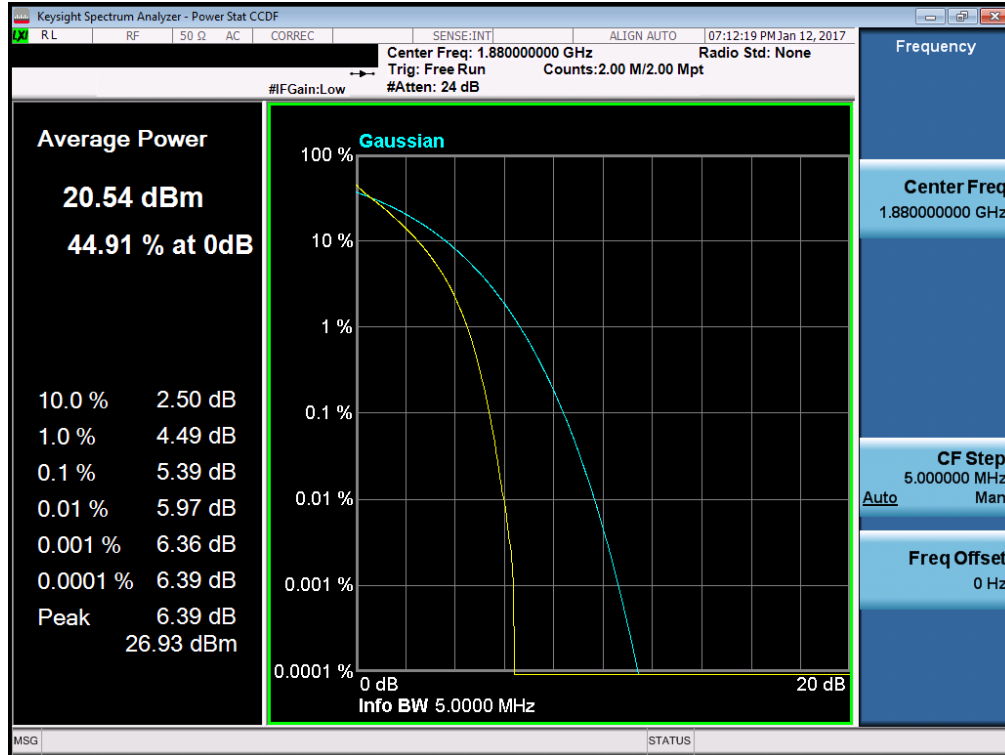


Plot 7-172. PAR Plot (Band 2 – 3MHz QPSK – RB Size 15)

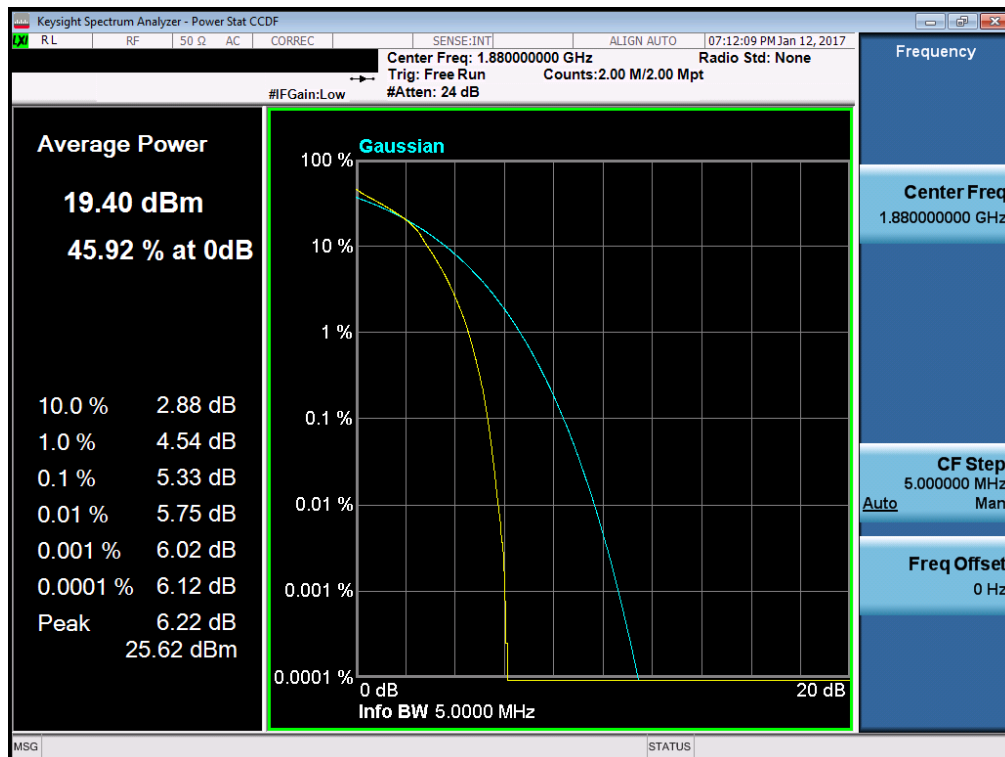


Plot 7-173. PAR Plot (Band 2 – 3MHz 16-QAM – RB Size 15)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 105 of 136

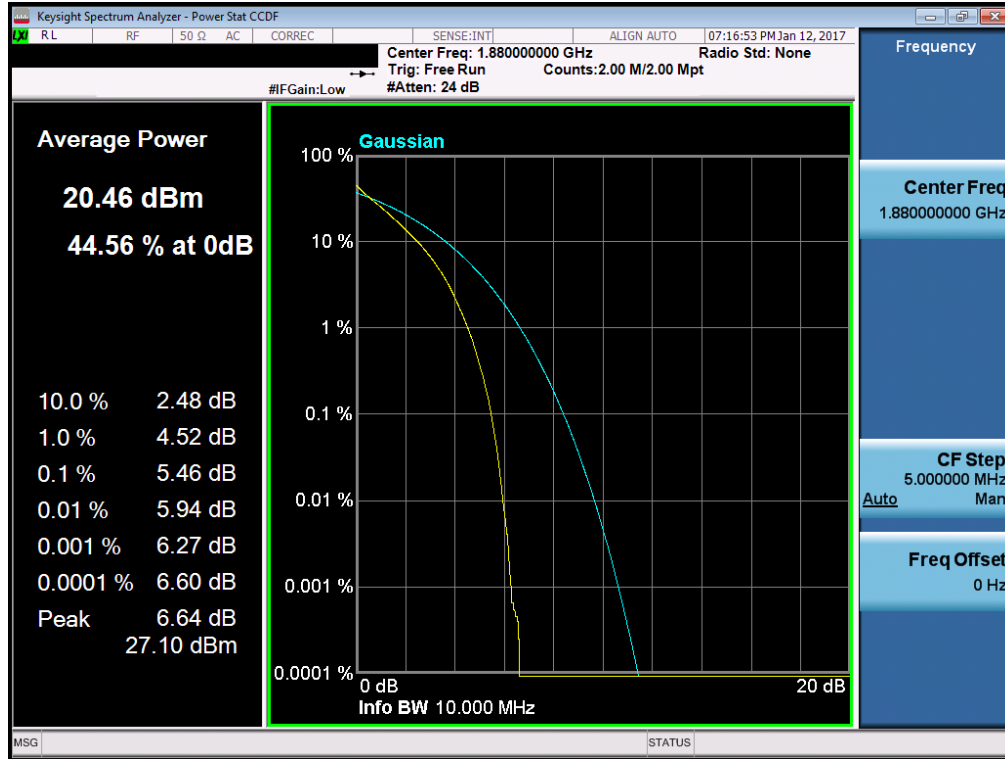


Plot 7-174. PAR Plot (Band 2 – 5MHz QPSK – RB Size 25)

