

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 7 is as noted in the Test Notes on the following page.

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

Test Procedure Used

KDB 971168 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 for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

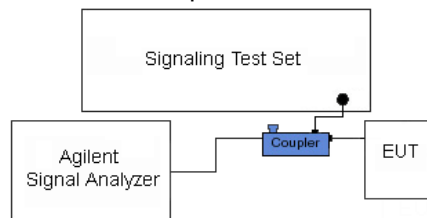


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

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

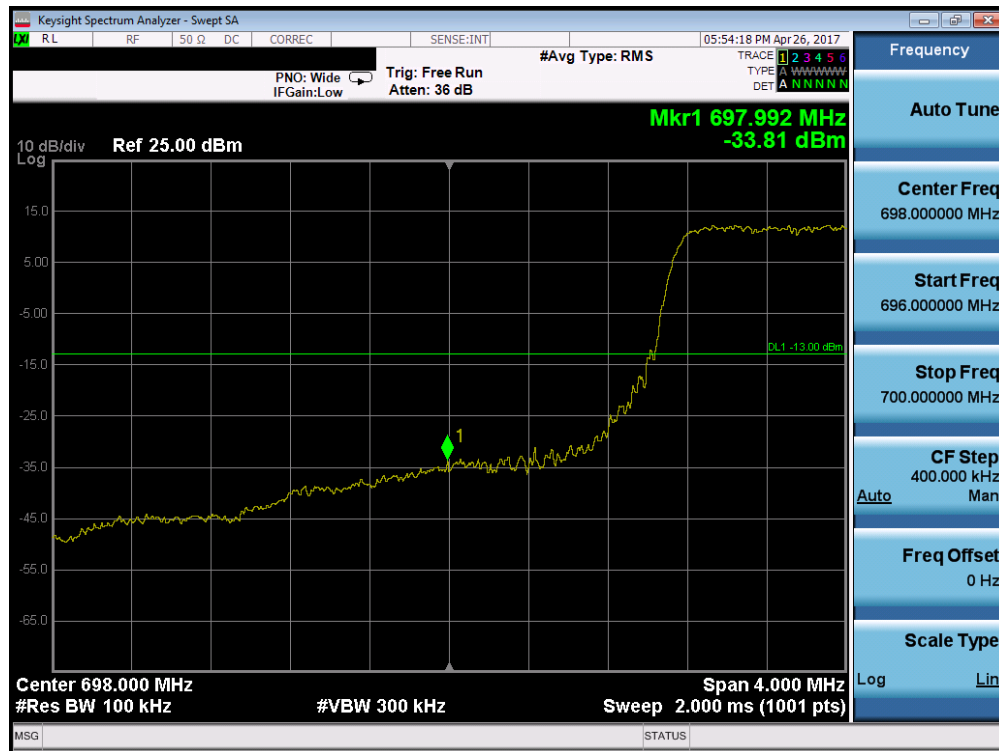
FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset	Page 62 of 133	

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.

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.

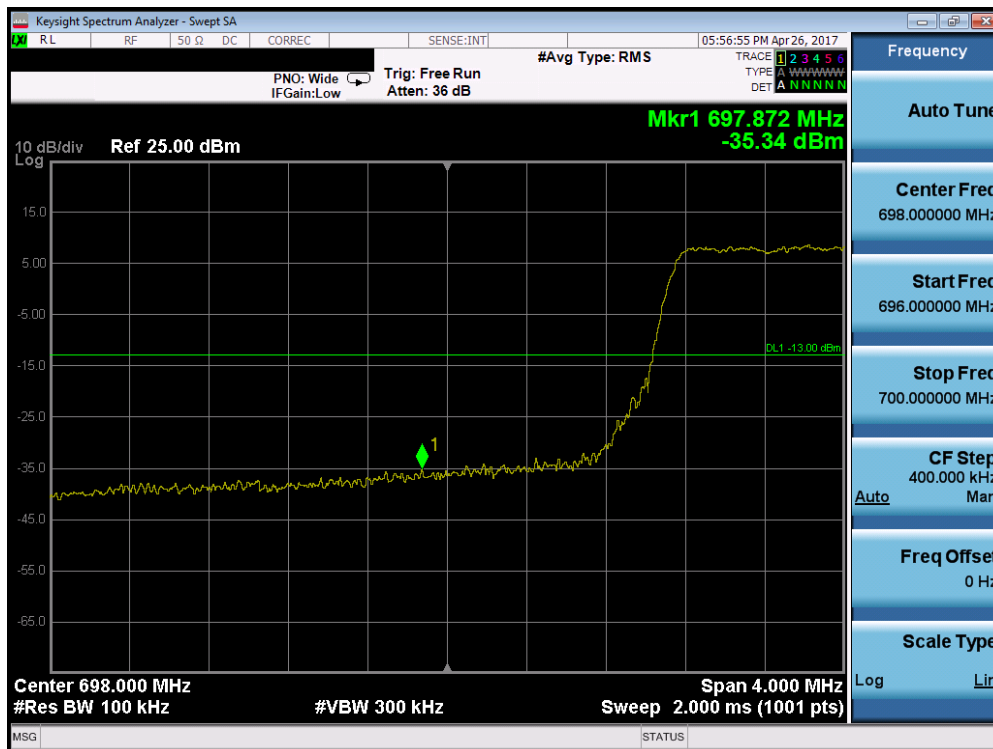


Plot 7-90. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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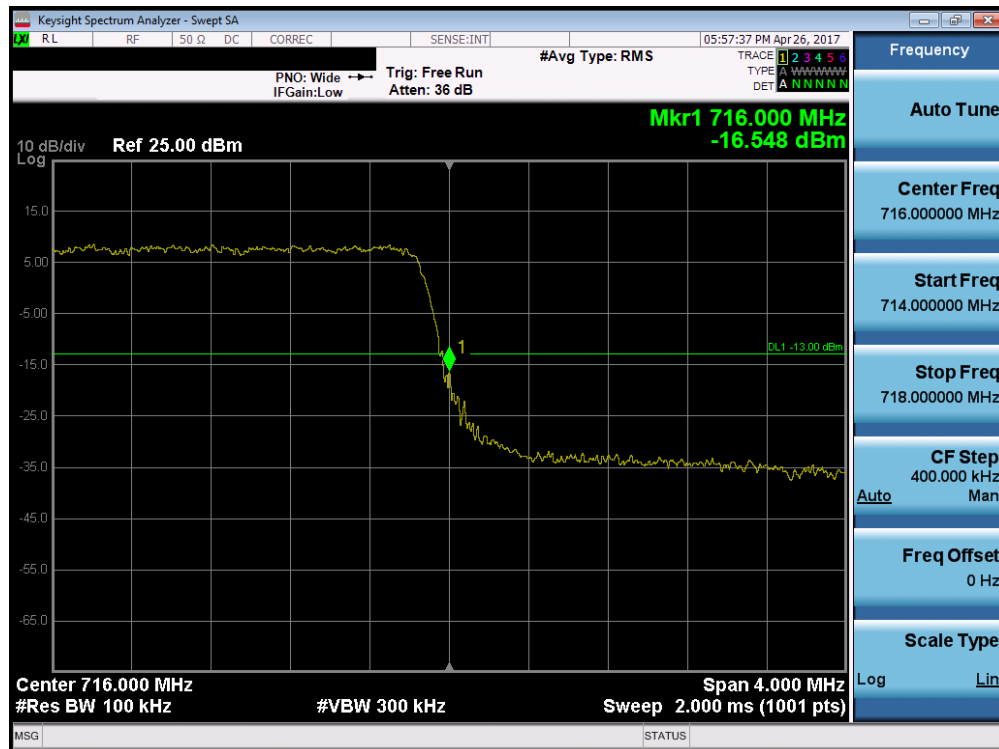


Plot 7-91. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

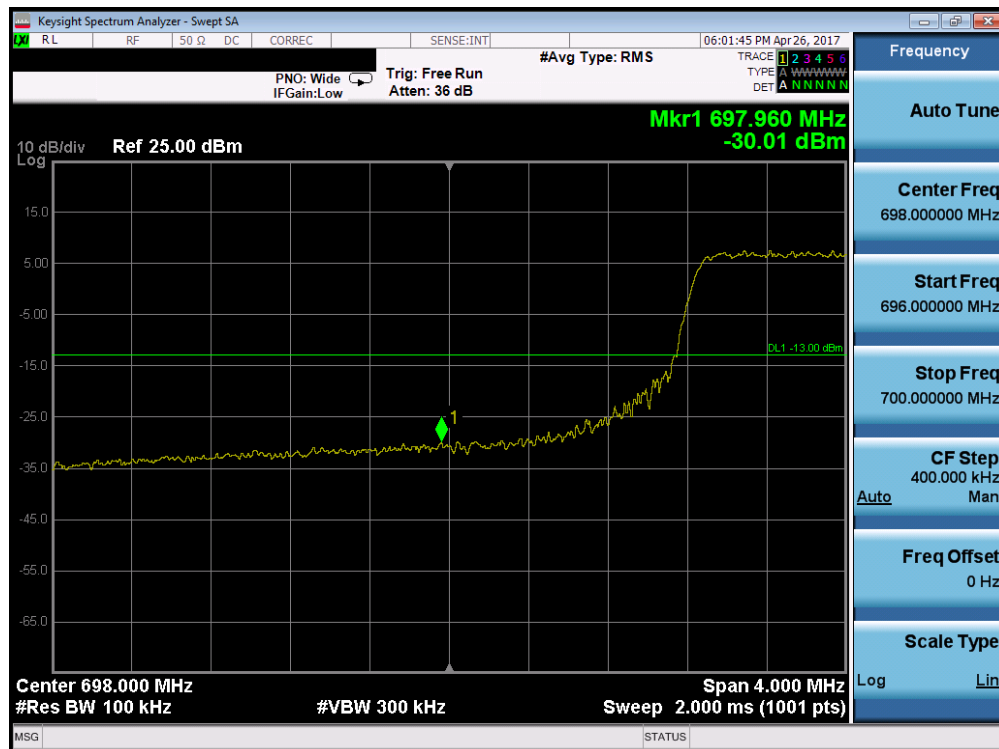


Plot 7-92. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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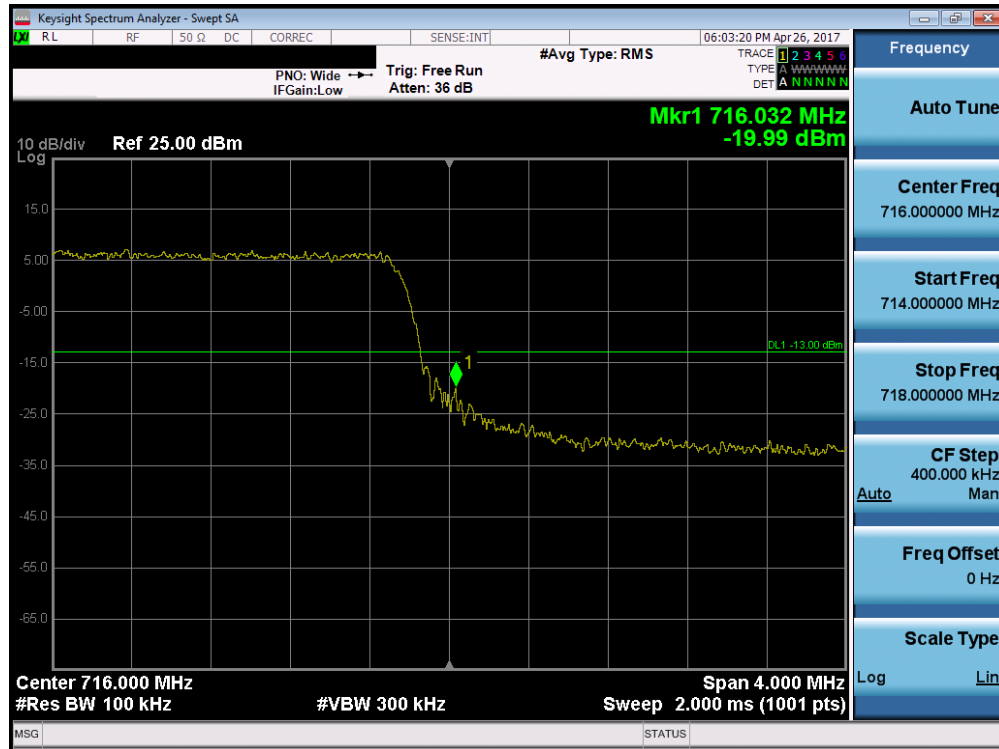


Plot 7-93. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

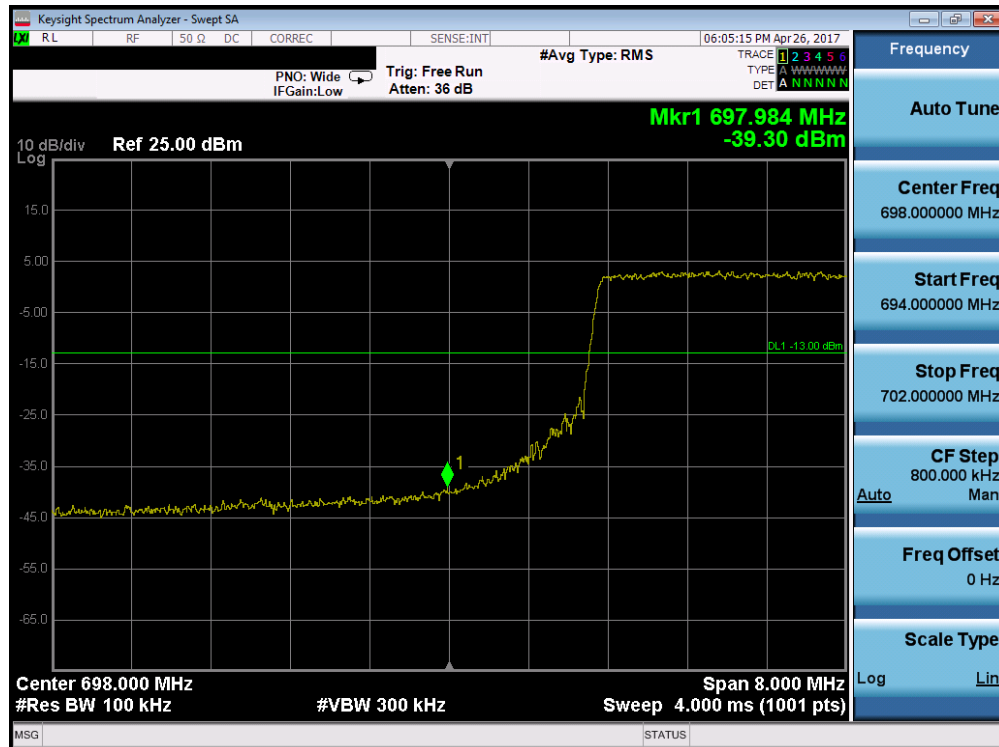


Plot 7-94. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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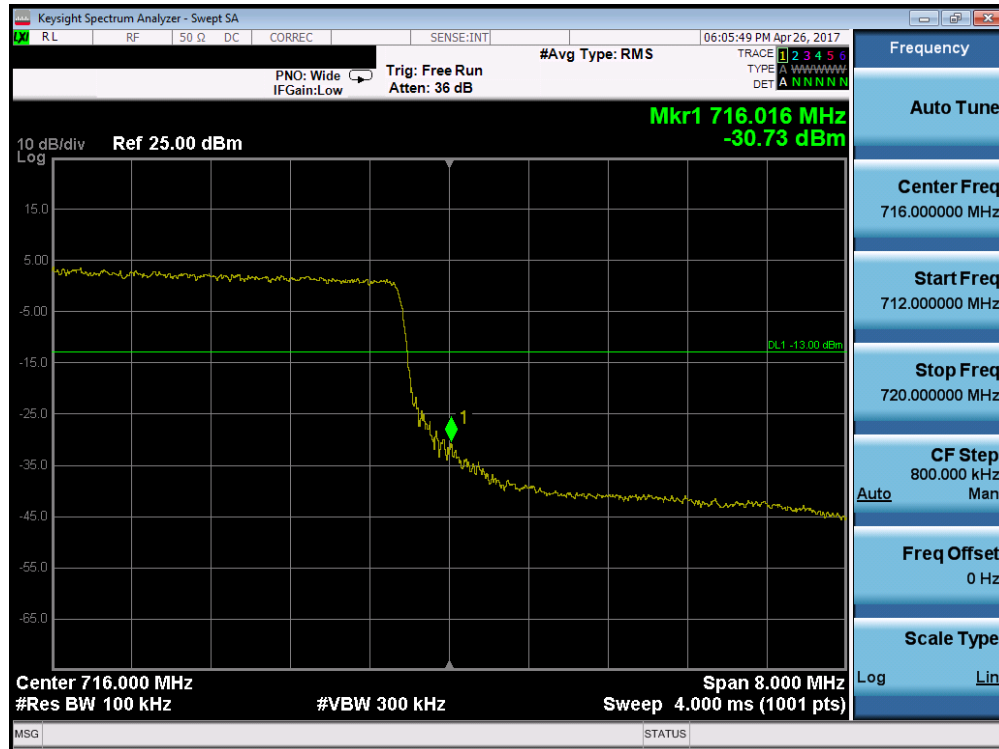


Plot 7-95. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

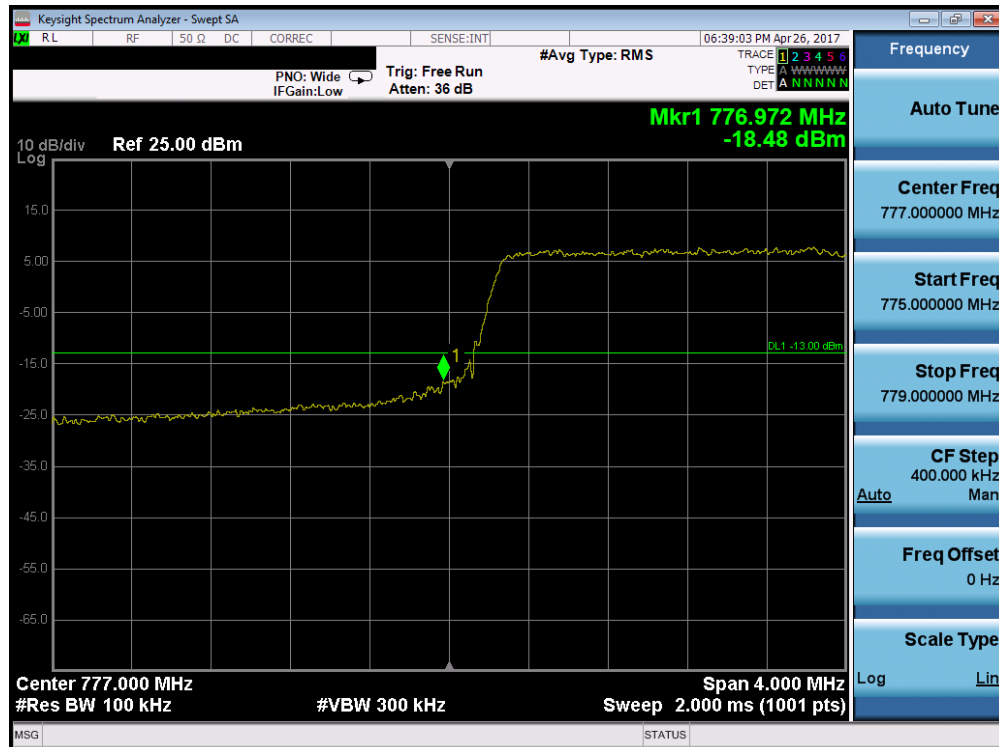


Plot 7-96. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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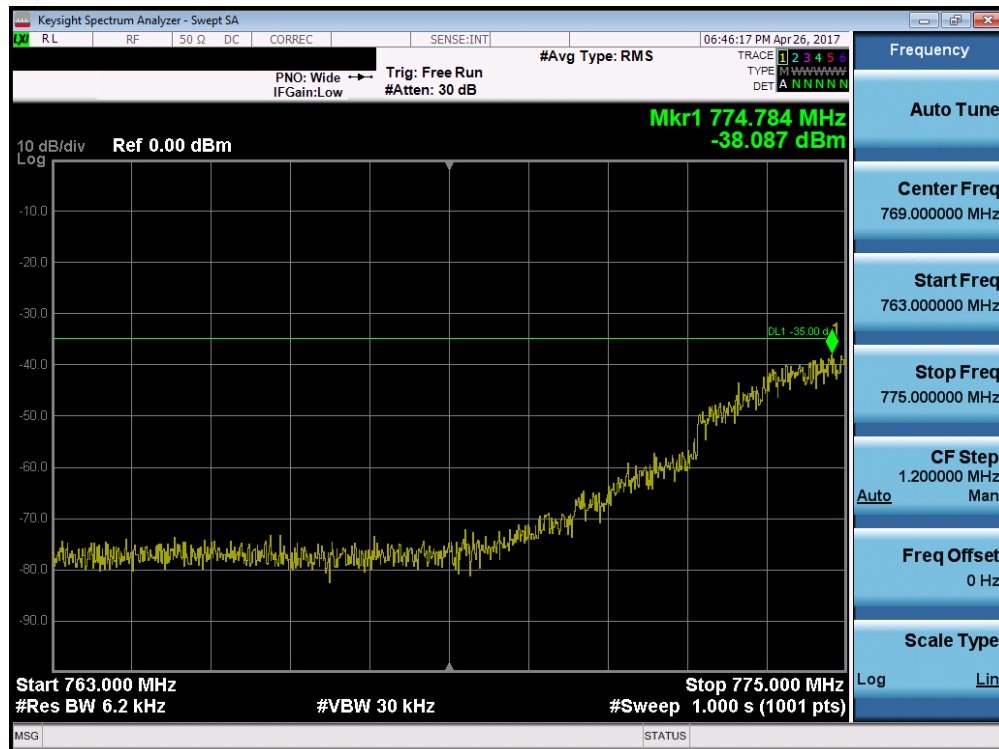


Plot 7-97. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

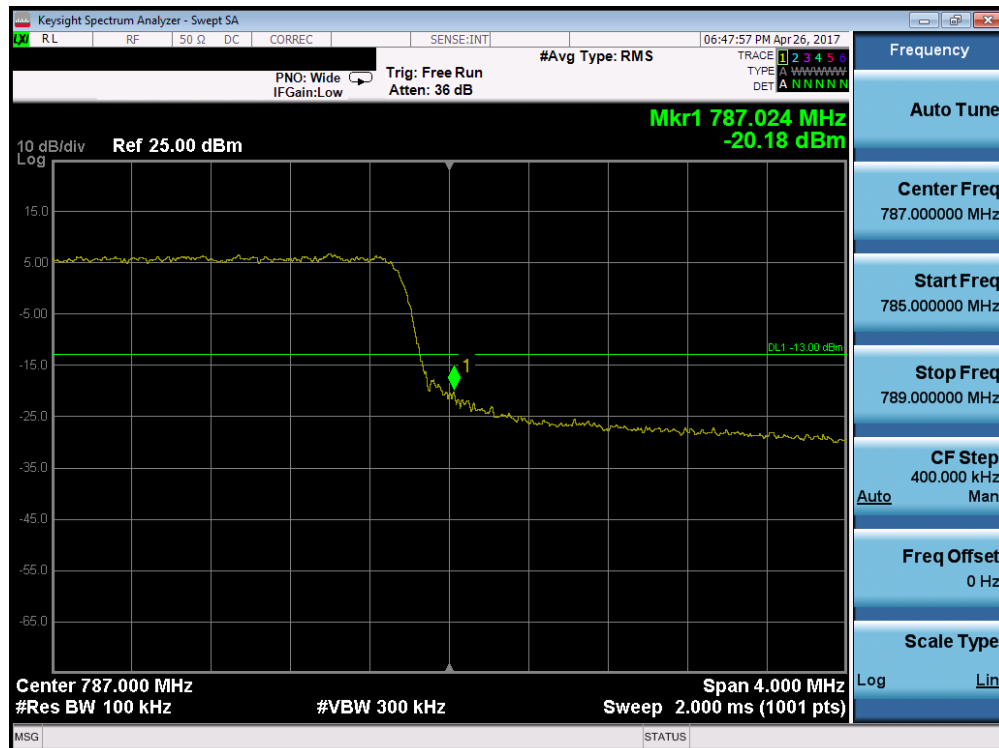


Plot 7-98. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-99. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

