

## 7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §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  $43 + \log_{10}(P_{\text{Watts}})$ , where P is the transmitter power in Watts.***

### Test Procedure Used

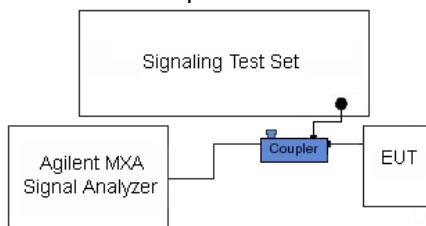
KDB 971168 D01 v02r02 – Section 6.0

### 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.



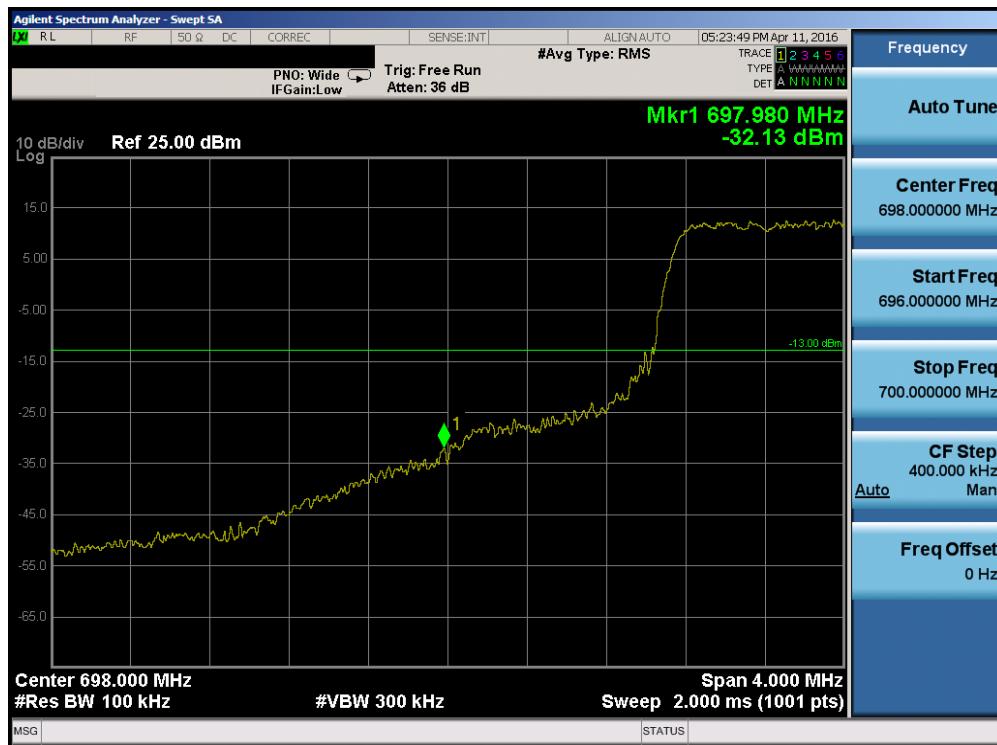
**Figure 7-3. Test Instrument & Measurement Setup**

### 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.

FCC ID: A3LSMG550T	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset	SAMSUNG Page 53 of 116

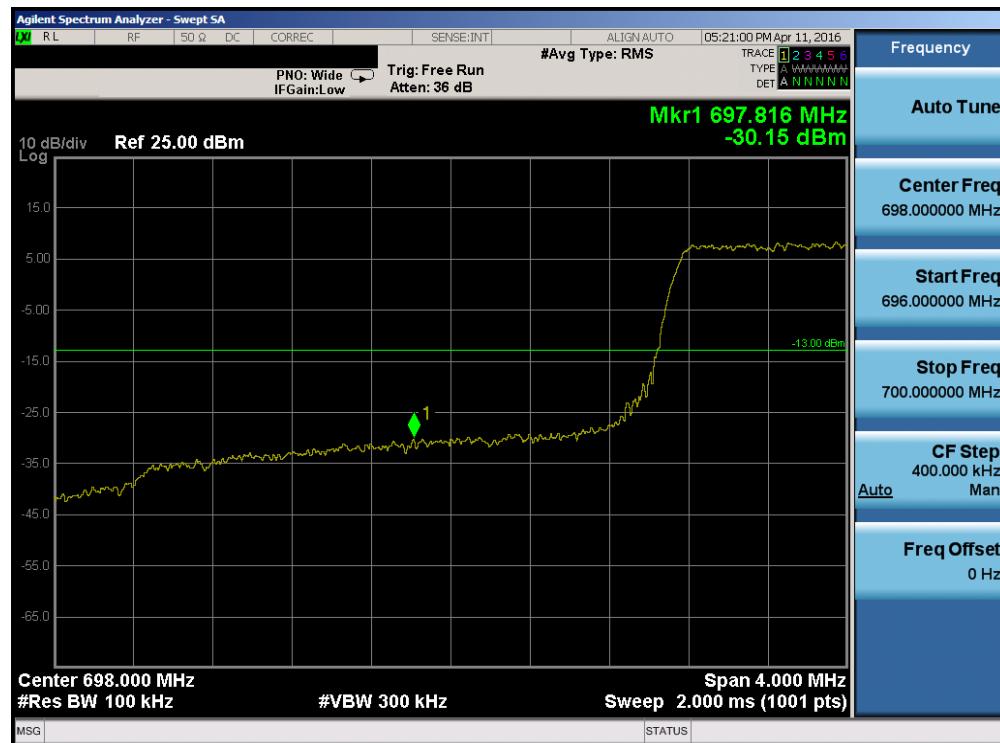


Plot 7-77. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

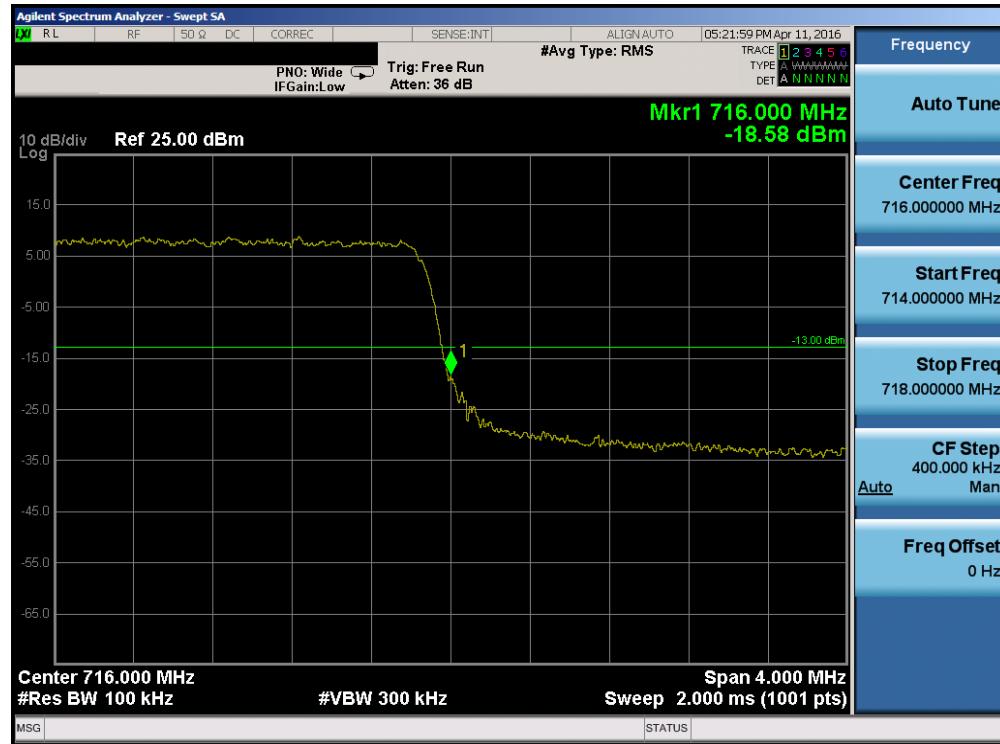


Plot 7-78. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 54 of 116

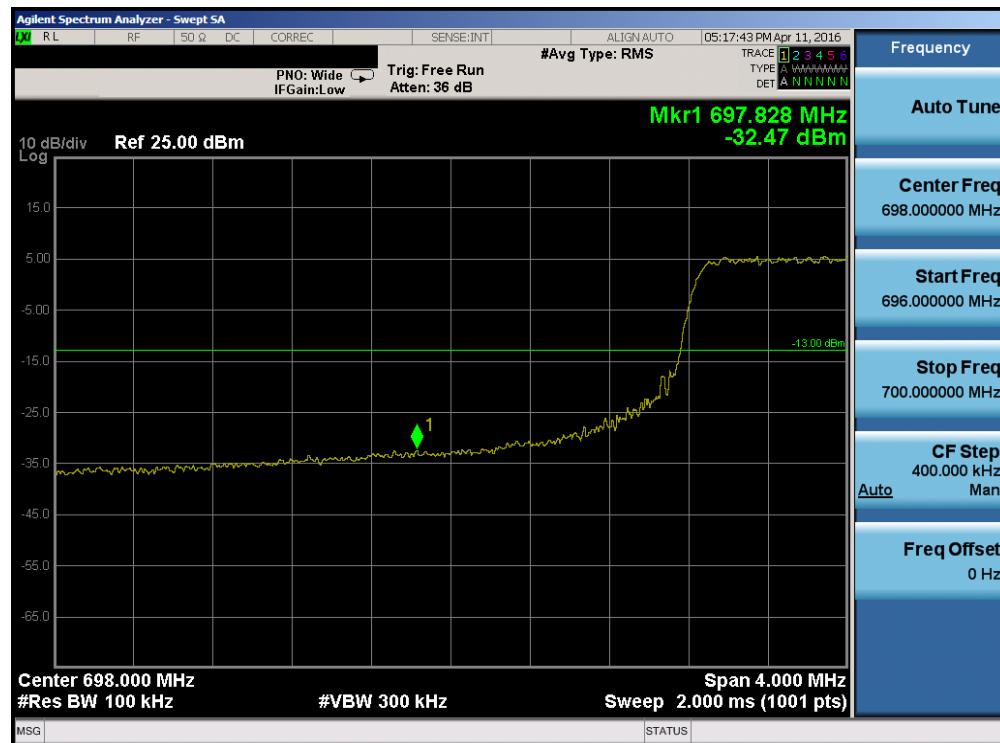


Plot 7-79. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-80. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 55 of 116

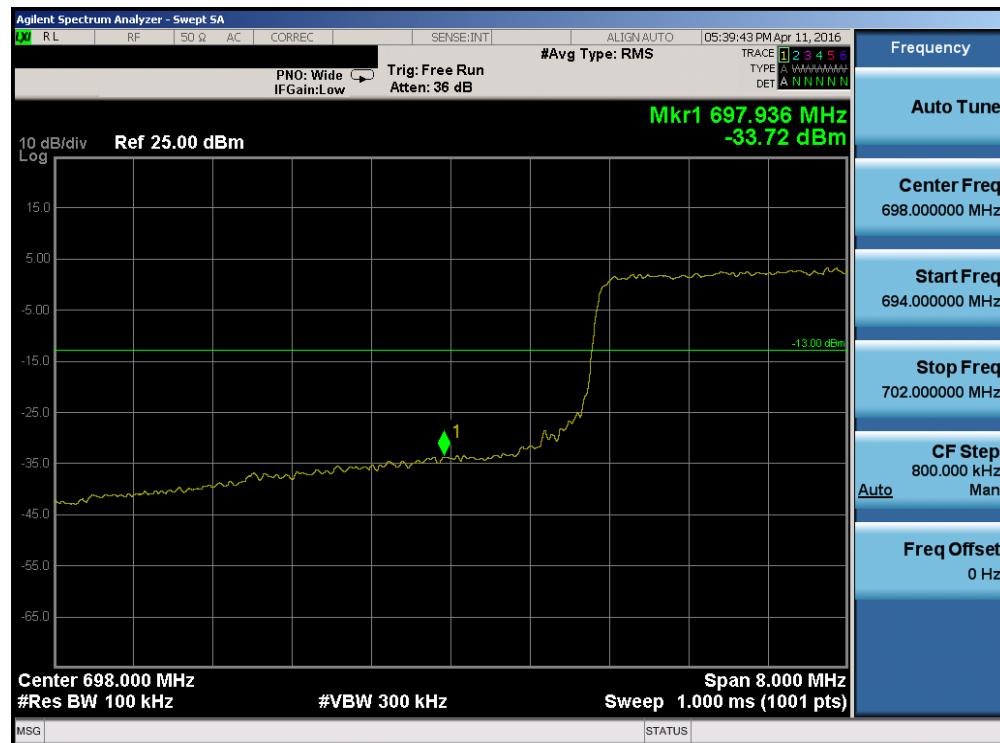


Plot 7-81. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-82. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 56 of 116

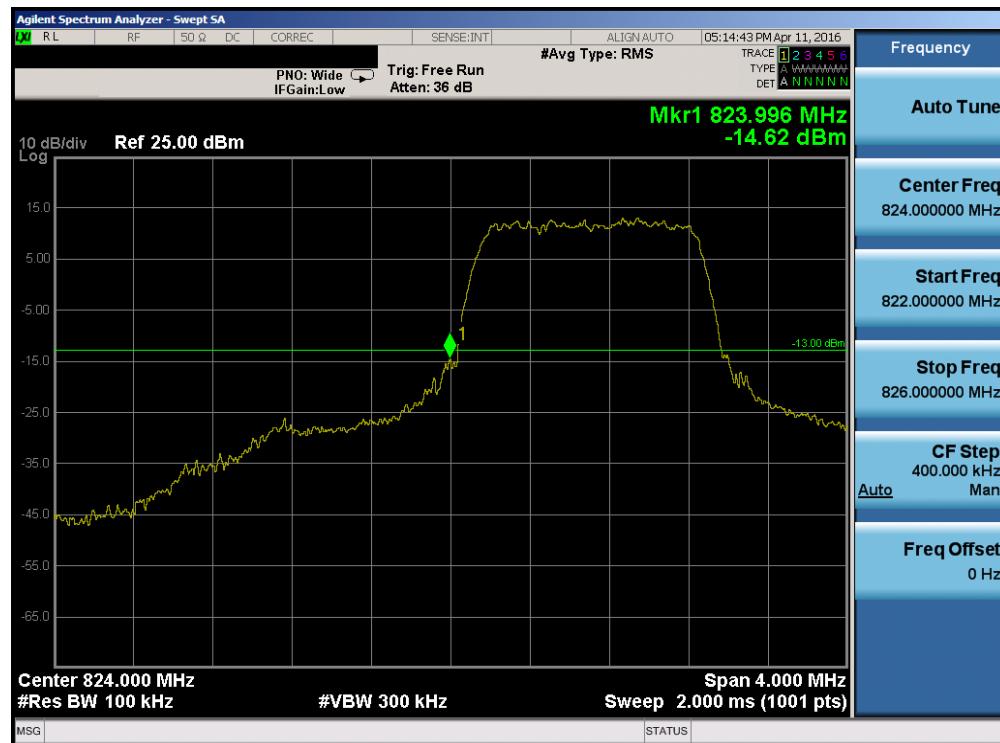


Plot 7-83. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



Plot 7-84. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 57 of 116

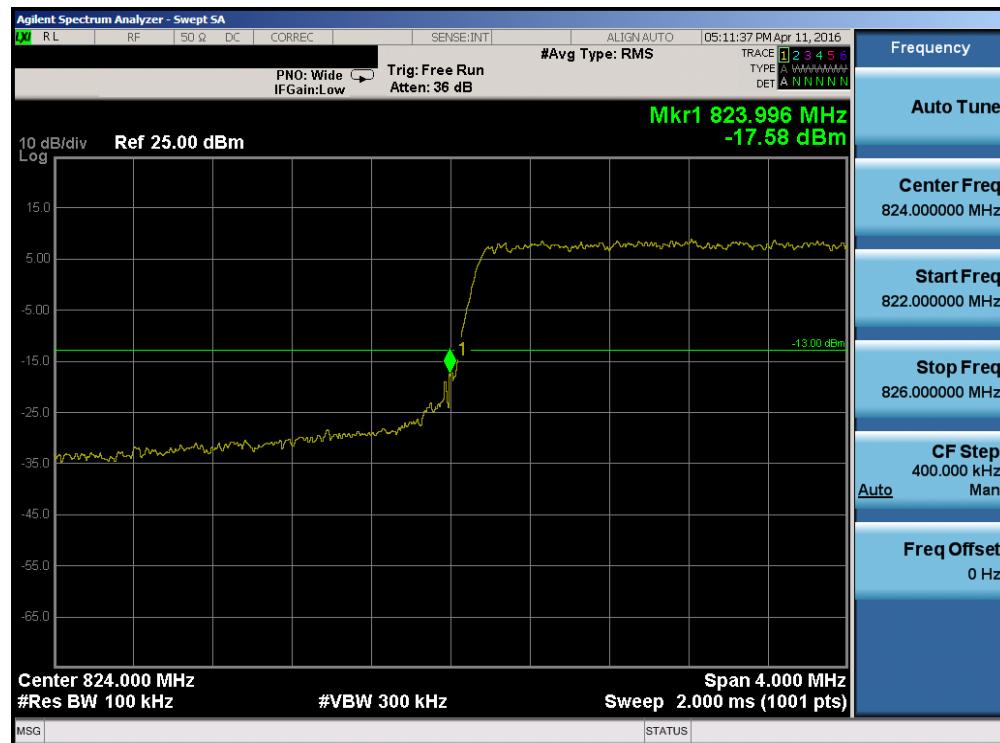


Plot 7-85. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-86. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 58 of 116

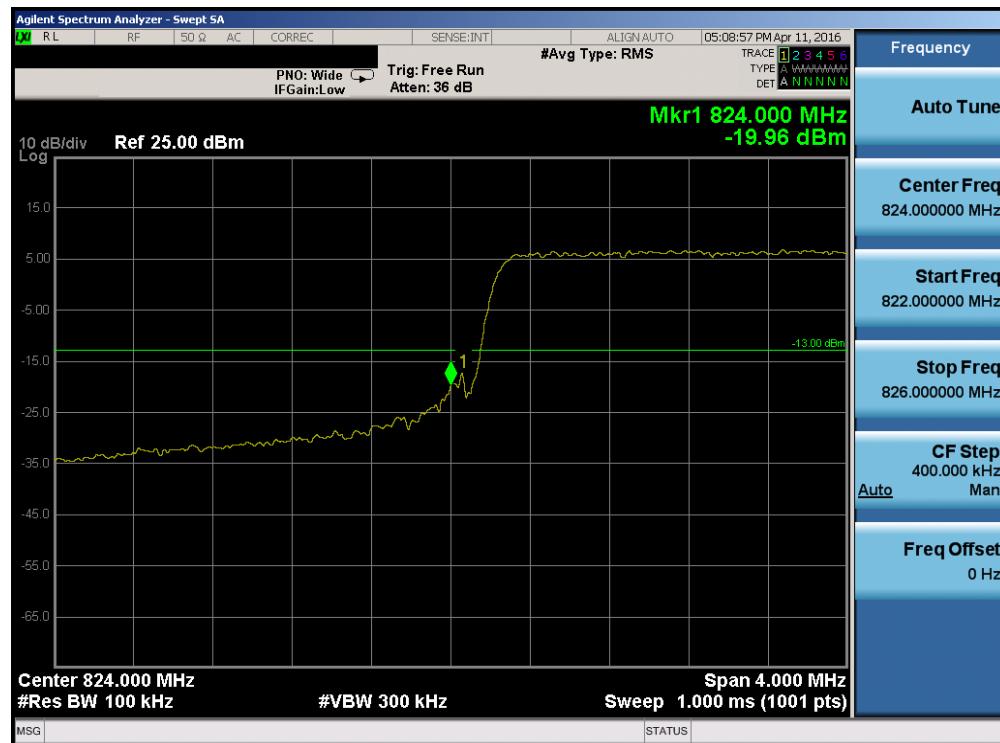


Plot 7-87. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-88. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 59 of 116