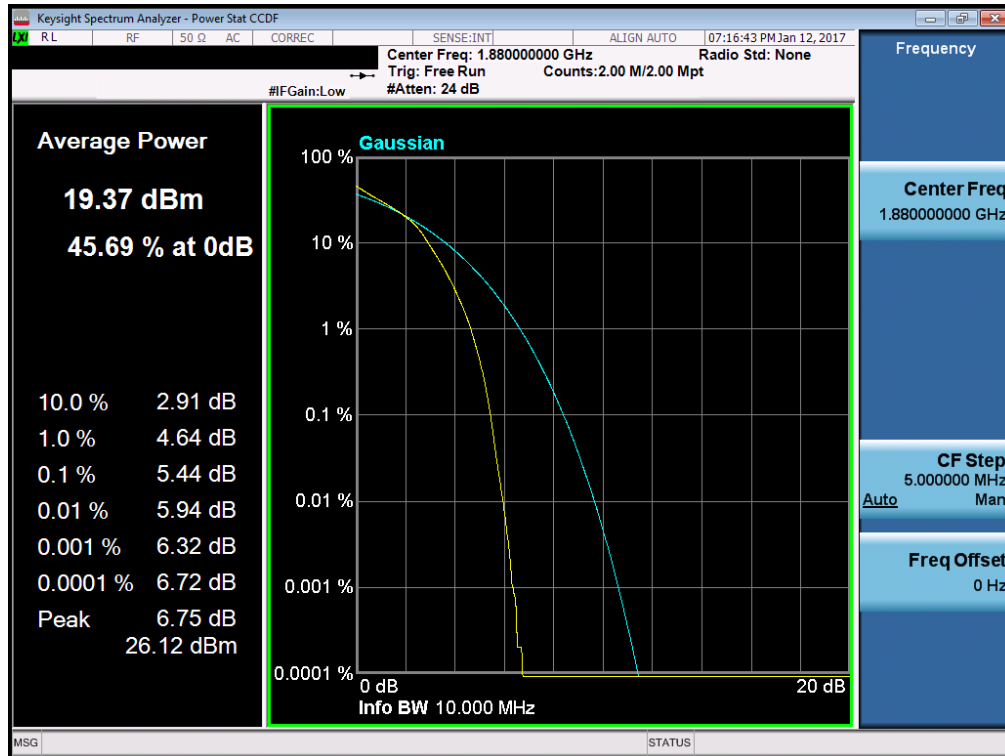


Plot 7-175. PAR Plot (Band 2 – 5MHz 16-QAM – RB Size 25)

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 106 of 136

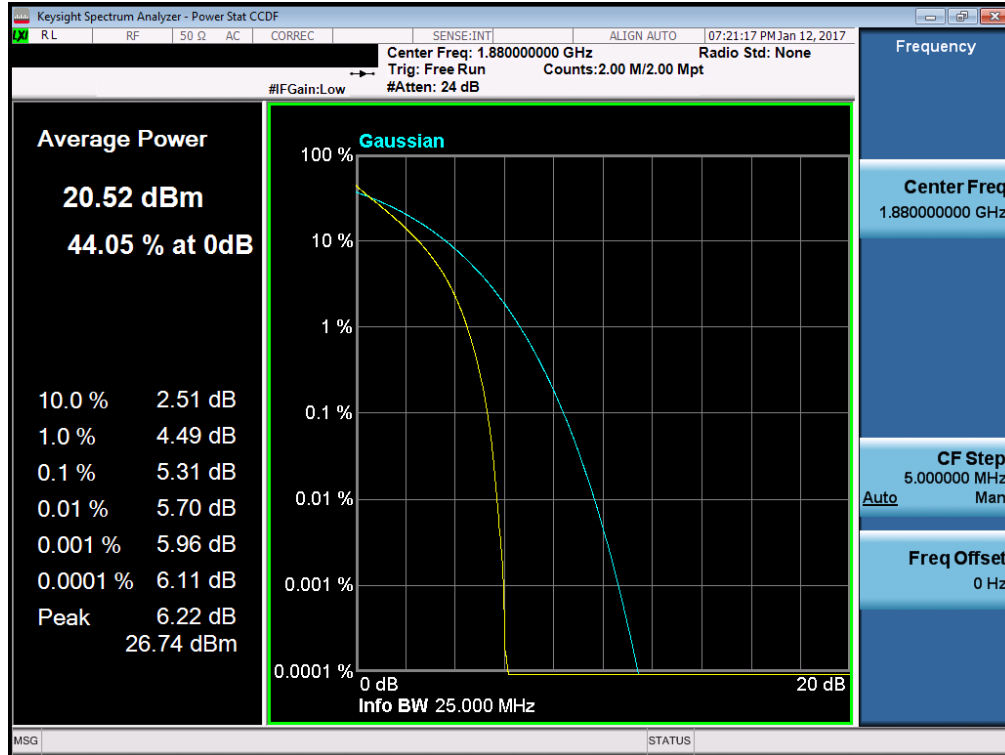


Plot 7-176. PAR Plot (Band 2 – 10MHz QPSK – RB Size 50)

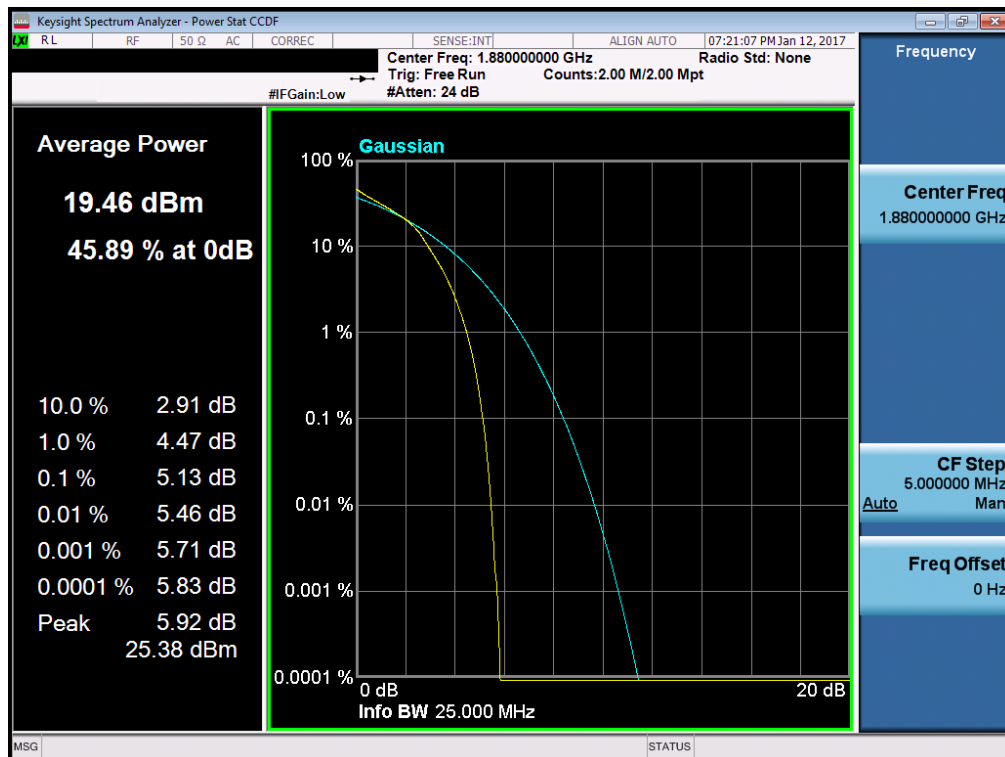


Plot 7-177. PAR Plot (Band 2 – 10MHz 16-QAM – RB Size 50)