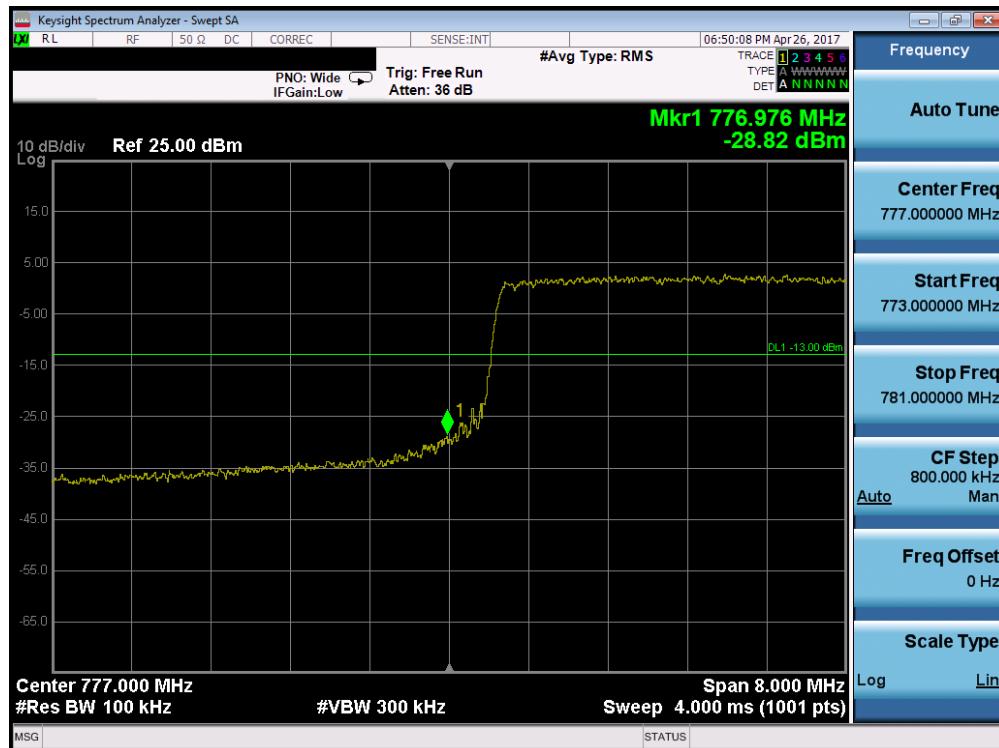


Plot 7-100. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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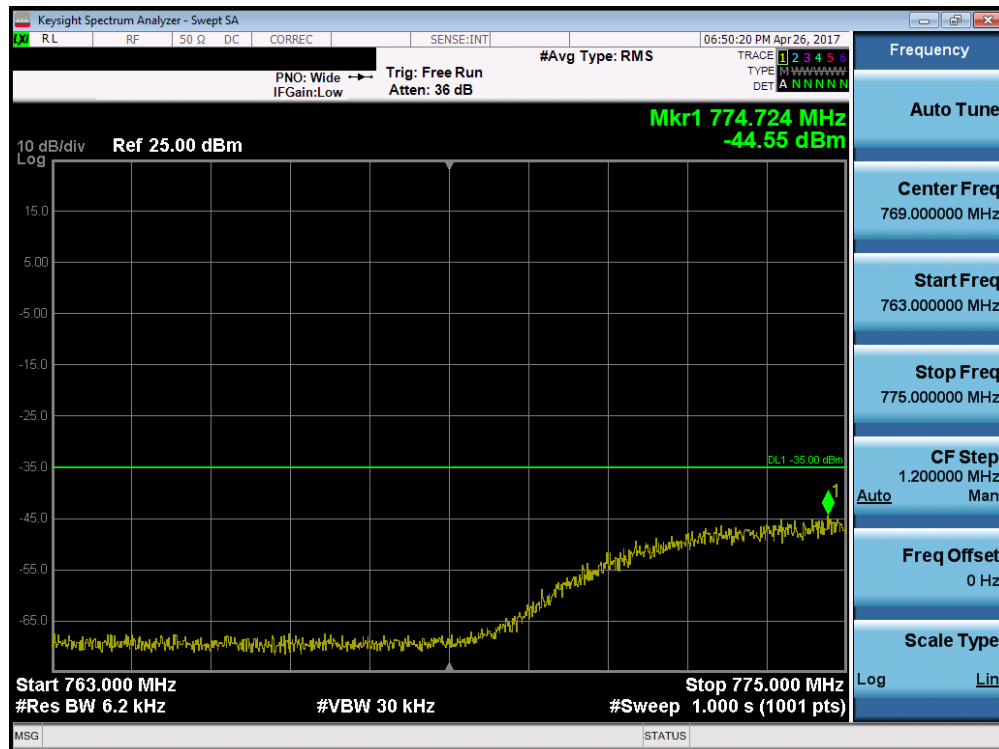


Plot 7-101. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-103. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

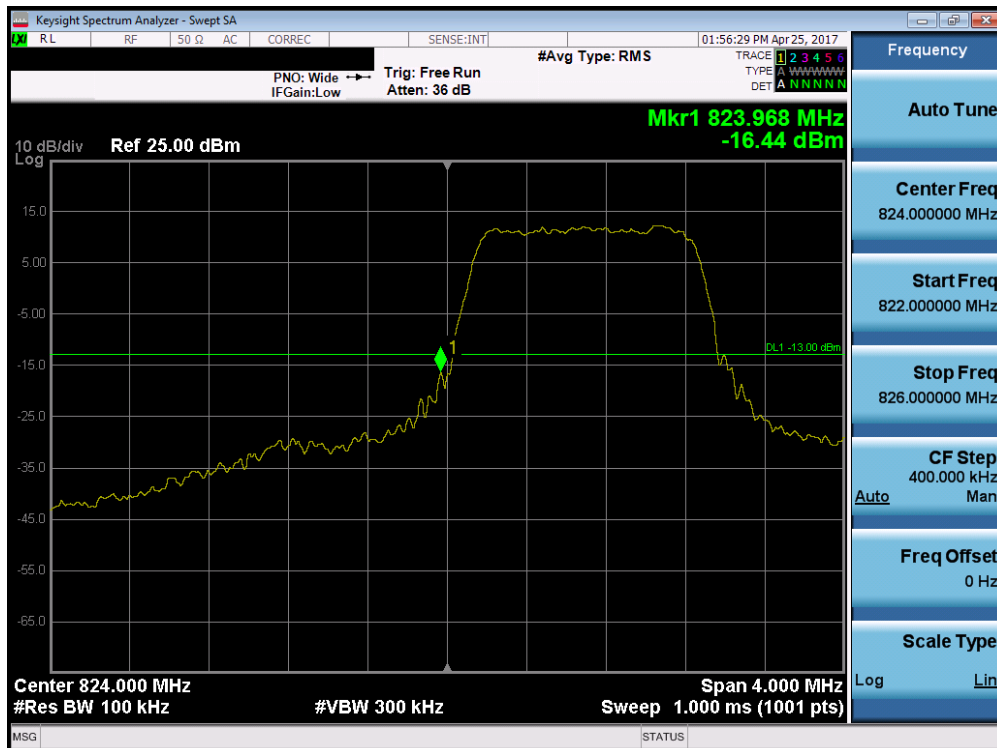


Plot 7-104. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG390W	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-105. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

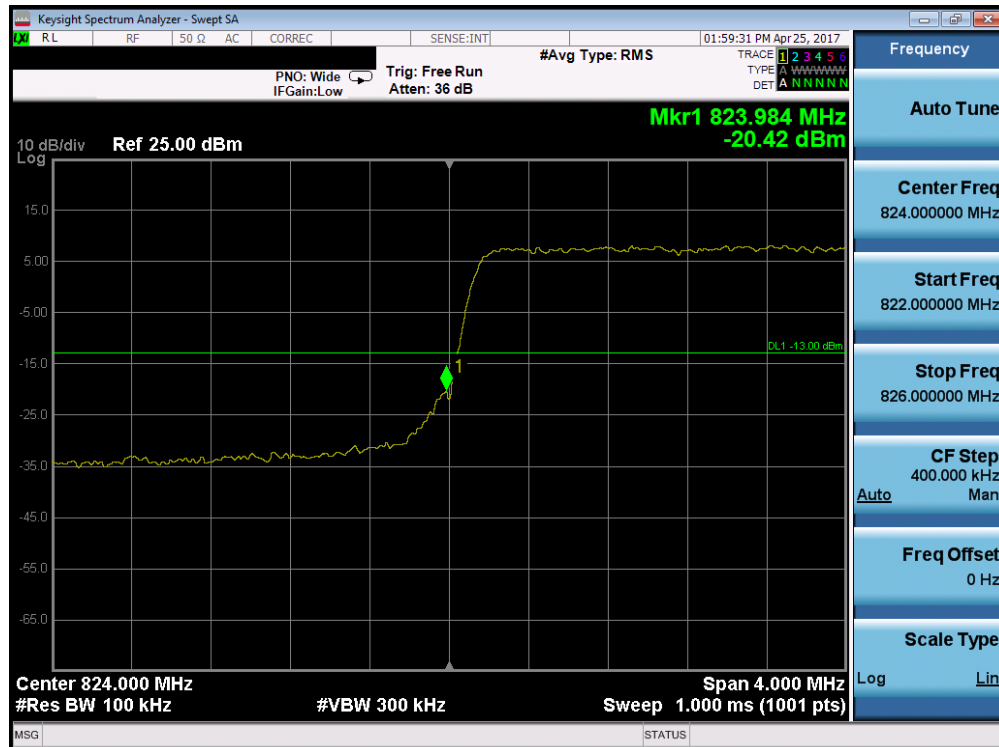


Plot 7-106. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-107. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

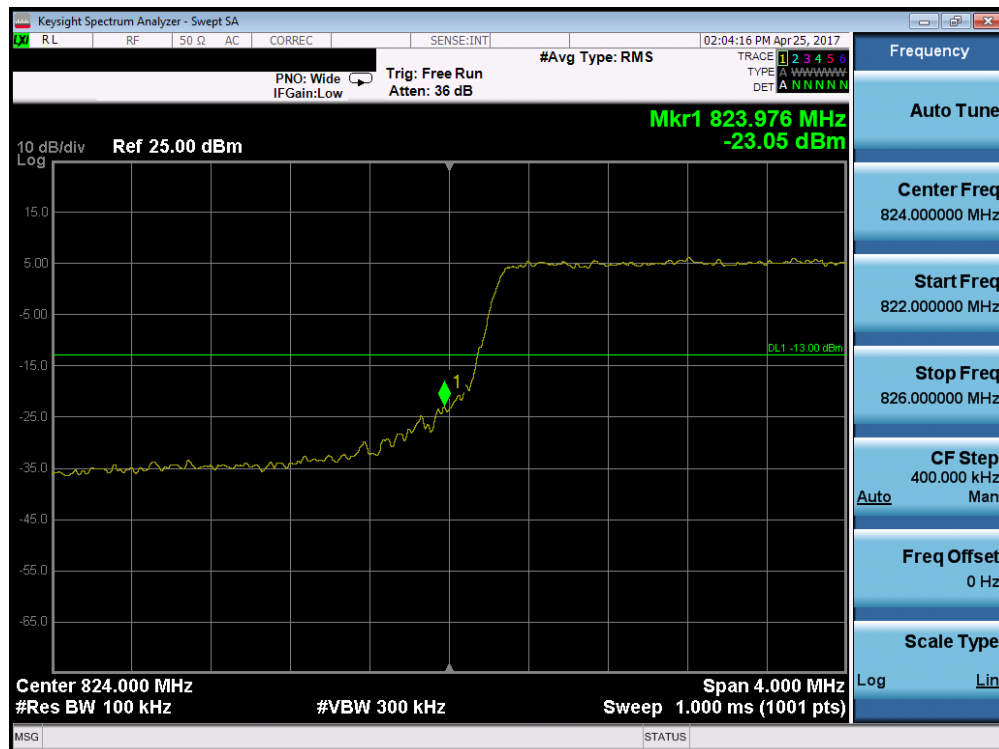


Plot 7-108. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-109. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - RB Size 15)

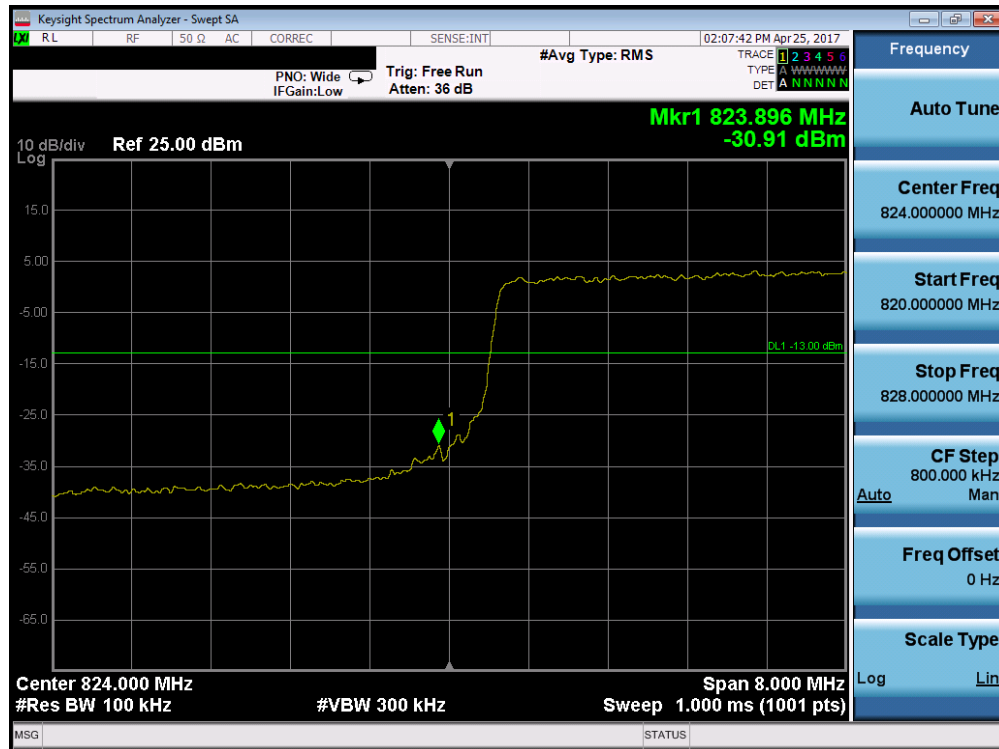


Plot 7-110. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - RB Size 25)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-111. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

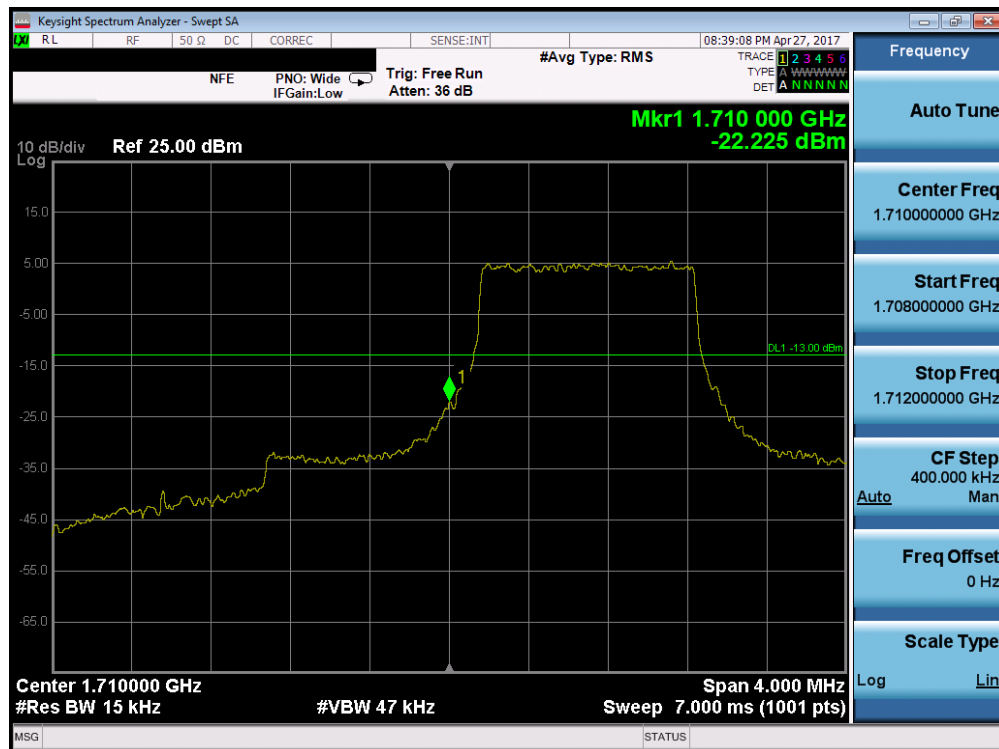


Plot 7-112. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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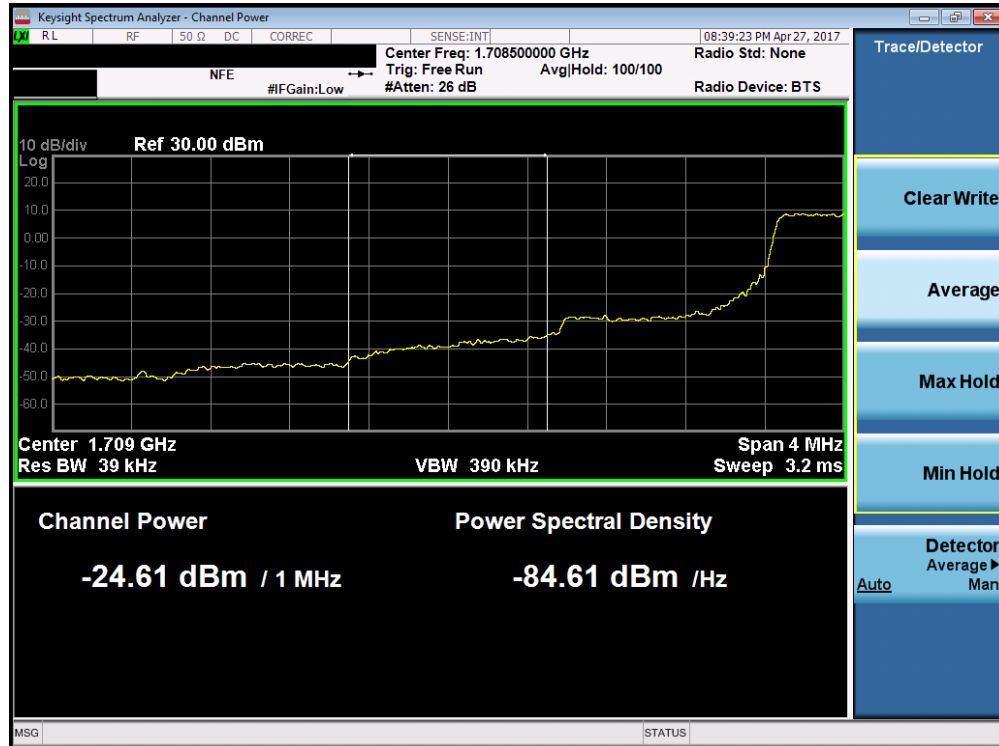


Plot 7-113. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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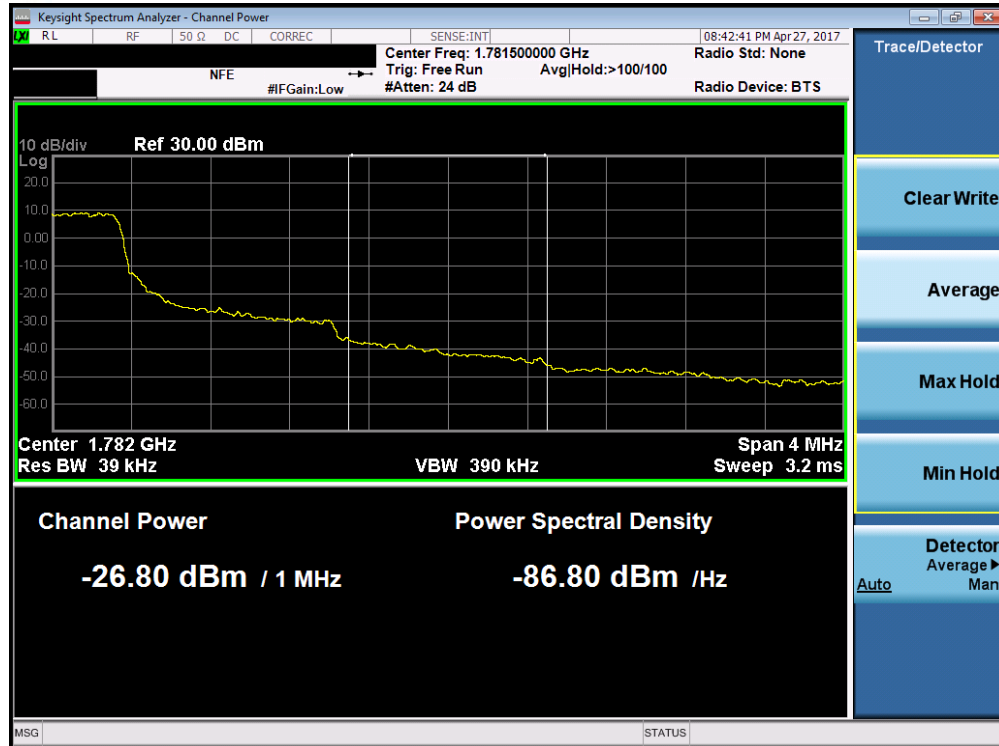


Plot 7-115. Lower Extended Band Edge Plot (Band 4/66 - 1.4MHz QPSK - RB Size 6)

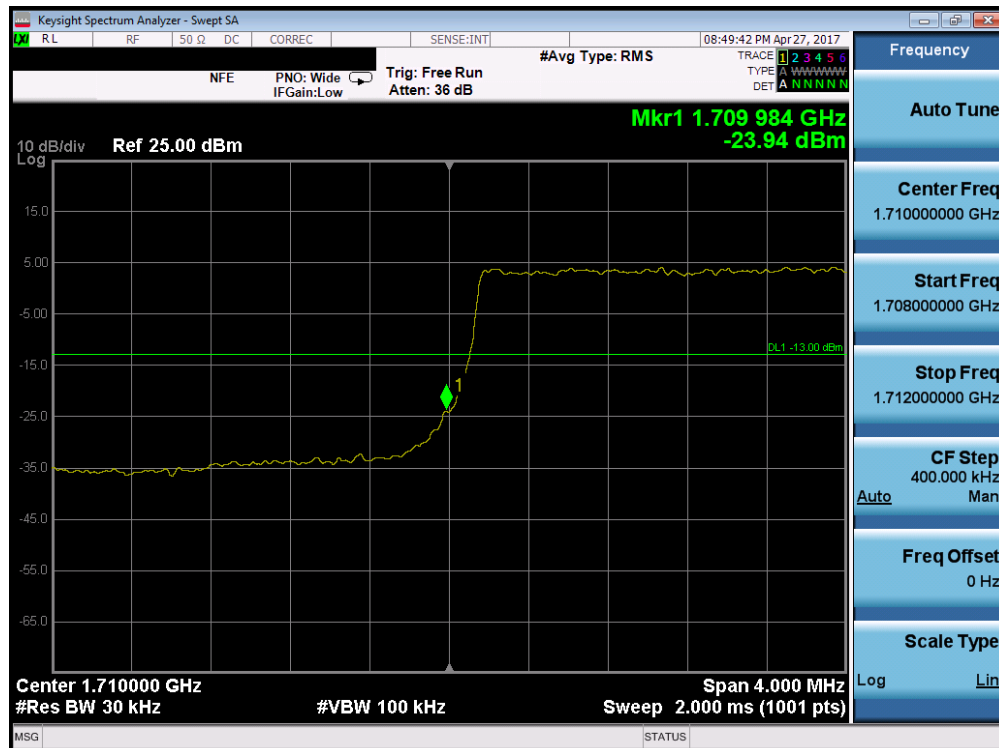


Plot 7-116. Upper Band Edge Plot (Band 4/66 - 1.4MHz QPSK - RB Size 6)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 76 of 133