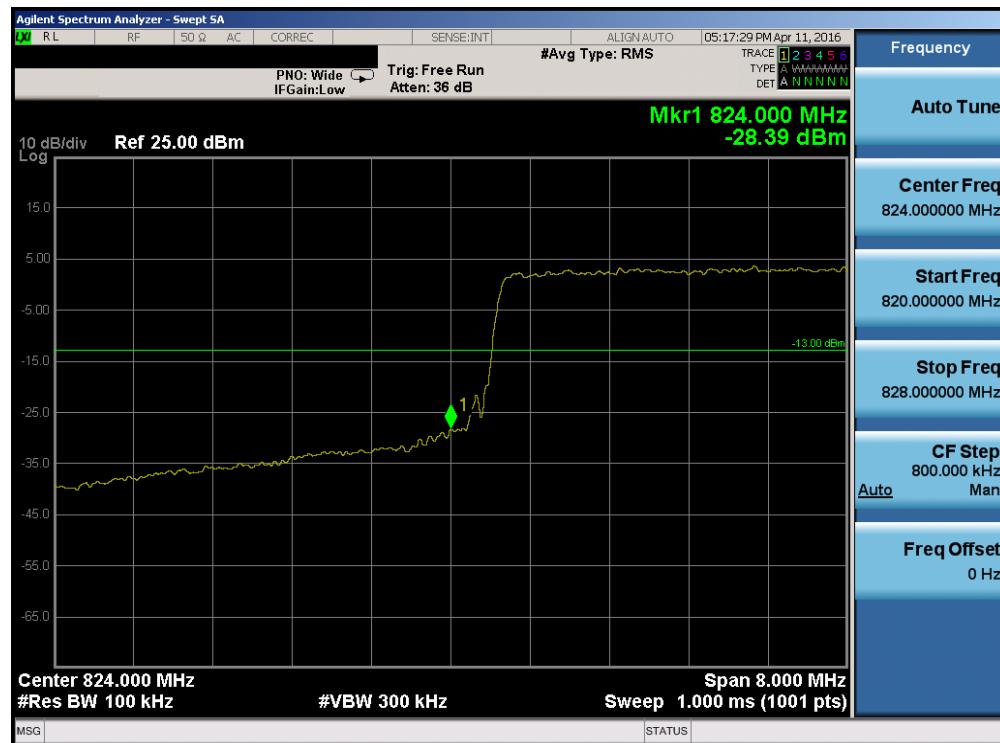


Plot 7-89. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

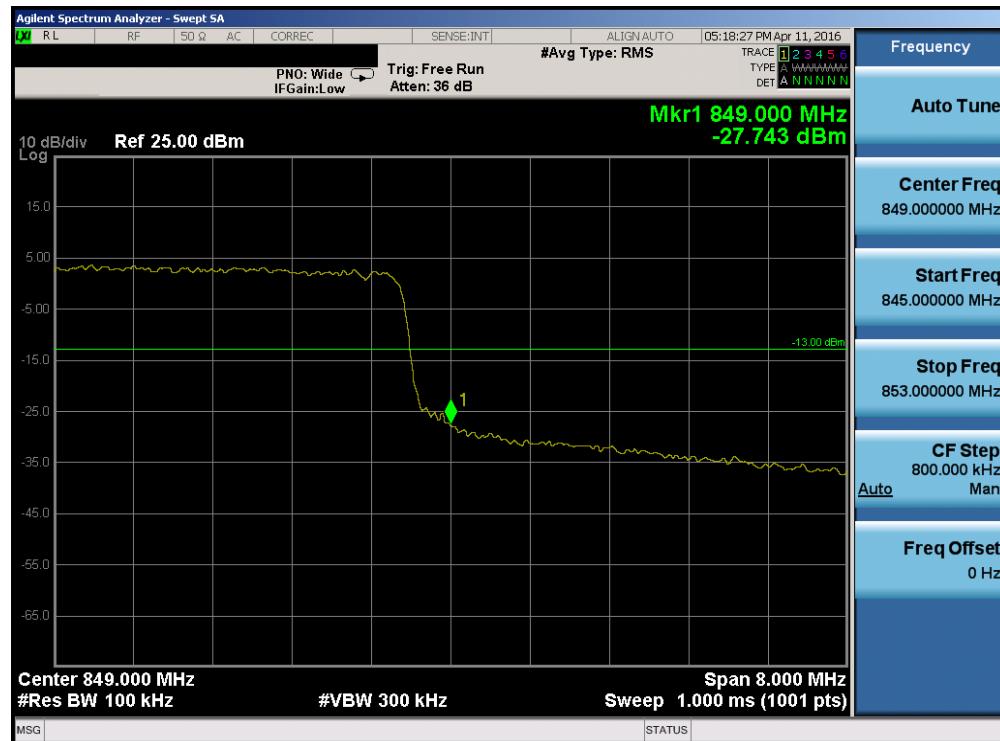


Plot 7-90. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 60 of 116



Plot 7-91. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

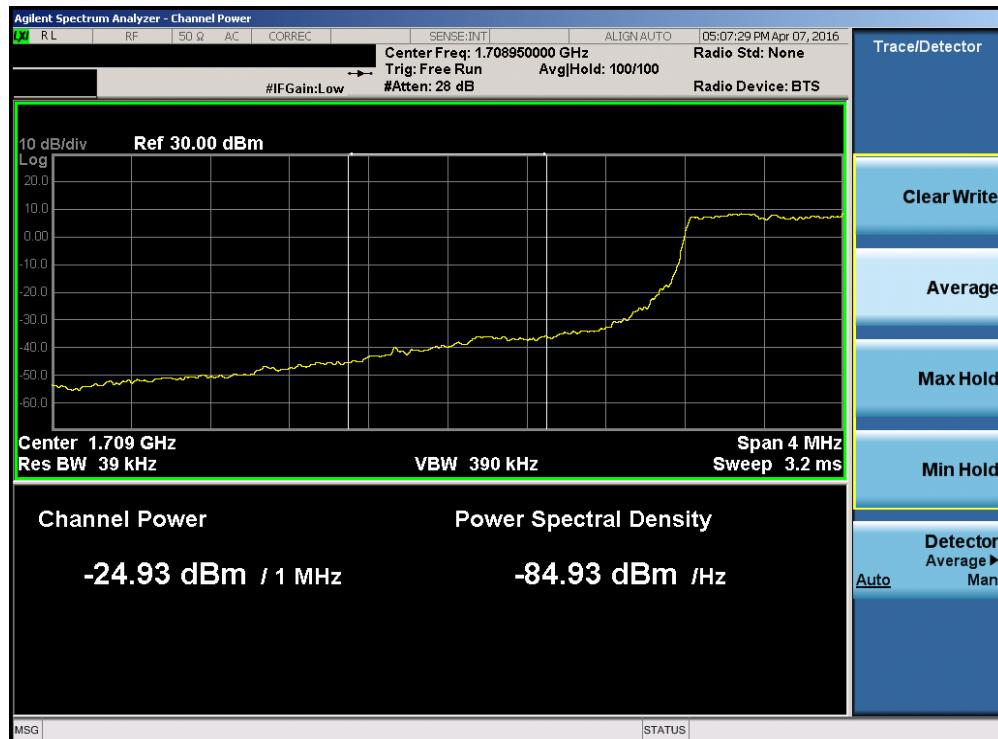


Plot 7-92. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 61 of 116



Plot 7-93. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

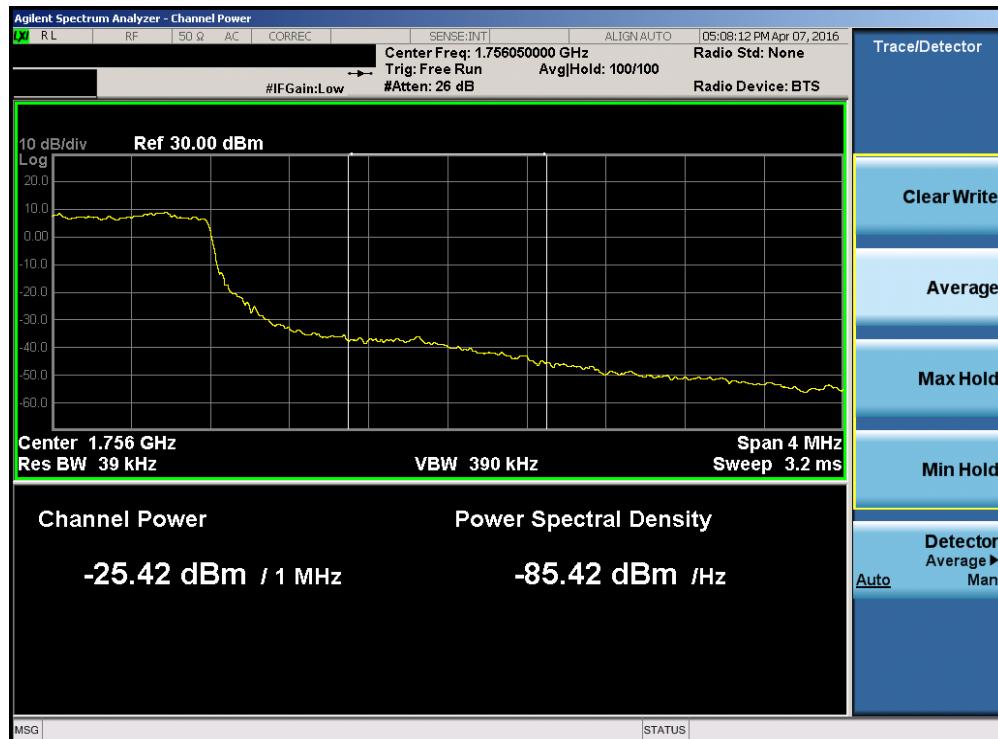


Plot 7-94. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 62 of 116

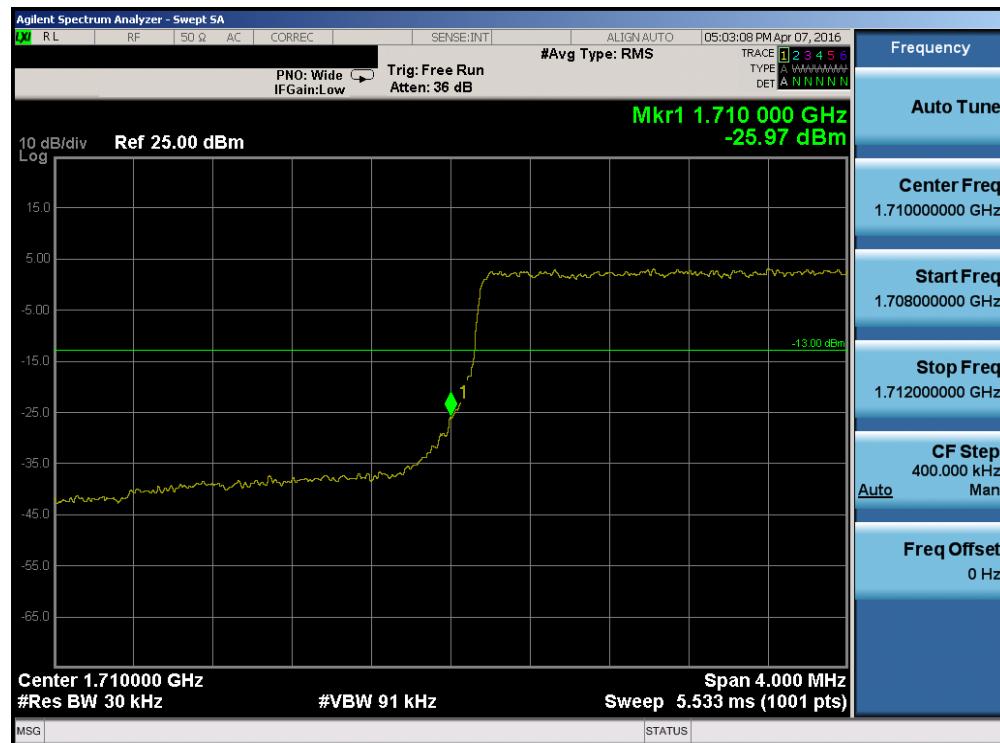


Plot 7-95. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

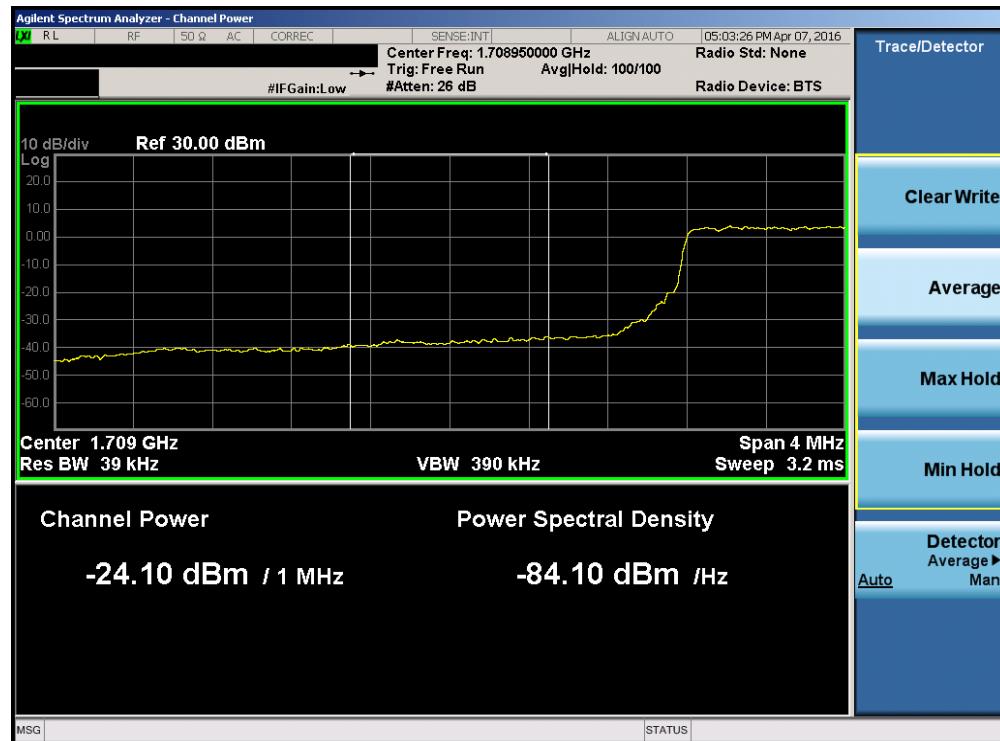


Plot 7-96. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset	Page 63 of 116