FCC ID: A3LSMA520W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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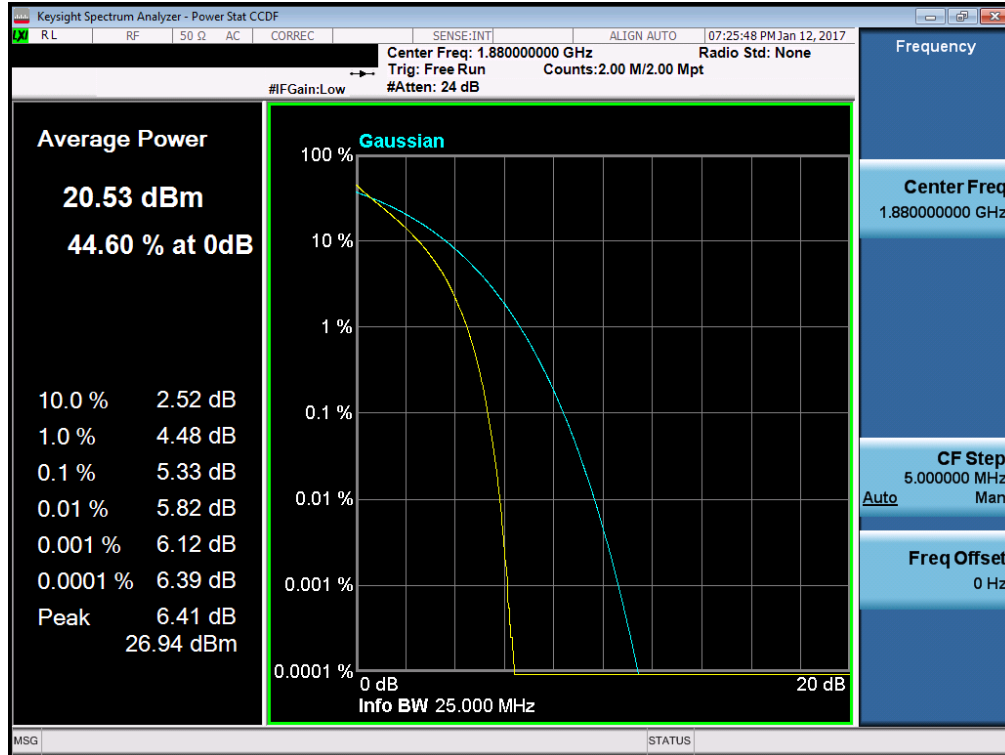


Plot 7-178. PAR Plot (Band 2 – 15MHz QPSK – RB Size 75)

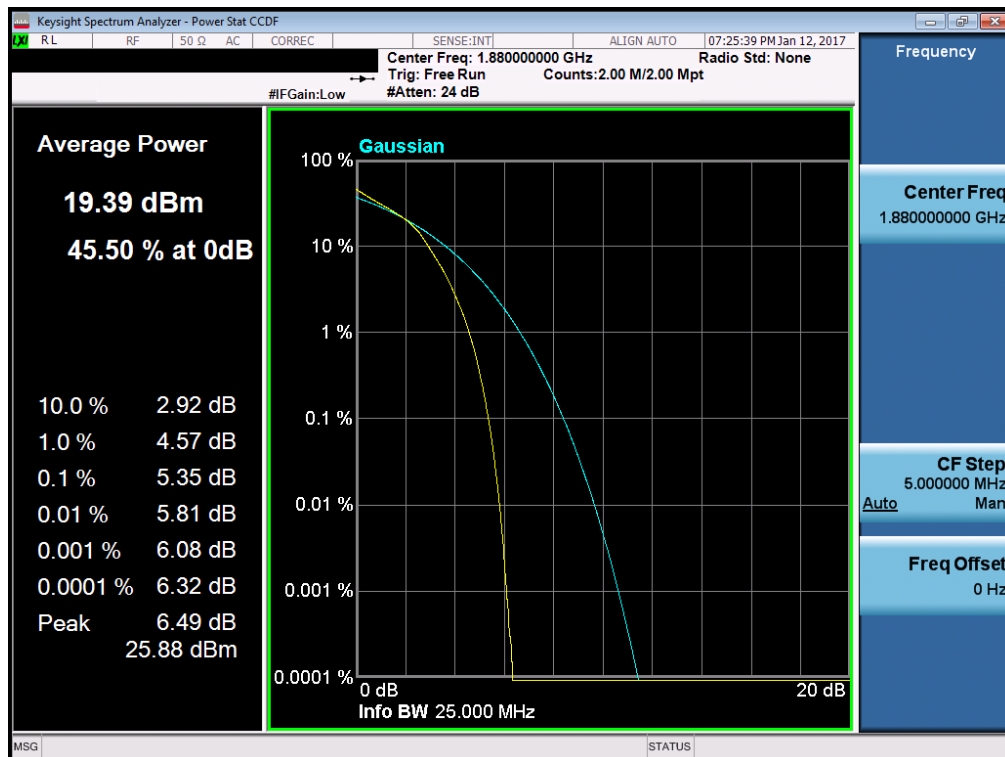


Plot 7-179. PAR Plot (Band 2 – 15MHz 16-QAM – RB Size 75)

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Plot 7-180. PAR Plot (Band 2 – 20MHz QPSK – RB Size 100)



Plot 7-181. PAR Plot (Band 2 – 20MHz 16-QAM – RB Size 100)

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7.6 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(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.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ 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.