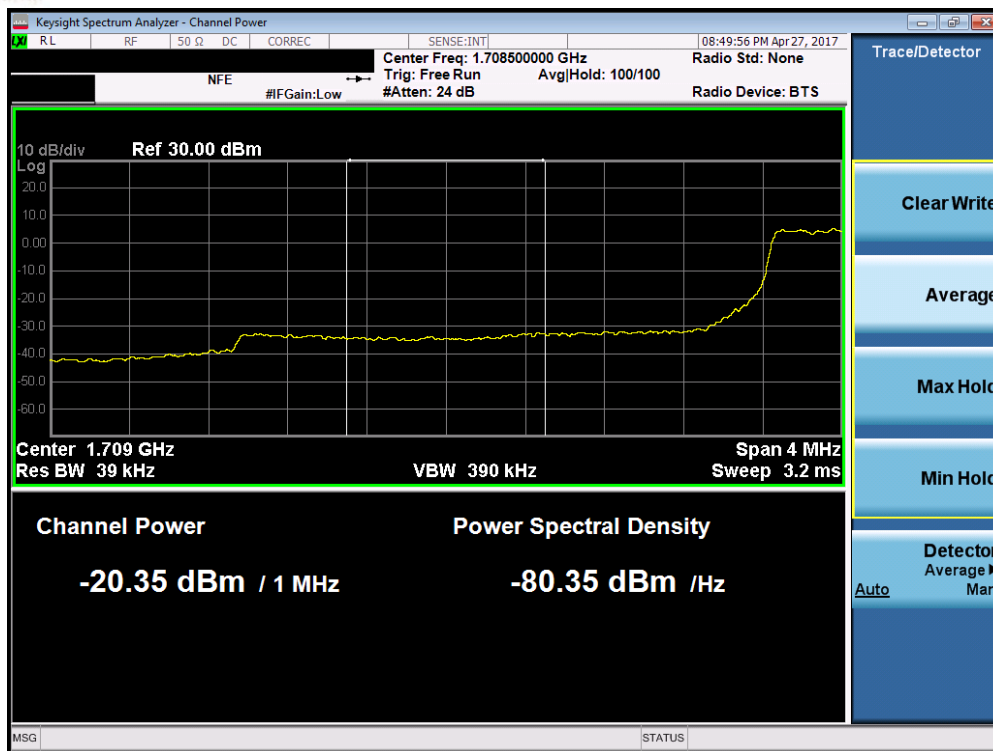


Plot 7-117. Upper Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

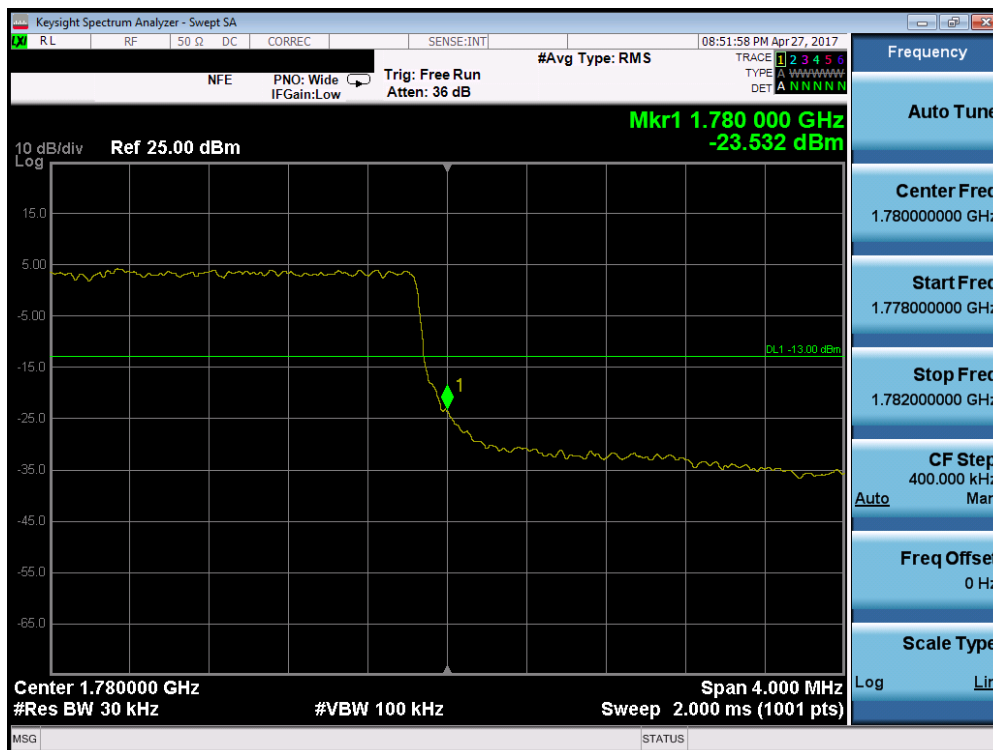


Plot 7-118. Lower Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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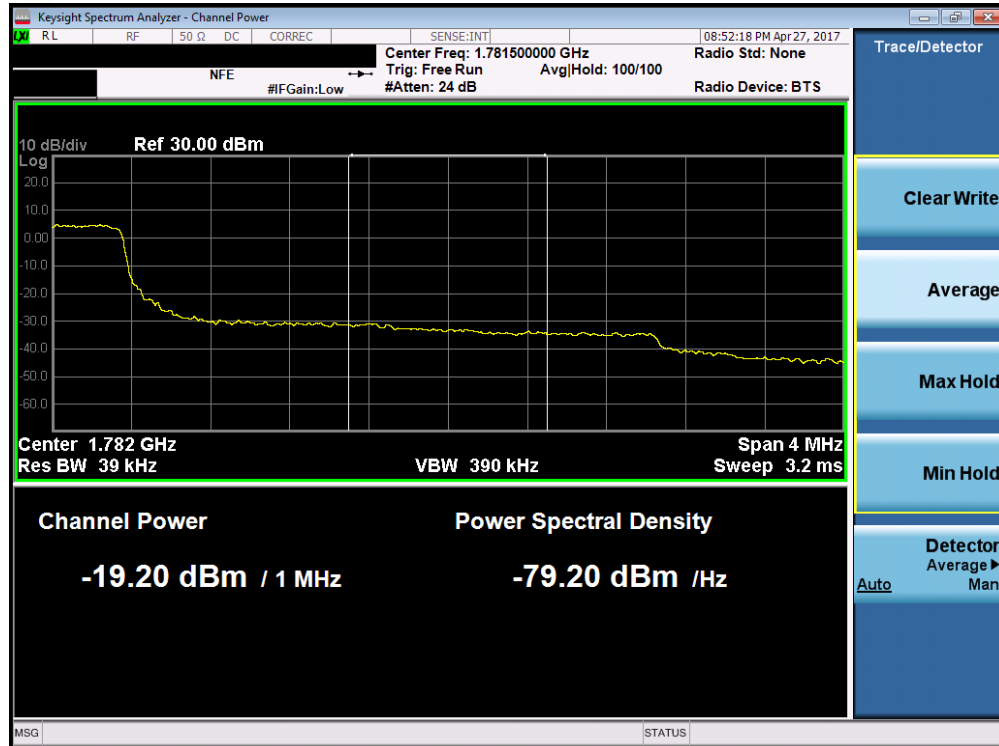


Plot 7-119. Lower Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

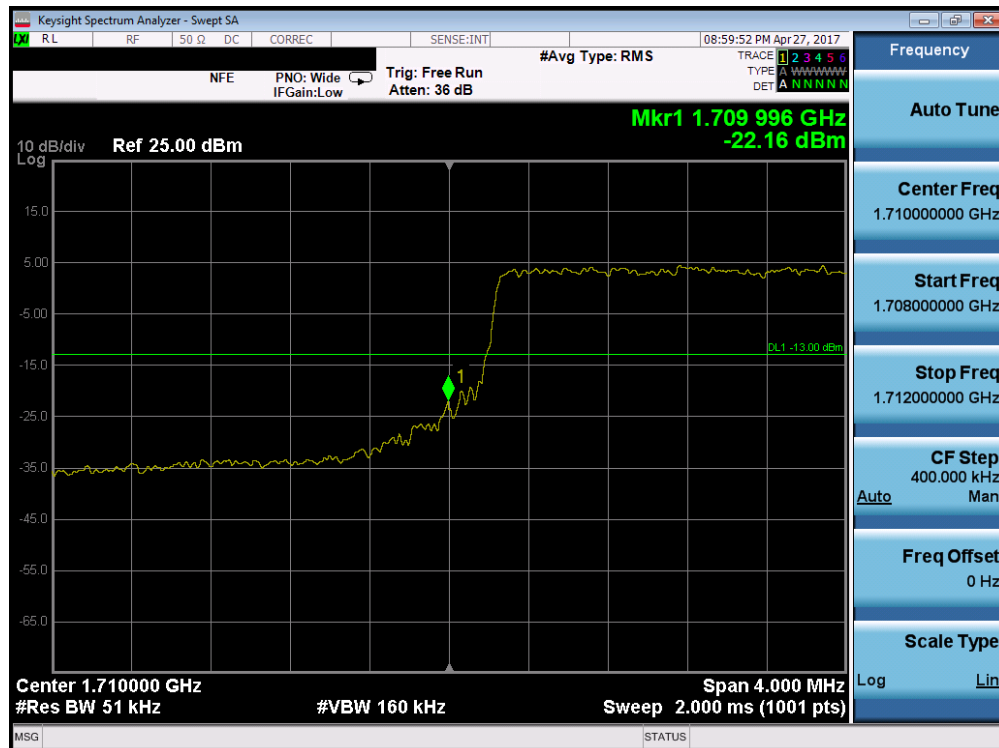


Plot 7-120. Upper Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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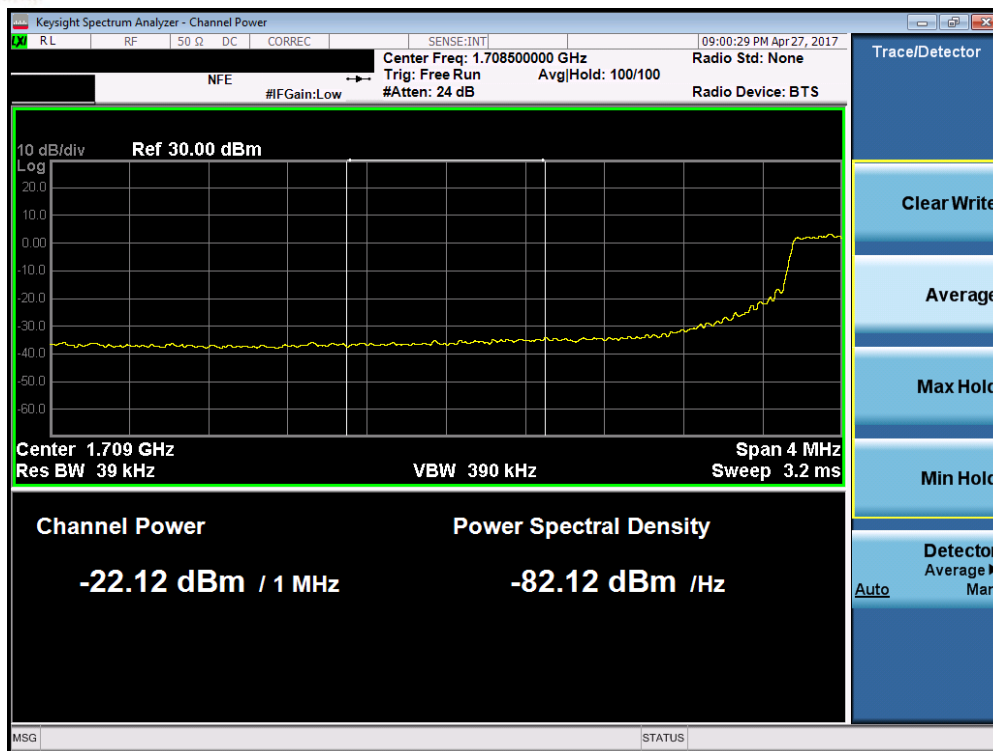


Plot 7-121. Upper Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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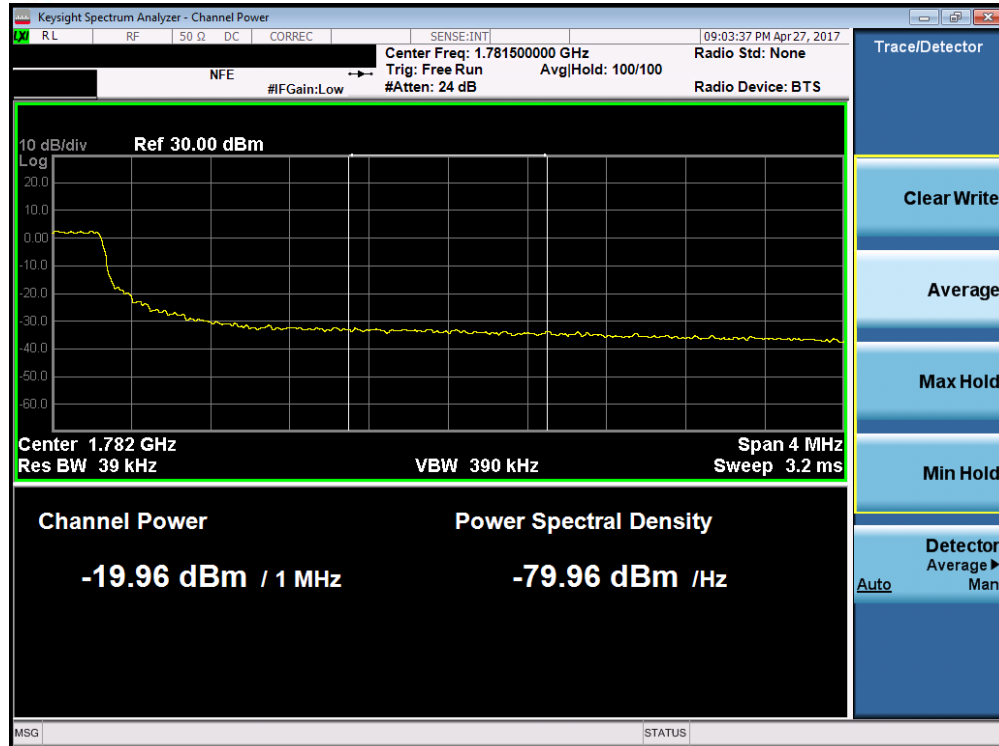


Plot 7-123. Lower Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

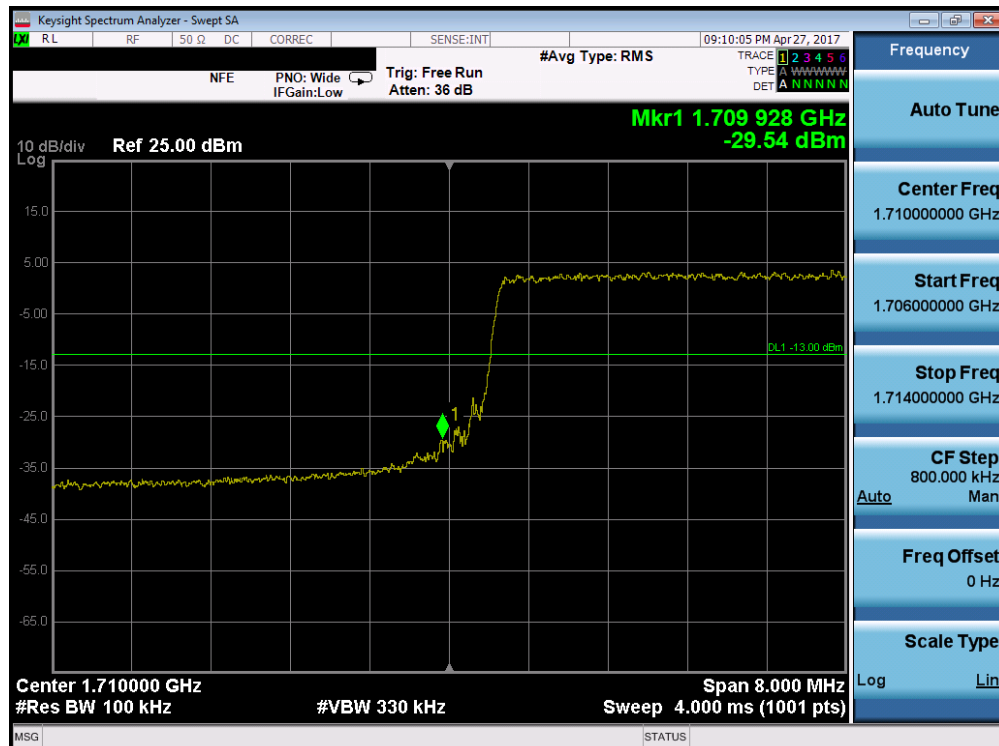


Plot 7-124. Upper Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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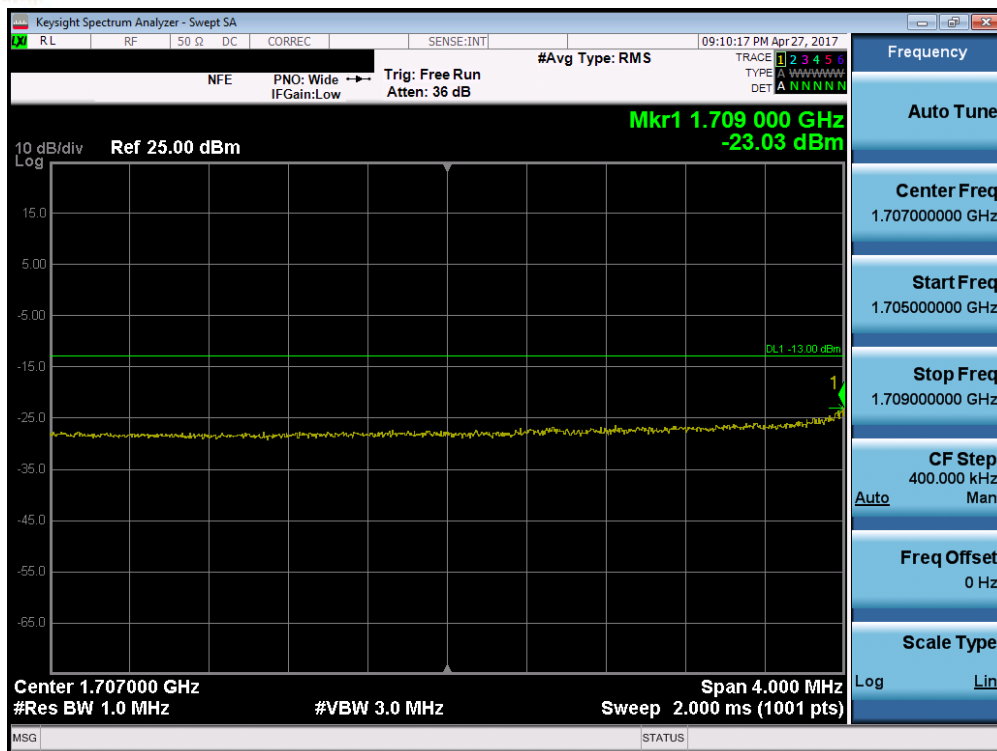


Plot 7-125. Upper Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

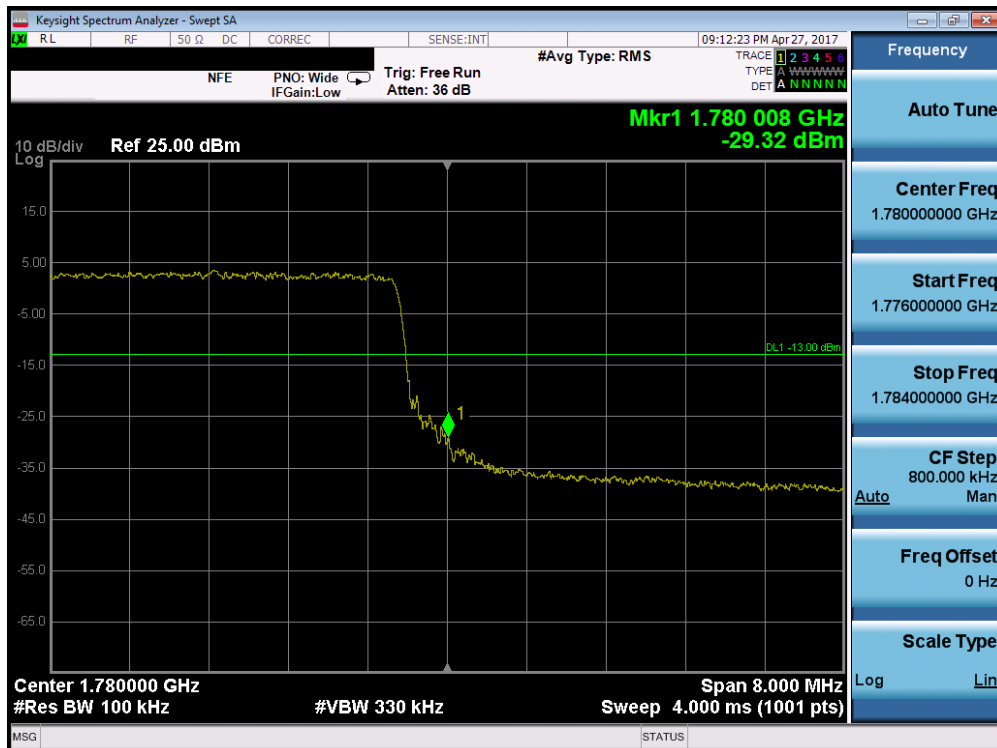


Plot 7-126. Lower Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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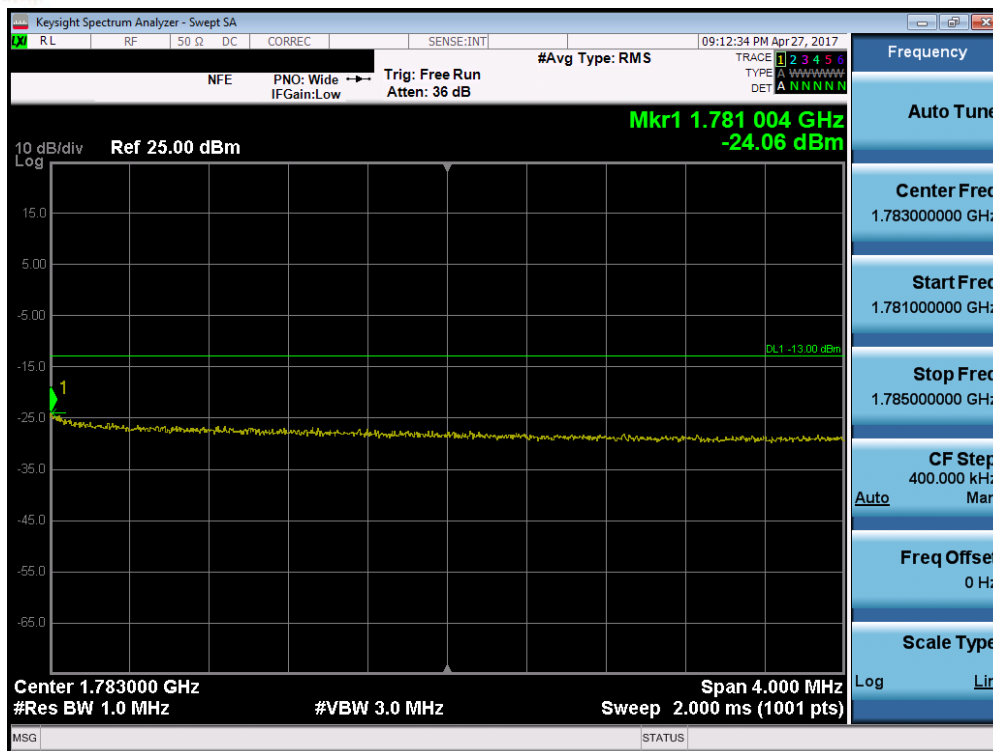


Plot 7-127. Lower Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

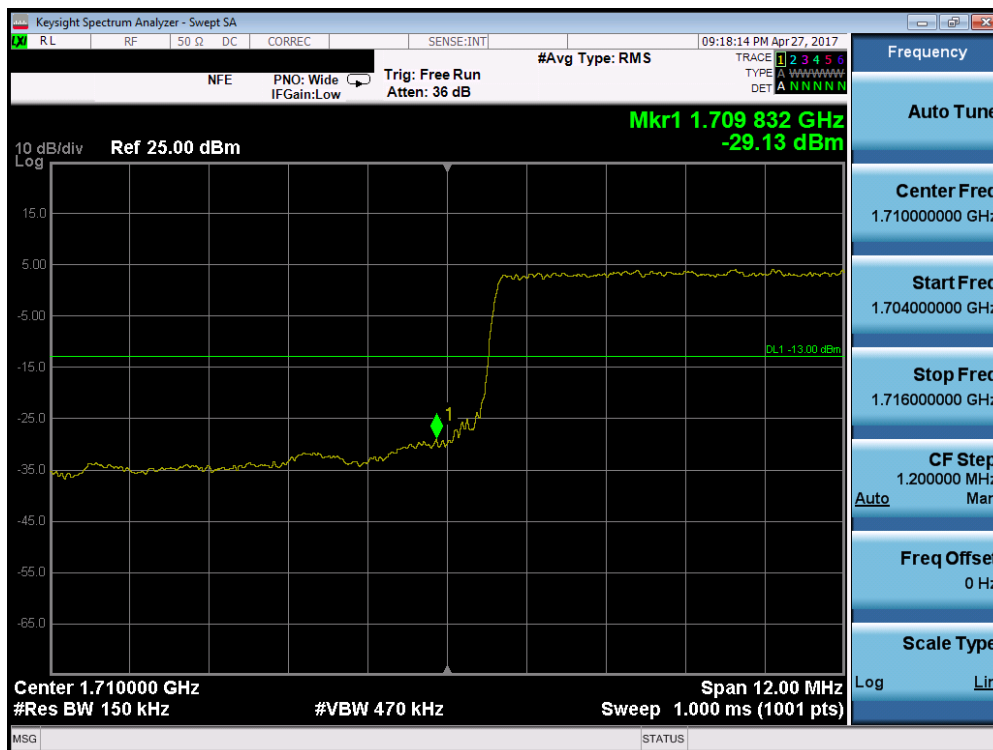


Plot 7-128. Upper Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-129. Upper Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

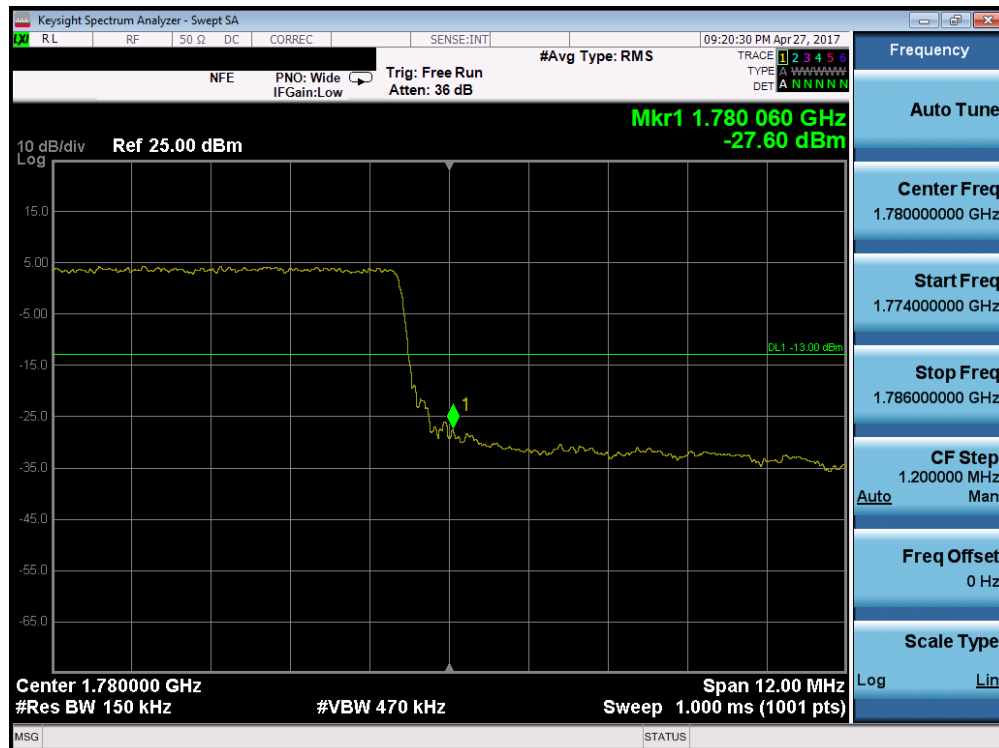


Plot 7-130. Lower Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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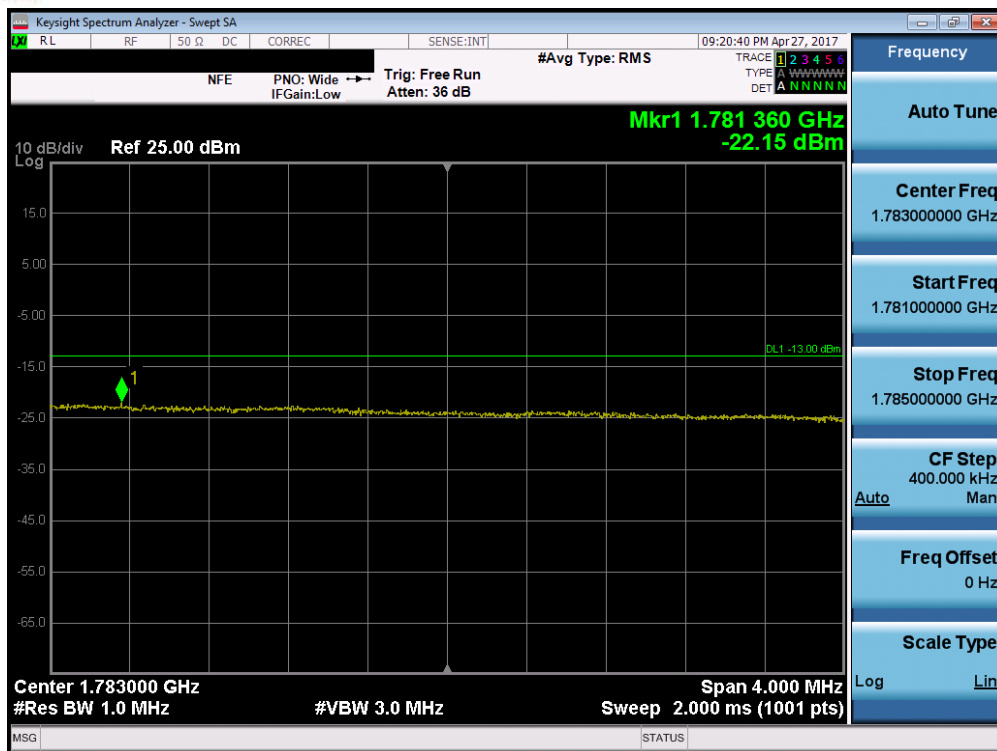