Plot 7-97. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

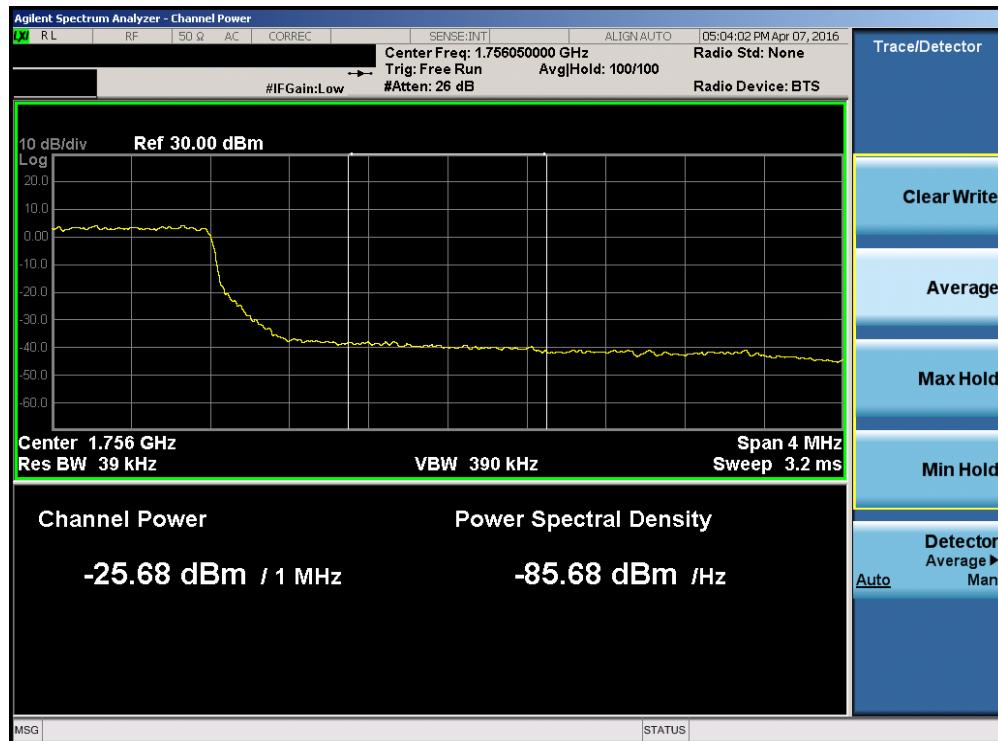


Plot 7-98. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 64 of 116

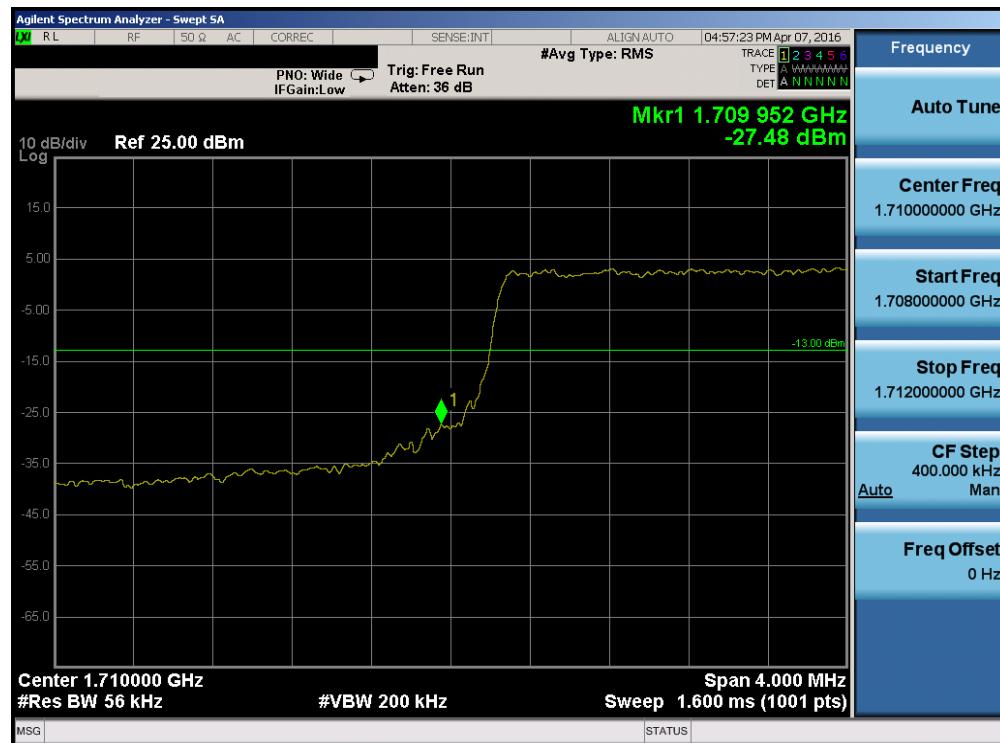


Plot 7-99. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

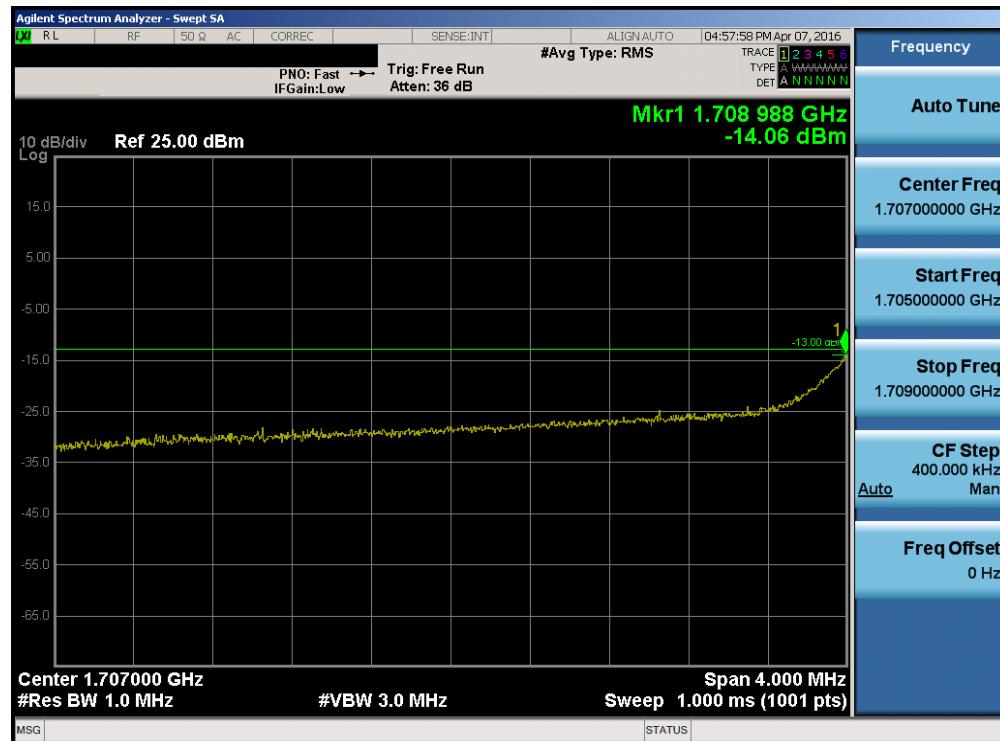


Plot 7-100. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 65 of 116

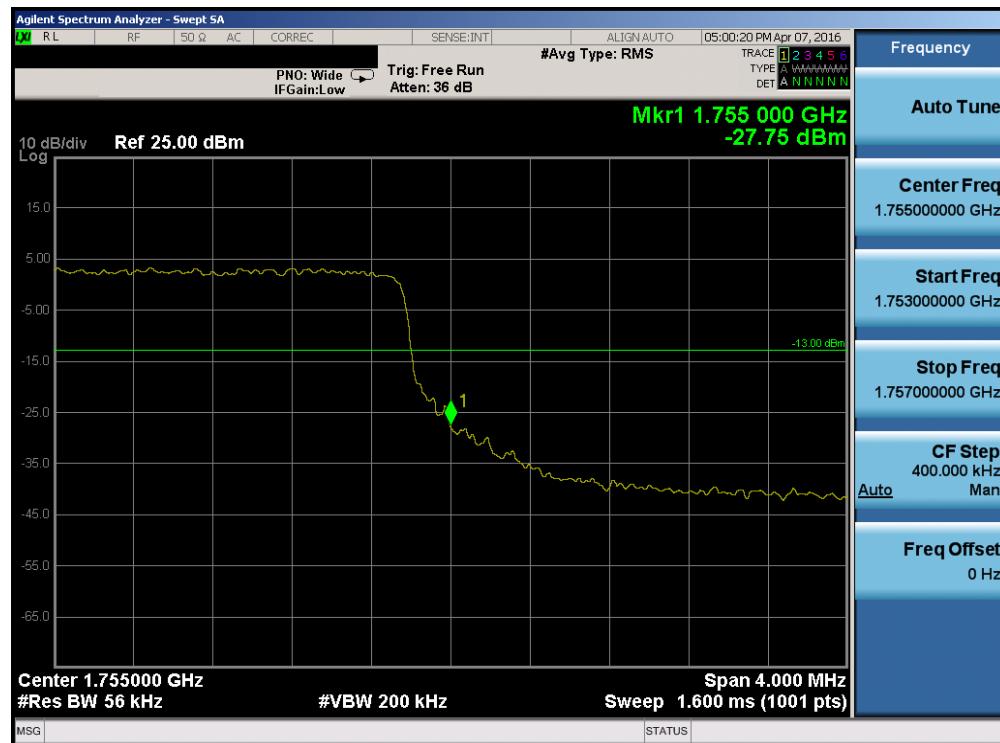


Plot 7-101. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

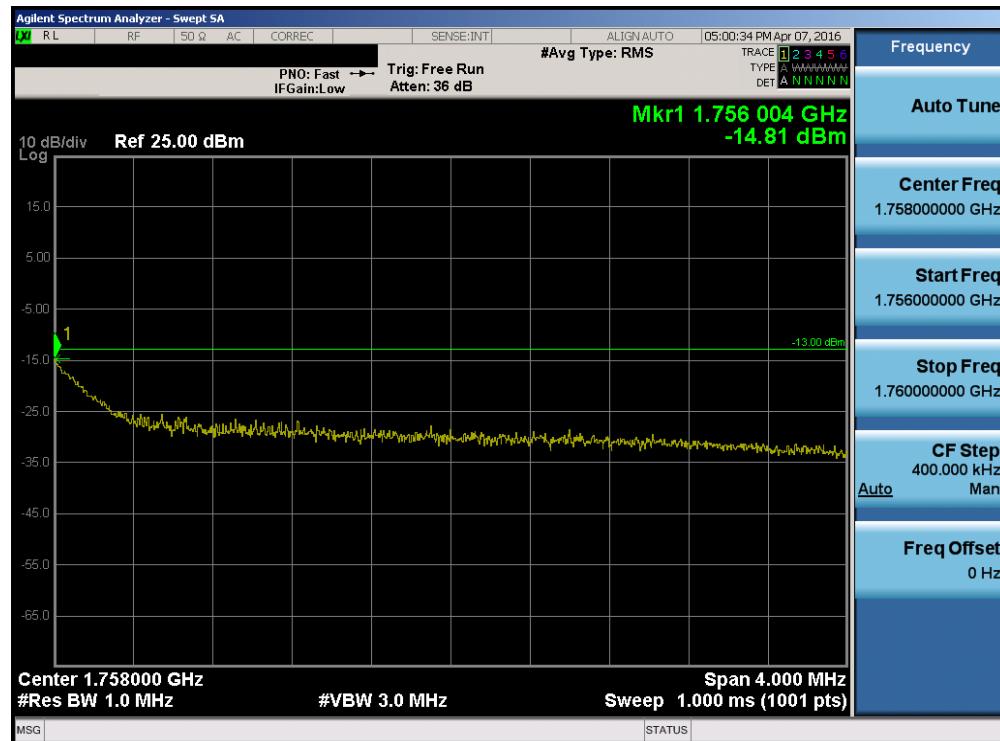


Plot 7-102. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 66 of 116

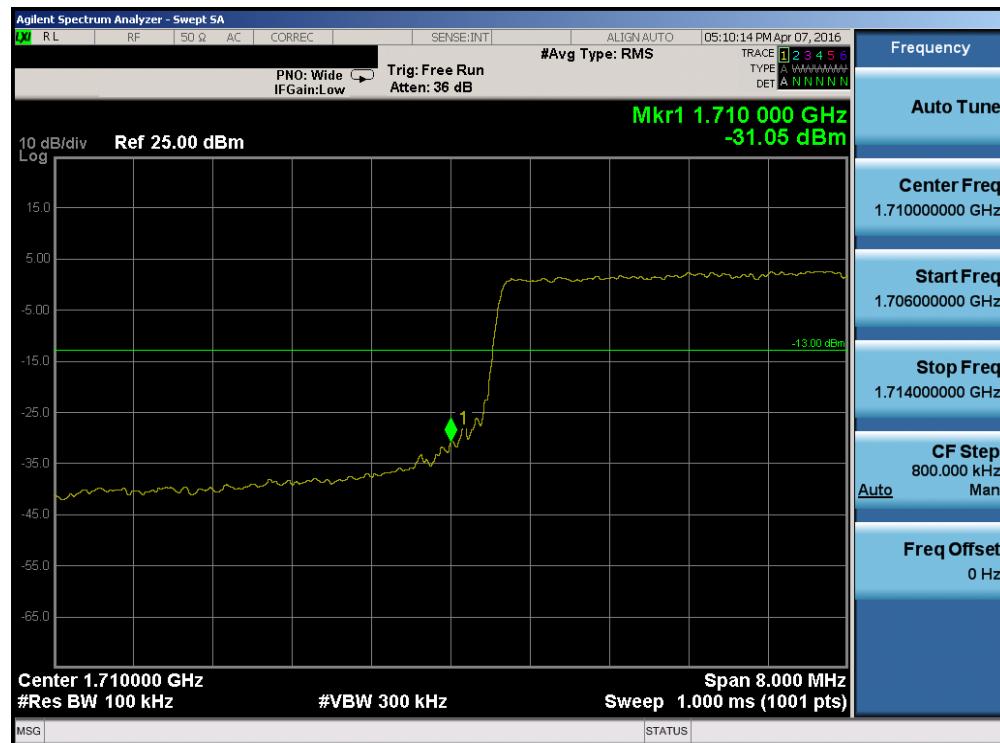


Plot 7-103. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

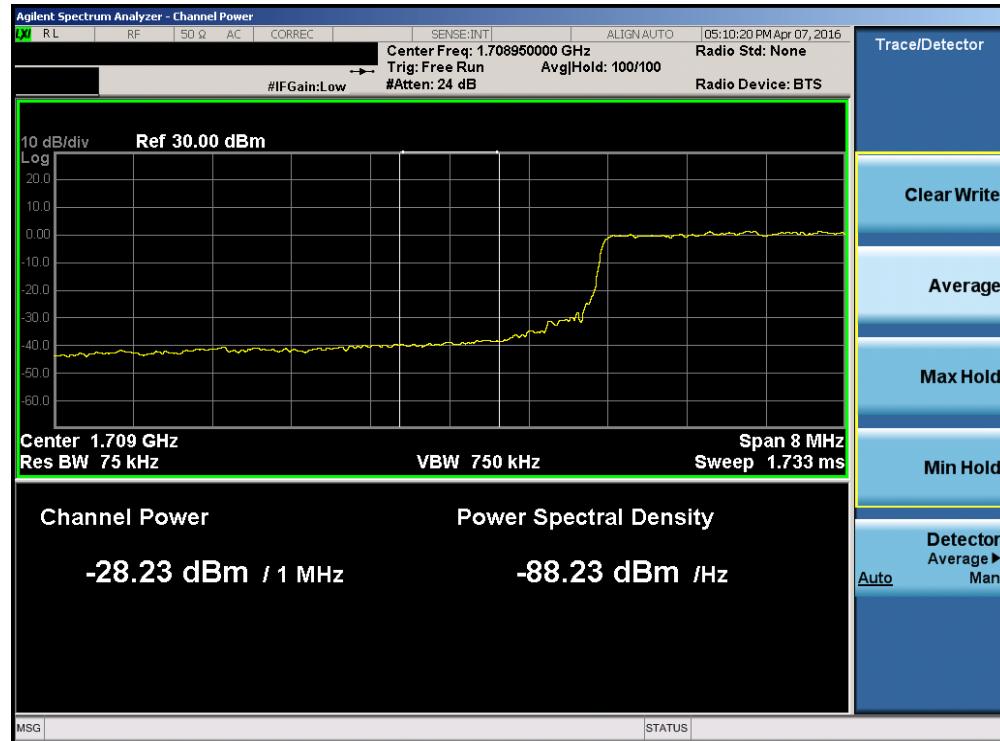


Plot 7-104. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 67 of 116

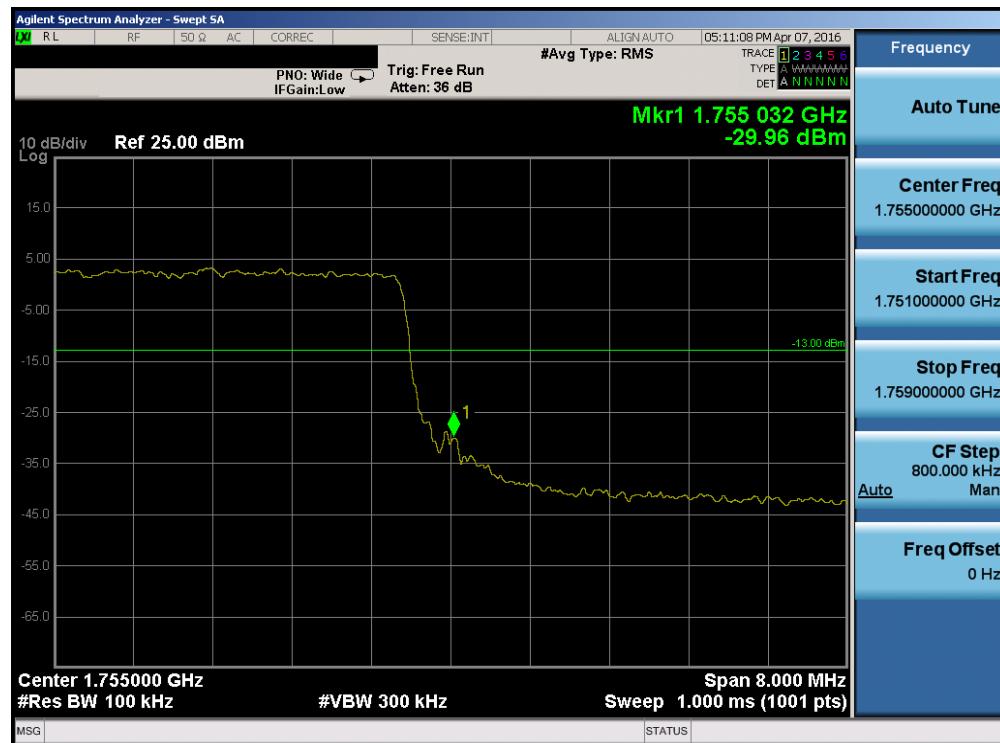


Plot 7-105. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

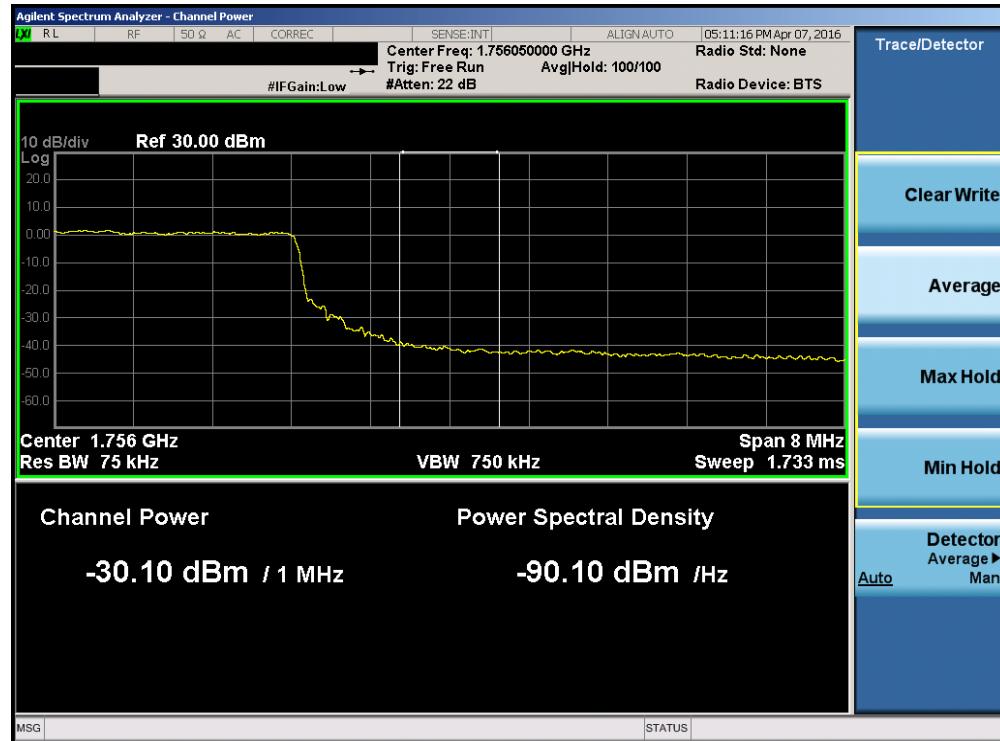


Plot 7-106. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 68 of 116

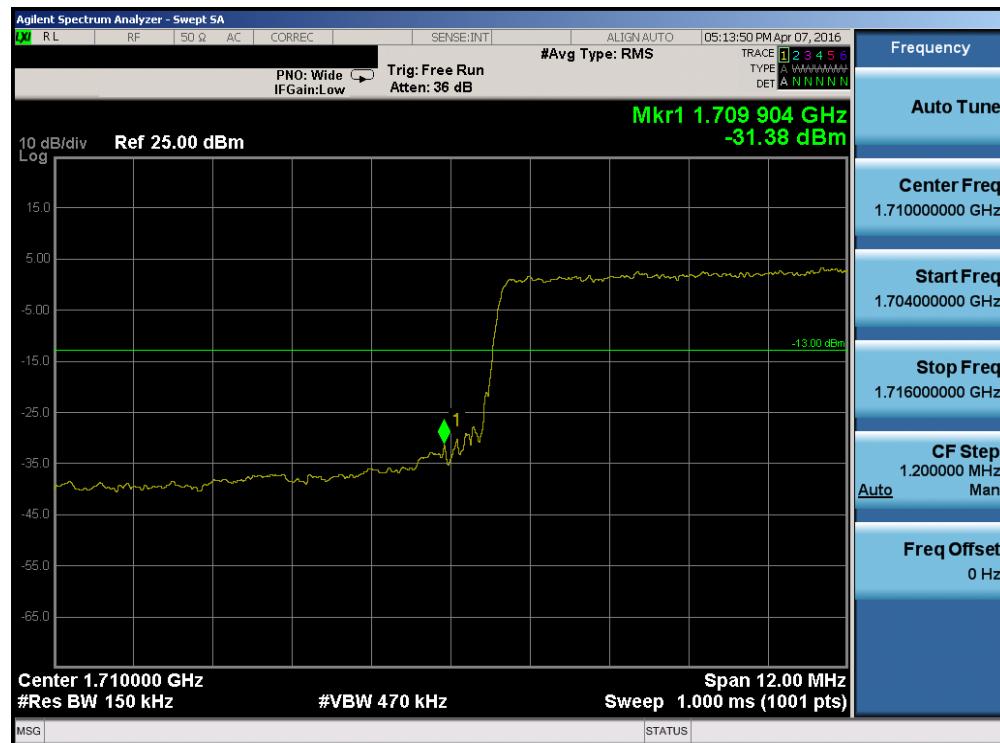


Plot 7-107. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

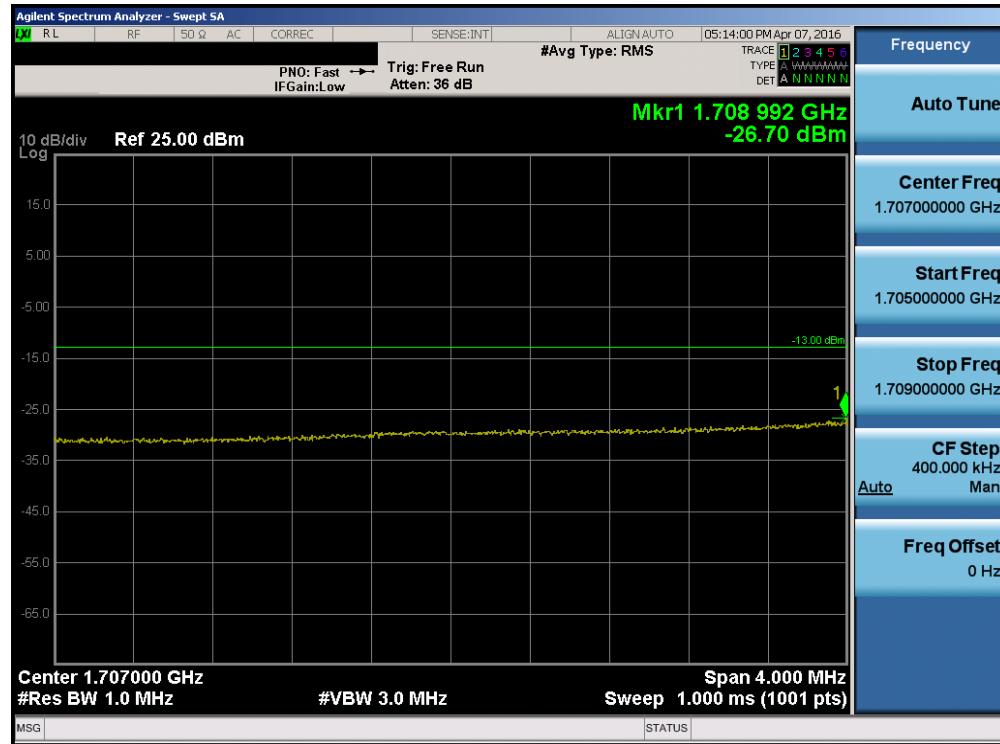


Plot 7-108. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 69 of 116



Plot 7-109. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

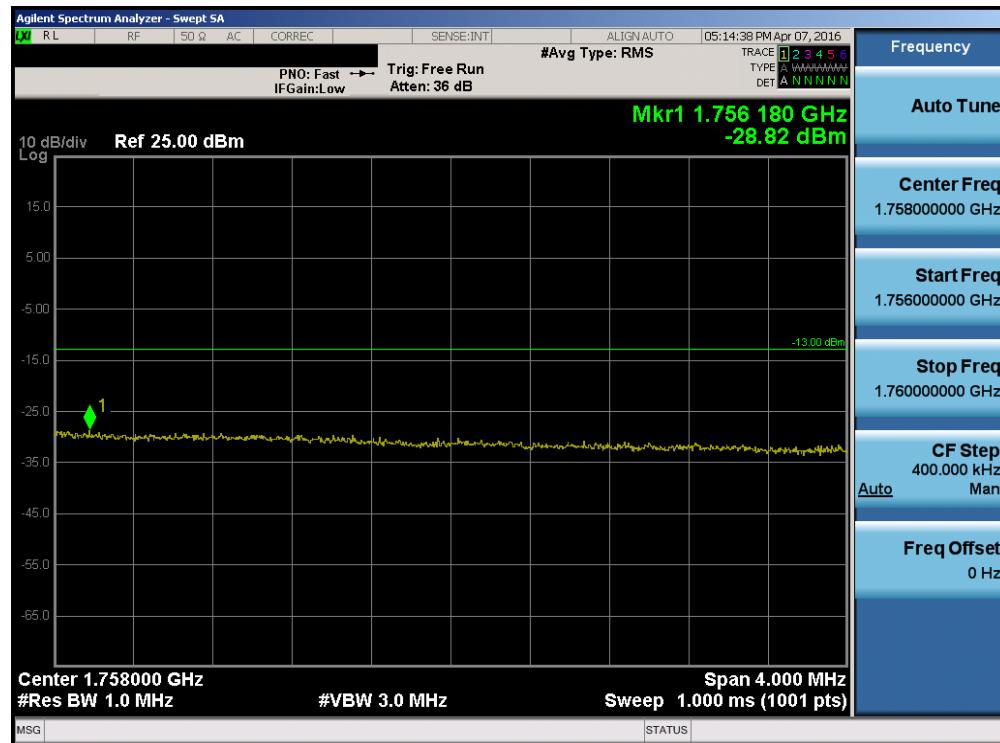


Plot 7-110. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 70 of 116

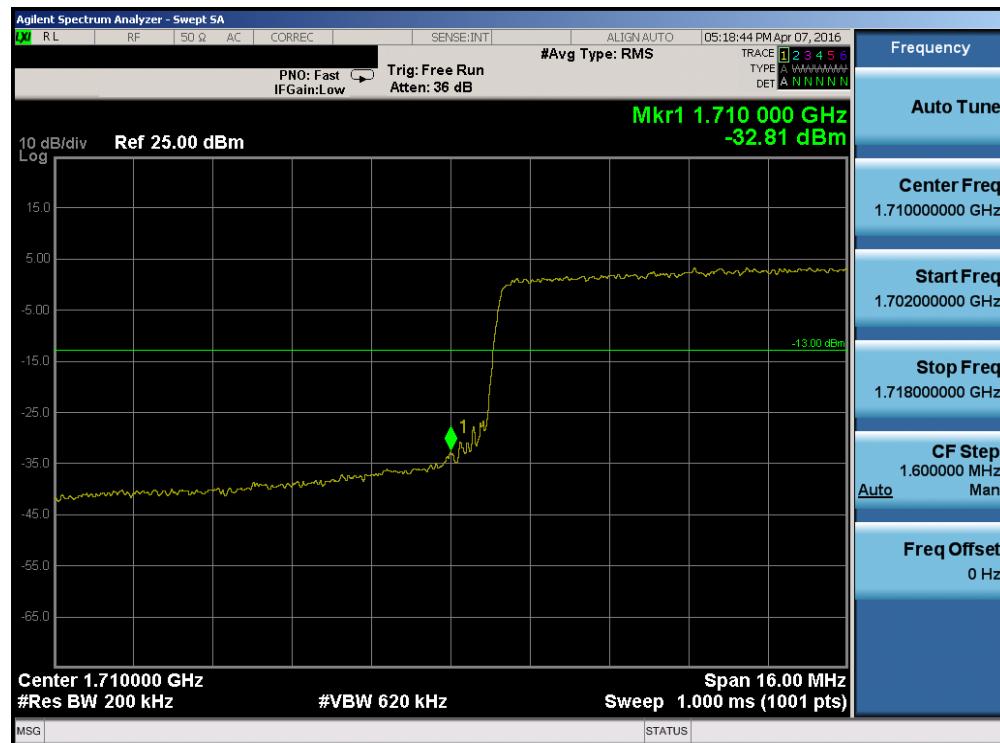


Plot 7-111. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

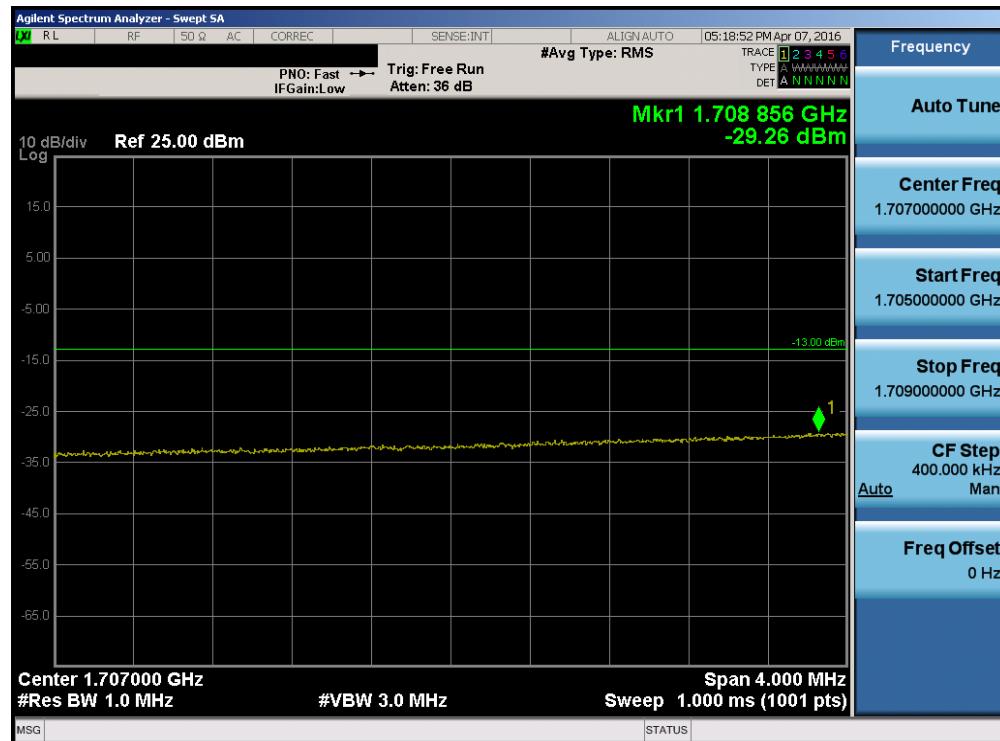


Plot 7-112. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 71 of 116



Plot 7-113. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-114. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 72 of 116