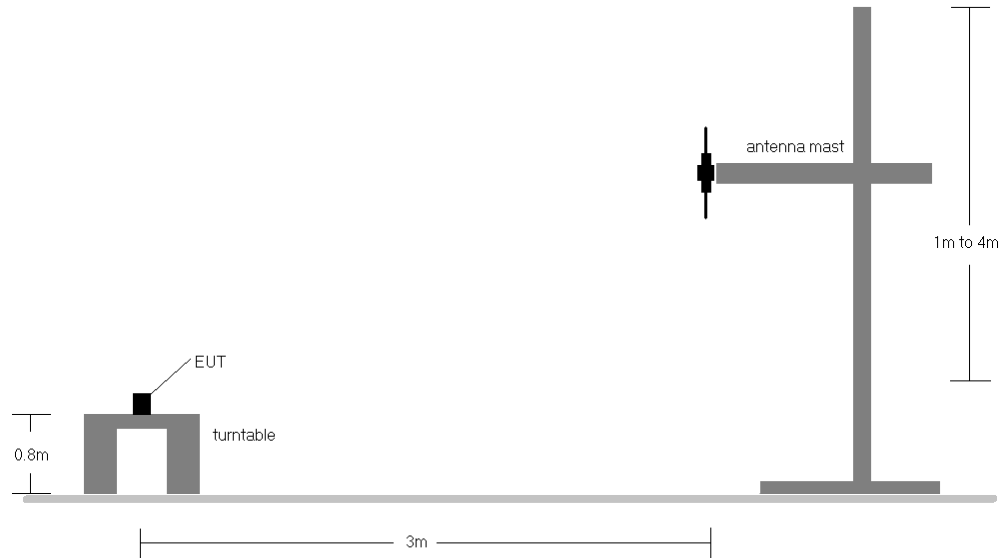


Figure 7-5. Radiated Test Setup <1GHz

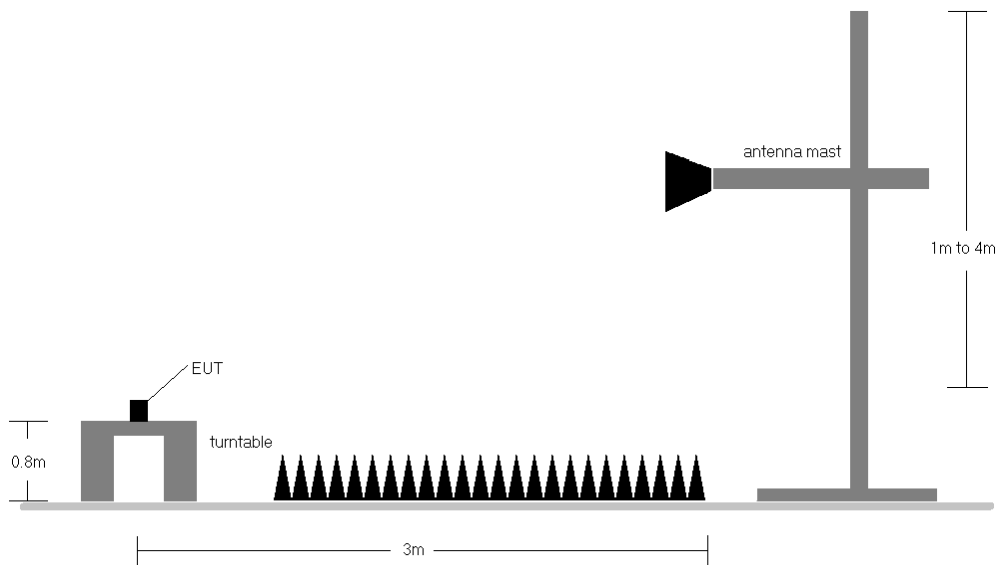


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

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

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	356	87	1 / 5	17.45	-0.25	17.20	34.77	-17.57
707.50	1.4	QPSK	H	358	89	1 / 5	18.33	-0.28	18.05	34.77	-16.72
715.30	1.4	QPSK	H	357	91	1 / 0	18.86	-0.31	18.55	34.77	-16.22
715.30	1.4	16-QAM	H	357	91	1 / 0	17.16	-0.31	16.85	34.77	-17.92
700.50	3	QPSK	H	3	89	1 / 14	18.60	-0.25	18.35	34.77	-16.42
707.50	3	QPSK	H	1	86	1 / 14	19.28	-0.28	19.00	34.77	-15.77
714.50	3	QPSK	H	354	89	1 / 14	19.82	-0.31	19.51	34.77	-15.26
714.50	3	16-QAM	H	354	89	1 / 14	18.08	-0.31	17.77	34.77	-17.00

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	3	90	1 / 24	19.56	-0.26	19.30	34.77	-15.47
707.50	5	QPSK	H	354	83	1 / 24	20.04	-0.28	19.76	34.77	-15.01
713.50	5	QPSK	H	353	84	1 / 12	20.36	-0.30	20.06	34.77	-14.72
713.50	5	16-QAM	H	353	84	1 / 12	18.55	-0.30	18.25	34.77	-16.53
704.00	10	QPSK	H	355	81	1 / 49	19.84	-0.27	19.57	34.77	-15.20
707.50	10	QPSK	H	354	87	1 / 49	19.99	-0.28	19.71	34.77	-15.06
711.00	10	QPSK	H	3	88	1 / 49	20.33	-0.29	20.04	34.77	-14.74
711.00	10	16-QAM	H	3	88	1 / 49	18.34	-0.29	18.05	34.77	-16.73
713.50	5	QPSK	V	357	317	1 / 74	19.73	-1.20	18.53	34.77	-16.24

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

FCC ID: A3LSMA520W	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 				Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	0	87	1 / 24	22.56	-0.57	21.99	34.77	-12.78
782.00	5	QPSK	H	353	88	1 / 24	22.68	-0.58	22.10	34.77	-12.67
784.50	5	QPSK	H	358	87	1 / 24	22.86	-0.59	22.27	34.77	-12.50
784.50	5	16-QAM	H	358	87	1 / 24	21.12	-0.59	20.53	34.77	-14.24
782.00	10	QPSK	H	1	91	1 / 49	23.64	-0.58	23.06	34.77	-11.71
782.00	10	QPSK	V	357	60	1 / 49	21.03	-1.38	19.65	34.77	-15.12

Table 7-4. ERP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	0	81	1 / 5	21.89	-0.75	21.14	38.45	-17.31
836.50	1.4	QPSK	H	0	85	1 / 5	22.68	-0.84	21.84	38.45	-16.61
848.30	1.4	QPSK	H	11	88	1 / 0	22.86	-0.94	21.92	38.45	-16.53
848.30	1.4	16-QAM	H	11	88	1 / 0	21.41	-0.94	20.47	38.45	-17.98
825.50	3	QPSK	H	355	90	1 / 14	22.50	-0.75	21.75	38.45	-16.71
836.50	3	QPSK	H	0	93	1 / 14	23.12	-0.84	22.28	38.45	-16.17
847.50	3	QPSK	H	358	91	1 / 7	23.41	-0.93	22.48	38.45	-15.97
847.50	3	16-QAM	H	358	91	1 / 7	21.56	-0.93	20.63	38.45	-17.82
826.50	5	QPSK	H	353	86	1 / 24	23.43	-0.76	22.67	38.45	-15.78
836.50	5	QPSK	H	352	85	1 / 24	23.90	-0.84	23.06	38.45	-15.39
846.50	5	QPSK	H	358	89	1 / 24	24.27	-0.92	23.35	38.45	-15.10
846.50	5	16-QAM	H	358	89	1 / 24	22.27	-0.92	21.35	38.45	-17.10
829.00	10	QPSK	H	358	83	1 / 49	23.47	-0.78	22.69	38.45	-15.76
836.50	10	QPSK	H	360	85	1 / 49	23.81	-0.84	22.97	38.45	-15.48
844.00	10	QPSK	H	358	87	1 / 49	24.04	-0.90	23.14	38.45	-15.31
844.00	10	16-QAM	H	358	87	1 / 49	21.94	-0.90	21.04	38.45	-17.41
846.50	5	QPSK	V	359	340	1 / 74	22.36	-1.36	21.00	38.45	-17.45

Table 7-5. ERP Data (Band 5)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	0	77	1 / 5	15.52	5.56	21.08	30.00	-8.92
1745.00	1.4	QPSK	H	0	80	1 / 5	16.24	5.32	21.56	30.00	-8.44
1779.30	1.4	QPSK	H	355	81	1 / 0	14.43	5.09	19.52	30.00	-10.48
1745.00	1.4	16-QAM	H	0	80	1 / 5	14.83	5.32	20.15	30.00	-9.85
1711.50	3	QPSK	H	5	75	1 / 14	15.59	5.55	21.14	30.00	-8.86
1745.00	3	QPSK	H	356	86	1 / 14	16.27	5.32	21.59	30.00	-8.41
1778.50	3	QPSK	H	354	81	1 / 0	14.77	5.10	19.87	30.00	-10.13
1745.00	3	16-QAM	H	356	86	1 / 14	14.87	5.32	20.19	30.00	-9.81
1712.50	5	QPSK	H	349	81	1 / 24	16.19	5.55	21.74	30.00	-8.26
1745.00	5	QPSK	H	359	79	1 / 0	16.89	5.32	22.21	30.00	-7.79
1777.50	5	QPSK	H	342	87	1 / 0	15.77	5.10	20.87	30.00	-9.13
1745.00	5	16-QAM	H	359	79	1 / 0	15.39	5.32	20.71	30.00	-9.29
1715.00	10	QPSK	H	358	80	1 / 49	17.11	5.53	22.64	30.00	-7.36
1745.00	10	QPSK	H	357	80	1 / 49	17.58	5.32	22.90	30.00	-7.10
1775.00	10	QPSK	H	358	78	1 / 0	16.57	5.12	21.69	30.00	-8.31
1745.00	10	16-QAM	H	357	80	1 / 49	15.94	5.32	21.26	30.00	-8.74
1717.50	15	QPSK	H	11	74	1 / 74	16.83	5.51	22.34	30.00	-7.66
1745.00	15	QPSK	H	359	82	1 / 74	17.57	5.32	22.89	30.00	-7.11
1772.50	15	QPSK	H	354	81	1 / 0	16.88	5.14	22.02	30.00	-7.98
1745.00	15	16-QAM	H	359	82	1 / 74	16.00	5.32	21.32	30.00	-8.68
1720.00	20	QPSK	H	355	82	1 / 99	17.15	5.49	22.64	30.00	-7.36
1745.00	20	QPSK	H	351	83	1 / 99	17.61	5.32	22.93	30.00	-7.07
1770.00	20	QPSK	H	358	84	1 / 0	16.84	5.15	21.99	30.00	-8.01
1745.00	20	16-QAM	H	351	83	1 / 99	16.08	5.32	21.40	30.00	-8.60
1745.00	20	QPSK	V	0	95	1 / 99	17.24	5.27	22.51	30.00	-7.49