Plot 7-131. Lower Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

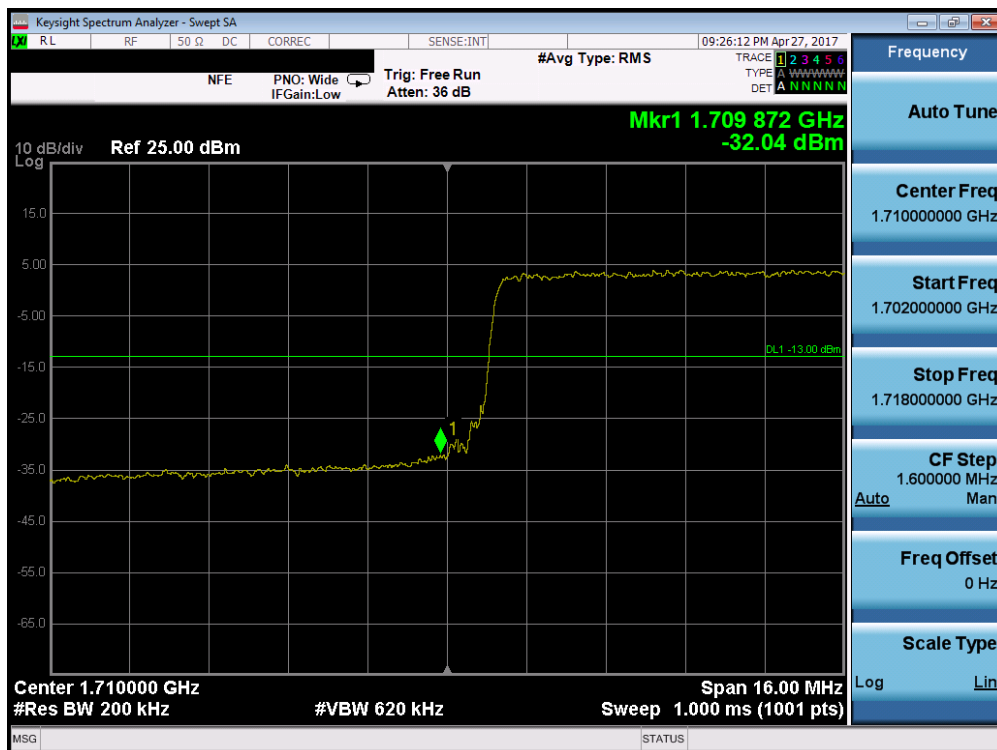


Plot 7-132. Upper Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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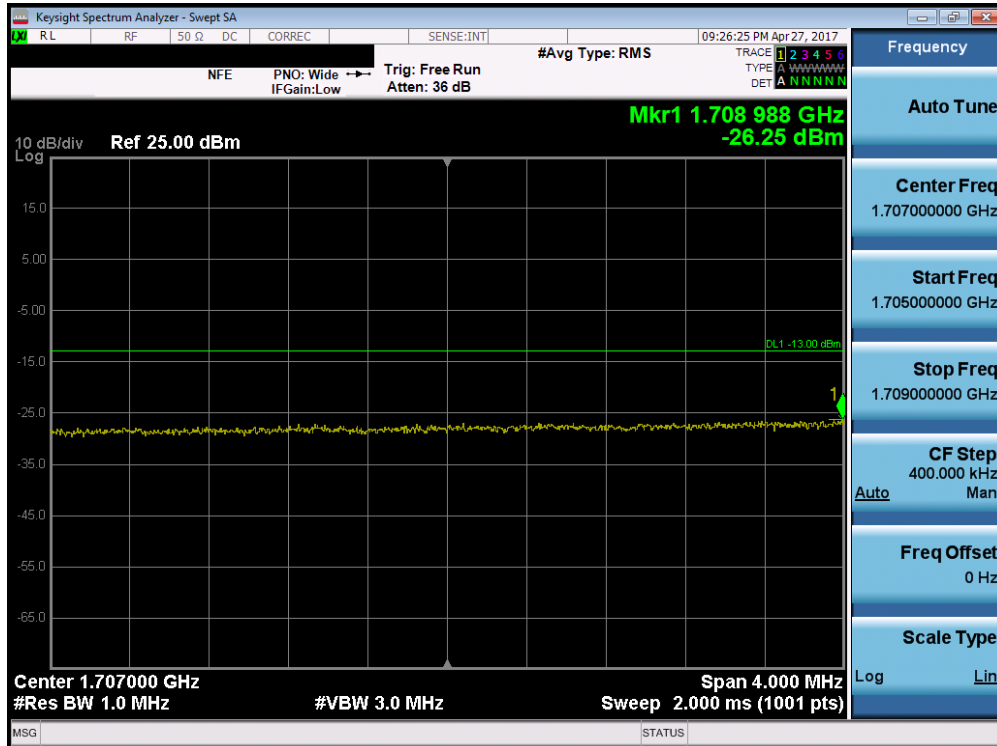


Plot 7-133. Upper Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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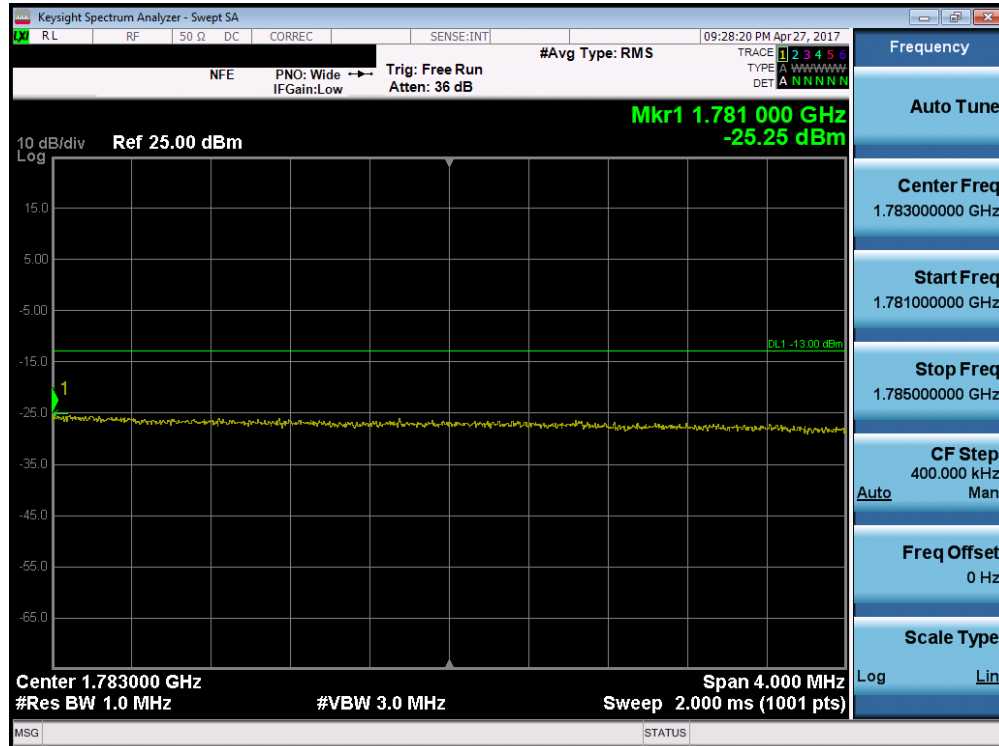