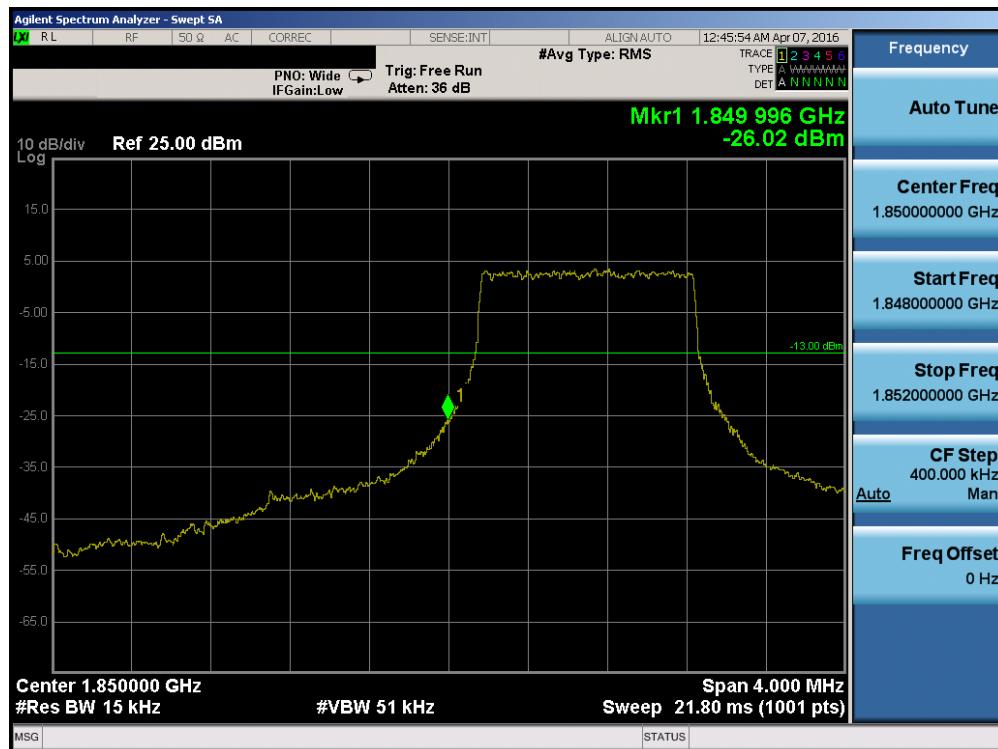


Plot 7-115. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

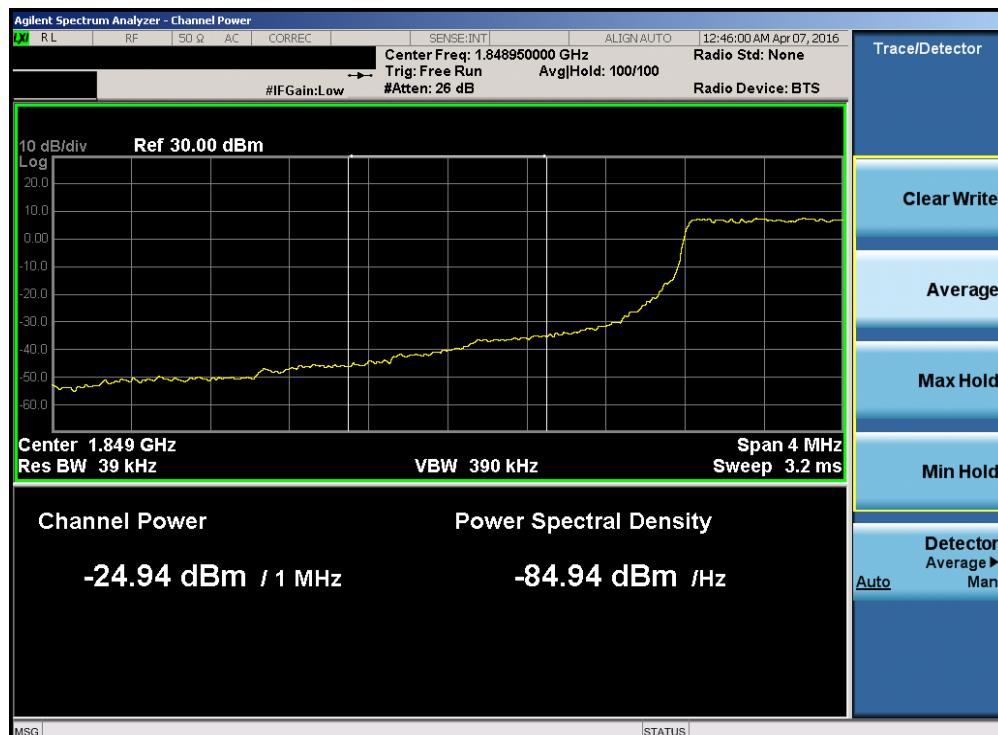


Plot 7-116. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 73 of 116



Plot 7-117. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

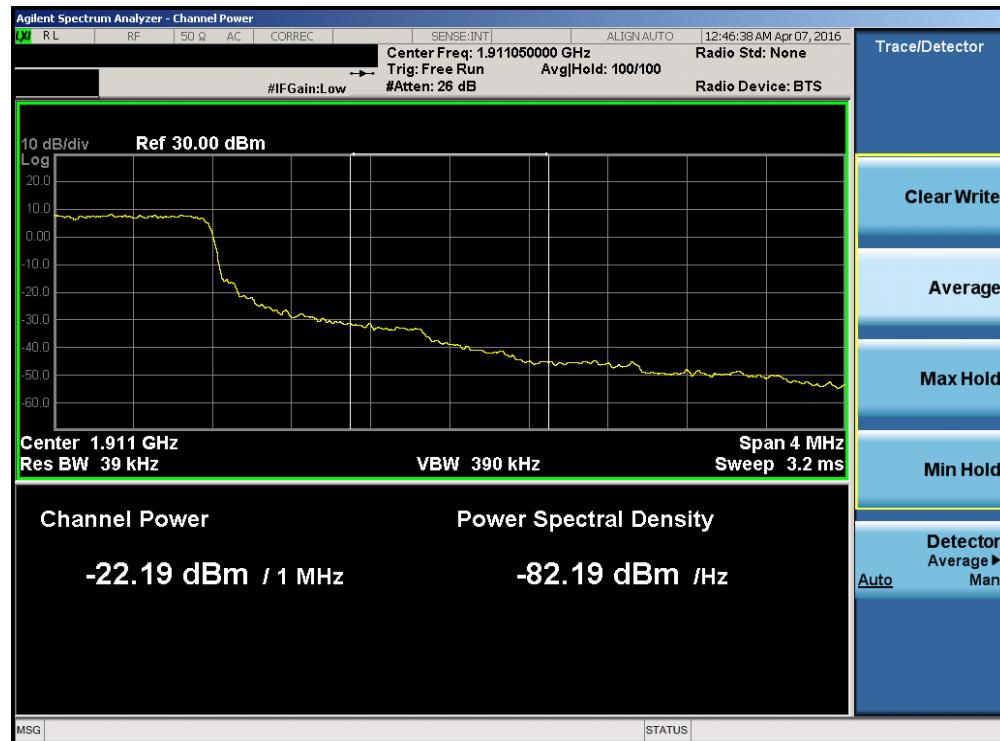


Plot 7-118. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 74 of 116

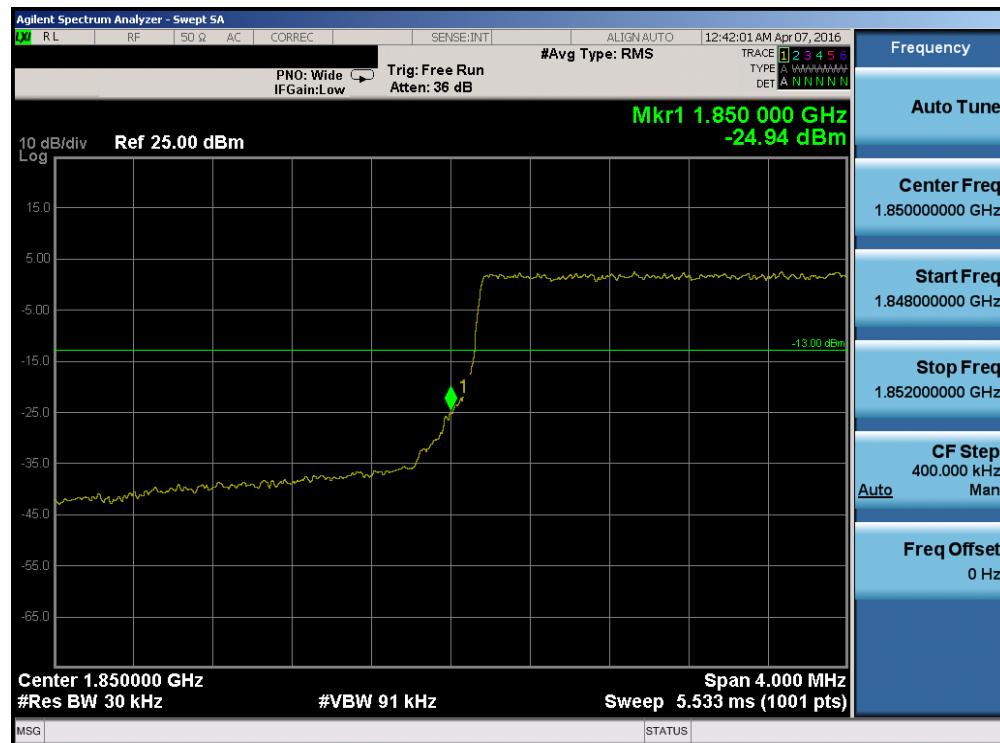


Plot 7-119. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

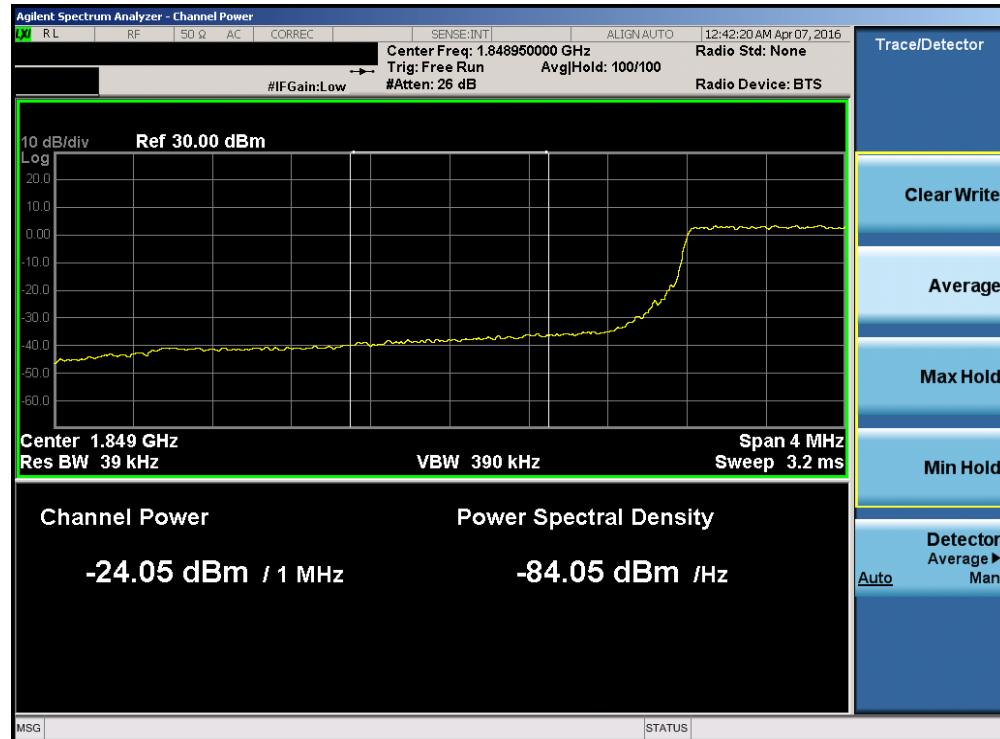


Plot 7-120. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset	Page 75 of 116