Table 7-6. EIRP Data (Band 66/4)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	14	73	1 / 0	15.85	4.82	20.67	33.01	-12.34
1880.00	1.4	QPSK	H	0	83	1 / 5	15.29	4.74	20.03	33.01	-12.98
1909.30	1.4	QPSK	H	0	82	1 / 5	16.12	4.68	20.80	33.01	-12.21
1909.30	1.4	16-QAM	H	0	82	1 / 5	14.85	4.68	19.53	33.01	-13.48
1851.50	3	QPSK	H	0	78	1 / 0	16.15	4.82	20.97	33.01	-12.04
1880.00	3	QPSK	H	14	74	1 / 14	16.87	4.74	21.61	33.01	-11.40
1908.50	3	QPSK	H	0	83	1 / 14	17.13	4.68	21.81	33.01	-11.20
1908.50	3	16-QAM	H	0	83	1 / 14	15.42	4.68	20.10	33.01	-12.91
1852.50	5	QPSK	H	0	76	1 / 0	16.76	4.81	21.57	33.01	-11.44
1880.00	5	QPSK	H	11	75	1 / 24	17.29	4.74	22.03	33.01	-10.98
1907.50	5	QPSK	H	16	74	1 / 24	17.92	4.68	22.60	33.01	-10.41
1907.50	5	16-QAM	H	16	74	1 / 24	16.17	4.68	20.85	33.01	-12.16
1855.00	10	QPSK	H	0	74	1 / 49	16.93	4.81	21.74	33.01	-11.27
1880.00	10	QPSK	H	13	76	1 / 49	17.44	4.74	22.18	33.01	-10.83
1905.00	10	QPSK	H	0	81	1 / 49	17.81	4.68	22.49	33.01	-10.52
1905.00	10	16-QAM	H	0	81	1 / 49	15.93	4.68	20.61	33.01	-12.40
1857.50	15	QPSK	H	12	71	1 / 74	17.35	4.80	22.15	33.01	-10.86
1880.00	15	QPSK	H	13	73	1 / 74	17.58	4.74	22.32	33.01	-10.69
1902.50	15	QPSK	H	15	77	1 / 74	17.50	4.69	22.19	33.01	-10.82
1880.00	15	16-QAM	H	13	73	1 / 74	15.61	4.74	20.35	33.01	-12.66
1860.00	20	QPSK	H	15	74	1 / 99	17.56	4.79	22.35	33.01	-10.66
1880.00	20	QPSK	H	8	79	1 / 99	16.91	4.74	21.65	33.01	-11.36
1900.00	20	QPSK	H	16	76	1 / 99	17.44	4.69	22.13	33.01	-10.88
1860.00	20	16-QAM	H	15	74	1 / 99	15.65	4.79	20.44	33.01	-12.57
1907.50	5	QPSK	V	302	348	1 / 99	14.72	4.87	19.59	33.01	-13.42

Table 7-7. EIRP Data (Band 2)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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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)

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 $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Test Setup

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

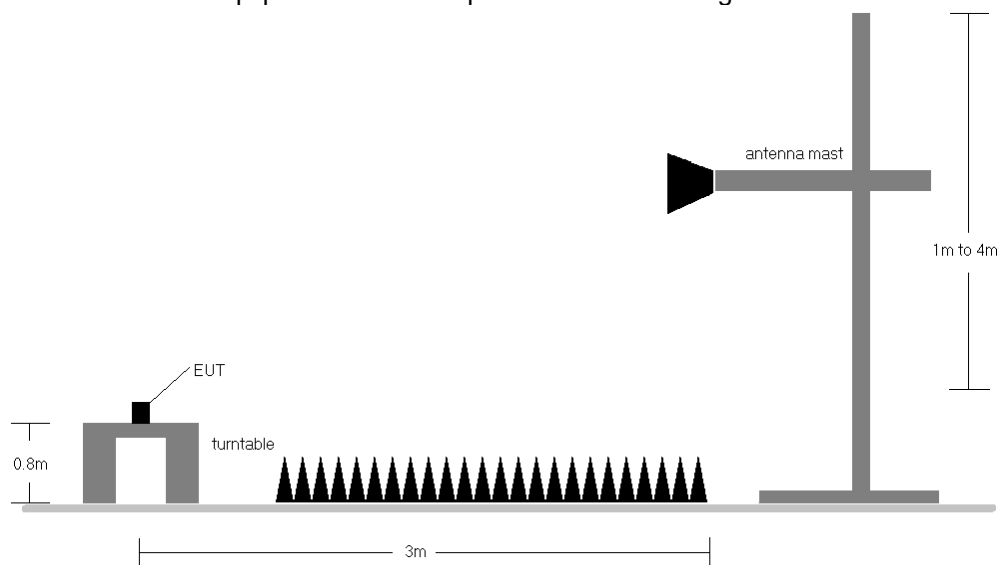


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: A3LSMA520W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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OPERATING FREQUENCY: 701.50 MHz
 CHANNEL: 23035
 MEASURED OUTPUT POWER: 19.30 dBm = 0.085 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 32.30 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	174	-69.89	5.60	-64.29	83.6
2104.50	H	117	213	-67.74	6.67	-61.07	80.4
2806.00	H	-	-	-70.21	7.92	-62.29	81.6
3507.50	H	-	-	-66.44	7.80	-58.64	77.9

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

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MEASURED OUTPUT POWER: 19.76 dBm = 0.095 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 32.76 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	110	162	-73.29	5.69	-67.60	87.4
2122.50	H	120	212	-66.84	6.75	-60.10	79.9
2830.00	H	-	-	-69.75	7.90	-61.85	81.6
3537.50	H	-	-	-66.44	7.81	-58.63	78.4

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

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 713.50 MHz
 CHANNEL: 23155
 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]
1427.00	H	110	173	-62.78	5.79	-56.99	77.0
2140.50	H	115	212	-66.82	6.82	-60.00	80.1
2854.00	H	-	-	-69.80	7.88	-61.92	82.0
3567.50	H	-	-	-66.34	7.82	-58.52	78.6

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

OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MEASURED OUTPUT POWER: 23.06 dBm = 0.202 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.06 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]
2346.00	H	110	186	-72.56	7.33	-65.23	88.3
3128.00	H	-	-	-69.96	7.20	-62.76	85.8
3910.00	H	-	-	-67.63	7.34	-60.29	83.3

Table 7-11. Radiated Spurious Data (Band 13 – Mid Channel)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.00 MHz
 DISTANCE: 3 meters
 NARROWBAND EMISSION LIMIT: -50 dBm
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	-	-	-73.02	6.57	-66.45	-26.5

Table 7-12. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

OPERATING FREQUENCY: 826.50 MHz
 CHANNEL: 20425
 MEASURED OUTPUT POWER: 22.67 dBm = 0.185 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 35.67 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	100	202	-78.72	6.28	-72.43	95.1
2479.50	H	-	-	-83.07	6.84	-76.22	98.9
3306.00	H	-	-	-80.17	7.14	-73.03	95.7

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

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MEASURED OUTPUT POWER: 23.06 dBm = 0.202 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.06 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]
1673.00	H	100	256	-76.24	6.21	-70.03	93.1
2509.50	H	-	-	-83.22	6.86	-76.36	99.4
3346.00	H	-	-	-81.27	7.26	-74.00	97.1