Plot 7-135. Lower Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

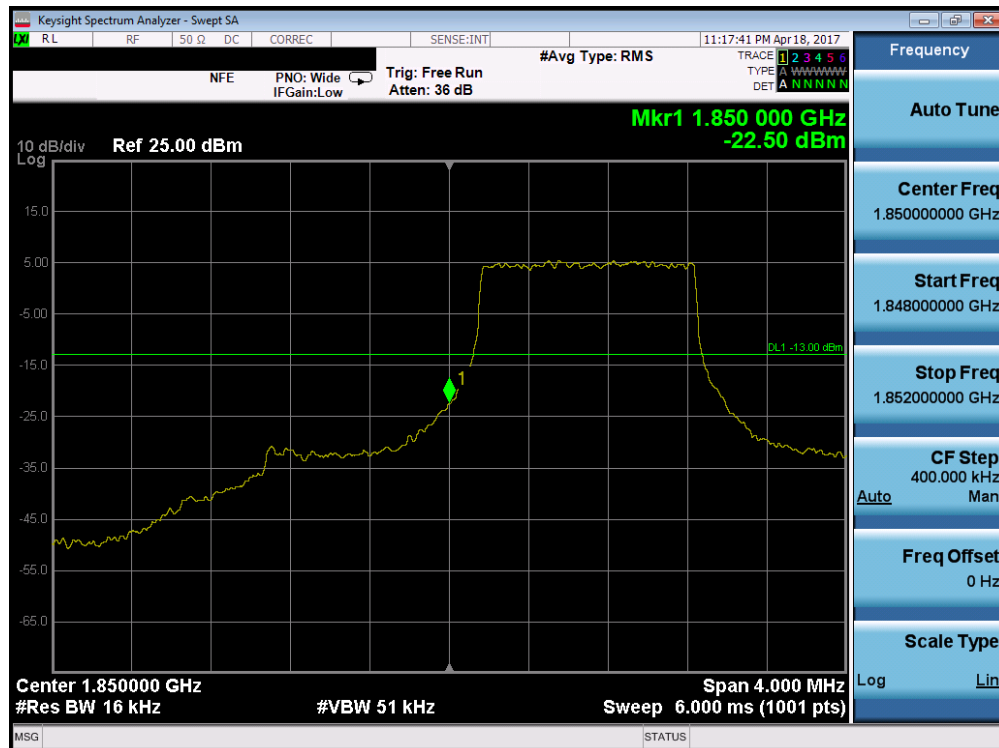


Plot 7-136. Upper Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 86 of 133

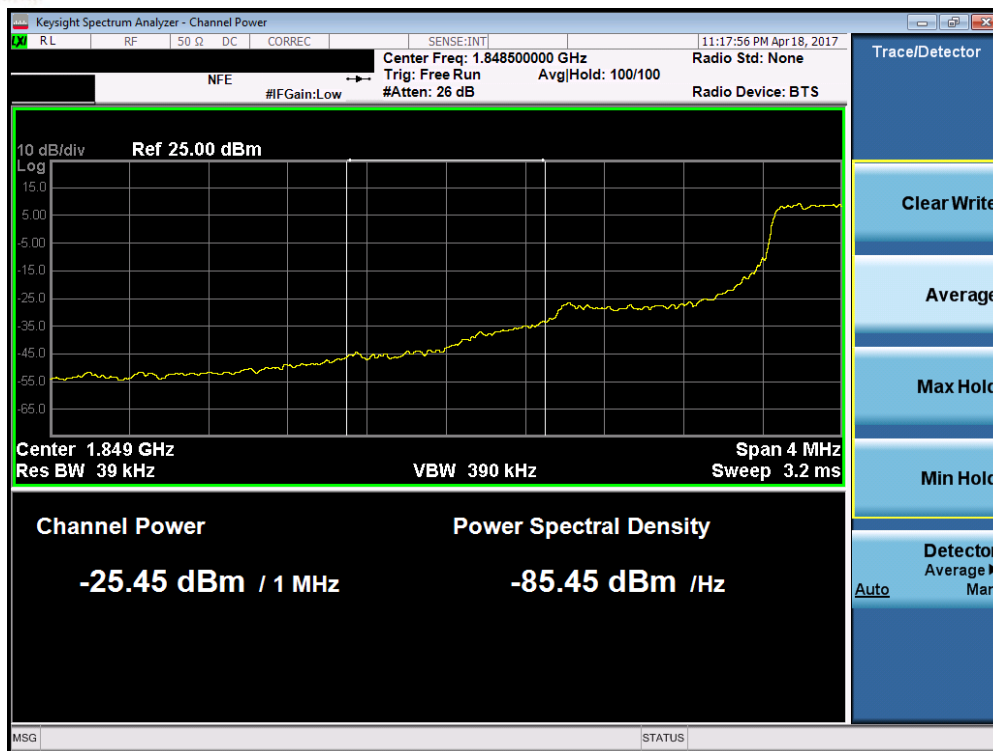


Plot 7-137. Upper Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 87 of 133

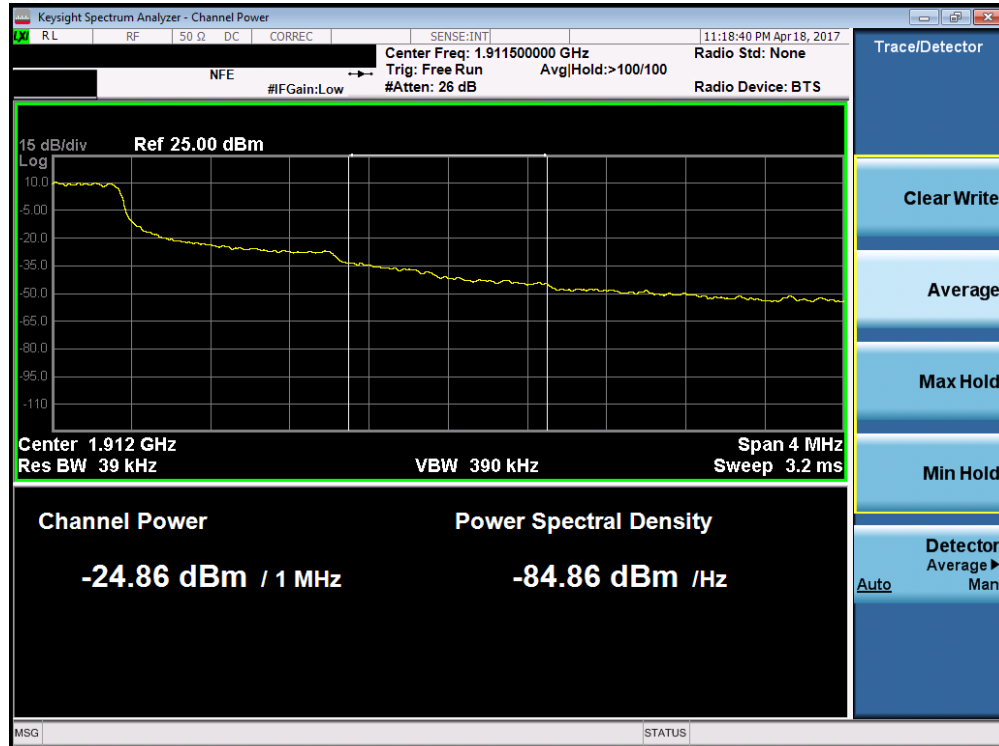


Plot 7-139. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

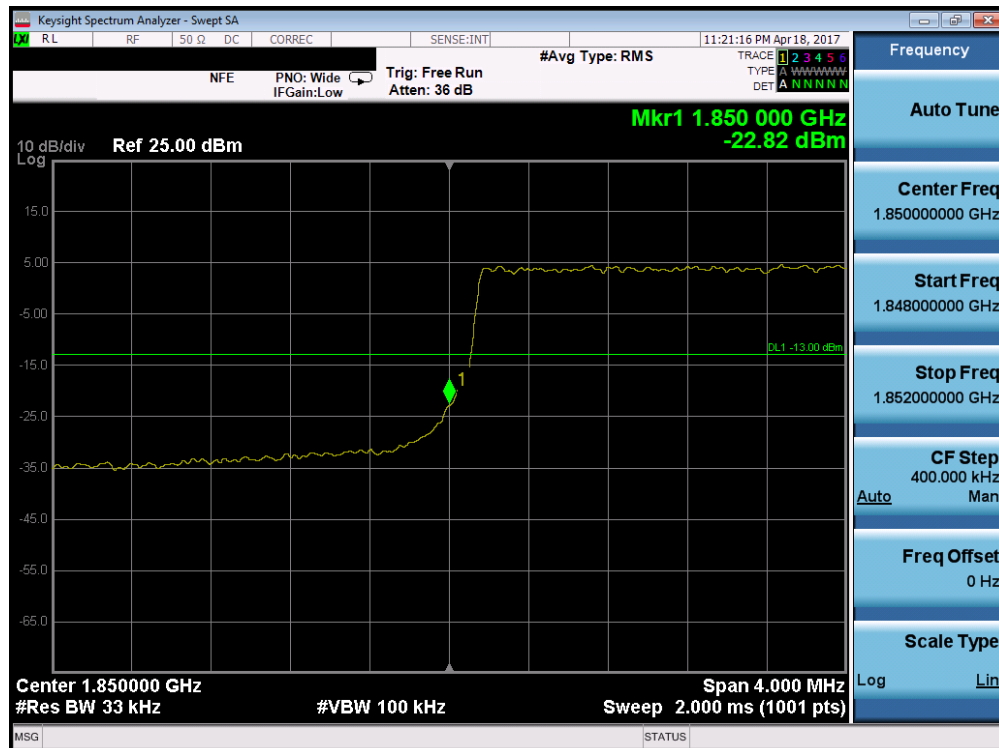


Plot 7-140. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 88 of 133

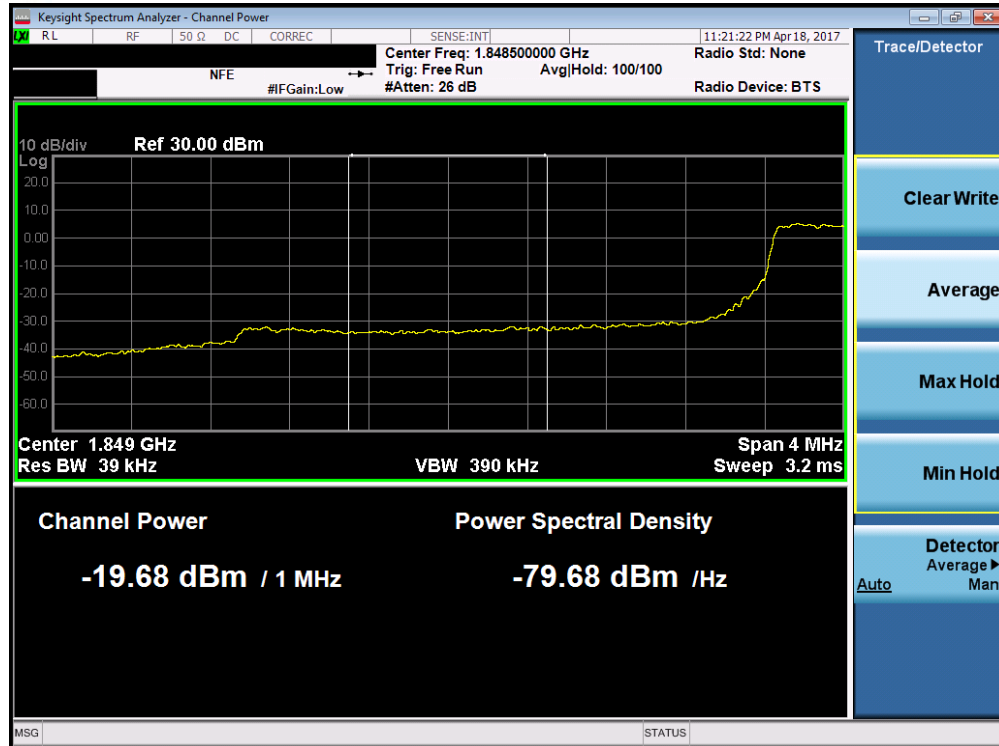


Plot 7-141. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

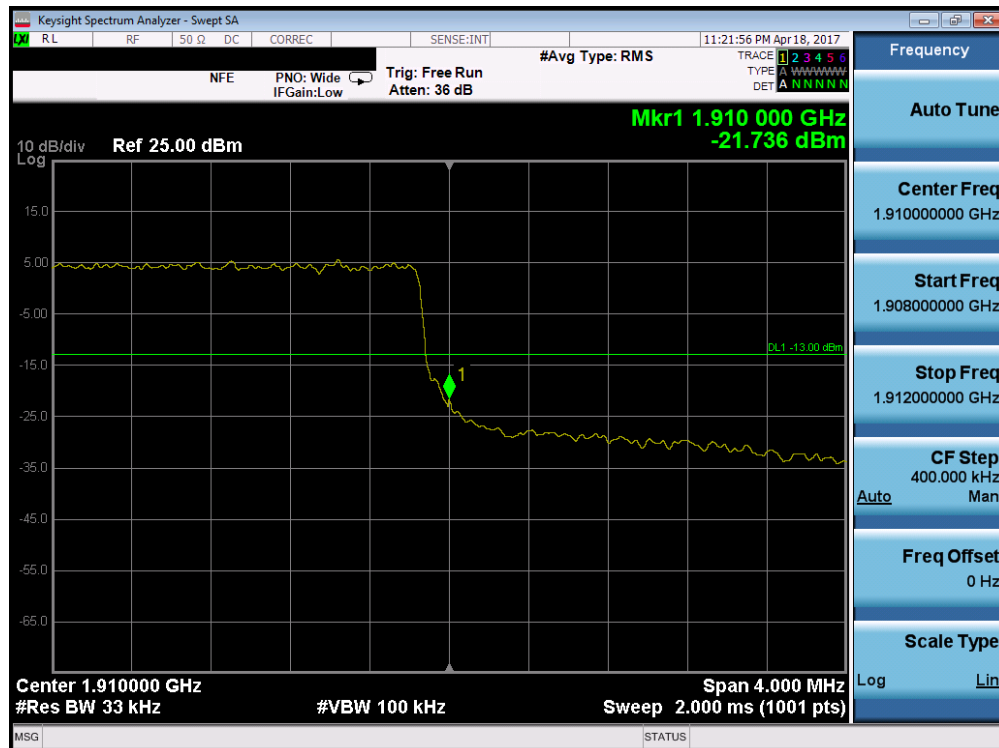


Plot 7-142. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 89 of 133

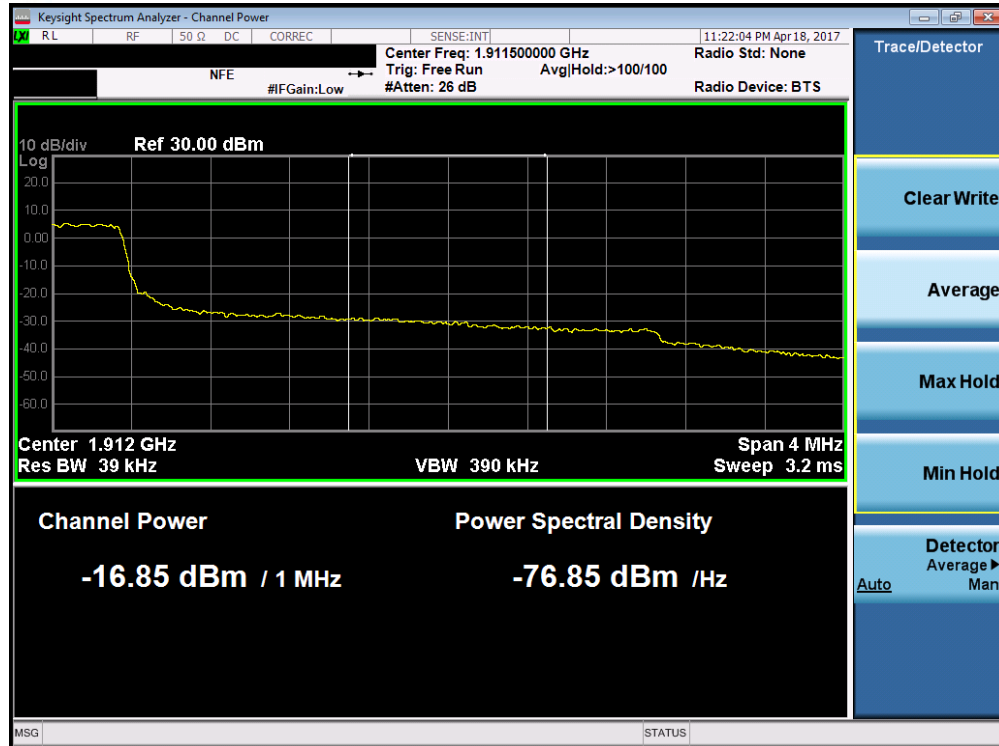


Plot 7-143. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

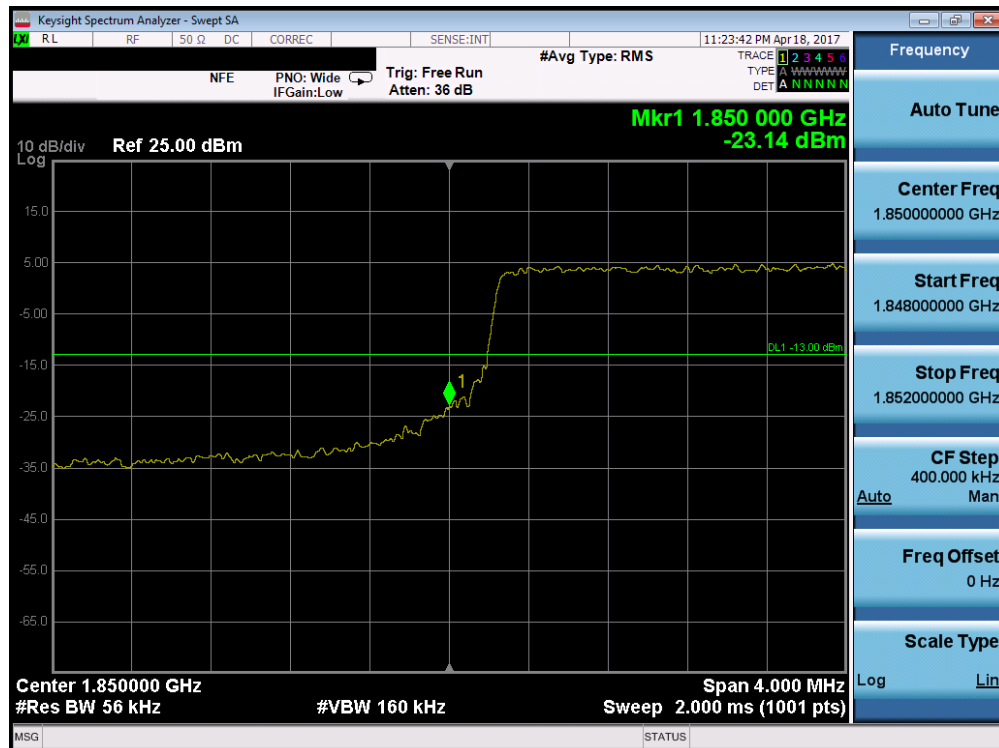


Plot 7-144. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 90 of 133

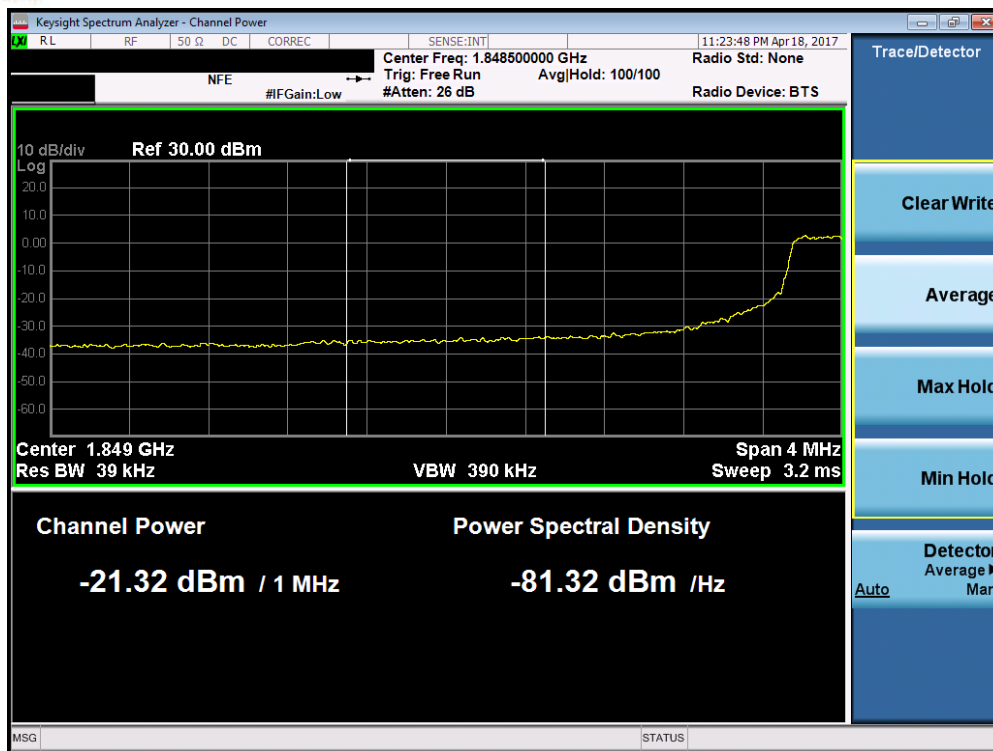


Plot 7-145. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 91 of 133

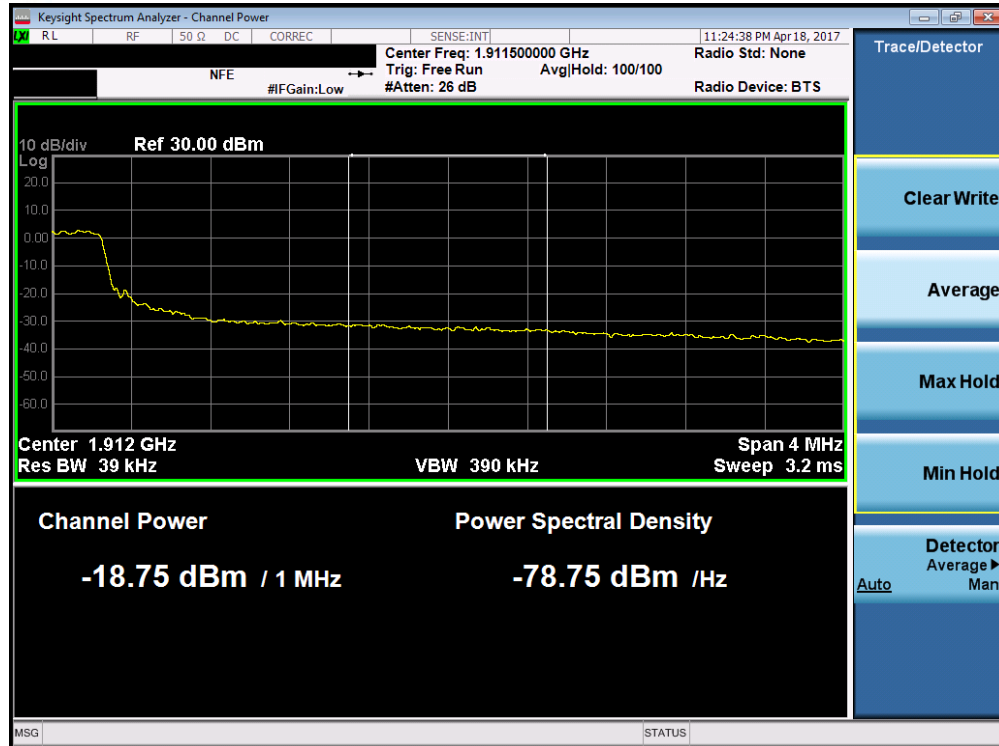


Plot 7-147. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

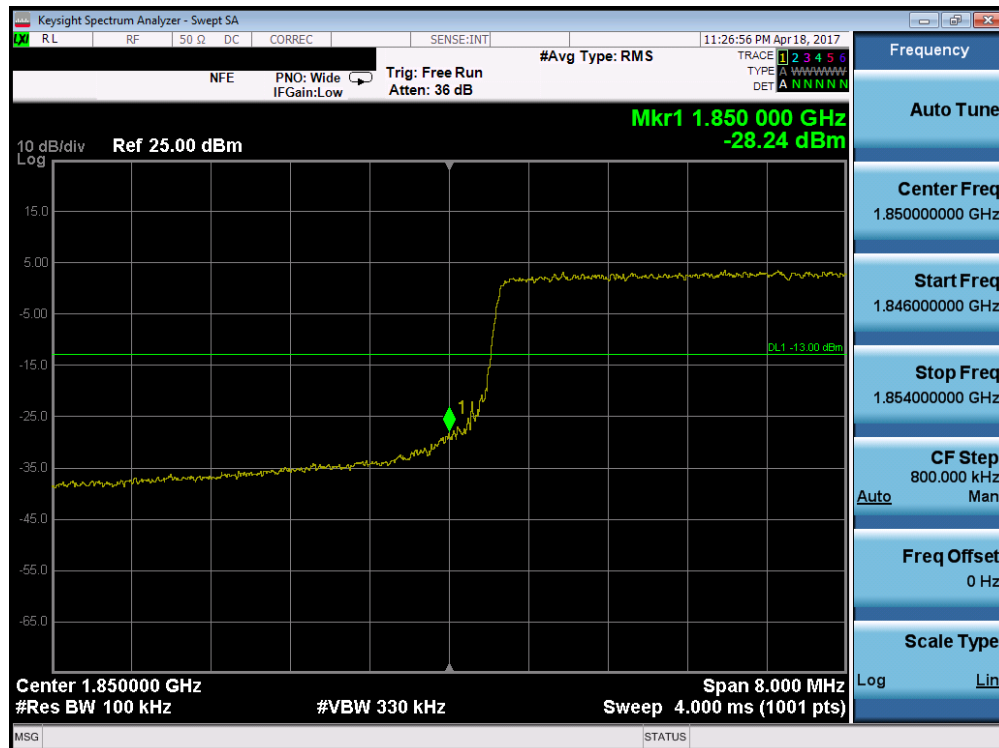


Plot 7-148. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 92 of 133

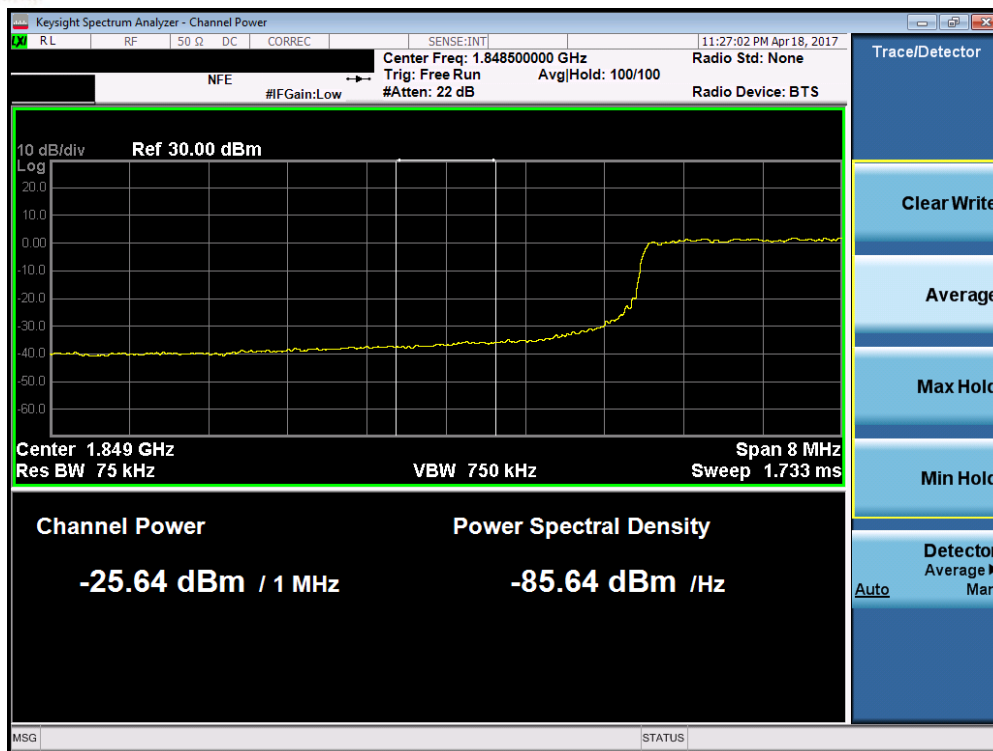


Plot 7-149. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



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

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 93 of 133

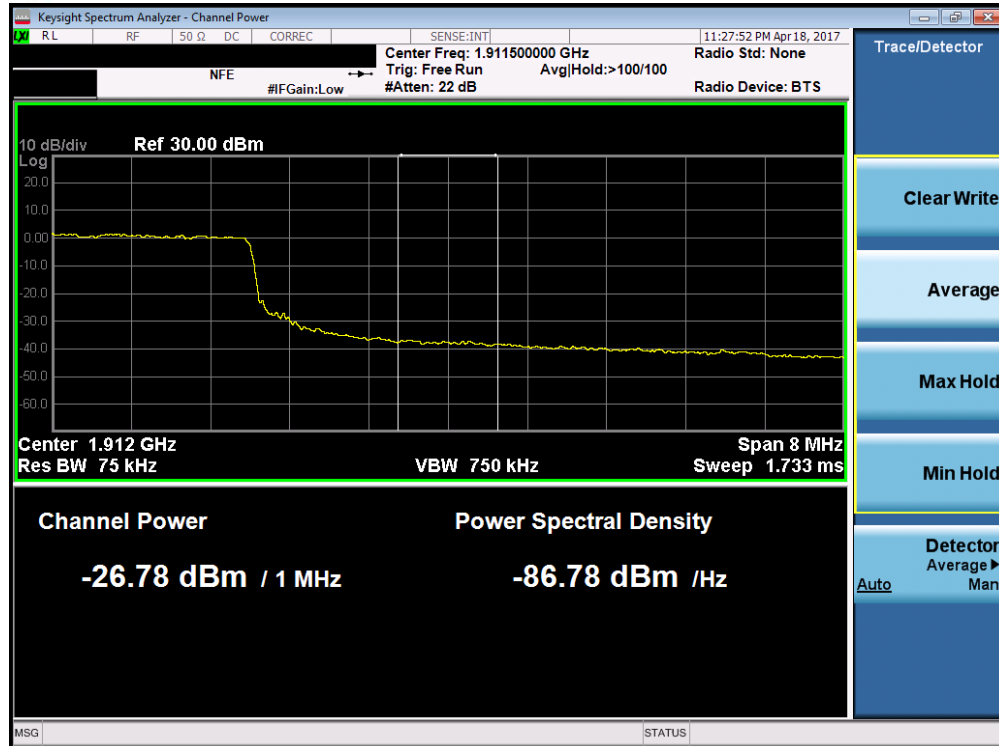


Plot 7-151. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

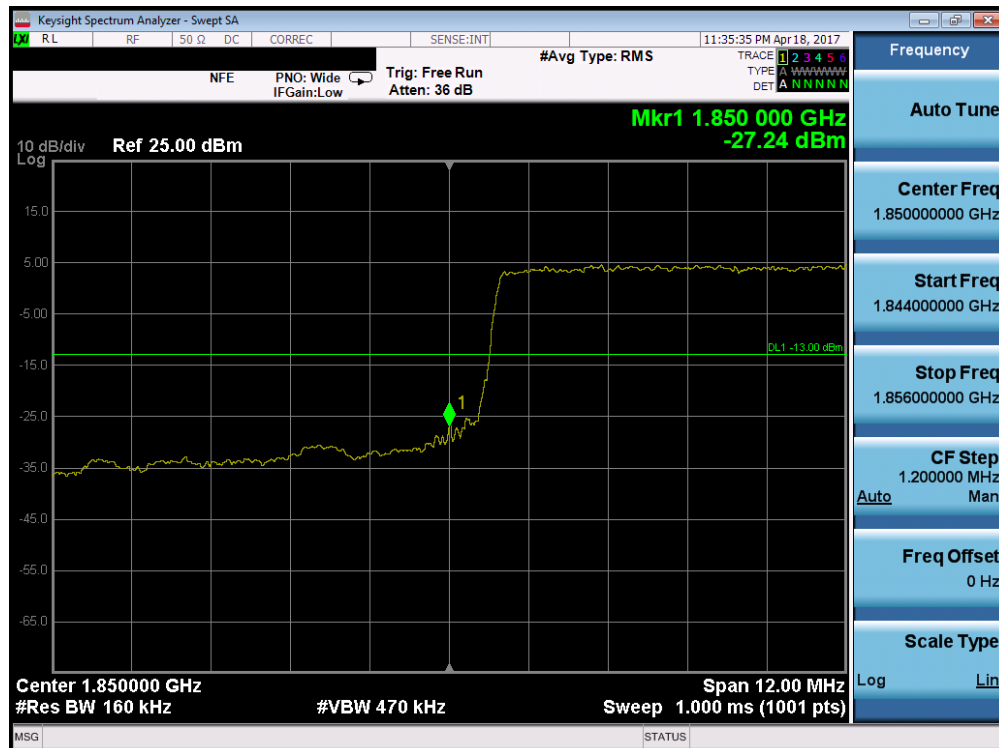


Plot 7-152. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 94 of 133

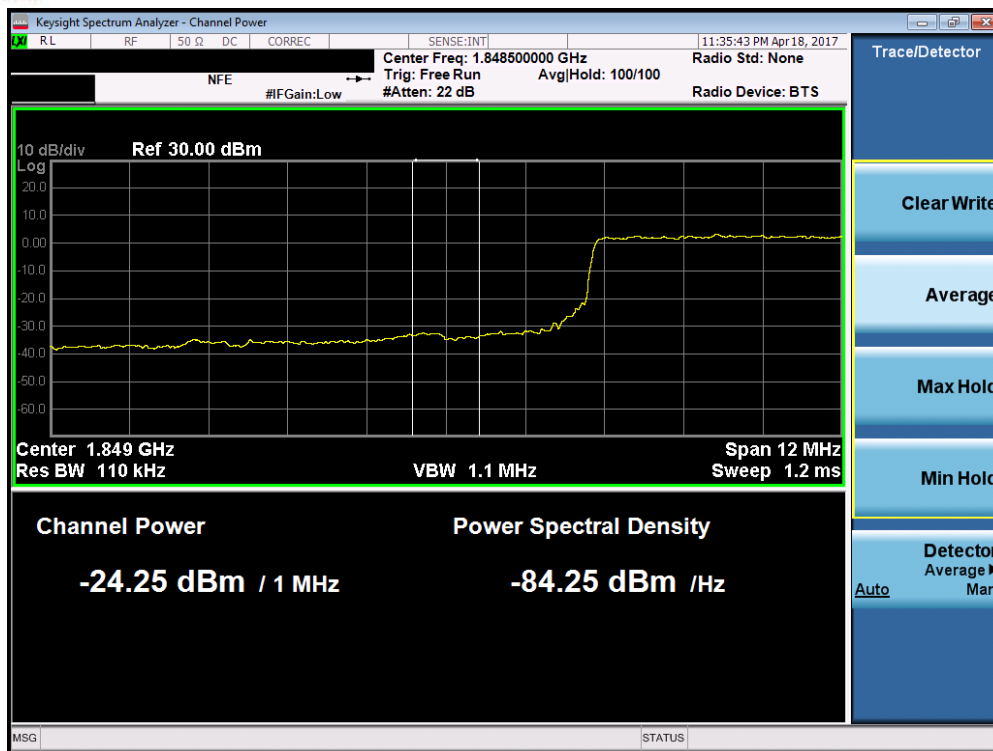


Plot 7-153. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