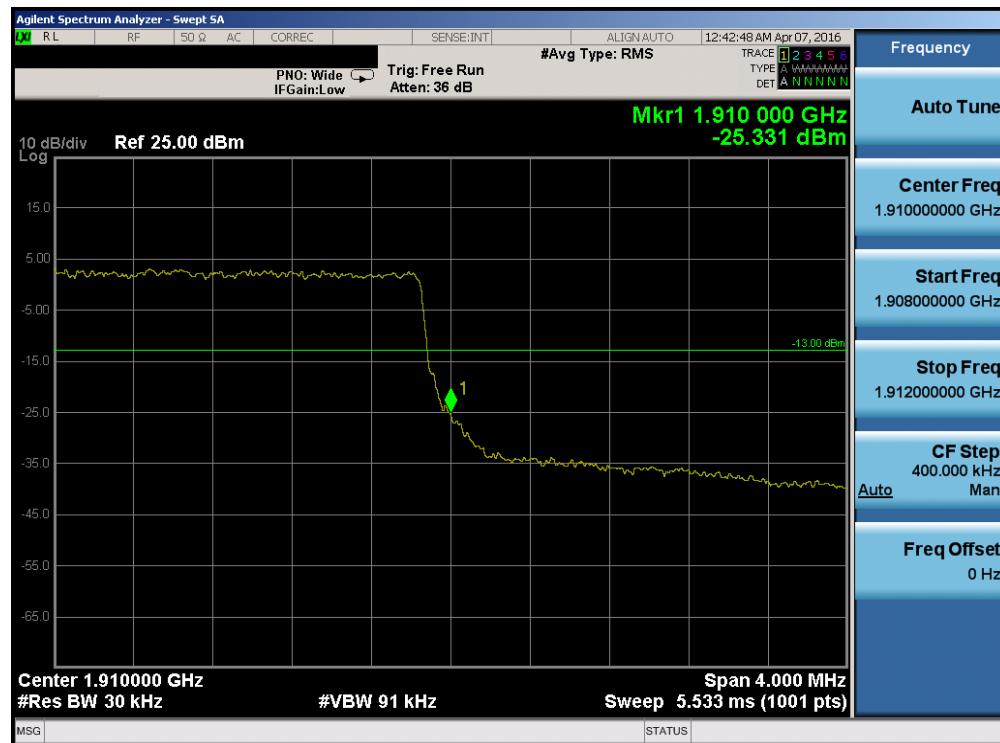


Plot 7-121. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

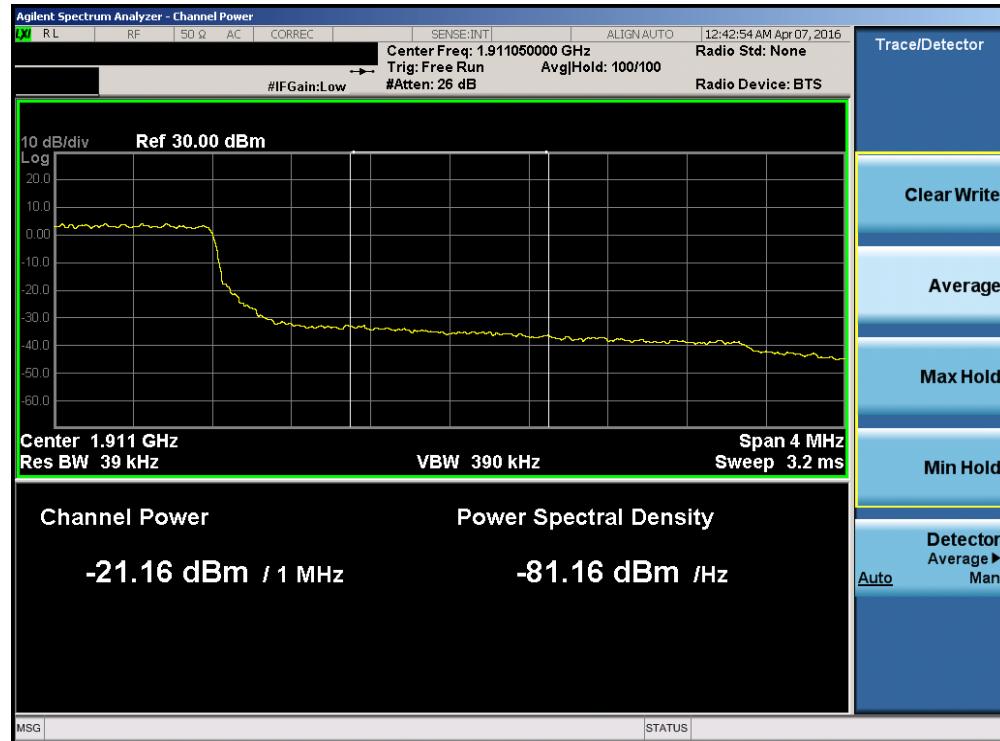


Plot 7-122. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 76 of 116

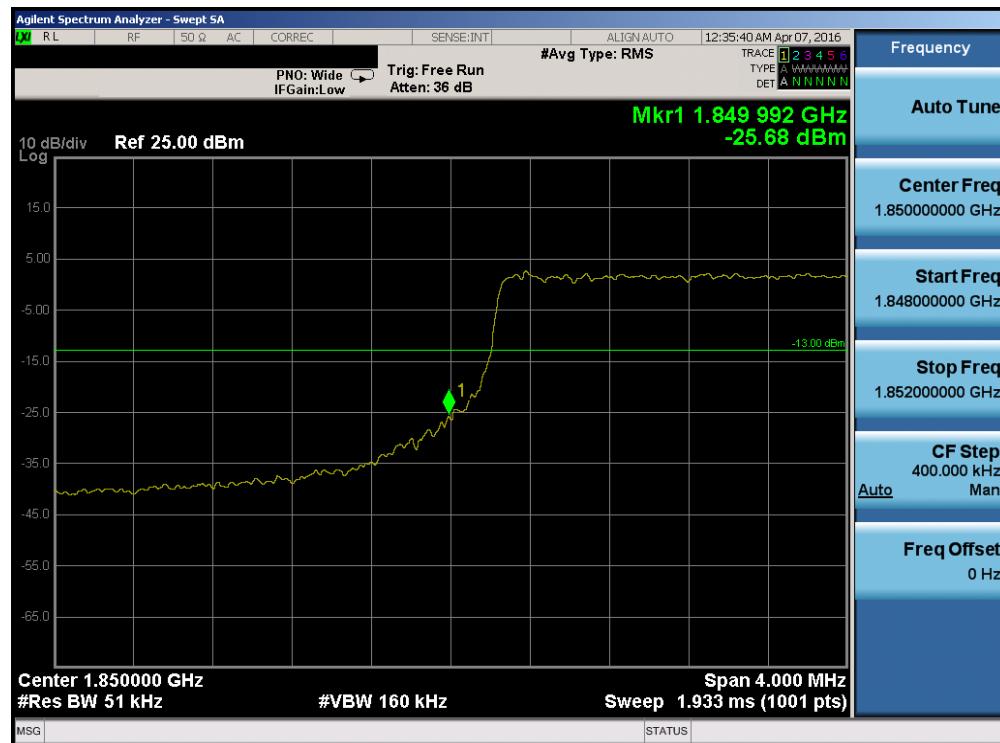


Plot 7-123. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

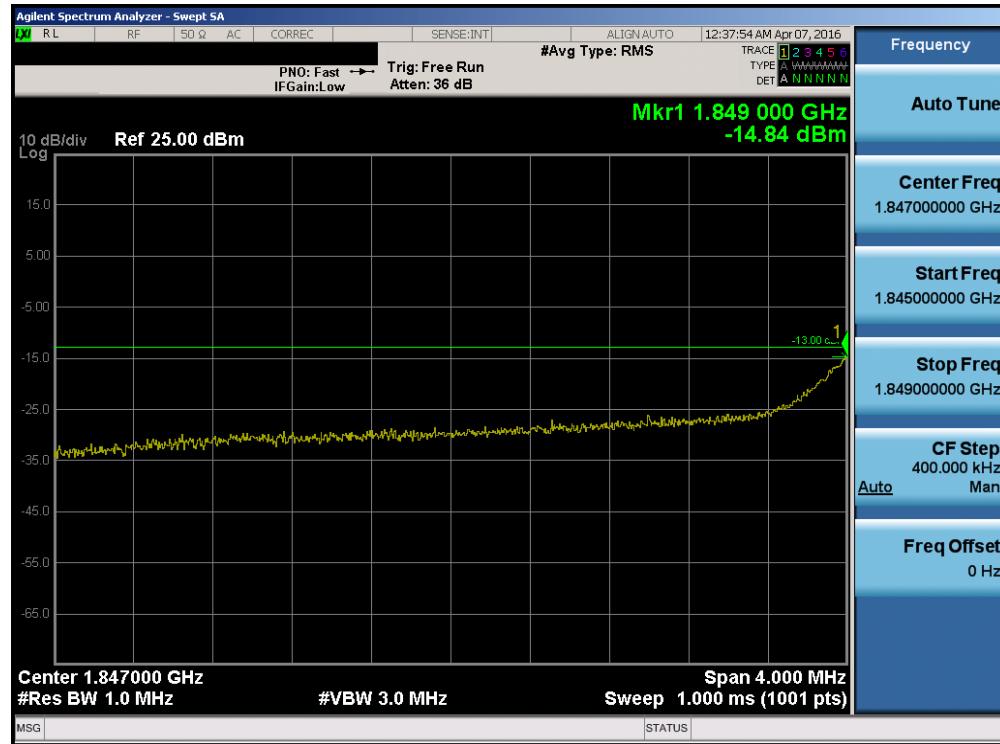


Plot 7-124. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 77 of 116

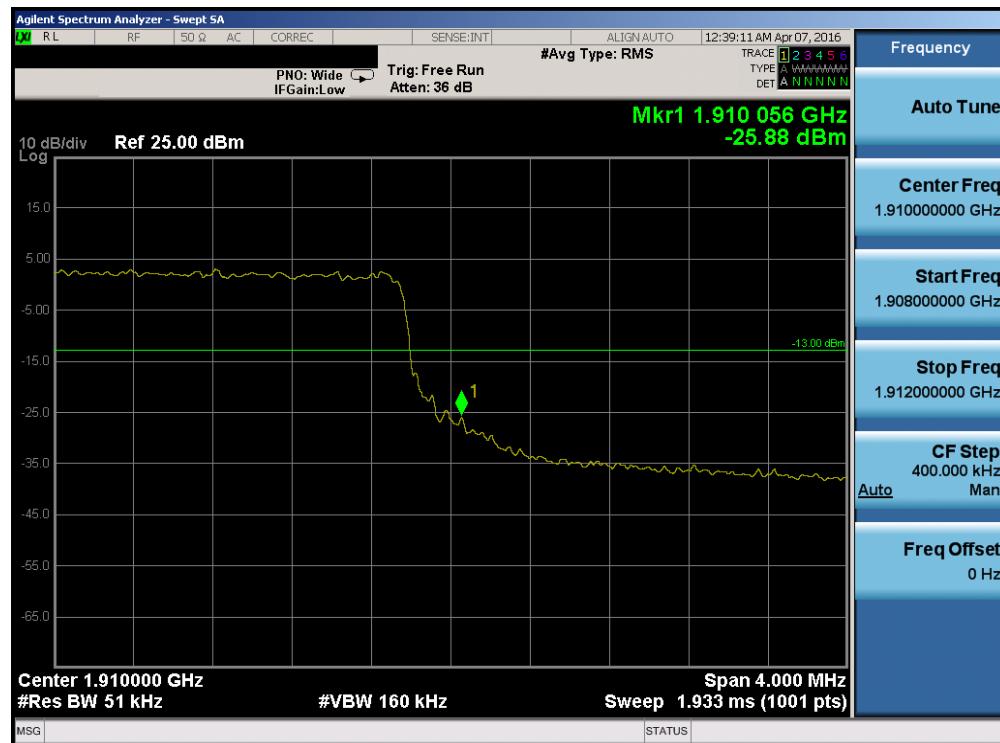


Plot 7-125. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

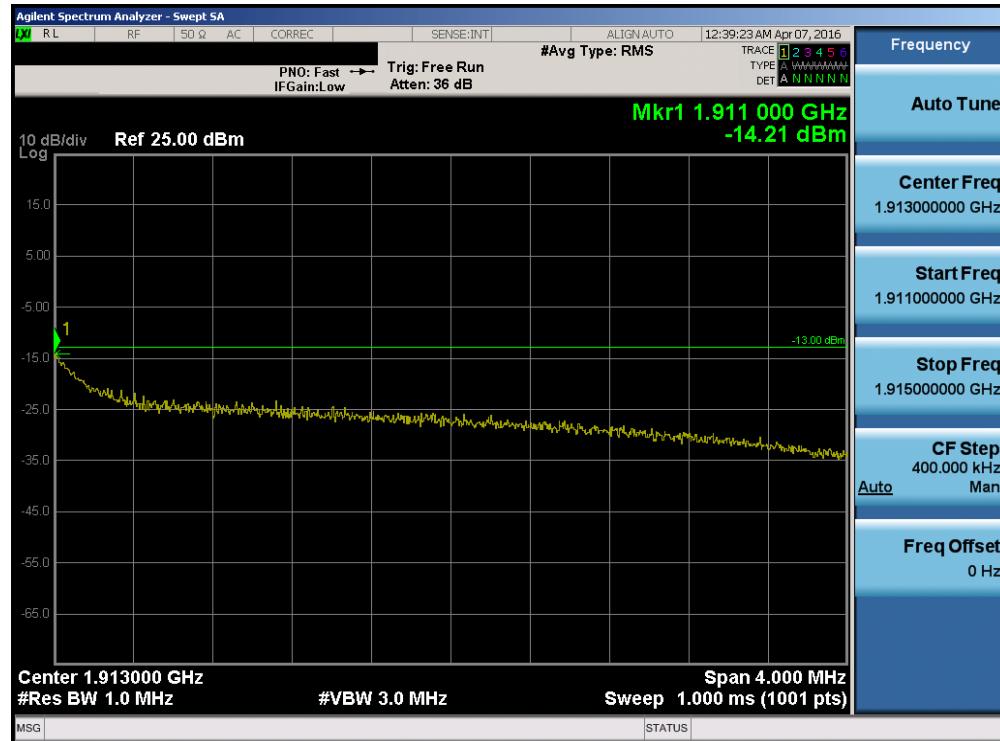


Plot 7-126. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 78 of 116

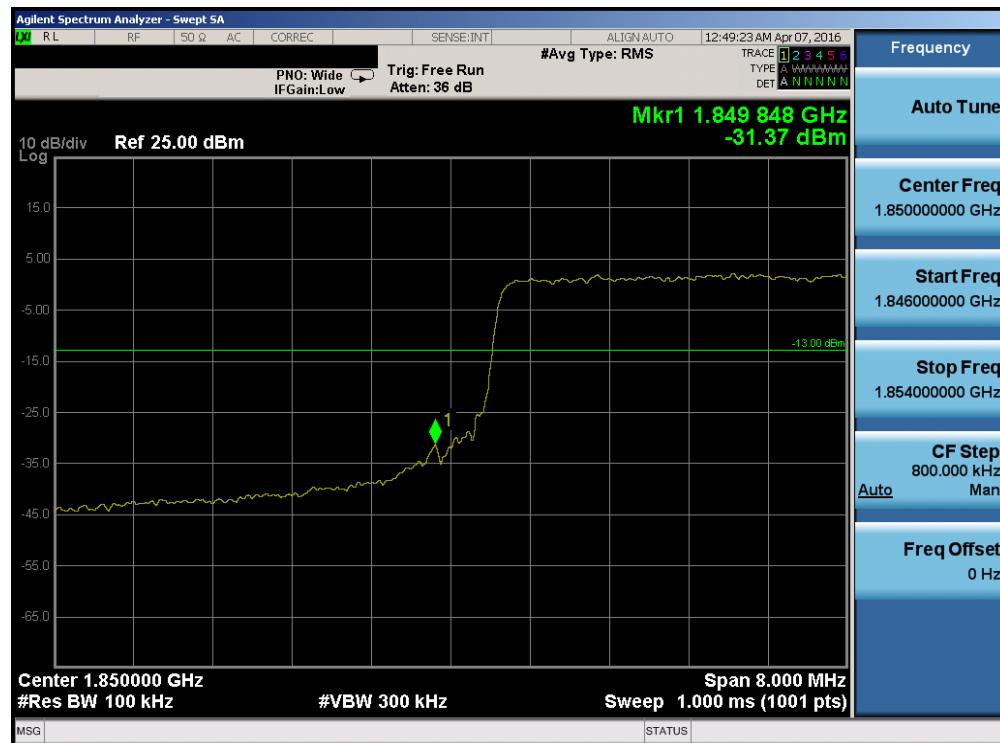


Plot 7-127. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

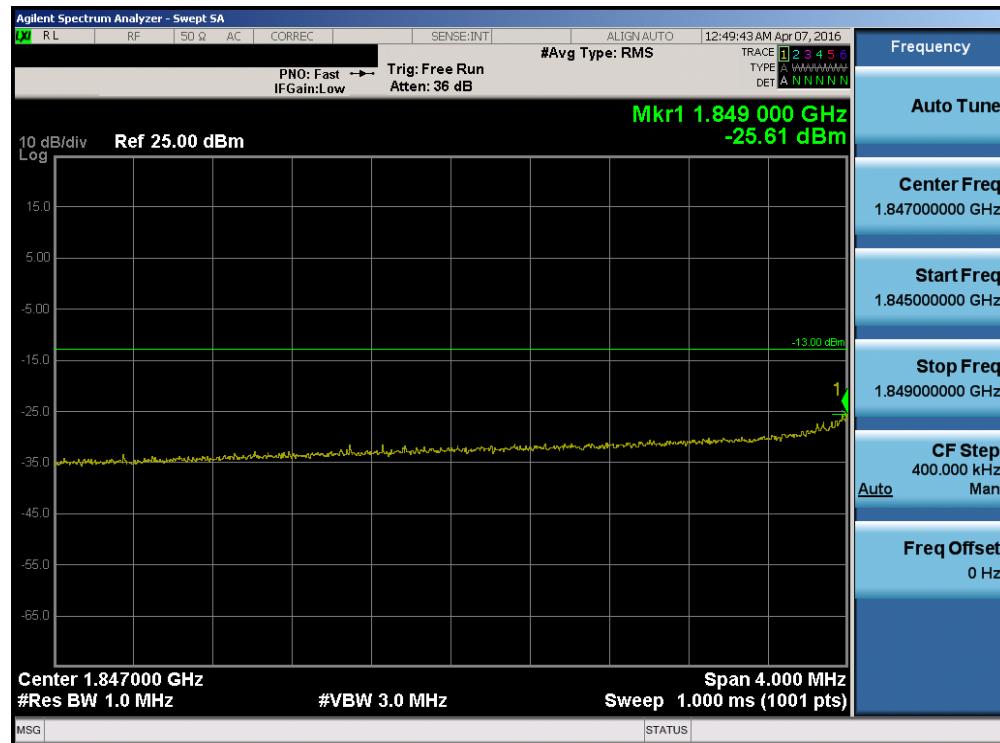


Plot 7-128. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 79 of 116

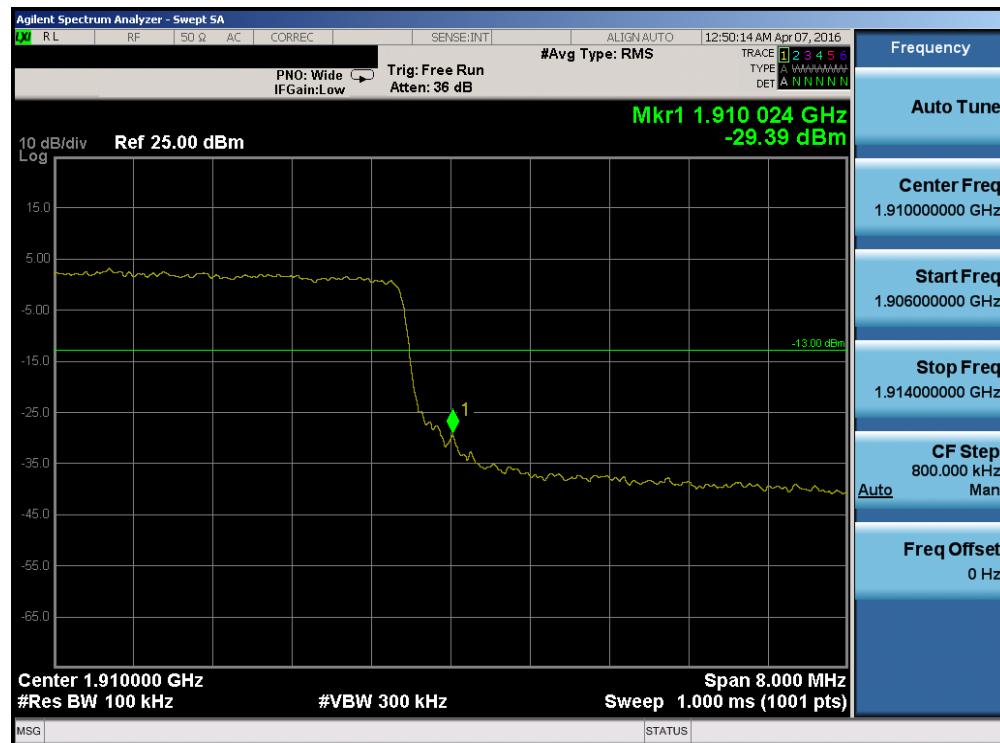


Plot 7-129. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

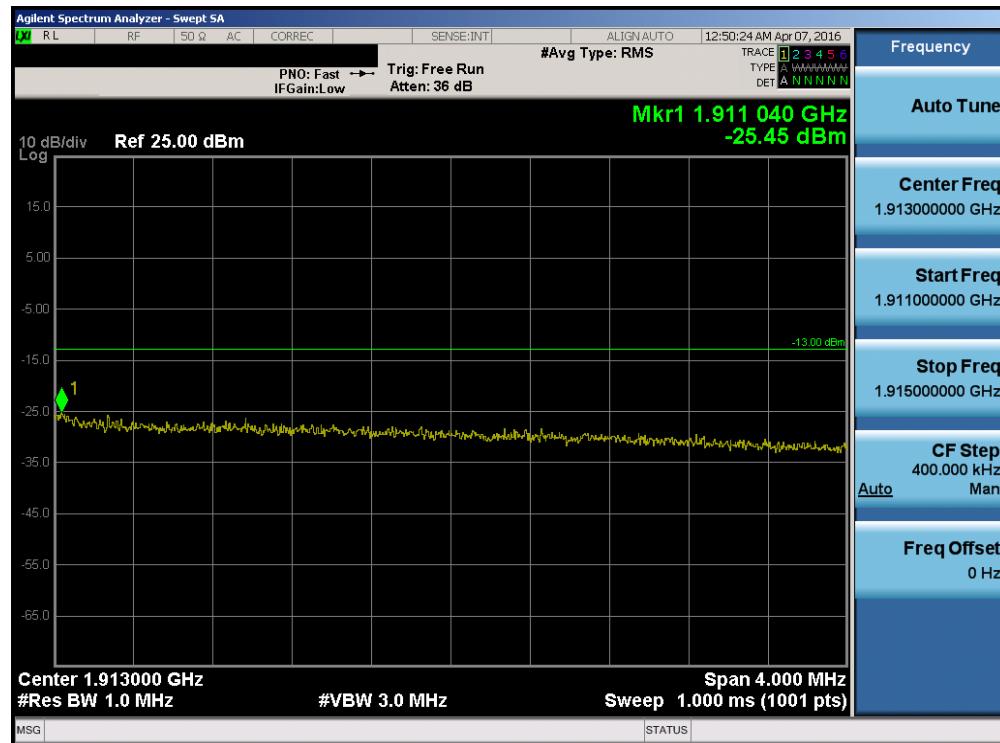


Plot 7-130. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 80 of 116

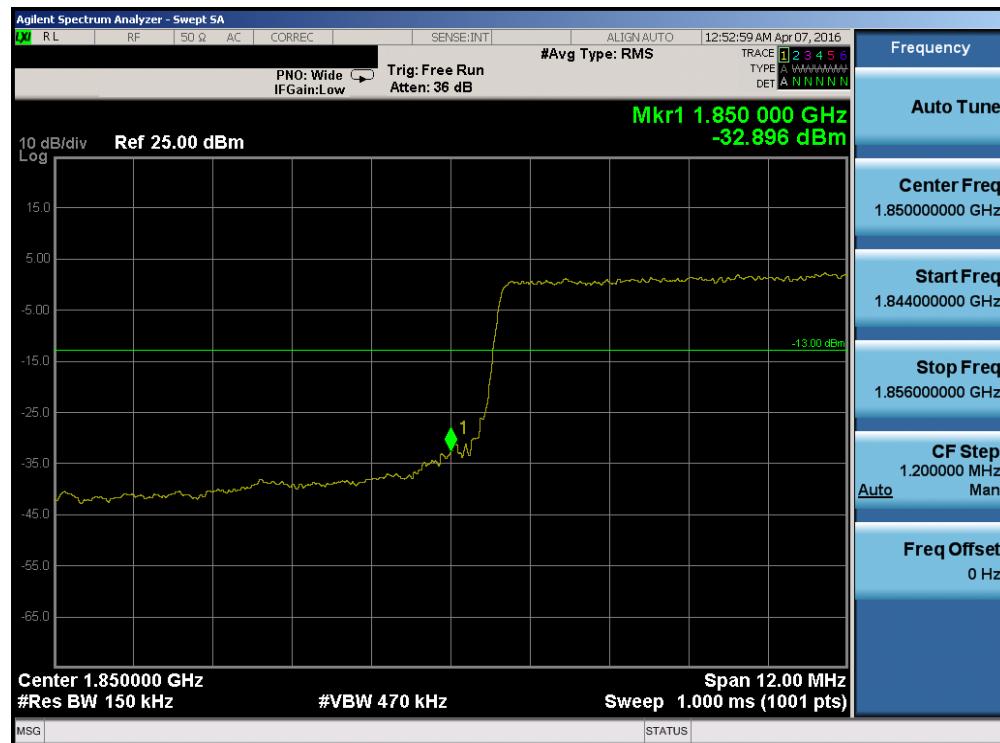


Plot 7-131. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-132. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 81 of 116



Plot 7-133. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

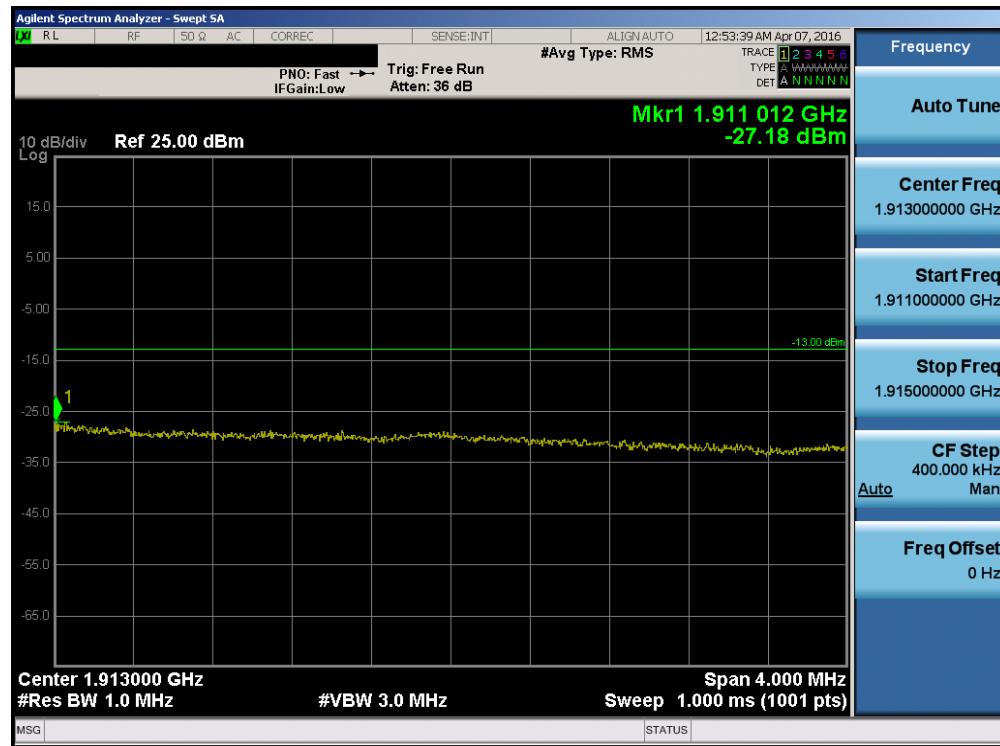


Plot 7-134. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 82 of 116

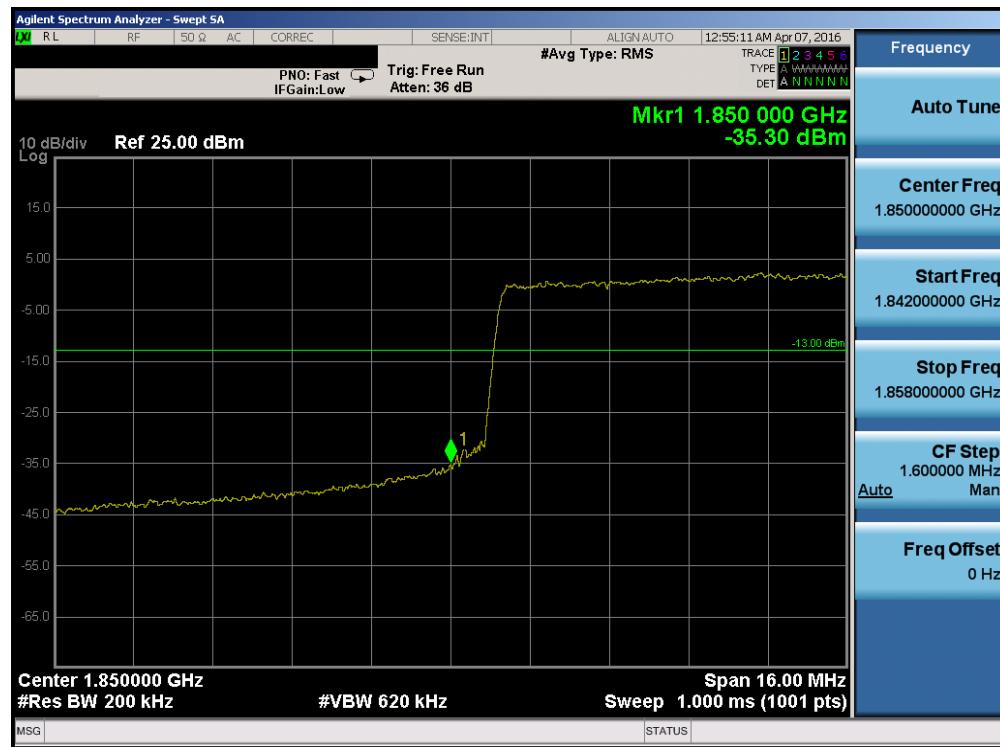


Plot 7-135. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-136. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset	Page 83 of 116