Table 7-14. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY: 846.50 MHz
 CHANNEL: 20625
 MEASURED OUTPUT POWER: 23.35 dBm = 0.216 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.35 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	100	258	-67.92	6.14	-61.79	85.1
2539.50	H	103	295	-81.93	6.95	-74.98	98.3
3386.00	H	-	-	-80.20	7.38	-72.82	96.2
4232.50	H	-	-	-79.48	8.34	-71.14	94.5

Table 7-15. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1720.00 MHz
 CHANNEL: 132072
 MEASURED OUTPUT POWER: 22.64 dBm = 0.184 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 35.64 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3440.00	H	110	32	-66.44	9.88	-56.55	79.2
5160.00	H	120	351	-66.64	10.75	-55.89	78.5
6880.00	H	110	334	-59.49	11.71	-47.78	70.4
8600.00	H	147	62	-54.64	11.07	-43.57	66.2
10320.00	H	110	356	-58.83	12.47	-46.36	69.0
12040.00	H	110	10	-54.99	12.80	-42.19	64.8

Table 7-16. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY: 1745.00 MHz
 CHANNEL: 132322
 MEASURED OUTPUT POWER: 22.93 dBm = 0.196 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 35.93 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3490.00	H	112	44	-67.56	9.94	-57.62	80.6
5235.00	H	153	348	-65.44	10.72	-54.71	77.6
6980.00	H	118	328	-58.65	11.82	-46.83	69.8
8725.00	H	110	62	-54.54	10.96	-43.58	66.5
10470.00	H	124	355	-59.23	12.67	-46.56	69.5
12215.00	H	137	19	-55.02	13.14	-41.87	64.8

Table 7-17. Radiated Spurious Data (Band 66/4 – Mid Channel)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1770.00 MHz
 CHANNEL: 132572
 MEASURED OUTPUT POWER: 21.99 dBm = 0.158 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 34.99 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3540.00	H	110	45	-67.01	9.96	-57.05	79.0
5310.00	H	110	341	-63.55	10.69	-52.86	74.9
7080.00	H	110	345	-59.82	11.78	-48.04	70.0
8850.00	H	130	61	-54.82	11.01	-43.81	65.8
10620.00	H	-	-	-59.39	12.69	-46.69	68.7
12390.00	H	-	-	-56.67	13.42	-43.25	65.2

Table 7-18. Radiated Spurious Data (Band 66/4 – High Channel)

OPERATING FREQUENCY: 1852.50 MHz
 CHANNEL: 18625
 MEASURED OUTPUT POWER: 21.57 dBm = 0.144 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 34.57 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3705.00	H	117	65	-62.93	9.52	-53.42	75.0
5557.50	H	110	10	-67.32	11.03	-56.29	77.9
7410.00	H	110	77	-58.93	10.95	-47.98	69.5
9262.50	H	-	-	-58.06	11.53	-46.53	68.1

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

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MEASURED OUTPUT POWER: 22.03 dBm = 0.160 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.03 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	H	110	65	-63.78	9.39	-54.40	76.4
5640.00	H	110	10	-67.42	11.22	-56.20	78.2
7520.00	H	110	81	-57.75	11.10	-46.64	68.7
9400.00	H	-	-	-57.21	11.54	-45.67	67.7

Table 7-20. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY: 1907.50 MHz
 CHANNEL: 19175
 MEASURED OUTPUT POWER: 22.60 dBm = 0.182 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.60 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3815.00	H	110	65	-63.60	9.32	-54.28	76.9
5722.50	H	110	351	-66.10	11.35	-54.76	77.4
7630.00	H	110	338	-54.81	11.32	-43.49	66.1
9537.50	H	-	-	-57.59	11.75	-45.84	68.4

Table 7-21. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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7.8 Frequency Stability / Temperature Variation

\$2.1055 \$22.355 \$24.235 \$27.54

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24 and Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-D-2010

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

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Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,809	-191	-0.0000270
100 %		- 30	707,500,027	27	0.0000038
100 %		- 20	707,499,942	-58	-0.0000082
100 %		- 10	707,500,424	424	0.0000599
100 %		0	707,500,032	32	0.0000045
100 %		+ 10	707,499,892	-108	-0.0000153
100 %		+ 20	707,500,165	165	0.0000233
100 %		+ 30	707,499,997	-3	-0.0000004
100 %		+ 40	707,500,120	120	0.0000170
100 %		+ 50	707,499,917	-83	-0.0000117
BATT. ENDPOINT	3.45	+ 20	707,500,186	186	0.0000263

Table 7-22. Frequency Stability Data (Band 12/17)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

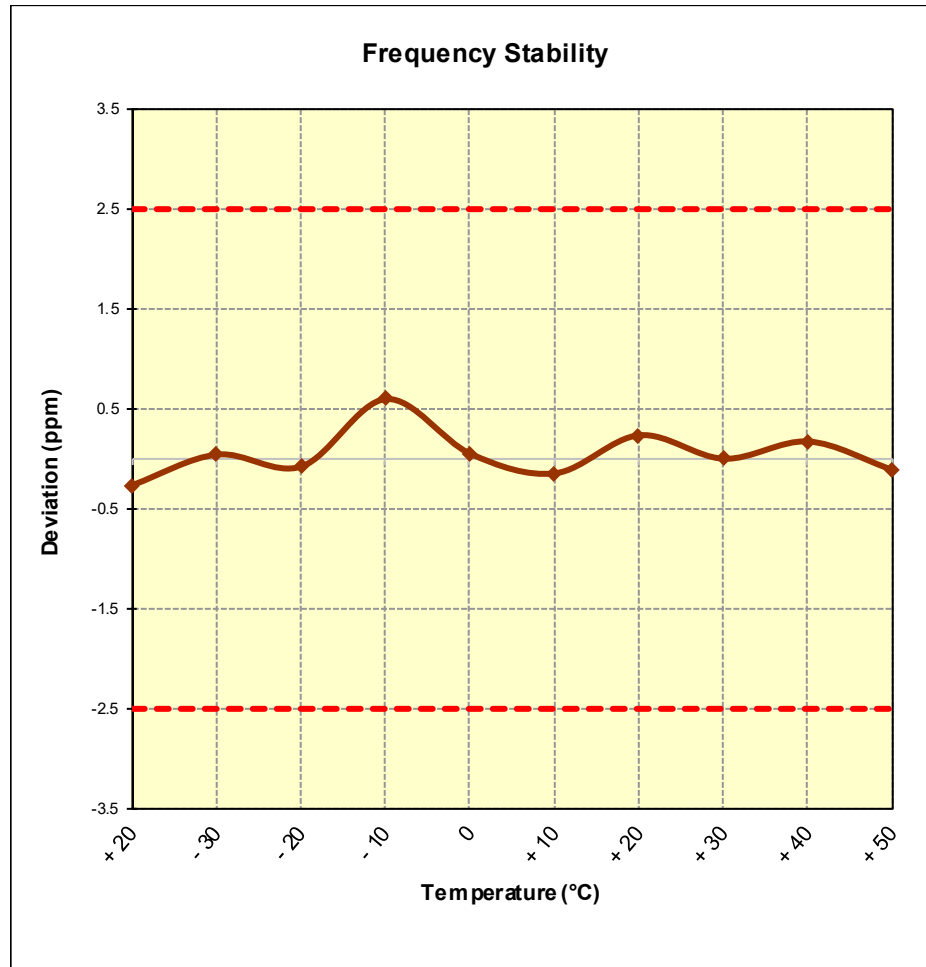


Figure 7-8. Frequency Stability Graph (Band 12/17)