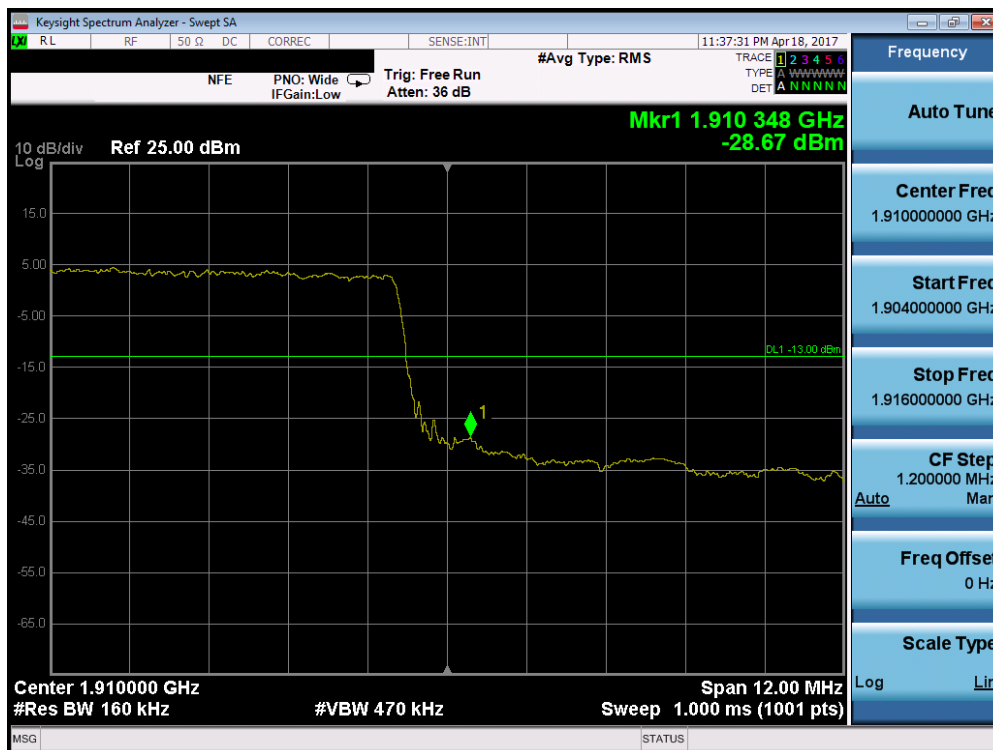


Plot 7-154. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 95 of 133

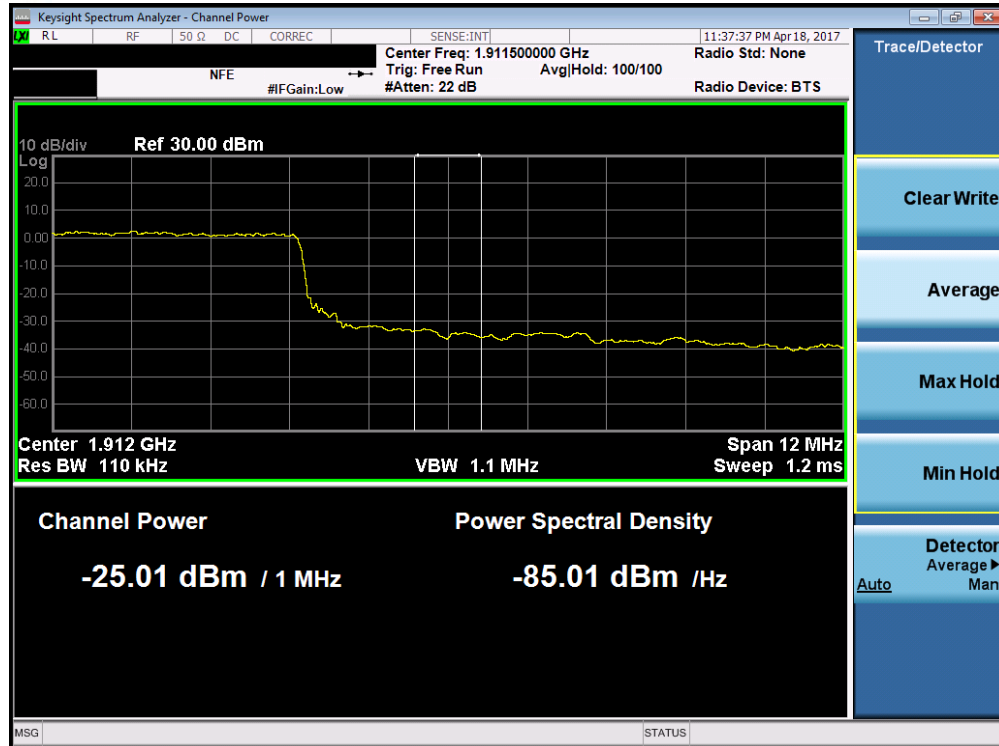


Plot 7-155. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

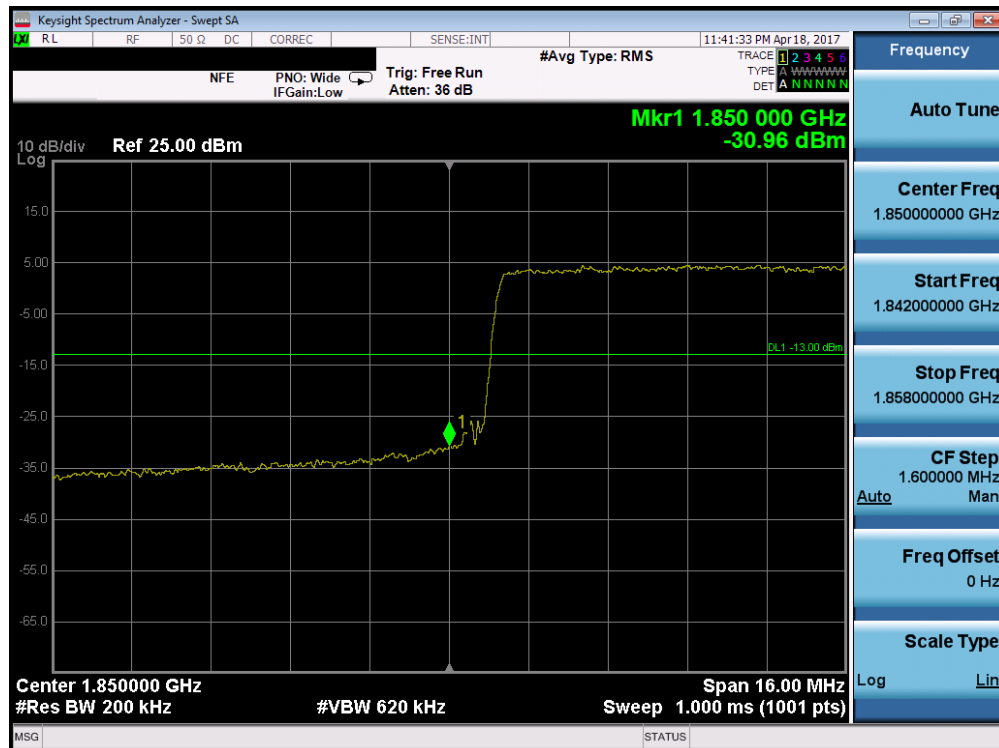


Plot 7-156. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 96 of 133

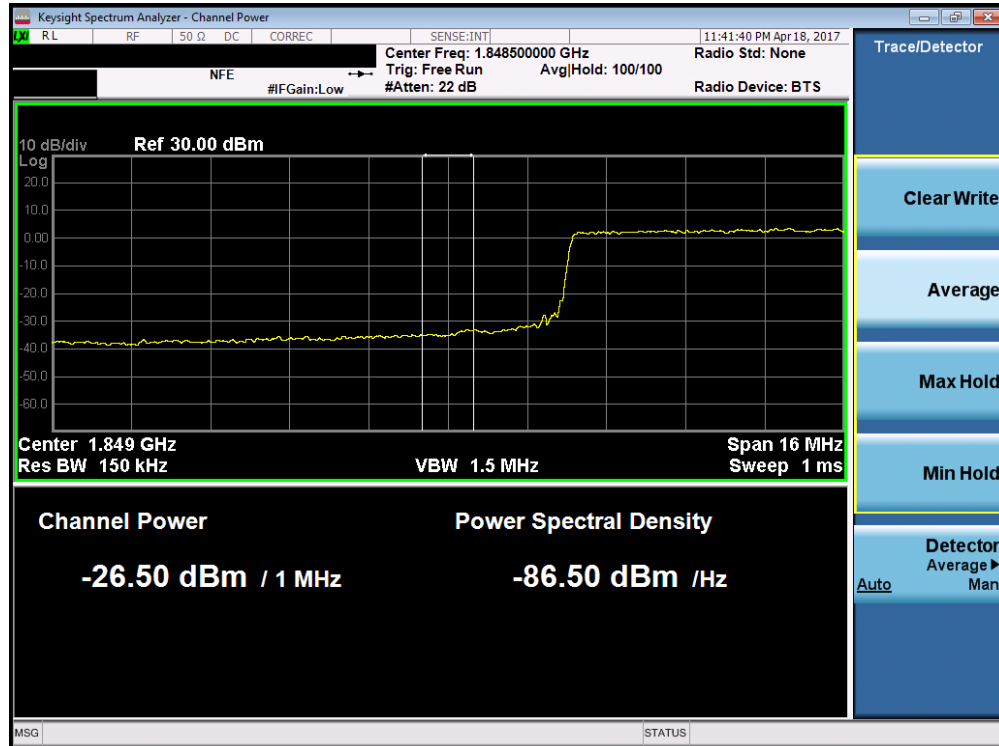


Plot 7-157. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

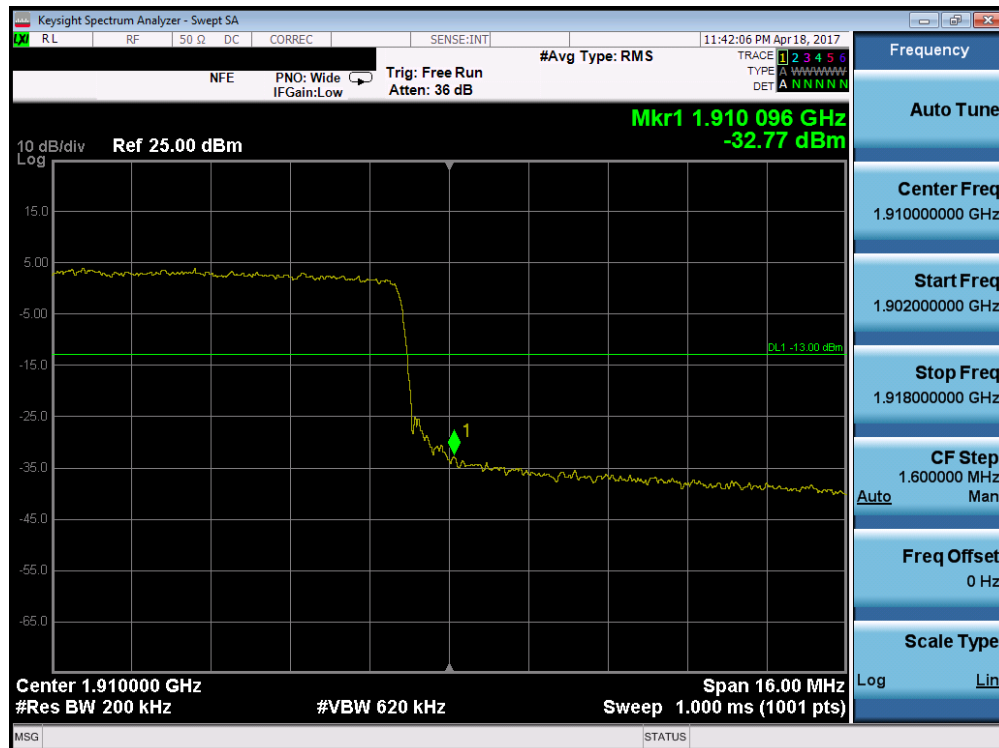


Plot 7-158. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 97 of 133

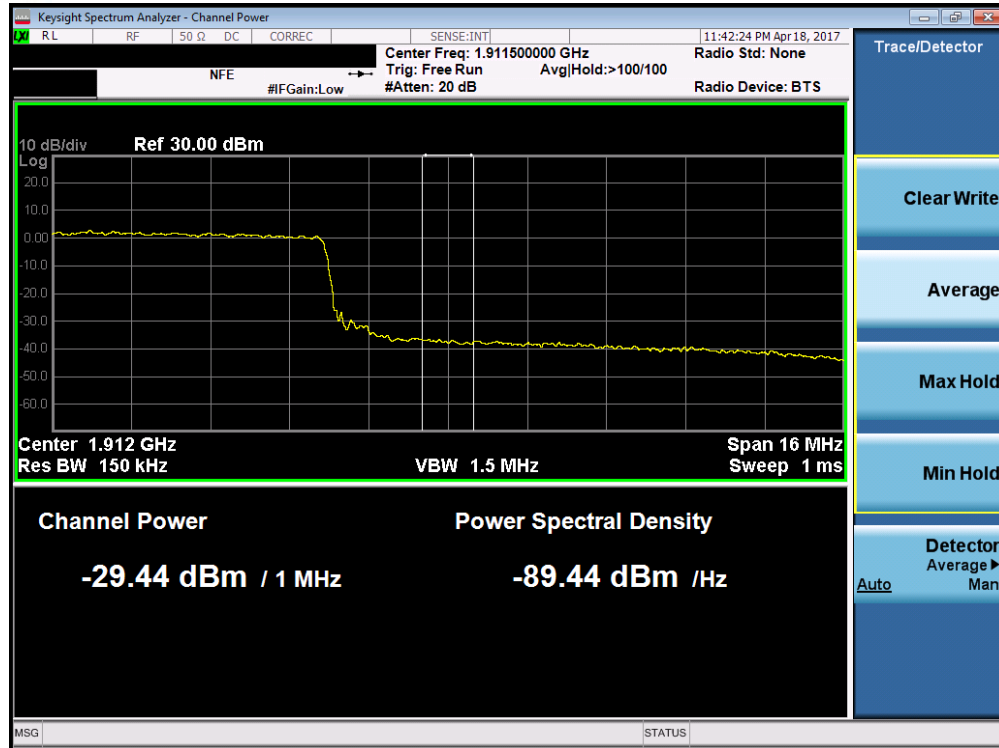


Plot 7-159. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-160. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 98 of 133



Plot 7-161. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset			Page 99 of 133

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.

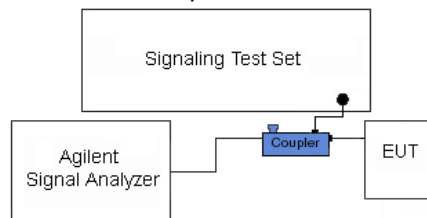
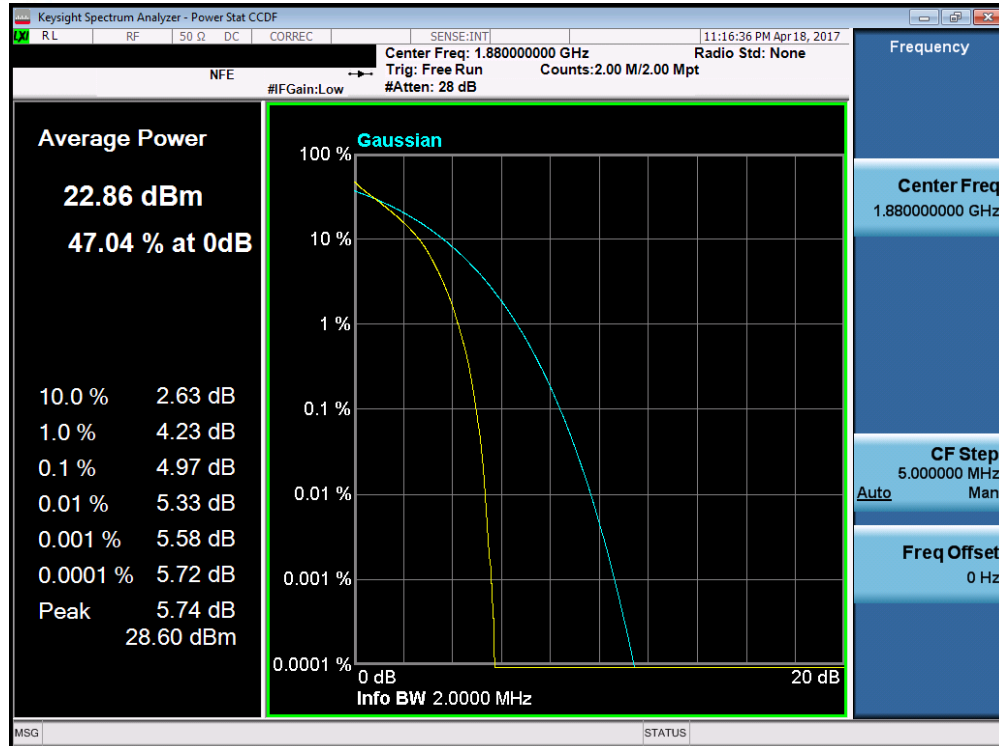


Figure 7-4. Test Instrument & Measurement Setup

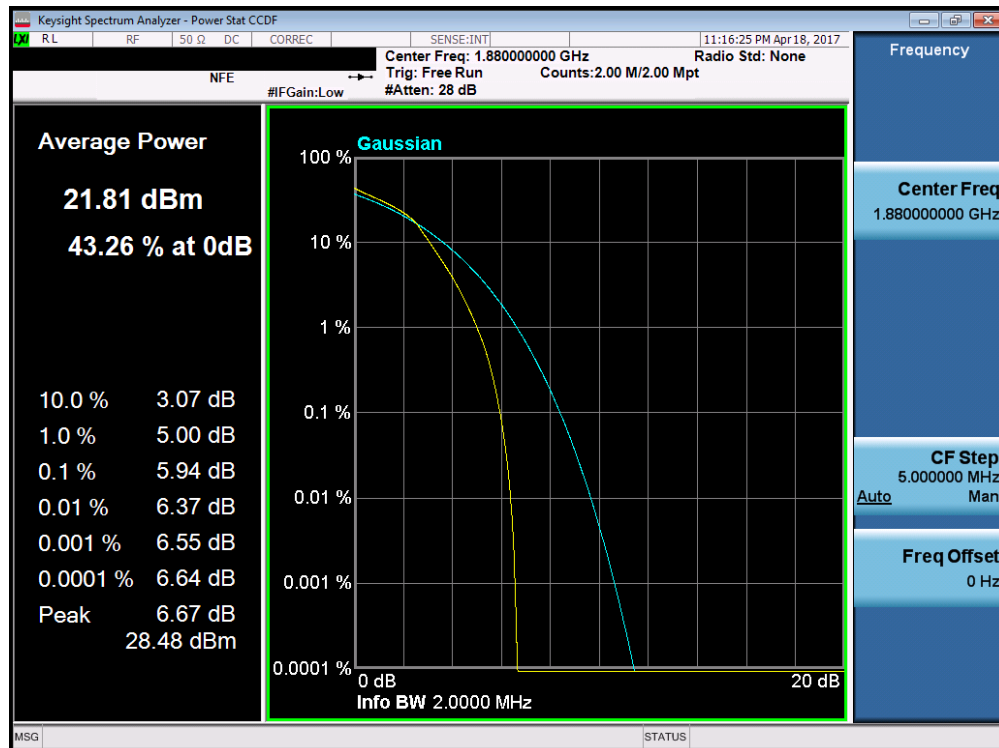
Test Notes

None.

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 100 of 133

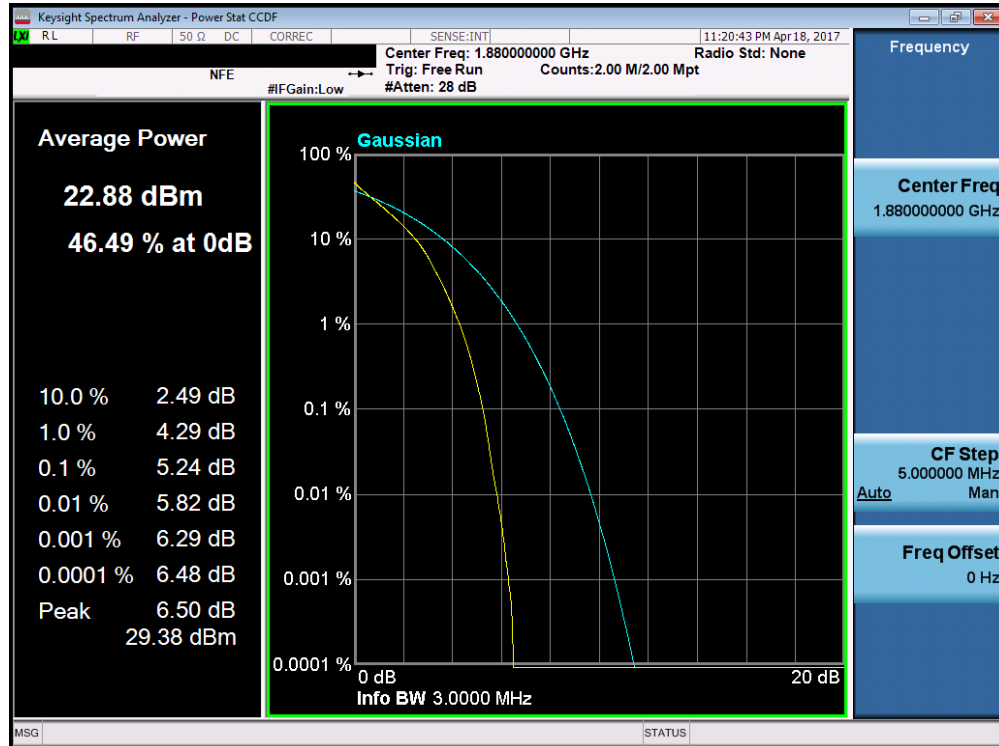


Plot 7-162. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

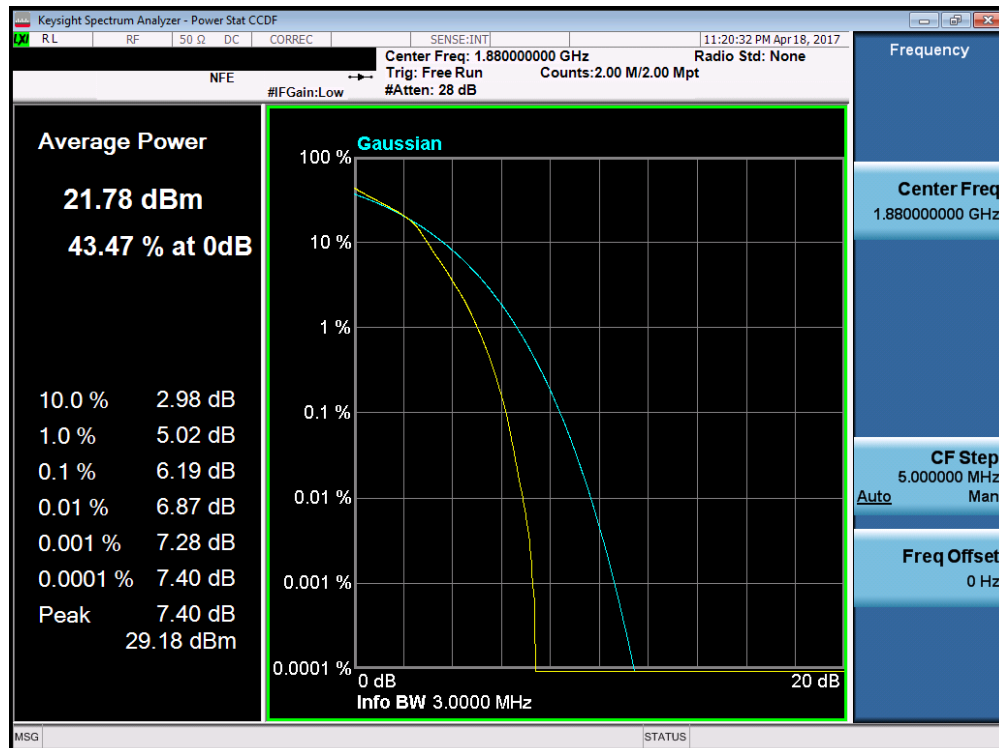


Plot 7-163. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 101 of 133	

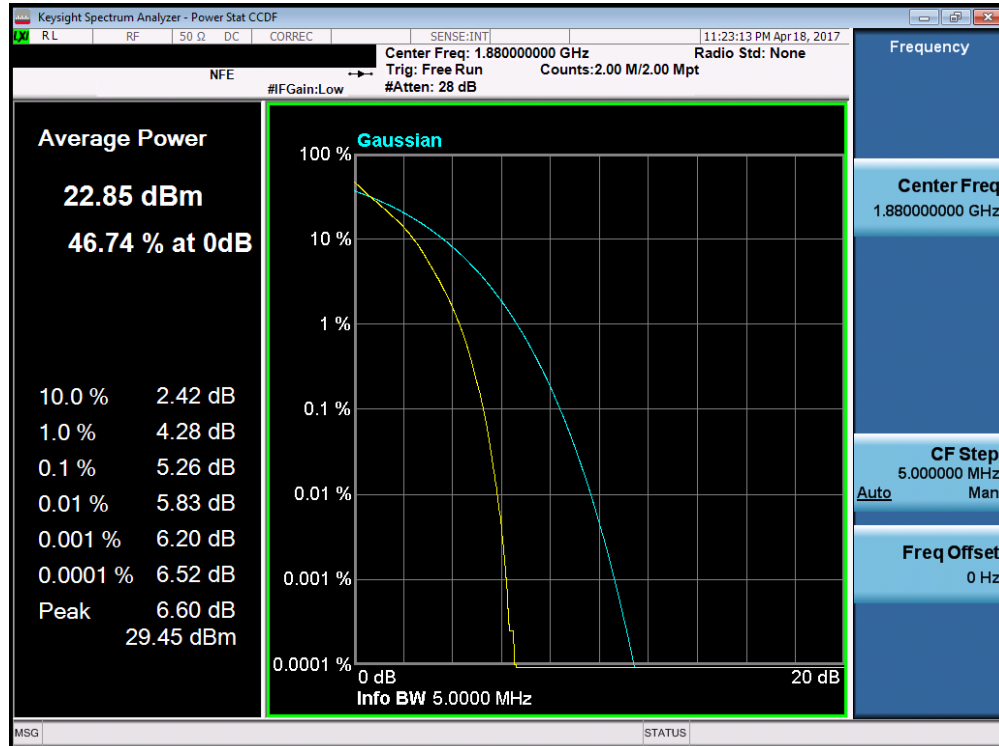


Plot 7-164. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

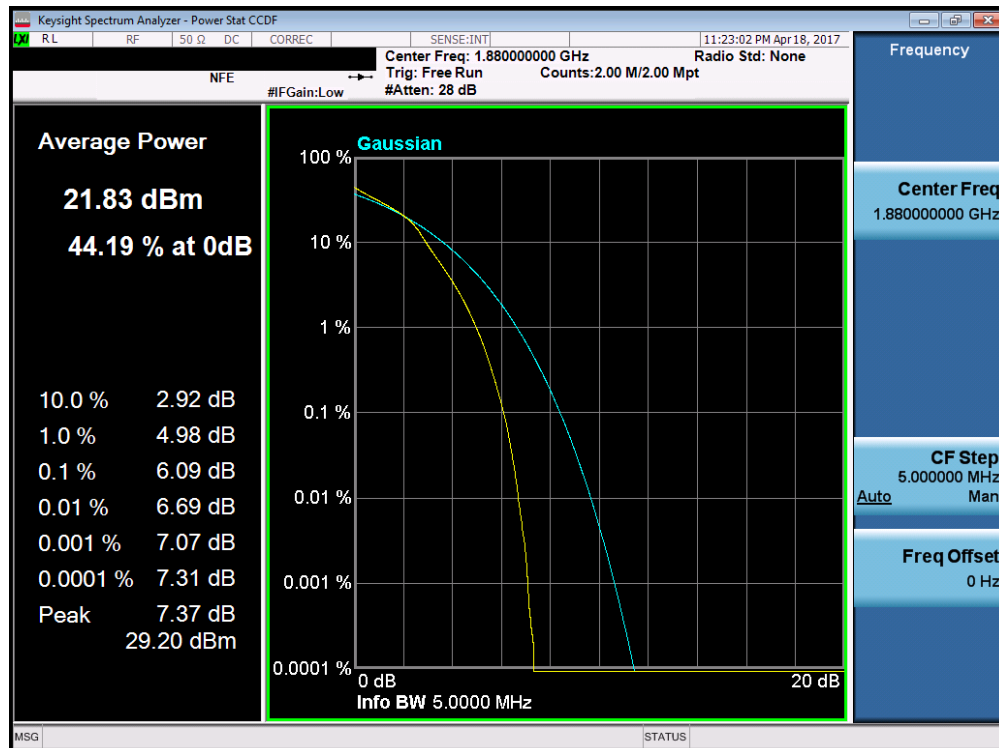


Plot 7-165. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 102 of 133	

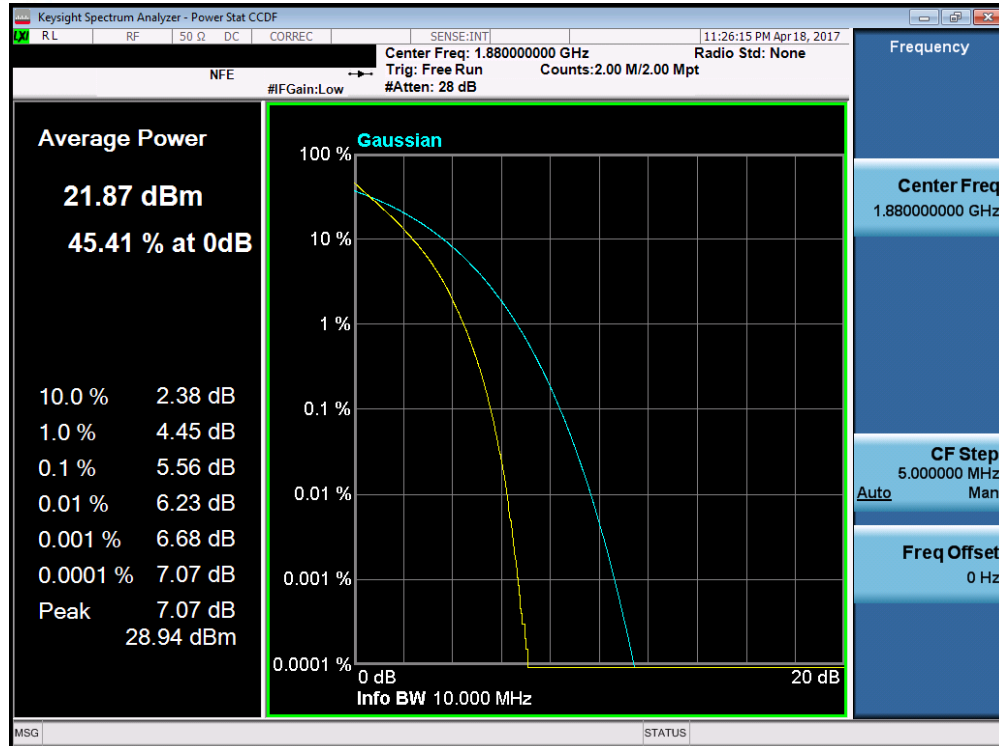


Plot 7-166. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

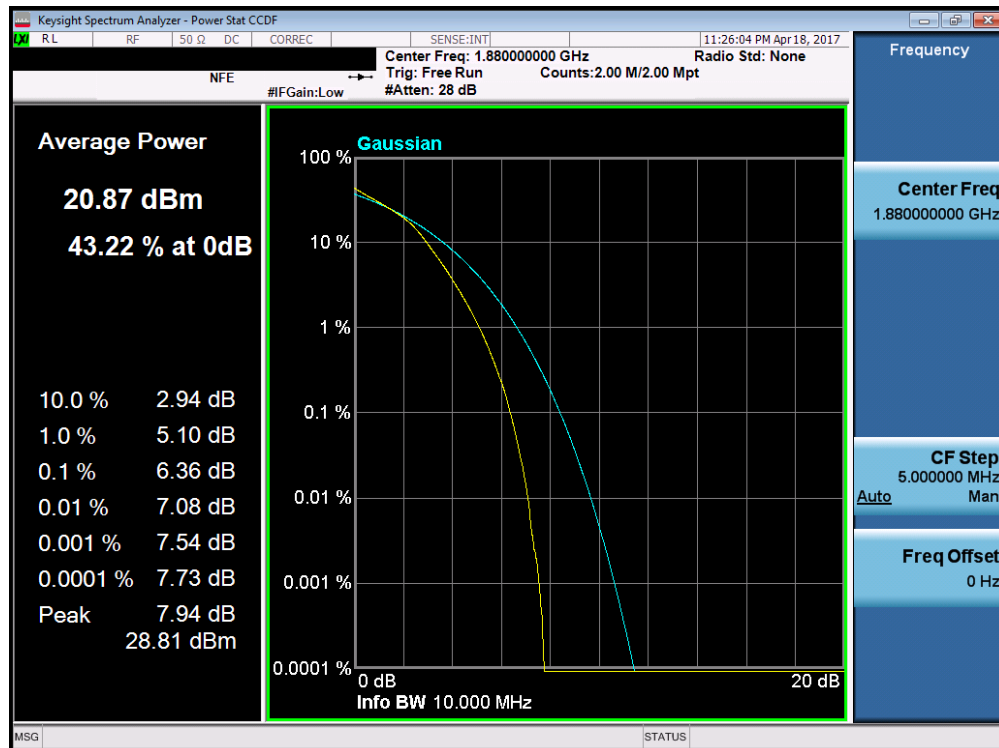


Plot 7-167. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: A3LSMG390W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset	Page 103 of 133