Plot 7-137. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

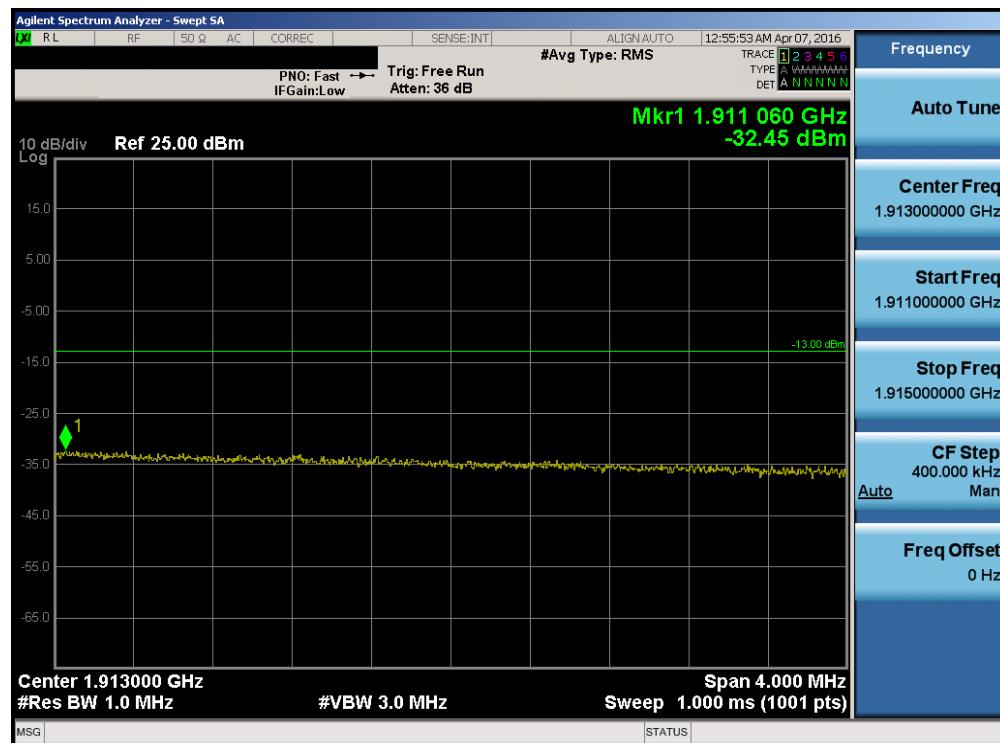


Plot 7-138. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 84 of 116



Plot 7-139. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-140. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 85 of 116

## 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

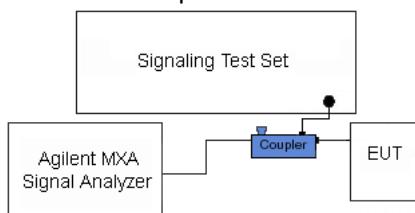
KDB 971168 D01 v02r02 – Section 5.7.1

### 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.

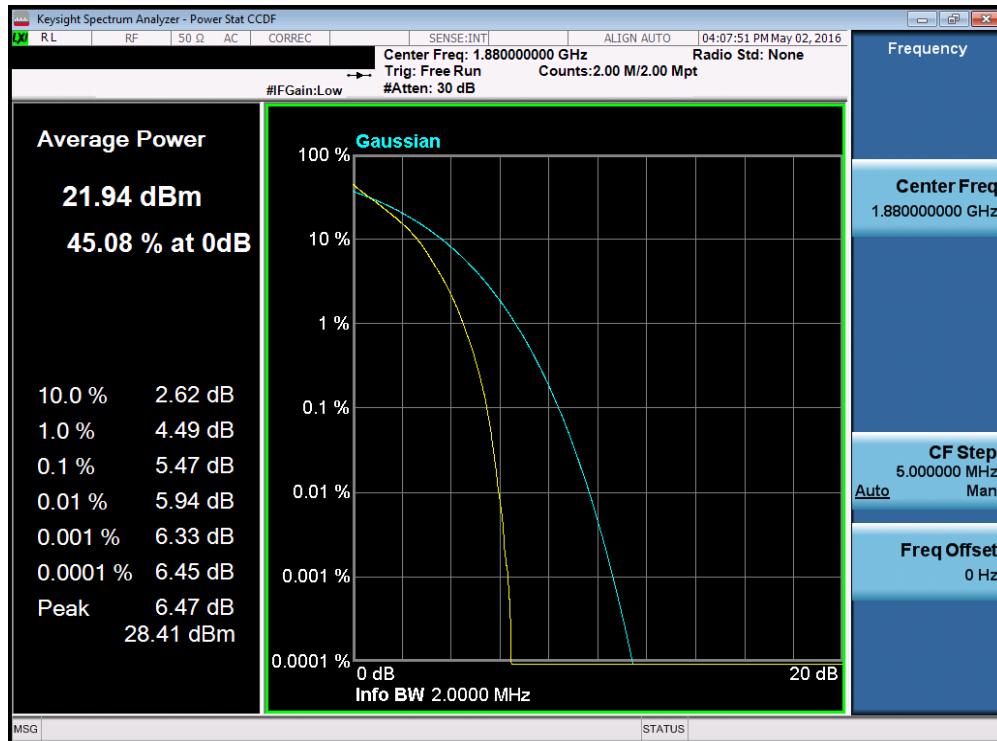


**Figure 7-4. Test Instrument & Measurement Setup**

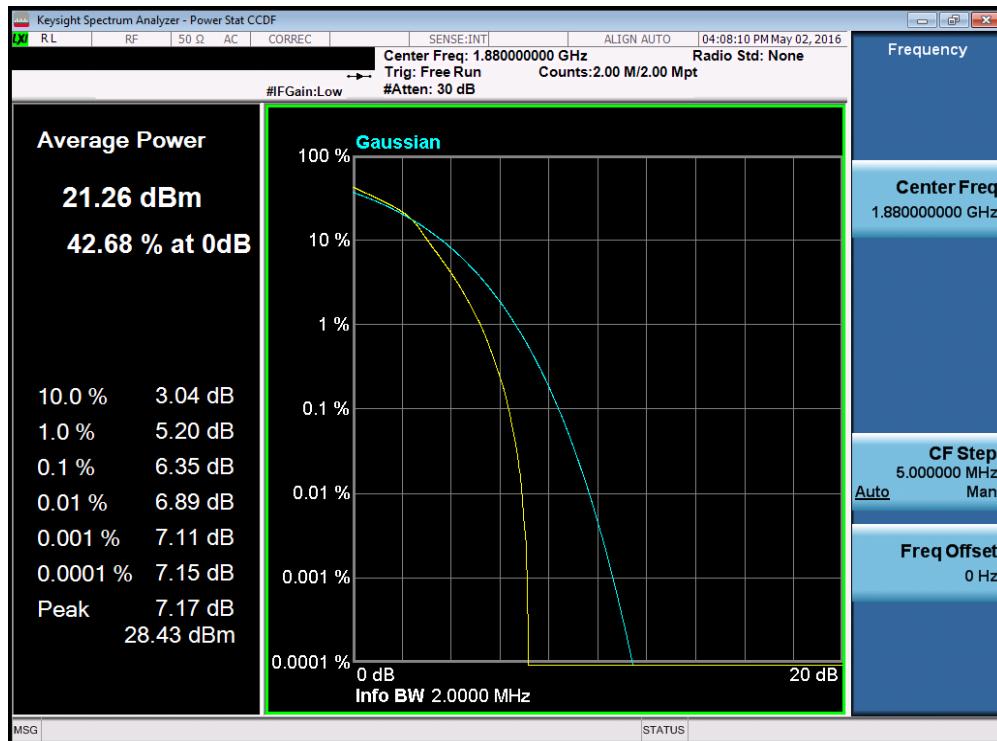
### Test Notes

None.