FCC ID: A3LSMA520W			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 Approved by: Quality Manager
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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)	781,999,756	-244	-0.0000312
100 %		- 30	781,999,885	-115	-0.0000147
100 %		- 20	781,999,996	-4	-0.0000005
100 %		- 10	782,000,222	222	0.0000284
100 %		0	782,000,113	113	0.0000145
100 %		+ 10	781,999,919	-81	-0.0000104
100 %		+ 20	781,999,823	-177	-0.0000226
100 %		+ 30	781,999,866	-134	-0.0000171
100 %		+ 40	782,000,004	4	0.0000005
100 %		+ 50	781,999,984	-16	-0.0000020
BATT. ENDPOINT	3.45	+ 20	781,999,891	-109	-0.0000139

Table 7-23. Frequency Stability Data (Band 13)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 13 Frequency Stability Measurements

§2.1055 §27.54

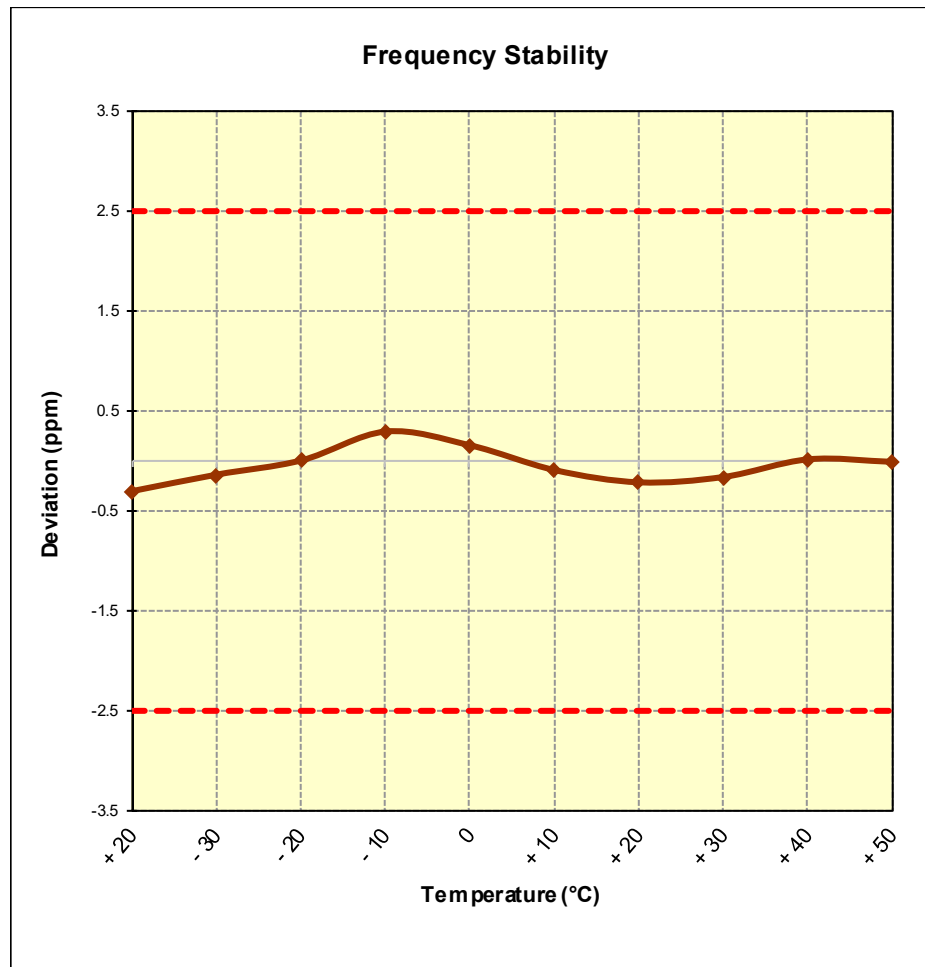


Figure 7-9. Frequency Stability Graph (Band 13)

FCC ID: A3LSMA520W			FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	 Approved by: Quality Manager
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Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY: 836,500,000 Hz

CHANNEL: 20525

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,047	47	0.0000056
100 %		- 30	836,499,894	-106	-0.0000127
100 %		- 20	836,499,890	-110	-0.0000132
100 %		- 10	836,499,931	-69	-0.0000082
100 %		0	836,500,375	375	0.0000448
100 %		+ 10	836,499,789	-211	-0.0000252
100 %		+ 20	836,500,110	110	0.0000132
100 %		+ 30	836,500,122	122	0.0000146
100 %		+ 40	836,500,072	72	0.0000086
100 %		+ 50	836,500,088	88	0.0000105
BATT. ENDPOINT	3.45	+ 20	836,500,217	217	0.0000259

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

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements

§2.1055 §22.355

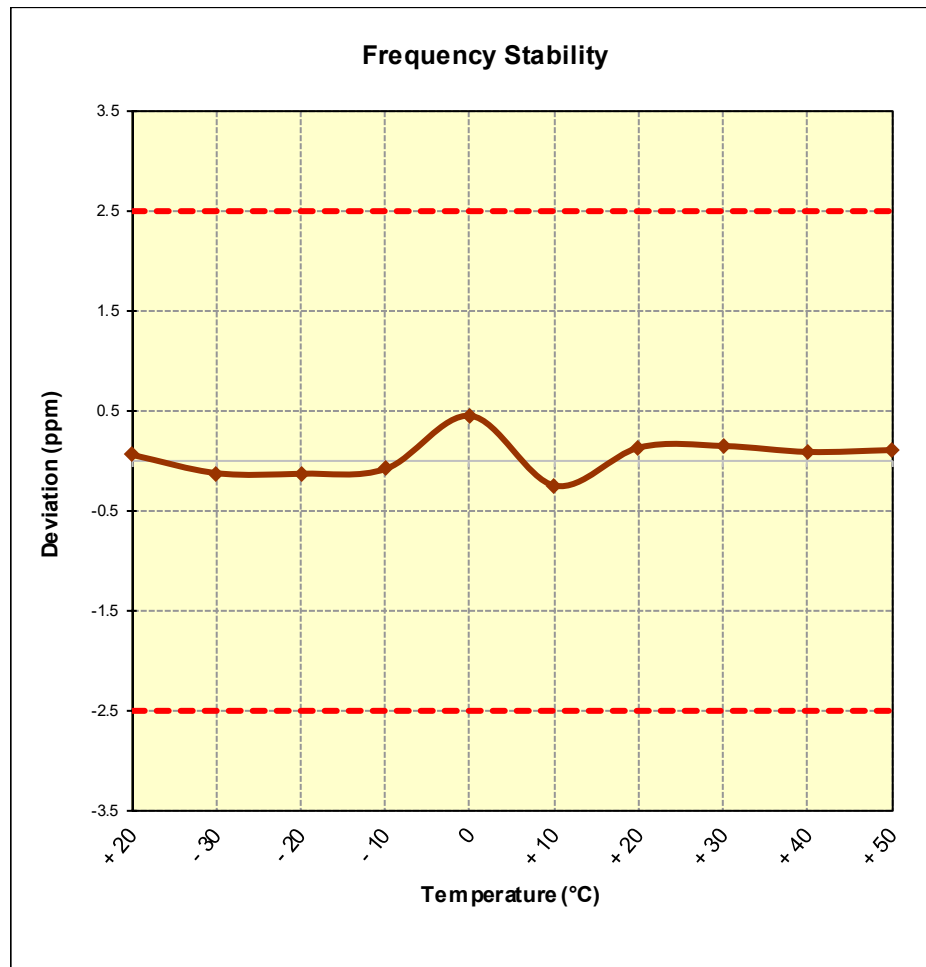


Figure 7-10. Frequency Stability Graph (Band 5)

FCC ID: A3LSMA520W	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		 Approved by: Quality Manager
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Band 66/4 Frequency Stability Measurements