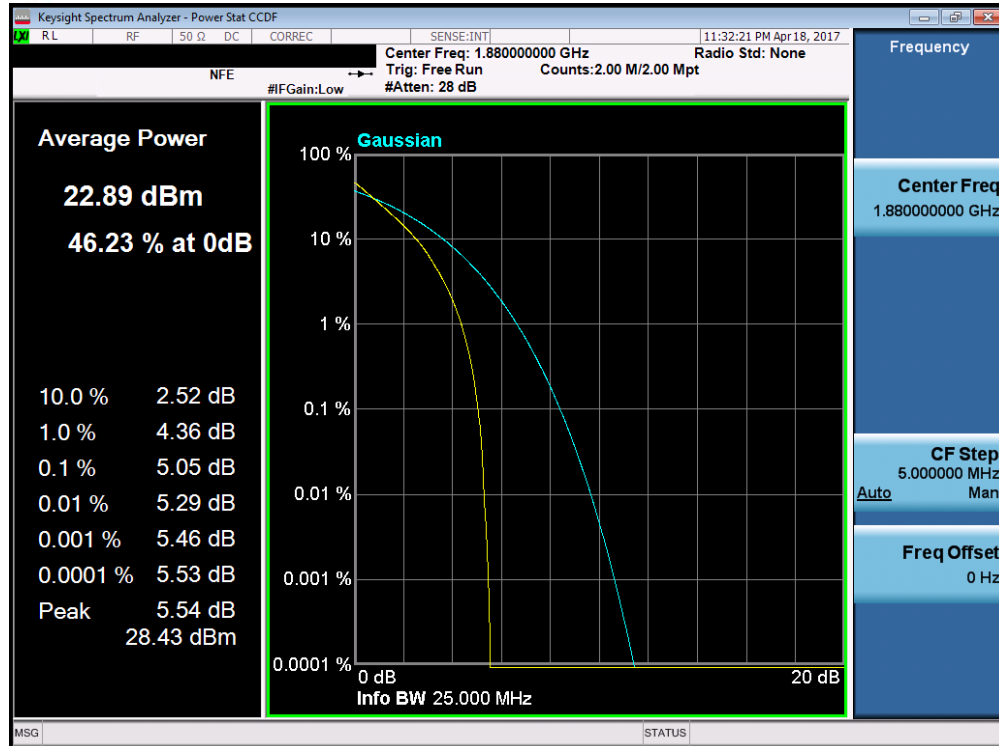


Plot 7-168. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

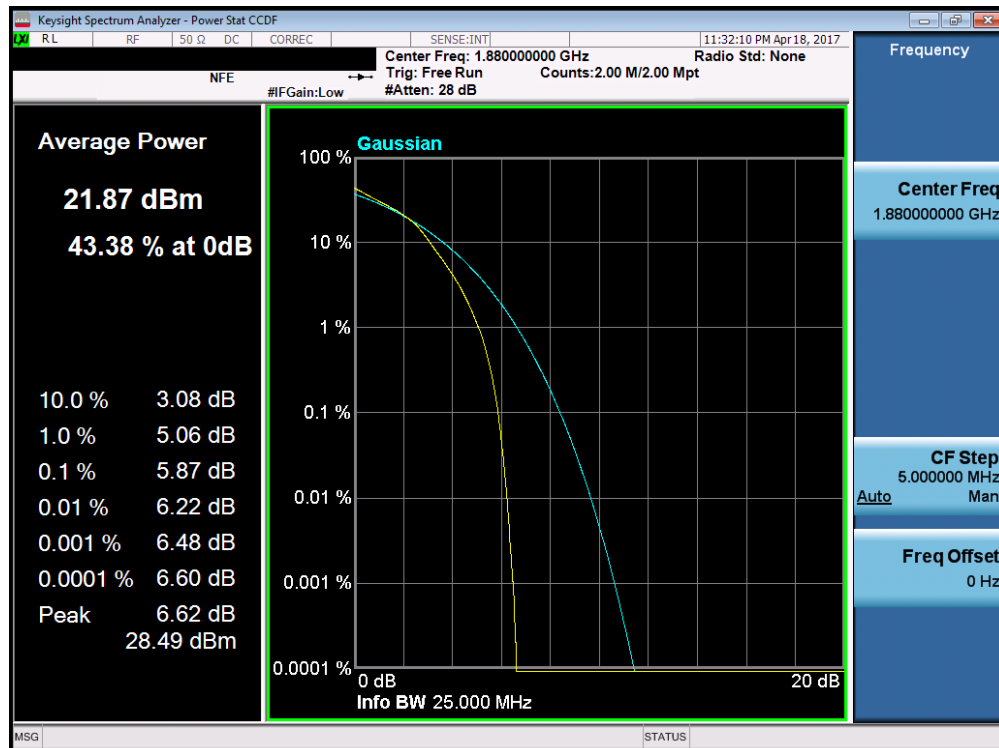


Plot 7-169. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: A3LSMG390W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset	Page 104 of 133	

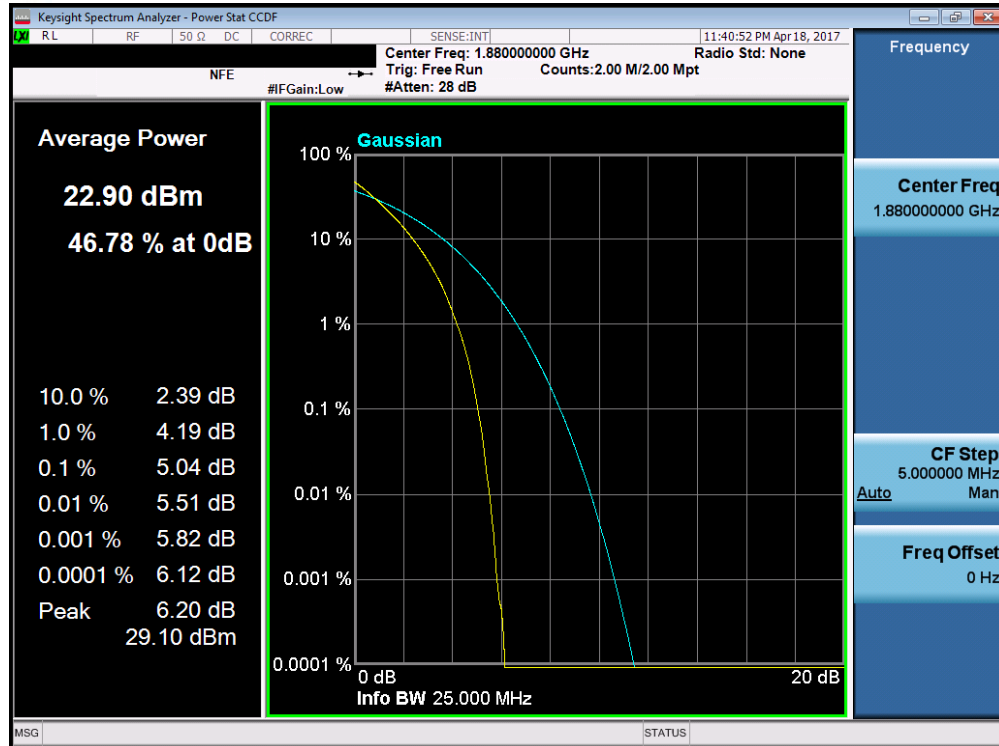


Plot 7-170. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

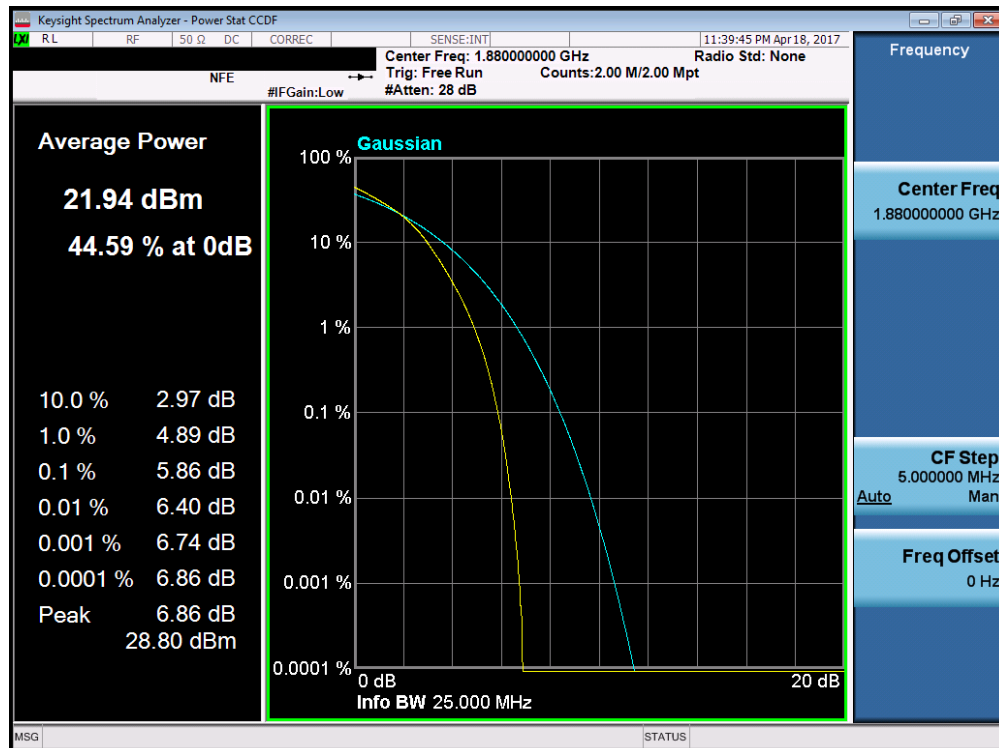


Plot 7-171. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: A3LSMG390W	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 – 20.0MHz QPSK – RB Size 100)



Plot 7-173. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: A3LSMG390W	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset	Page 106 of 133	

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.
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

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset	Page 107 of 133	

Test Setup

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

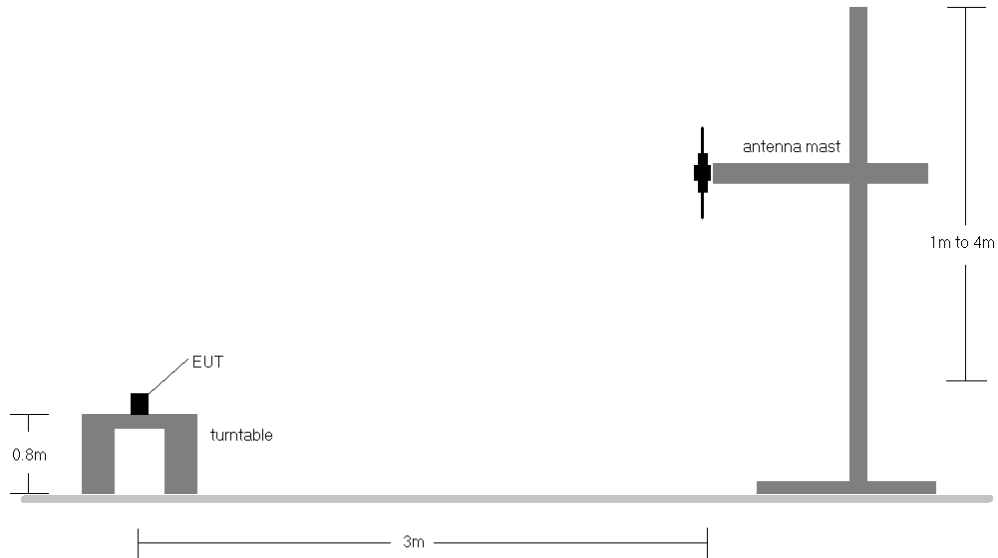


Figure 7-5. Radiated Test Setup <1GHz

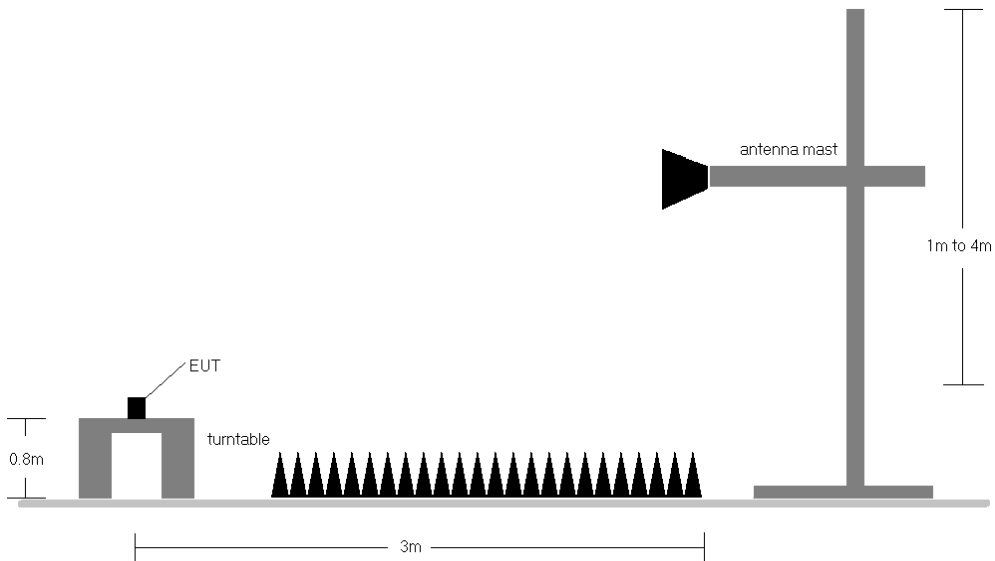


Figure 7-6. Radiated Test Setup >1GHz

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.

FCC ID: A3LSMG390W	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	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]
699.70	1.4	QPSK	V	352	353	1 / 5	23.12	-1.05	22.07	34.77	-12.70
707.50	1.4	QPSK	V	0	0	1 / 5	23.81	-1.02	22.79	34.77	-11.98
715.30	1.4	QPSK	V	348	350	1 / 5	24.23	-0.99	23.24	34.77	-11.53
715.30	1.4	16-QAM	V	348	350	1 / 5	22.57	-0.99	21.58	34.77	-13.19
700.50	3	QPSK	V	350	352	1 / 14	23.61	-1.05	22.56	34.77	-12.21
707.50	3	QPSK	V	349	343	1 / 7	23.66	-1.02	22.64	34.77	-12.13
714.50	3	QPSK	V	355	343	1 / 14	24.19	-0.99	23.20	34.77	-11.57
714.50	3	16-QAM	V	355	343	1 / 14	22.45	-0.99	21.46	34.77	-13.31
701.50	5	QPSK	V	346	347	1 / 24	23.50	-1.04	22.46	34.77	-12.32
707.50	5	QPSK	V	338	349	1 / 0	23.36	-1.02	22.34	34.77	-12.43
713.50	5	QPSK	V	351	350	1 / 24	24.24	-1.00	23.24	34.77	-11.53
713.50	5	16-QAM	V	351	350	1 / 24	22.25	-1.00	21.25	34.77	-13.52
704.00	10	QPSK	V	351	345	1 / 25	23.69	-1.03	22.66	34.77	-12.11
707.50	10	QPSK	V	350	346	1 / 49	23.87	-1.02	22.85	34.77	-11.92
711.00	10	QPSK	V	341	1	1 / 49	24.08	-1.01	23.07	34.77	-11.70
711.00	10	16-QAM	V	341	1	1 / 49	22.02	-1.01	21.01	34.77	-13.76
713.50	5	QPSK	H	19	43	1 / 74	21.46	-1.00	20.46	34.77	-14.31

Table 7-2. ERP Data (Band 12/17)

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	87	339	1 / 24	22.83	-0.83	22.00	34.77	-12.77
782.00	5	QPSK	H	93	329	1 / 12	22.50	-0.82	21.68	34.77	-13.09
784.50	5	QPSK	H	274	351	1 / 24	22.79	-0.81	21.98	34.77	-12.79
779.50	5	16-QAM	H	87	339	1 / 24	20.81	-0.83	19.98	34.77	-14.79
782.00	10	QPSK	H	73	341	1 / 49	22.88	-0.82	22.06	34.77	-12.71
782.00	10	16-QAM	H	73	341	1 / 49	20.90	-0.82	20.08	34.77	-14.69
782.00	10	QPSK	V	351	349	1 / 74	21.74	-0.82	20.92	34.77	-13.85

Table 7-3. ERP Data (Band 13)

FCC ID: A3LSMG390W	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 				Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset			Page 109 of 133

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	81	341	1 / 5	23.12	-0.65	22.47	38.45	-15.98
836.50	1.4	QPSK	H	94	335	1 / 0	22.58	-0.65	21.93	38.45	-16.52
848.30	1.4	QPSK	H	92	336	1 / 0	23.34	-0.65	22.69	38.45	-15.76
848.30	1.4	16-QAM	H	92	336	1 / 0	21.87	-0.65	21.22	38.45	-17.23
825.50	3	QPSK	H	87	333	1 / 14	23.35	-0.65	22.70	38.45	-15.75
836.50	3	QPSK	H	88	353	1 / 14	21.60	-0.65	20.95	38.45	-17.50
847.50	3	QPSK	H	86	335	1 / 0	23.44	-0.65	22.79	38.45	-15.66
847.50	3	16-QAM	H	86	335	1 / 0	21.67	-0.65	21.02	38.45	-17.43
826.50	5	QPSK	H	80	349	1 / 0	22.71	-0.65	22.06	38.45	-16.39
836.50	5	QPSK	H	102	347	1 / 0	21.90	-0.65	21.25	38.45	-17.20
846.50	5	QPSK	H	91	338	1 / 24	23.17	-0.65	22.52	38.45	-15.93
846.50	5	16-QAM	H	91	338	1 / 24	21.10	-0.65	20.45	38.45	-18.00
829.00	10	QPSK	H	97	344	1 / 0	22.88	-0.65	22.23	38.45	-16.22
836.50	10	QPSK	H	79	350	1 / 0	22.17	-0.65	21.52	38.45	-16.93
844.00	10	QPSK	H	70	352	1 / 25	22.41	-0.65	21.76	38.45	-16.69
829.00	10	16-QAM	H	97	344	1 / 0	21.05	-0.65	20.40	38.45	-18.05
847.50	3	QPSK	V	0	357	1 / 0	22.48	-0.65	21.83	38.45	-16.62

Table 7-4. ERP Data (Band 5)

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset	Page 110 of 133	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	270	347	1 / 0	19.45	5.65	25.10	30.00	-4.90
1745.00	1.4	QPSK	V	277	350	1 / 5	19.46	5.27	24.73	30.00	-5.27
1779.30	1.4	QPSK	V	266	337	1 / 5	18.36	4.90	23.26	30.00	-6.74
1710.70	1.4	16-QAM	V	270	347	1 / 0	17.68	5.65	23.33	30.00	-6.67
1711.50	3	QPSK	V	272	351	1 / 14	19.47	5.64	25.11	30.00	-4.89
1745.00	3	QPSK	V	281	347	1 / 0	19.30	5.27	24.57	30.00	-5.43
1778.50	3	QPSK	V	278	350	1 / 14	19.66	4.91	24.57	30.00	-5.43
1711.50	3	16-QAM	V	272	351	1 / 14	17.45	5.64	23.09	30.00	-6.91
1712.50	5	QPSK	V	274	350	1 / 24	19.40	5.63	25.03	30.00	-4.97
1745.00	5	QPSK	V	277	346	1 / 24	19.33	5.27	24.60	30.00	-5.40
1777.50	5	QPSK	V	269	349	1 / 0	19.67	4.92	24.59	30.00	-5.41
1712.50	5	16-QAM	V	274	350	1 / 24	17.31	5.63	22.94	30.00	-7.06
1715.00	10	QPSK	V	272	350	1 / 49	19.51	5.60	25.11	30.00	-4.89
1745.00	10	QPSK	V	272	343	1 / 49	19.18	5.27	24.45	30.00	-5.55
1775.00	10	QPSK	V	267	348	1 / 49	19.61	4.95	24.56	30.00	-5.44
1715.00	10	16-QAM	V	272	350	1 / 49	17.59	5.60	23.19	30.00	-6.81
1717.50	15	QPSK	V	280	346	1 / 74	19.40	5.57	24.97	30.00	-5.03
1745.00	15	QPSK	V	271	351	1 / 74	19.13	5.27	24.40	30.00	-5.60
1772.50	15	QPSK	V	274	349	1 / 74	19.72	4.97	24.69	30.00	-5.31
1717.50	15	16-QAM	V	280	346	1 / 74	17.27	5.57	22.84	30.00	-7.16
1720.00	20	QPSK	V	278	351	1 / 0	19.15	5.54	24.69	30.00	-5.31
1745.00	20	QPSK	V	278	349	1 / 99	19.21	5.27	24.48	30.00	-5.52
1770.00	20	QPSK	V	270	351	1 / 99	19.52	5.00	24.52	30.00	-5.48
1720.00	20	16-QAM	V	278	351	1 / 0	17.28	5.54	22.82	30.00	-7.18
1715.00	10	QPSK	H	346	351	1 / 0	19.42	5.60	25.02	30.00	-4.98

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

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 111 of 133

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	261	352	1 / 0	19.40	4.79	24.19	33.01	-8.82
1880.00	1.4	QPSK	V	255	351	1 / 5	19.72	4.84	24.56	33.01	-8.45
1909.30	1.4	QPSK	V	271	349	1 / 3	18.20	4.86	23.06	33.01	-9.95
1880.00	1.4	16-QAM	V	255	351	1 / 5	18.03	4.84	22.87	33.01	-10.14
1851.50	3	QPSK	V	254	350	1 / 7	19.46	4.79	24.25	33.01	-8.76
1880.00	3	QPSK	V	259	350	1 / 0	20.00	4.84	24.84	33.01	-8.17
1908.50	3	QPSK	V	268	350	1 / 0	18.78	4.86	23.64	33.01	-9.37
1880.00	3	16-QAM	V	259	350	1 / 0	18.32	4.84	23.16	33.01	-9.85
1852.50	5	QPSK	V	268	353	1 / 0	19.38	4.79	24.17	33.01	-8.84
1880.00	5	QPSK	V	271	350	1 / 12	19.57	4.84	24.41	33.01	-8.60
1907.50	5	QPSK	V	267	350	1 / 0	19.30	4.87	24.17	33.01	-8.84
1880.00	5	16-QAM	V	271	350	1 / 12	17.73	4.84	22.57	33.01	-10.44
1855.00	10	QPSK	V	264	354	1 / 25	19.16	4.80	23.96	33.01	-9.05
1880.00	10	QPSK	V	260	351	1 / 0	19.88	4.84	24.72	33.01	-8.29
1905.00	10	QPSK	V	261	352	1 / 25	19.73	4.87	24.60	33.01	-8.41
1880.00	10	16-QAM	V	260	351	1 / 0	18.29	4.84	23.13	33.01	-9.88
1857.50	15	QPSK	V	277	349	1 / 74	19.73	4.80	24.53	33.01	-8.48
1880.00	15	QPSK	V	271	353	1 / 36	19.81	4.84	24.65	33.01	-8.36
1902.50	15	QPSK	V	270	351	1 / 0	19.70	4.88	24.58	33.01	-8.43
1880.00	15	16-QAM	V	271	353	1 / 36	17.94	4.84	22.78	33.01	-10.23
1860.00	20	QPSK	V	265	355	1 / 50	19.54	4.81	24.35	33.01	-8.67
1880.00	20	QPSK	V	274	357	1 / 0	18.90	4.84	23.74	33.01	-9.27
1900.00	20	QPSK	V	259	357	1 / 50	18.75	4.88	23.63	33.01	-9.38
1860.00	20	16-QAM	V	265	355	1 / 50	17.97	4.81	22.78	33.01	-10.24
1880.00	3	QPSK	H	351	339	1 / 0	19.70	4.74	24.44	33.01	-8.57

Table 7-6. EIRP Data (Band 2)

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1704170149-03.A3L	Test Dates: 4/17 - 5/1/2017	EUT Type: Portable Handset		Page 112 of 133

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 $\geq 3 \times$ 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: A3LSMG390W		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.