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 86 of 116

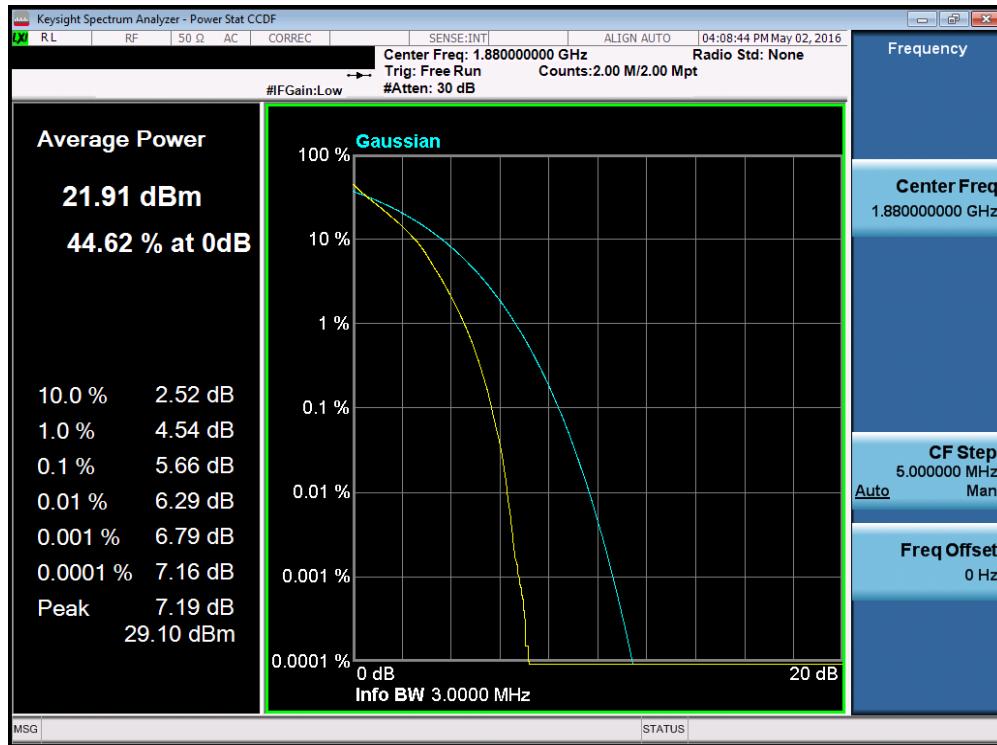


Plot 7-141. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

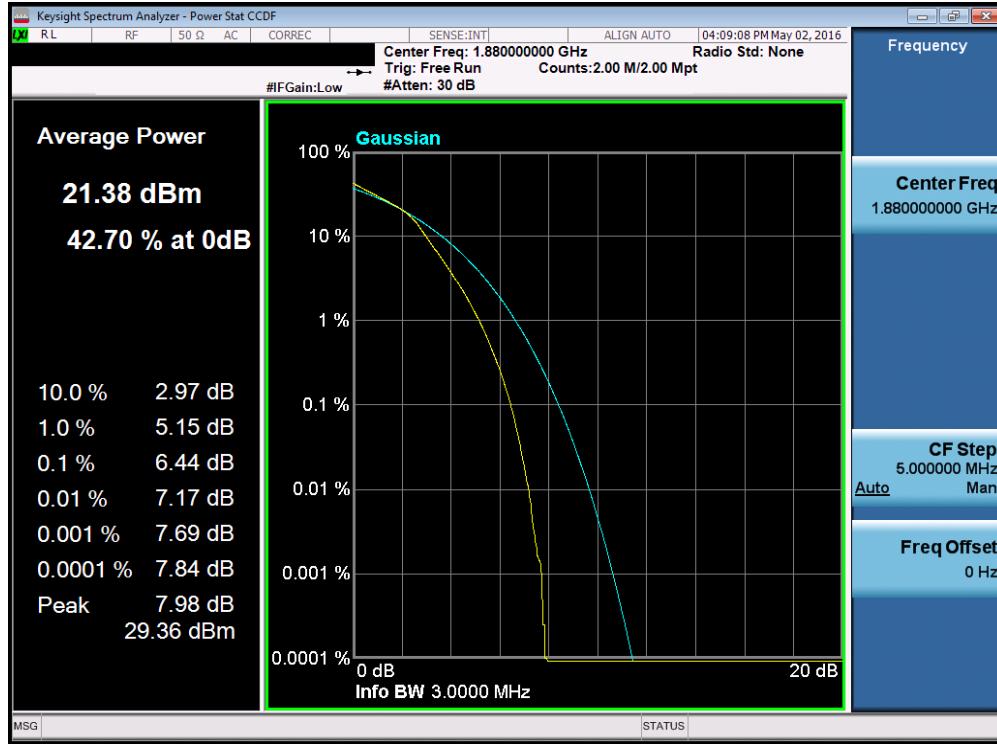


Plot 7-142. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 87 of 116

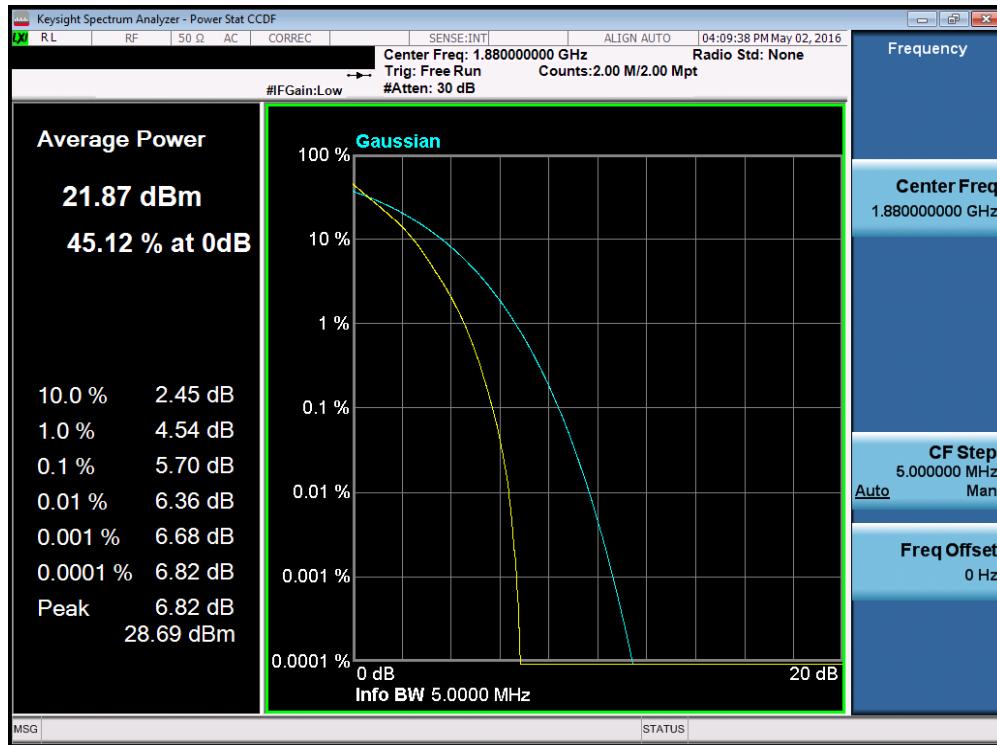


Plot 7-143. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

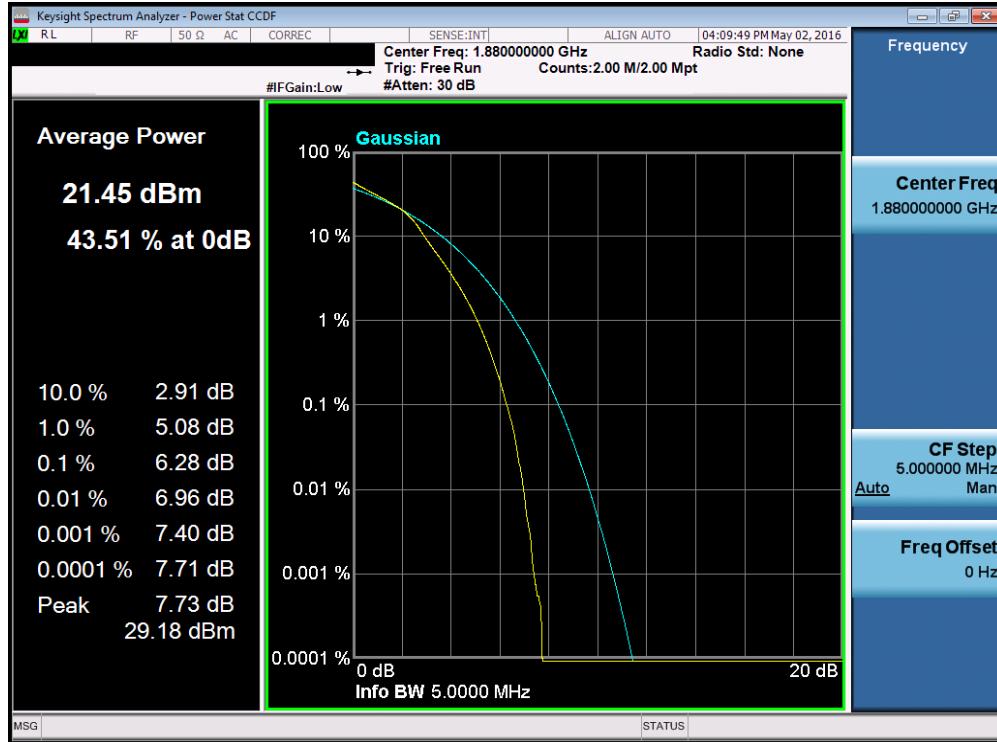


Plot 7-144. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 88 of 116

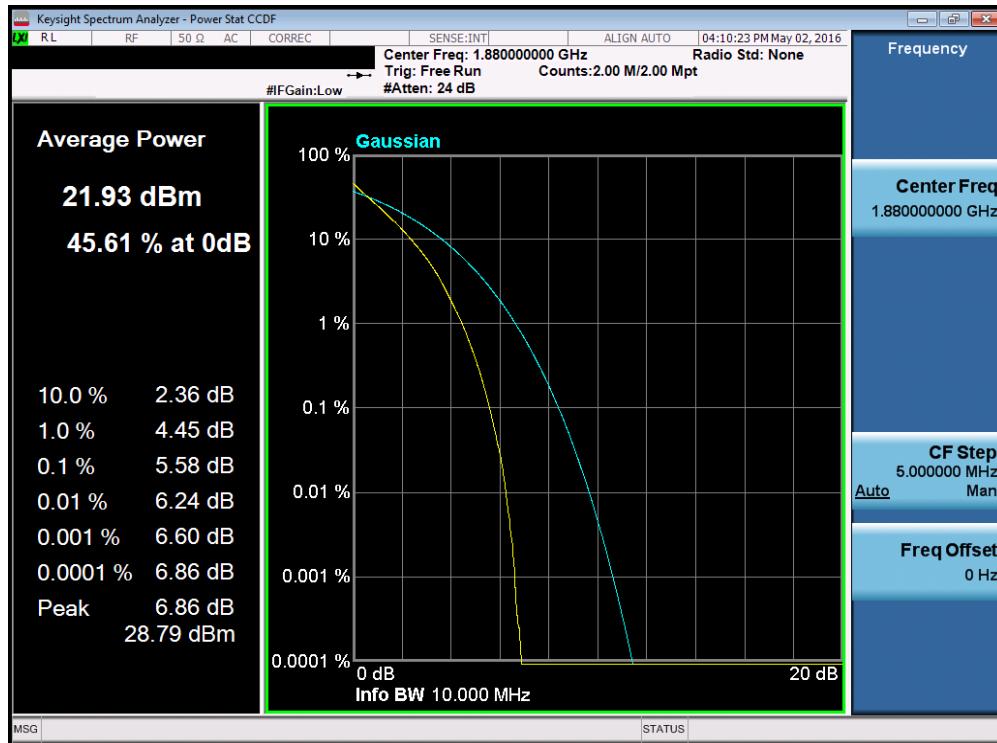


Plot 7-145. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

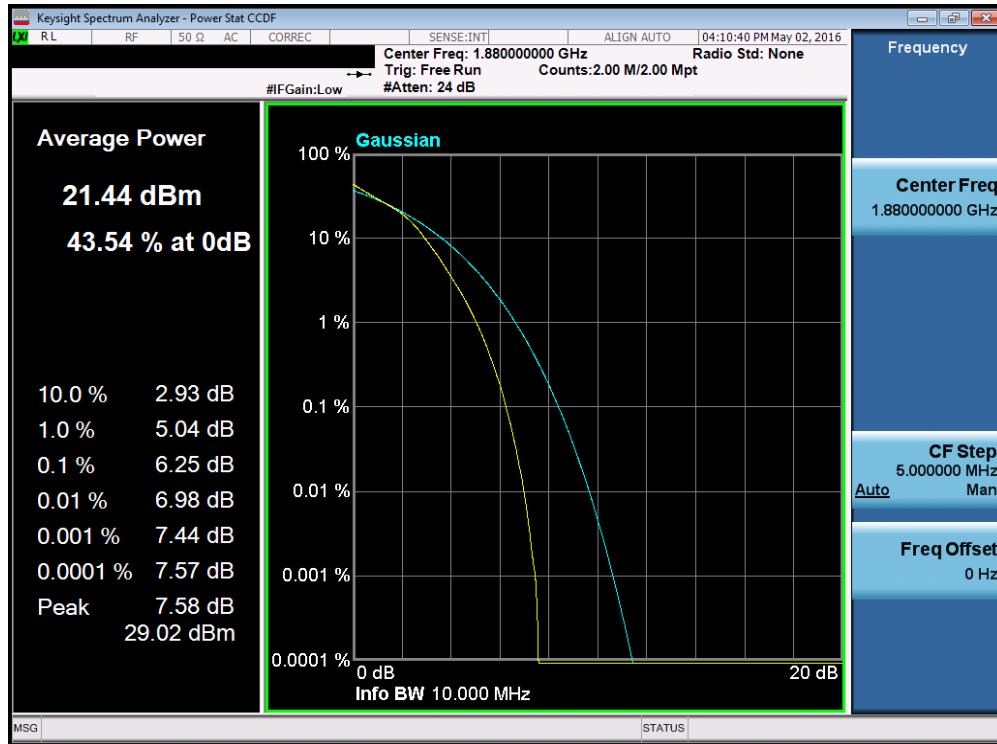


Plot 7-146. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 89 of 116

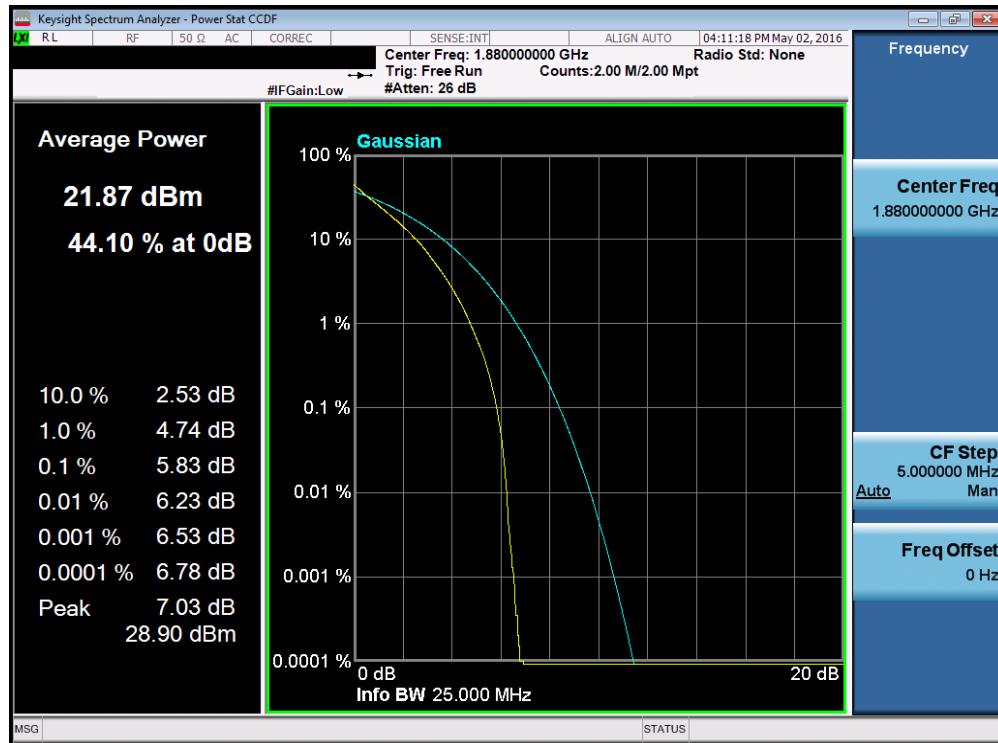


Plot 7-147. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

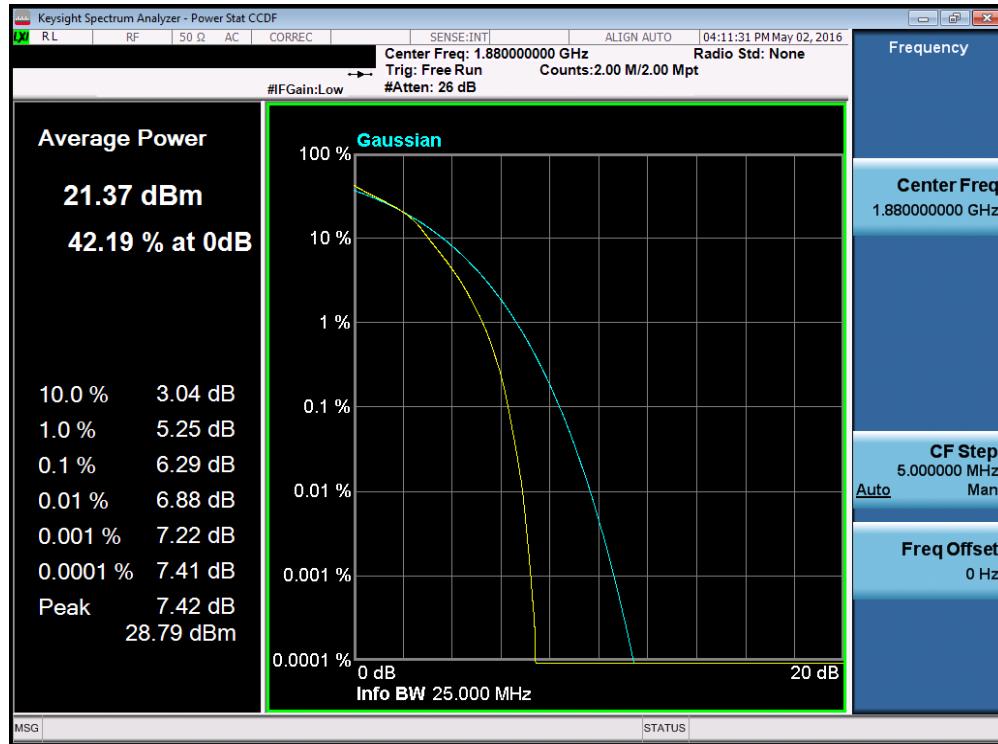


Plot 7-148. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 90 of 116

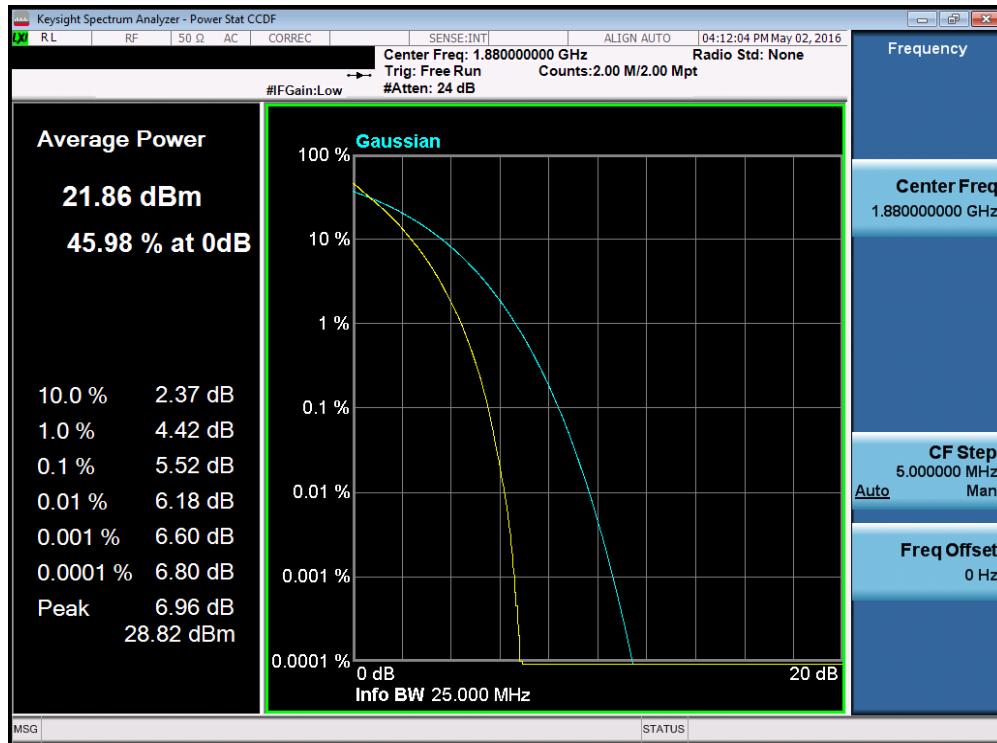


Plot 7-149. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

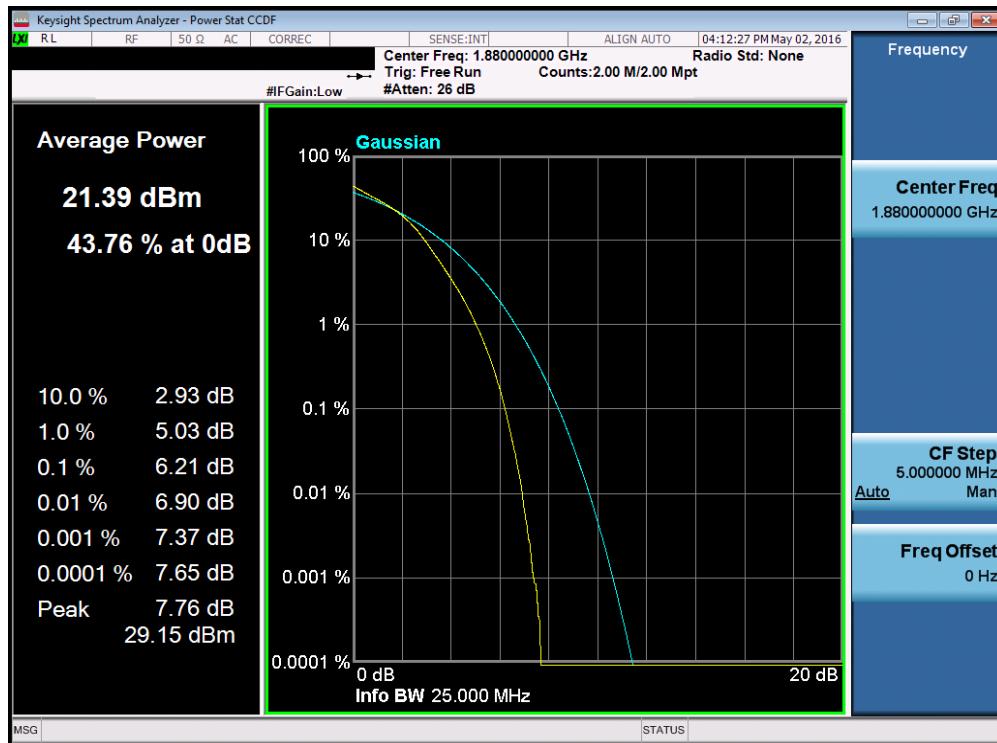


Plot 7-150. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 91 of 116



Plot 7-151. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-152. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 92 of 116

## 7.6 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(c.10) §27.50(d.4)

### Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically 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-C-2004 – Section 2.2.17

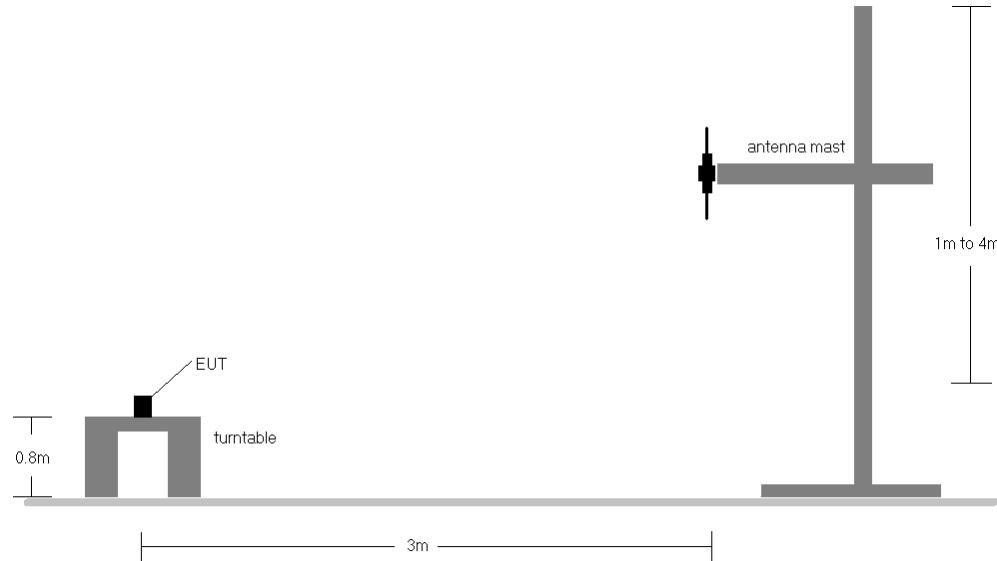
### Test Settings

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

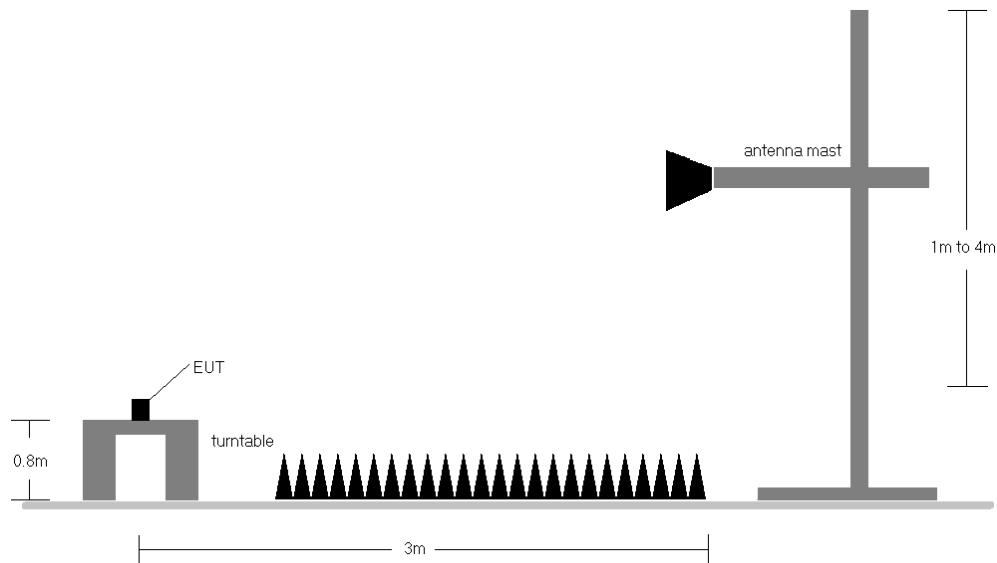
FCC ID: A3LSMG550T	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 93 of 116

## 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: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 94 of 116

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	235	256	1 / 5	14.41	2.11	16.52	34.77	-18.25
707.50	1.4	QPSK	H	235	254	3 / 2	15.42	2.31	17.73	34.77	-17.04
715.30	1.4	QPSK	H	227	82	1 / 5	16.50	2.52	19.02	34.77	-15.75
699.70	1.4	16-QAM	H	235	256	1 / 5	11.90	2.11	14.01	34.77	-20.76
707.50	1.4	16-QAM	H	235	254	3 / 2	13.27	2.31	15.58	34.77	-19.19
715.30	1.4	16-QAM	H	227	82	1 / 5	13.93	2.52	16.45	34.77	-18.32
700.50	3	QPSK	H	235	244	1 / 14	14.53	2.12	16.65	34.77	-18.12
707.50	3	QPSK	H	235	259	1 / 14	15.45	2.31	17.76	34.77	-17.01
714.50	3	QPSK	H	240	263	1 / 14	16.40	2.50	18.90	34.77	-15.87
700.50	3	16-QAM	H	235	244	1 / 14	12.10	2.12	14.22	34.77	-20.55
707.50	3	16-QAM	H	235	259	1 / 14	12.99	2.31	15.30	34.77	-19.47
714.50	3	16-QAM	H	240	263	1 / 14	13.87	2.50	16.37	34.77	-18.40
701.50	5	QPSK	H	235	257	1 / 24	15.04	2.15	17.19	34.77	-17.58
707.50	5	QPSK	H	236	251	1 / 24	15.62	2.31	17.93	34.77	-16.84
713.50	5	QPSK	H	240	249	1 / 24	16.23	2.48	18.71	34.77	-16.07
701.50	5	16-QAM	H	235	257	1 / 24	12.68	2.15	14.83	34.77	-19.94
707.50	5	16-QAM	H	236	251	1 / 24	13.43	2.31	15.74	34.77	-19.03
713.50	5	16-QAM	H	240	249	1 / 24	14.17	2.48	16.65	34.77	-18.13
704.00	10	QPSK	H	231	72	1 / 49	16.56	2.22	18.78	34.77	-16.00
707.50	10	QPSK	H	234	57	1 / 49	17.31	2.31	19.62	34.77	-15.15
711.00	10	QPSK	H	238	74	1 / 49	17.63	2.41	20.04	34.77	-14.73
704.00	10	16-QAM	H	231	72	1 / 49	14.14	2.22	16.36	34.77	-18.42
707.50	10	16-QAM	H	234	57	1 / 49	14.96	2.31	17.27	34.77	-17.50
711.00	10	16-QAM	H	238	74	1 / 49	15.41	2.41	17.82	34.77	-16.95
711.00	10	QPSK	V	166	74	1 / 49	15.08	2.96	18.04	34.77	-16.73

Table 7-2. ERP Data (Band 12)

FCC ID: A3LSMG550T	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)					 SAMSUNG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset						Page 95 of 116
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	198	55	1 / 0	14.99	5.01	20.00	38.45	-18.45
836.50	1.4	QPSK	H	203	63	1 / 0	15.31	5.16	20.47	38.45	-17.98
848.30	1.4	QPSK	H	196	69	1 / 0	15.13	5.30	20.43	38.45	-18.02
824.70	1.4	16-QAM	H	198	55	1 / 0	13.09	5.01	18.10	38.45	-20.35
836.50	1.4	16-QAM	H	203	63	1 / 0	13.41	5.16	18.57	38.45	-19.88
848.30	1.4	16-QAM	H	196	69	1 / 0	13.23	5.30	18.53	38.45	-19.92
825.50	3	QPSK	H	198	67	1 / 0	15.03	5.02	20.05	38.45	-18.40
836.50	3	QPSK	H	203	68	1 / 0	15.47	5.16	20.63	38.45	-17.82
847.50	3	QPSK	H	196	60	1 / 0	15.37	5.29	20.66	38.45	-17.79
825.50	3	16-QAM	H	198	67	1 / 0	13.13	5.02	18.15	38.45	-20.30
836.50	3	16-QAM	H	203	68	1 / 0	13.57	5.16	18.73	38.45	-19.72
847.50	3	16-QAM	H	196	60	1 / 0	13.47	5.29	18.76	38.45	-19.69
826.50	5	QPSK	H	198	63	1 / 0	15.02	5.06	20.08	38.45	-18.37
836.50	5	QPSK	H	206	67	1 / 0	15.24	5.16	20.40	38.45	-18.05
846.50	5	QPSK	H	195	68	1 / 0	14.84	5.25	20.09	38.45	-18.36
826.50	5	16-QAM	H	198	63	1 / 49	12.93	5.06	17.99	38.45	-20.46
836.50	5	16-QAM	H	206	67	1 / 0	12.67	5.16	17.83	38.45	-20.62
846.50	5	16-QAM	H	195	68	1 / 0	12.61	5.25	17.86	38.45	-20.59
829.00	10	QPSK	H	198	67	1 / 49	15.37	5.06	20.43	38.45	-18.02
836.50	10	QPSK	H	203	58	1 / 0	15.63	5.16	20.79	38.45	-17.66
844.00	10	QPSK	H	196	60	1 / 0	15.53	5.25	20.78	38.45	-17.67
829.00	10	16-QAM	H	198	67	1 / 49	13.28	5.06	18.34	38.45	-20.11
836.50	10	16-QAM	H	203	58	1 / 0	13.22	5.16	18.38	38.45	-20.07
844.00	10	16-QAM	H	196	60	1 / 0	13.30	5.25	18.55	38.45	-19.90
836.50	10	QPSK	V	134	0	1 / 0	13.00	5.00	18.00	38.45	-20.45

Table 7-3. ERP Data (Band 5)