\$2.1055 \$27.54

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,745,000,039	39	0.0000022
100 %		- 30	1,744,999,931	-69	-0.0000040
100 %		- 20	1,744,999,922	-78	-0.0000045
100 %		- 10	1,745,000,147	147	0.0000084
100 %		0	1,745,000,129	129	0.0000074
100 %		+ 10	1,745,000,007	7	0.0000004
100 %		+ 20	1,744,999,717	-283	-0.0000162
100 %		+ 30	1,745,000,008	8	0.0000005
100 %		+ 40	1,745,000,076	76	0.0000044
100 %		+ 50	1,745,000,061	61	0.0000035
BATT. ENDPOINT	3.45	+ 20	1,744,999,887	-113	-0.0000065

Table 7-25. Frequency Stability Data (Band 66/4)

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 66/4 Frequency Stability Measurements

§2.1055 §§27.54

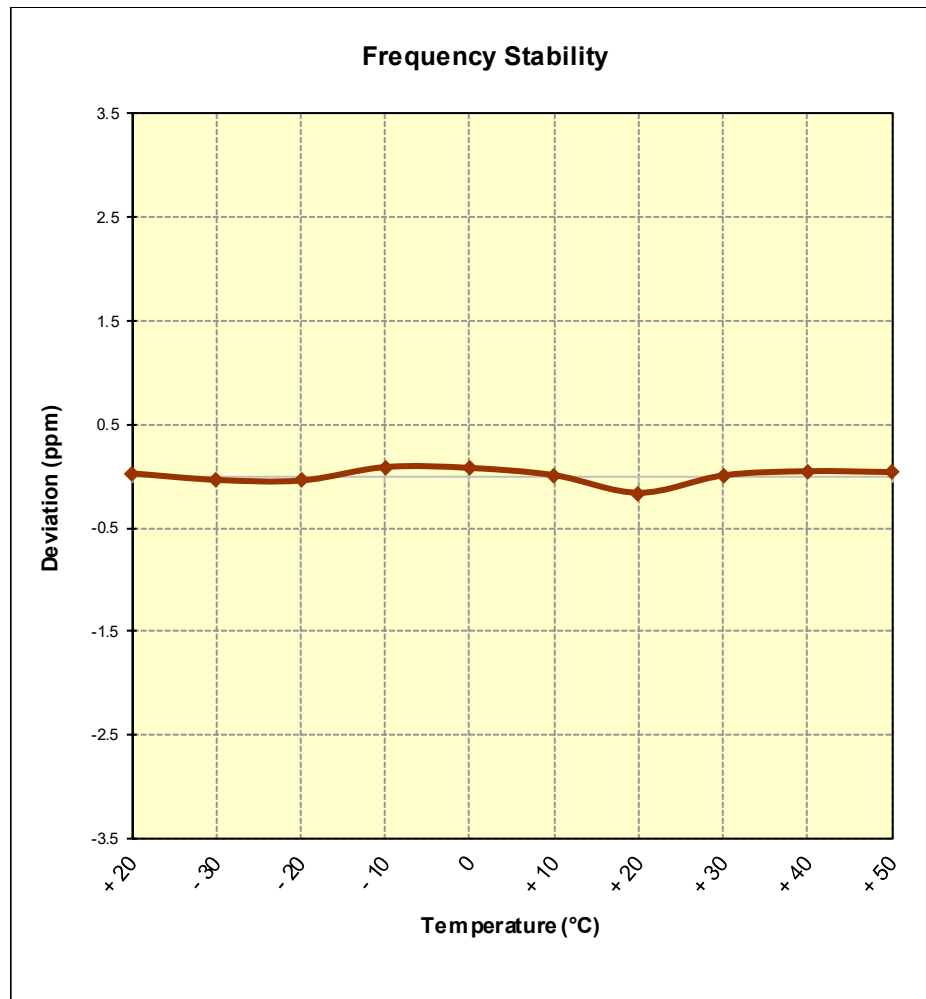


Figure 7-11. Frequency Stability Graph (Band 66/4)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,880,000,115	115	0.0000061
100 %		- 30	1,880,000,361	361	0.0000192
100 %		- 20	1,880,000,058	58	0.0000031
100 %		- 10	1,879,999,678	-322	-0.0000171
100 %		0	1,879,999,995	-5	-0.0000003
100 %		+ 10	1,880,000,065	65	0.0000035
100 %		+ 20	1,879,999,965	-35	-0.0000019
100 %		+ 30	1,880,000,086	86	0.0000046
100 %		+ 40	1,880,000,079	79	0.0000042
100 %		+ 50	1,879,999,861	-139	-0.0000074
BATT. ENDPOINT	3.45	+ 20	1,880,000,203	203	0.0000108

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

Note:

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

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Band 2 Frequency Stability Measurements

§2.1055 §24.235

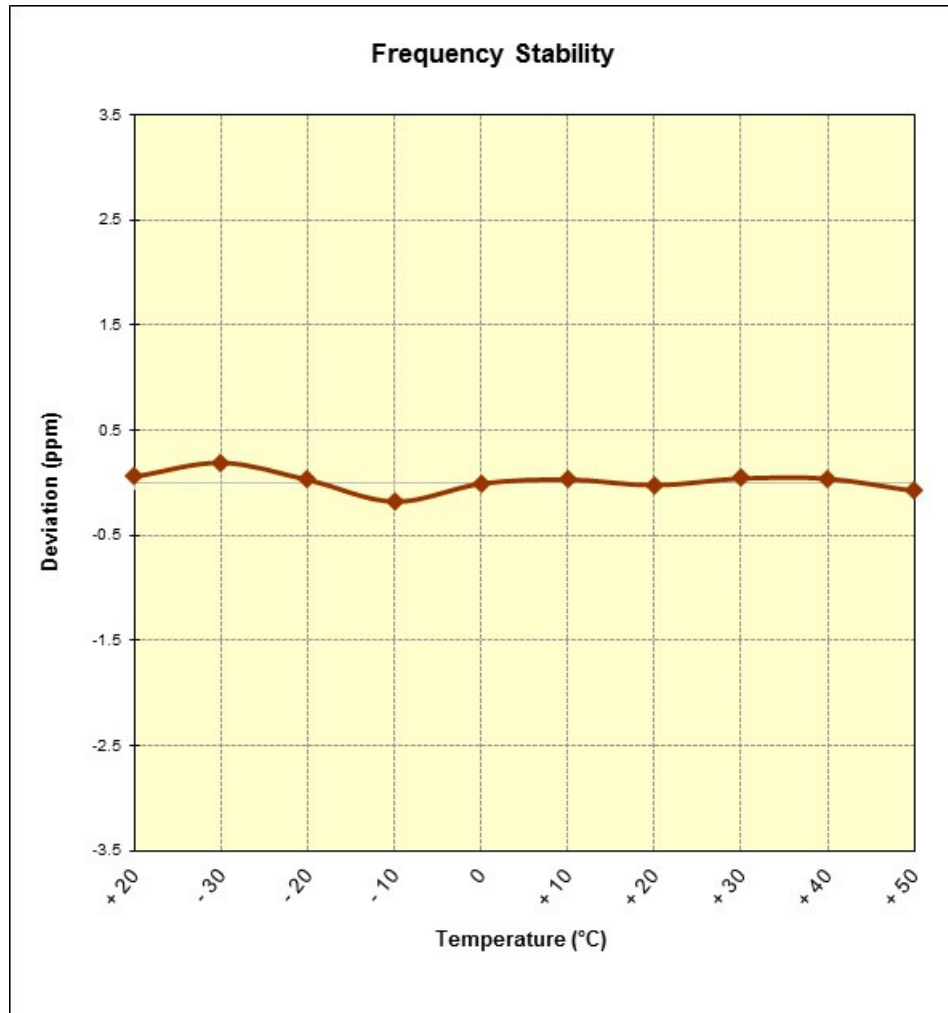


Figure 7-12. Frequency Stability Graph (Band 2)

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMA520W** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: A3LSMA520W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1701050017-03.A3L	Test Dates: 1/12/2017-1/29/2017	EUT Type: Portable Handset		Page 136 of 136