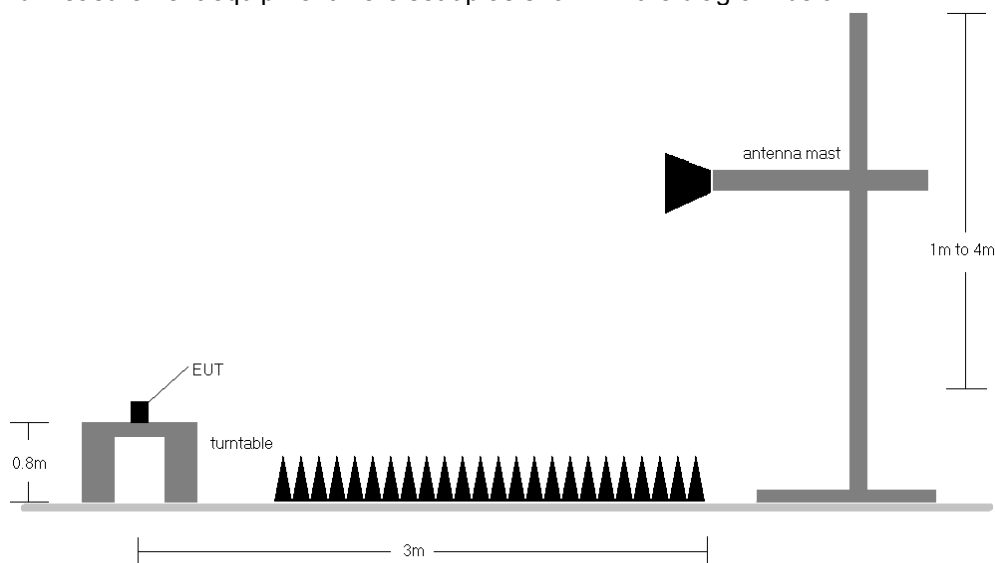


Figure 7-7. Test Instrument & Measurement Setup

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: A3LSMG390W	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: 22.46 dBm = 0.176 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.46 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	H	100	129	-64.46	5.92	-58.54	81.0
2104.50	H	100	200	-55.60	6.80	-48.80	71.3
2806.00	H	100	209	-65.21	8.12	-57.09	79.5
3507.50	H	100	51	-60.70	7.74	-52.95	75.4
4209.00	H	100	112	-65.51	8.23	-57.29	79.7

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

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MEASURED OUTPUT POWER: 22.34 dBm = 0.171 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.34 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	100	228	-64.77	5.96	-58.80	81.1
2122.50	H	100	209	-56.03	6.84	-49.18	71.5
2830.00	H	100	190	-64.01	8.13	-55.88	78.2
3537.50	H	100	42	-60.33	7.79	-52.54	74.9
4245.00	H	100	104	-65.54	8.40	-57.15	79.5

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

FCC ID: A3LSMG390W		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: 23.24 dBm = 0.211 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.24 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	100	201	-63.41	6.01	-57.40	80.6
2140.50	H	100	203	-55.66	6.89	-48.77	72.0
2854.00	H	100	199	-64.72	8.15	-56.57	79.8
3567.50	H	100	37	-59.06	7.84	-51.22	74.5
4281.00	H	100	120	-66.32	8.56	-57.75	81.0

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

OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MEASURED OUTPUT POWER: 22.06 dBm = 0.161 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 35.06 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	109	27	-65.35	7.00	-58.35	80.4
3128.00	H	100	45	-61.28	7.21	-54.07	76.1
3910.00	H	100	209	-60.91	7.15	-53.76	75.8

Table 7-10. Radiated Spurious Data (Band 13 – Mid Channel)

FCC ID: A3LSMG390W		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	100	58	-64.40	6.41	-57.99	-18.0

Table 7-11. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

OPERATING FREQUENCY: 825.50 MHz
 CHANNEL: 20415
 MEASURED OUTPUT POWER: 22.70 dBm = 0.186 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) = 35.70$ 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]
1651.00	H	100	39	-64.32	6.29	-58.03	80.7
2476.50	H	100	42	-62.56	6.85	-55.72	78.4
3302.00	H	100	12	-61.71	7.13	-54.58	77.3

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

FCC ID: A3LSMG390W		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: 20.95 dBm = 0.124 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.95 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	46	-66.91	6.21	-60.70	81.6
2509.50	H	100	27	-63.09	6.86	-56.23	77.2
3346.00	H	100	3	-62.55	7.26	-55.28	76.2

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

OPERATING FREQUENCY: 847.50 MHz
 CHANNEL: 20635
 MEASURED OUTPUT POWER: 22.79 dBm = 0.190 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 35.79 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]
1695.00	H	100	24	-63.57	6.13	-57.44	80.2
2542.50	H	100	32	-62.44	6.96	-55.49	78.3
3390.00	H	100	17	-61.79	7.39	-54.40	77.2

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

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1715.00 MHz
 CHANNEL: 132022
 MEASURED OUTPUT POWER: 25.11 dBm = 0.324 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) = 38.11$ 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]
3430.00	H	100	312	-56.48	9.67	-46.81	71.9
5145.00	H	100	229	-63.33	10.90	-52.43	77.5
6860.00	H	-	-	-58.91	10.79	-48.12	73.2

Table 7-15. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY: 1745.00 MHz
 CHANNEL: 132322
 MEASURED OUTPUT POWER: 24.45 dBm = 0.279 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) = 37.45$ 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	100	330	-57.00	9.85	-47.15	71.6
5235.00	H	100	212	-63.83	10.88	-52.95	77.4
6980.00	H	-	-	-58.35	11.00	-47.35	71.8

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

FCC ID: A3LSMG390W		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1775.00 MHz
 CHANNEL: 132622
 MEASURED OUTPUT POWER: 24.56 dBm = 0.286 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 37.56 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]
3550.00	H	100	324	-57.67	9.96	-47.71	72.3
5325.00	H	100	203	-63.84	11.04	-52.80	77.4
7100.00	H	-	-	-59.45	11.14	-48.32	72.9

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

OPERATING FREQUENCY: 1851.50 MHz
 CHANNEL: 18615
 MEASURED OUTPUT POWER: 24.25 dBm = 0.266 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 37.25 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	100	50	-62.48	10.02	-52.46	76.7
5554.50	H	100	341	-64.48	11.19	-53.29	77.5
7406.00	H	-	-	-58.26	10.87	-47.39	71.6

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

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OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MEASURED OUTPUT POWER: 24.84 dBm = 0.305 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 37.84 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	100	46	-61.36	9.79	-51.57	76.4
5640.00	H	100	345	-64.35	11.35	-53.00	77.8
7520.00	H	-	-	-59.50	11.22	-48.28	73.1

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

OPERATING FREQUENCY: 1908.50 MHz
 CHANNEL: 19185
 MEASURED OUTPUT POWER: 23.64 dBm = 0.231 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.64 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]
3817.00	H	100	48	-62.24	9.57	-52.67	76.3
5725.50	H	100	348	-64.70	11.43	-53.27	76.9
7634.00	H	-	-	-58.12	11.50	-46.62	70.3

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

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7.8 Frequency Stability / Temperature Variation

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

Test Overview and Limit

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

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

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 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)	707,499,958	-42	-0.0000059
100 %		- 30	707,499,975	-25	-0.0000035
100 %		- 20	707,499,688	-312	-0.0000441
100 %		- 10	707,499,934	-66	-0.0000093
100 %		0	707,499,818	-182	-0.0000257
100 %		+ 10	707,500,140	140	0.0000198
100 %		+ 20	707,500,029	29	0.0000041
100 %		+ 30	707,500,389	389	0.0000550
100 %		+ 40	707,500,294	294	0.0000416
100 %		+ 50	707,500,153	153	0.0000216
BATT. ENDPOINT	3.45	+ 20	707,499,994	-6	-0.0000008

Table 7-21. Frequency Stability Data (Band 12/17)

FCC ID: A3LSMG390W	 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

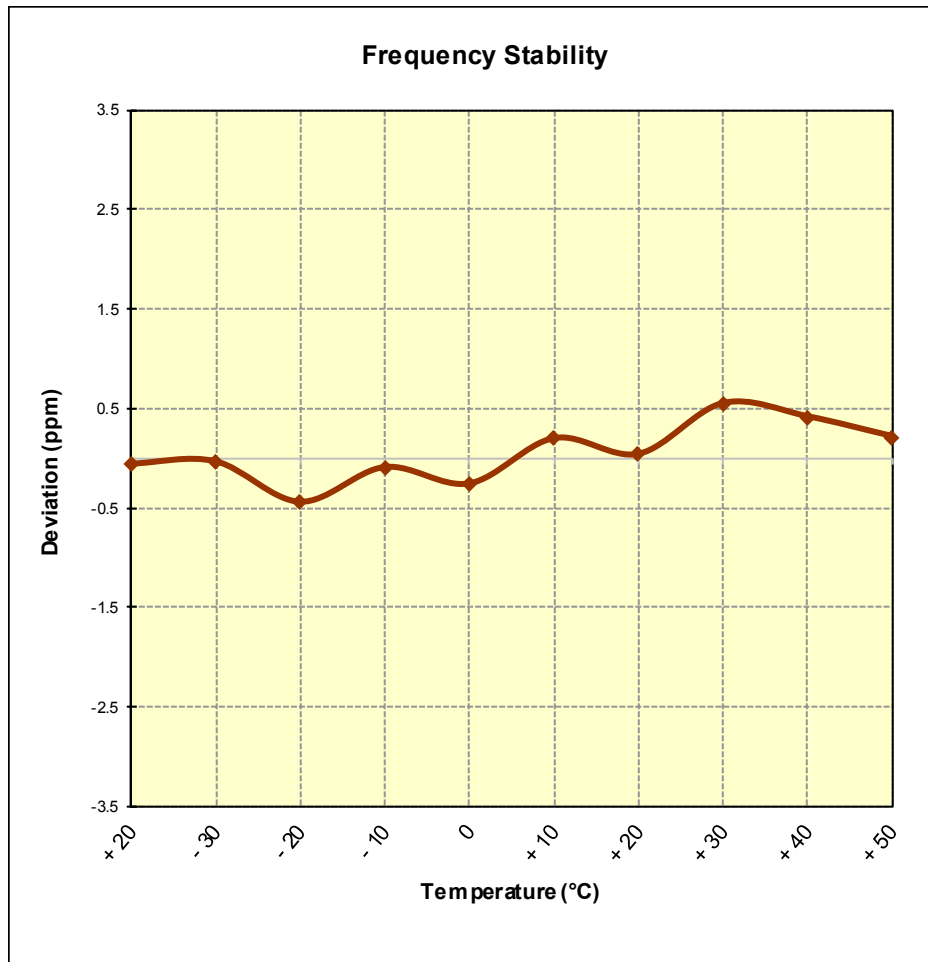


Figure 7-8. Frequency Stability Graph (Band 12/17)

FCC ID: A3LSMG390W	 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)	782,000,190	190	0.0000243
100 %		- 30	781,999,975	-25	-0.0000032
100 %		- 20	781,999,918	-82	-0.0000105
100 %		- 10	781,999,945	-55	-0.0000070
100 %		0	781,999,976	-24	-0.0000031
100 %		+ 10	782,000,049	49	0.0000063
100 %		+ 20	781,999,968	-32	-0.0000041
100 %		+ 30	781,999,680	-320	-0.0000409
100 %		+ 40	781,999,969	-31	-0.0000040
100 %		+ 50	782,000,065	65	0.0000083
BATT. ENDPOINT	3.45	+ 20	781,999,935	-65	-0.0000083

Table 7-22. Frequency Stability Data (Band 13)

FCC ID: A3LSMG390W	 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

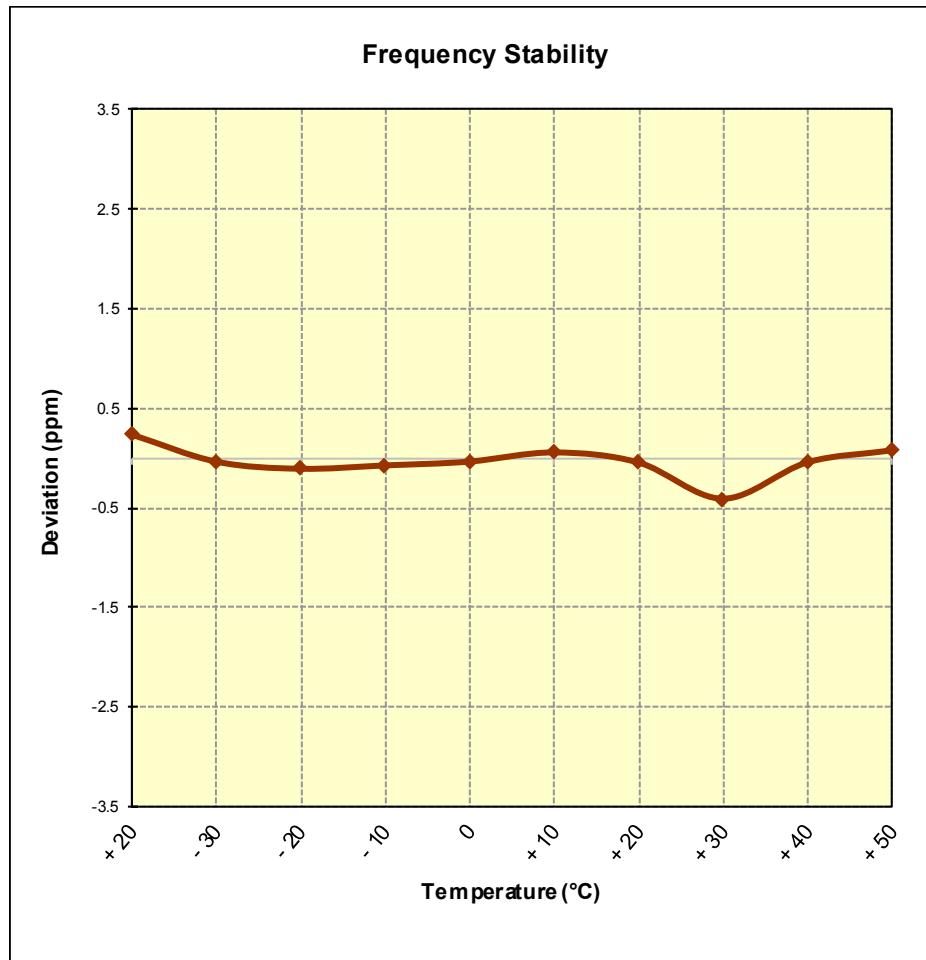


Figure 7-9. Frequency Stability Graph (Band 13)

FCC ID: A3LSMG390W	 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)	836,500,108	108	0.0000129
100 %		- 30	836,500,136	136	0.0000163
100 %		- 20	836,499,989	-11	-0.0000013
100 %		- 10	836,500,272	272	0.0000325
100 %		0	836,499,590	-410	-0.0000490
100 %		+ 10	836,499,863	-137	-0.0000164
100 %		+ 20	836,499,770	-230	-0.0000275
100 %		+ 30	836,500,003	3	0.0000004
100 %		+ 40	836,500,158	158	0.0000189
100 %		+ 50	836,499,876	-124	-0.0000148
BATT. ENDPOINT	3.45	+ 20	836,499,832	-168	-0.0000201

Table 7-23. Frequency Stability Data (Band 5)

FCC ID: A3LSMG390W		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

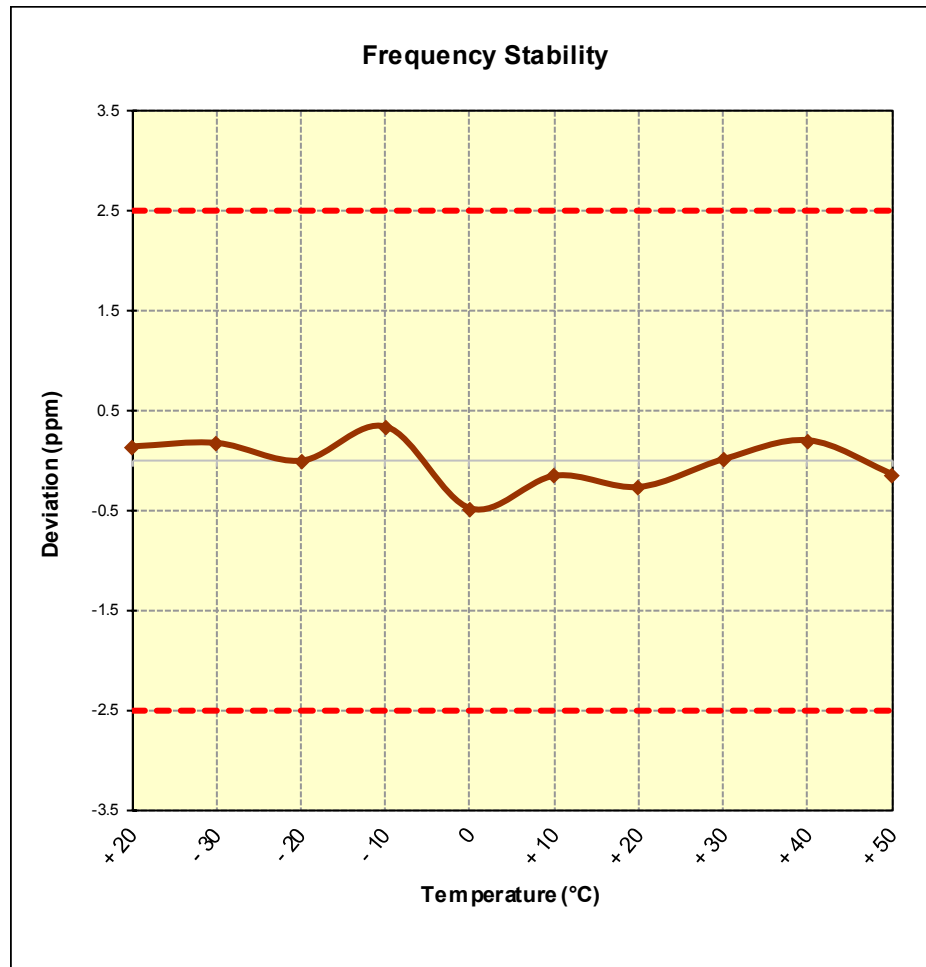


Figure 7-10. Frequency Stability Graph (Band 5)

FCC ID: A3LSMG390W	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		 Approved by: Quality Manager
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Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,927	-73	-0.0000042
100 %		- 30	1,744,999,924	-76	-0.0000044
100 %		- 20	1,744,999,751	-249	-0.0000143
100 %		- 10	1,744,999,966	-34	-0.0000019
100 %		0	1,744,999,987	-13	-0.0000007
100 %		+ 10	1,745,000,072	72	0.0000041
100 %		+ 20	1,744,999,819	-181	-0.0000104
100 %		+ 30	1,744,999,980	-20	-0.0000011
100 %		+ 40	1,744,999,904	-96	-0.0000055
100 %		+ 50	1,745,000,324	324	0.0000186
BATT. ENDPOINT	3.45	+ 20	1,745,000,018	18	0.0000010

Table 7-24. Frequency Stability Data (Band 4/66)

Note:

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

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Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54

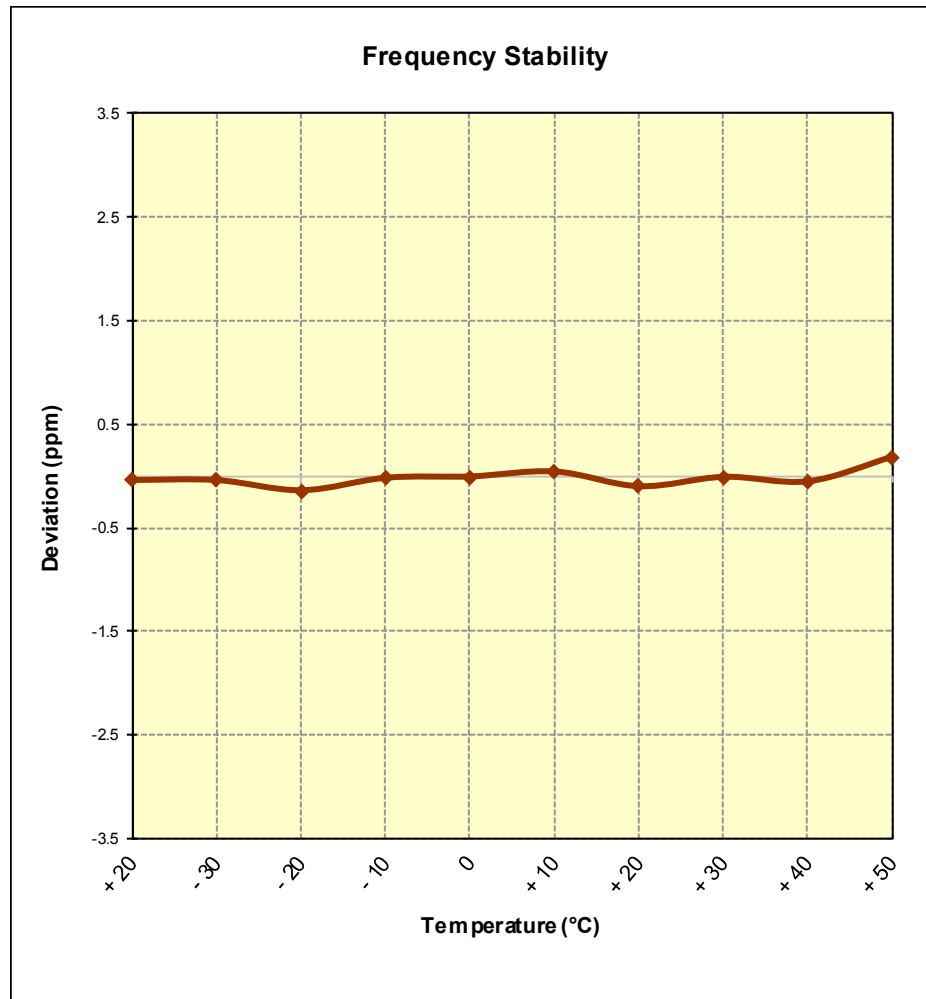


Figure 7-11. Frequency Stability Graph (Band 4/66)

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Band 2 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,994	-6	-0.0000003
100 %		- 30	1,880,000,227	227	0.0000121
100 %		- 20	1,880,000,172	172	0.0000091
100 %		- 10	1,879,999,679	-321	-0.0000171
100 %		0	1,880,000,167	167	0.0000089
100 %		+ 10	1,880,000,069	69	0.0000037
100 %		+ 20	1,879,999,942	-58	-0.0000031
100 %		+ 30	1,880,000,052	52	0.0000028
100 %		+ 40	1,879,999,919	-81	-0.0000043
100 %		+ 50	1,880,000,172	172	0.0000091
85 %	3.27	+ 20	1,879,999,890	-110	-0.0000059
BATT. ENDPOINT	3.45	+ 20	1,880,000,031	31	0.0000016

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

Note:

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

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Band 2 Frequency Stability Measurements

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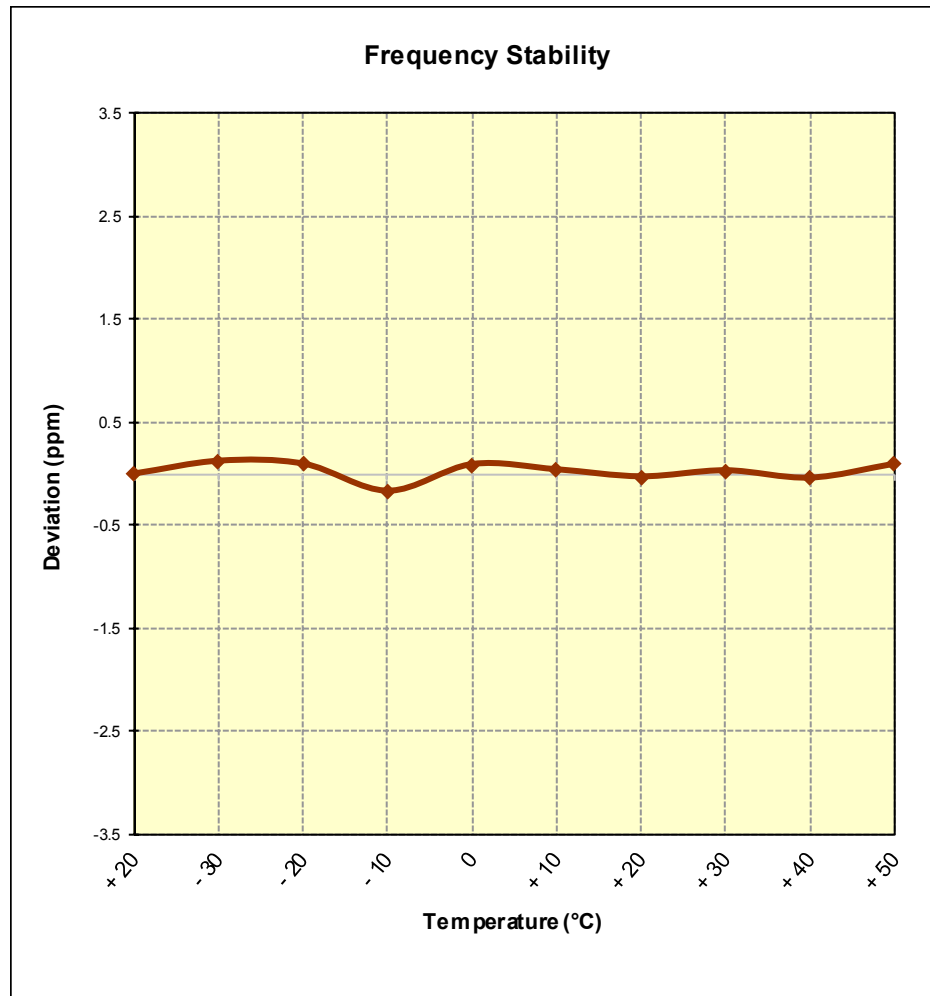


Figure 7-12. Frequency Stability Graph (Band 2)

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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: A3LSMG390W** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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