FCC ID: A3LSMG550T	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)				 Reviewed by: Quality Manager	
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset					Page 96 of 116
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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	113	95	3 / 2	13.43	9.84	23.27	30.00	-6.73
1732.50	1.4	QPSK	H	110	78	3 / 2	12.66	9.78	22.44	30.00	-7.56
1754.30	1.4	QPSK	H	110	74	3 / 2	12.25	9.73	21.98	30.00	-8.02
1710.70	1.4	16-QAM	H	113	95	3 / 2	10.95	9.84	20.79	30.00	-9.21
1732.50	1.4	16-QAM	H	110	78	3 / 2	10.37	9.78	20.15	30.00	-9.85
1754.30	1.4	16-QAM	H	110	74	3 / 2	10.01	9.73	19.74	30.00	-10.26
1711.50	3	QPSK	H	112	95	1 / 0	13.44	9.84	23.28	30.00	-6.72
1732.50	3	QPSK	H	114	75	1 / 0	13.03	9.78	22.81	30.00	-7.19
1753.50	3	QPSK	H	110	73	1 / 0	12.03	9.74	21.77	30.00	-8.23
1711.50	3	16-QAM	H	112	95	1 / 0	11.17	9.84	21.01	30.00	-8.99
1732.50	3	16-QAM	H	114	75	1 / 0	10.52	9.78	20.30	30.00	-9.70
1753.50	3	16-QAM	H	110	73	1 / 0	9.57	9.74	19.31	30.00	-10.69
1712.50	5	QPSK	H	113	76	1 / 0	13.25	9.83	23.08	30.00	-6.92
1732.50	5	QPSK	H	115	70	1 / 0	12.88	9.78	22.66	30.00	-7.34
1752.50	5	QPSK	H	110	79	1 / 0	12.15	9.74	21.89	30.00	-8.11
1712.50	5	16-QAM	H	113	76	1 / 0	10.94	9.83	20.77	30.00	-9.23
1732.50	5	16-QAM	H	115	70	1 / 0	10.52	9.78	20.30	30.00	-9.70
1752.50	5	16-QAM	H	110	79	1 / 0	10.15	9.74	19.89	30.00	-10.11
1715.00	10	QPSK	H	115	95	1 / 0	13.42	9.83	23.25	30.00	-6.75
1732.50	10	QPSK	H	118	70	1 / 0	13.03	9.78	22.81	30.00	-7.19
1750.00	10	QPSK	H	110	76	1 / 0	12.46	9.74	22.20	30.00	-7.80
1715.00	10	16-QAM	H	115	95	1 / 0	11.26	9.83	21.09	30.00	-8.91
1732.50	10	16-QAM	H	118	70	1 / 0	10.51	9.78	20.29	30.00	-9.71
1750.00	10	16-QAM	H	110	76	1 / 0	10.29	9.74	20.03	30.00	-9.97
1717.50	15	QPSK	H	115	94	1 / 0	13.43	9.82	23.25	30.00	-6.75
1732.50	15	QPSK	H	119	75	1 / 0	13.22	9.78	23.00	30.00	-7.00
1747.50	15	QPSK	H	110	68	1 / 0	12.73	9.75	22.48	30.00	-7.52
1717.50	15	16-QAM	H	115	94	1 / 0	11.29	9.82	21.11	30.00	-8.89
1732.50	15	16-QAM	H	119	75	1 / 0	10.61	9.78	20.39	30.00	-9.61
1747.50	15	16-QAM	H	110	68	1 / 0	10.57	9.75	20.32	30.00	-9.68
1720.00	20	QPSK	H	116	81	1 / 0	12.86	9.81	22.67	30.00	-7.33
1732.50	20	QPSK	H	115	76	1 / 0	13.69	9.78	23.47	30.00	-6.53
1745.00	20	QPSK	H	110	73	1 / 0	13.03	9.76	22.79	30.00	-7.21
1720.00	20	16-QAM	H	116	81	1 / 0	10.50	9.81	20.31	30.00	-9.69
1732.50	20	16-QAM	H	115	76	1 / 0	11.39	9.78	21.17	30.00	-8.83
1745.00	20	16-QAM	H	110	73	1 / 0	10.87	9.76	20.63	30.00	-9.37
1732.50	20	QPSK	V	130	80	1 / 0	12.09	9.78	21.87	30.00	-8.13

**Table 7-4. EIRP Data (Band 4)**

FCC ID: A3LSMG550T	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)							Reviewed by:  Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset						Page 97 of 116
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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	263	171	1 / 5	14.68	9.54	24.22	33.01	-8.79
1880.00	1.4	QPSK	H	323	136	1 / 5	12.83	9.50	22.33	33.01	-10.68
1909.30	1.4	QPSK	H	321	170	1 / 5	11.75	9.48	21.23	33.01	-11.78
1850.70	1.4	16-QAM	H	263	171	1 / 5	13.23	9.54	22.77	33.01	-10.24
1880.00	1.4	16-QAM	H	323	136	1 / 5	11.33	9.50	20.83	33.01	-12.18
1909.30	1.4	16-QAM	H	321	170	1 / 5	10.50	9.48	19.98	33.01	-13.03
1851.50	3	QPSK	H	280	160	1 / 14	14.44	9.54	23.98	33.01	-9.03
1880.00	3	QPSK	H	259	170	1 / 0	15.06	9.50	24.56	33.01	-8.45
1908.50	3	QPSK	H	279	349	1 / 14	12.09	9.48	21.57	33.01	-11.44
1851.50	3	16-QAM	H	280	160	1 / 14	12.71	9.54	22.25	33.01	-10.76
1880.00	3	16-QAM	H	259	170	1 / 14	13.18	9.50	22.68	33.01	-10.33
1908.50	3	16-QAM	H	279	349	1 / 14	10.18	9.48	19.66	33.01	-13.35
1852.50	5	QPSK	H	268	160	1 / 24	15.35	9.54	24.89	33.01	-8.12
1880.00	5	QPSK	H	270	155	1 / 0	13.89	9.50	23.39	33.01	-9.62
1907.50	5	QPSK	H	100	157	1 / 24	13.05	9.48	22.53	33.01	-10.48
1852.50	5	16-QAM	H	268	160	1 / 24	13.50	9.54	23.04	33.01	-9.97
1880.00	5	16-QAM	H	270	155	1 / 0	12.28	9.50	21.78	33.01	-11.23
1907.50	5	16-QAM	H	100	157	1 / 24	11.36	9.48	20.84	33.01	-12.17
1855.00	10	QPSK	H	265	175	1 / 0	15.68	9.54	25.22	33.01	-7.79
1880.00	10	QPSK	H	259	170	1 / 0	15.89	9.50	25.39	33.01	-7.62
1880.00	10	QPSK	V	259	170	1 / 0	15.30	9.27	24.57	33.01	-8.44
1905.00	10	QPSK	H	263	345	1 / 0	14.53	9.47	24.00	33.01	-9.01
1855.00	10	16-QAM	H	265	175	1 / 0	13.82	9.54	23.36	33.01	-9.65
1880.00	10	16-QAM	H	259	170	1 / 0	14.03	9.50	23.53	33.01	-9.48
1905.00	10	16-QAM	H	263	345	1 / 0	12.93	9.47	22.40	33.01	-10.61
1857.50	15	QPSK	H	273	171	1 / 0	15.09	9.53	24.62	33.01	-8.39
1880.00	15	QPSK	H	258	167	1 / 0	15.77	9.50	25.27	33.01	-7.74
1902.50	15	QPSK	H	262	339	1 / 0	14.80	9.47	24.27	33.01	-8.74
1857.50	15	16-QAM	H	273	171	1 / 0	13.36	9.53	22.89	33.01	-10.12
1880.00	15	16-QAM	H	258	167	1 / 0	13.99	9.50	23.49	33.01	-9.52
1902.50	15	16-QAM	H	262	339	1 / 0	13.14	9.47	22.61	33.01	-10.40
1860.00	20	QPSK	H	267	190	1 / 99	14.20	9.53	23.73	33.01	-9.28
1880.00	20	QPSK	H	260	192	1 / 99	13.46	9.50	22.96	33.01	-10.05
1900.00	20	QPSK	H	253	196	1 / 0	13.40	9.46	22.86	33.01	-10.15
1860.00	20	16-QAM	H	267	190	1 / 99	12.52	9.53	22.05	33.01	-10.96
1880.00	20	16-QAM	H	260	192	1 / 99	11.74	9.50	21.24	33.01	-11.77
1900.00	20	16-QAM	H	253	196	1 / 0	11.44	9.46	20.90	33.01	-12.11

Table 7-5. EIRP Data (Band 2)

FCC ID: A3LSMG550T	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)							Reviewed by:  Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset						
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## 7.7 Radiated Spurious Emissions Measurements

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

### Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

### Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-C-2004 – Section 2.2.12

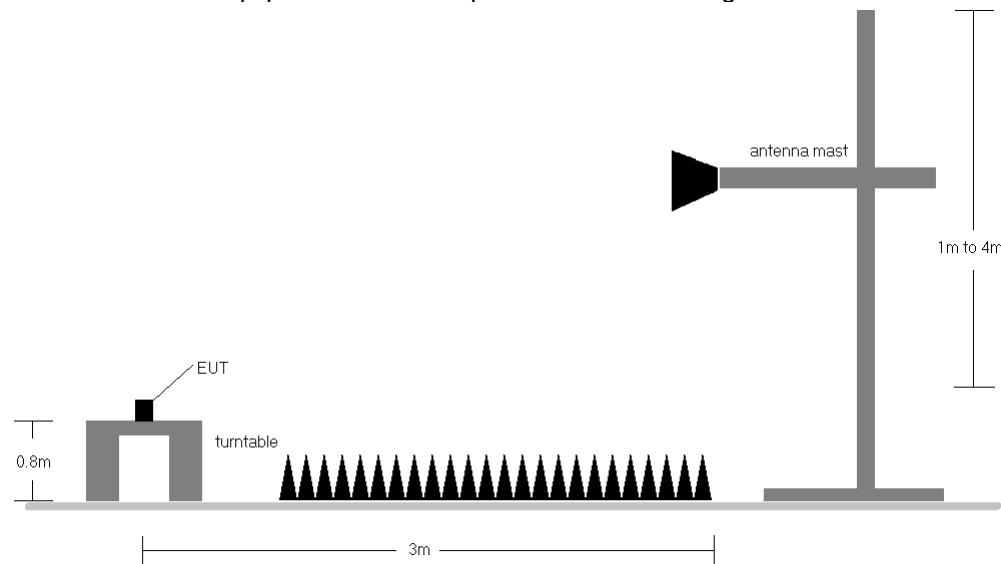
### Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW  $\geq$  3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points  $\geq$  2 x span / RBW
5. Detector = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize

FCC ID: A3LSMG550T	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 99 of 116

## 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: A3LSMG550T	 <b>PCTEST</b> <small>ENGINEERING LABORATORY, INC.</small>	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT <small>(CERTIFICATION)</small>		Reviewed by: <small>Quality Manager</small>
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 100 of 116



OPERATING FREQUENCY: 704.00 MHz  
 CHANNEL: 23060  
 MEASURED OUTPUT POWER: 18.78 dBm = 0.075 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  31.78 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]
1408.00	H	158	41	-55.42	2.51	-52.91	71.7
2112.00	H	326	33	-44.73	2.98	-41.75	60.5
2816.00	H	204	13	-55.76	4.75	-51.02	69.8
3520.00	H	197	171	-54.73	6.27	-48.46	67.2
4224.00	H	-	-	-56.18	7.12	-49.06	67.8

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

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 MEASURED OUTPUT POWER: 19.62 dBm = 0.092 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  32.62 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	151	0	-55.95	2.59	-53.36	73.0
2122.50	H	121	351	-44.10	3.02	-41.08	60.7
2830.00	H	191	293	-56.28	4.74	-51.54	71.2
3537.50	H	197	256	-56.23	6.28	-49.95	69.6
4245.00	H	-	-	-56.10	7.14	-48.95	68.6

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

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 101 of 116

OPERATING FREQUENCY: 711.00 MHz  
 CHANNEL: 23130  
 MEASURED OUTPUT POWER: 20.04 dBm = 0.101 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.04 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBD]	Spurious Emission Level [dBm]	[dBc]
1422.00	H	159	365	-49.88	2.66	-47.22	67.3
2133.00	H	320	31	-50.55	3.05	-47.50	67.5
2844.00	H	194	14	-55.73	4.73	-51.00	71.0
3555.00	H	191	255	-56.42	6.30	-50.12	70.2
4266.00	H	-	-	-55.98	7.17	-48.82	68.9

Table 7-8. Radiated Spurious Data (Band 12 – High Channel)

OPERATING FREQUENCY: 829.00 MHz  
 CHANNEL: 20450  
 MEASURED OUTPUT POWER: 20.43 dBm = 0.111 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.43 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBD]	Spurious Emission Level [dBm]	[dBc]
1658.00	H	237	295	-55.00	6.70	-48.31	68.7
2487.00	H	248	9	-59.14	7.58	-51.56	72.0
3316.00	H	-	-	-60.69	7.42	-53.27	73.7

Table 7-9. Radiated Spurious Data (Band 5 – Low Channel)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 102 of 116

OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 20525  
 MEASURED OUTPUT POWER: 20.79 dBm = 0.120 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.79 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]
1673.00	H	232	303	-47.73	6.70	-41.03	61.8
2509.50	H	239	346	-62.39	7.63	-54.76	75.5
3346.00	H	-	-	-59.70	7.51	-52.19	73.0

Table 7-10. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY: 844.00 MHz  
 CHANNEL: 20600  
 MEASURED OUTPUT POWER: 20.78 dBm = 0.120 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.78 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	H	307	303	-55.86	6.70	-49.17	69.9
2532.00	H	-	-	-62.89	7.61	-55.29	76.1
3376.00	H	-	-	-60.75	7.61	-53.14	73.9

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

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset			Page 103 of 116



OPERATING FREQUENCY: 1720.00 MHz  
 CHANNEL: 20050  
 MEASURED OUTPUT POWER: 22.67 dBm = 0.185 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 20.0 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 [dBi]	Spurious Emission Level [dBm]	[dBc]
3440.00	H	110	190	-61.55	9.88	-51.66	74.3
5160.00	H	110	237	-56.77	10.75	-46.01	68.7
6880.00	H	113	252	-50.12	11.71	-38.42	61.1
8600.00	H	113	271	-48.50	11.07	-37.43	60.1
10320.00	H	-	-	-53.08	12.47	-40.61	63.3

Table 7-12. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 MEASURED OUTPUT POWER: 23.47 dBm = 0.223 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 20.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) = 36.47$  dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	H	110	188	-61.94	9.91	-52.03	75.5
5197.50	H	113	200	-58.68	10.75	-47.94	71.4
6930.00	H	110	232	-49.27	11.76	-37.51	61.0
8662.50	H	110	249	-53.24	11.00	-42.24	65.7
10395.00	H	-	-	-54.87	12.65	-42.22	65.7

Table 7-13. Radiated Spurious Data (Band 4 – Mid Channel)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 104 of 116

OPERATING FREQUENCY: 1745.00 MHz  
 CHANNEL: 20300  
 MEASURED OUTPUT POWER: 22.79 dBm = 0.190 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 20.0 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 [dBi]	Spurious Emission Level [dBm]	[dBc]
3490.00	H	110	155	-61.05	9.94	-51.11	73.9
5235.00	H	110	167	-58.71	10.72	-47.98	70.8
6980.00	H	110	200	-52.61	11.82	-40.79	63.6
8725.00	H	110	181	-52.59	10.96	-41.63	64.4
10470.00	H	-	-	-52.76	12.67	-40.09	62.9

Table 7-14. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY: 1855.00 MHz  
 CHANNEL: 18650  
 MEASURED OUTPUT POWER: 25.22 dBm = 0.332 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  38.22 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]
3710.00	H	123	248	-60.22	9.51	-50.71	75.9
5565.00	H	121	345	-55.80	11.06	-44.74	70.0
7420.00	H	124	337	-50.22	10.97	-39.25	64.5
9275.00	H	124	377	-55.12	11.53	-43.59	68.8
11130.00	H	-	-	-52.53	12.79	-39.74	65.0

Table 7-15. Radiated Spurious Data (Band 2 – Low Channel)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 105 of 116

OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 25.39 dBm = 0.346 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) = 38.39$  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	210	-58.54	9.39	-49.16	74.5
5640.00	H	112	217	-55.36	11.22	-44.13	69.5
7520.00	H	116	262	-52.93	11.10	-41.83	67.2
9400.00	H	115	268	-53.11	11.54	-41.57	67.0
11280.00	H	-	-	-52.48	12.76	-39.71	65.1

Table 7-16. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY: 1905.00 MHz  
 CHANNEL: 1915  
 MEASURED OUTPUT POWER: 24.00 dBm = 0.251 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) = 37.00$  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]
3810.00	H	115	234	-59.72	9.39	-50.34	74.3
5715.00	H	121	250	-53.36	11.22	-42.13	66.1
7620.00	H	118	289	-49.82	11.10	-38.72	62.7
9525.00	H	-	-	-54.41	11.54	-42.87	66.9

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

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 106 of 116

## 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-C-2004. The frequency stability of the transmitter is measured by:

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

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

### Test Procedure Used

ANSI/TIA-603-C-2004

### Test Settings

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

### Test Setup

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

### Test Notes

None

FCC ID: A3LSMG550T	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 107 of 116

## Band 12 Frequency Stability Measurements

**§2.1055 \$27.54**

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	707,500,260	260	0.0000367
100 %		- 30	707,500,287	287	0.0000406
100 %		- 20	707,499,723	-277	-0.0000392
100 %		- 10	707,499,785	-215	-0.0000304
100 %		0	707,499,930	-70	-0.0000099
100 %		+ 10	707,499,945	-55	-0.0000078
100 %		+ 20	707,499,992	-8	-0.0000011
100 %		+ 30	707,500,124	124	0.0000175
100 %		+ 40	707,499,961	-39	-0.0000055
100 %		+ 50	707,500,107	107	0.0000151
BATT. ENDPOINT	3.40	+ 20	707,499,878	-122	-0.0000172

**Table 7-18. Frequency Stability Data (Band 12)**

**Note:**

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

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 108 of 116

## Band 12 Frequency Stability Measurements

[\\$2.1055](#) [\\$27.54](#)

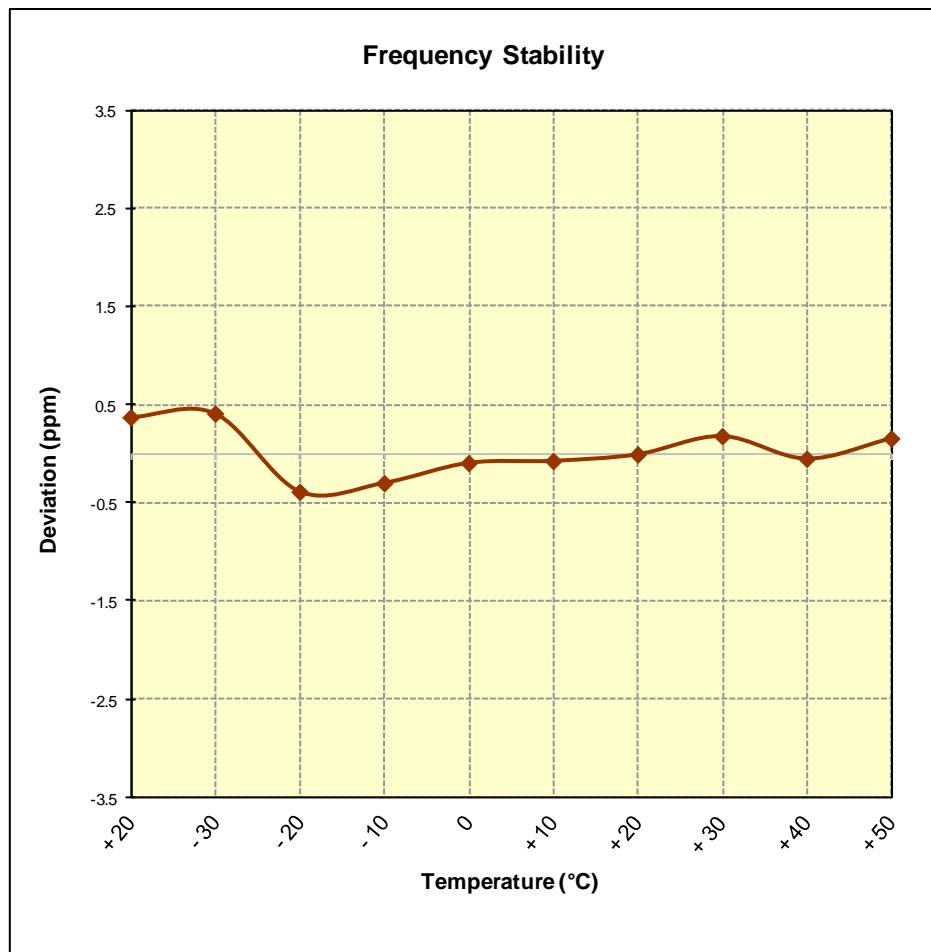


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 109 of 116



## Band 5 Frequency Stability Measurements

[\\$2.1055](#) [\\$22.355](#)

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,500,228	228	0.0000273
100 %		- 30	836,499,675	-325	-0.0000389
100 %		- 20	836,499,584	-416	-0.0000497
100 %		- 10	836,500,021	21	0.0000025
100 %		0	836,500,061	61	0.0000073
100 %		+ 10	836,499,650	-350	-0.0000418
100 %		+ 20	836,499,926	-74	-0.0000088
100 %		+ 30	836,500,070	70	0.0000084
100 %		+ 40	836,500,028	28	0.0000033
100 %		+ 50	836,499,902	-98	-0.0000117
BATT. ENDPOINT	3.40	+ 20	836,499,772	-228	-0.0000273

Table 7-19. Frequency Stability Data (Band 5)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 110 of 116

## Band 5 Frequency Stability Measurements

[\\$2.1055 \\$22.355](#)

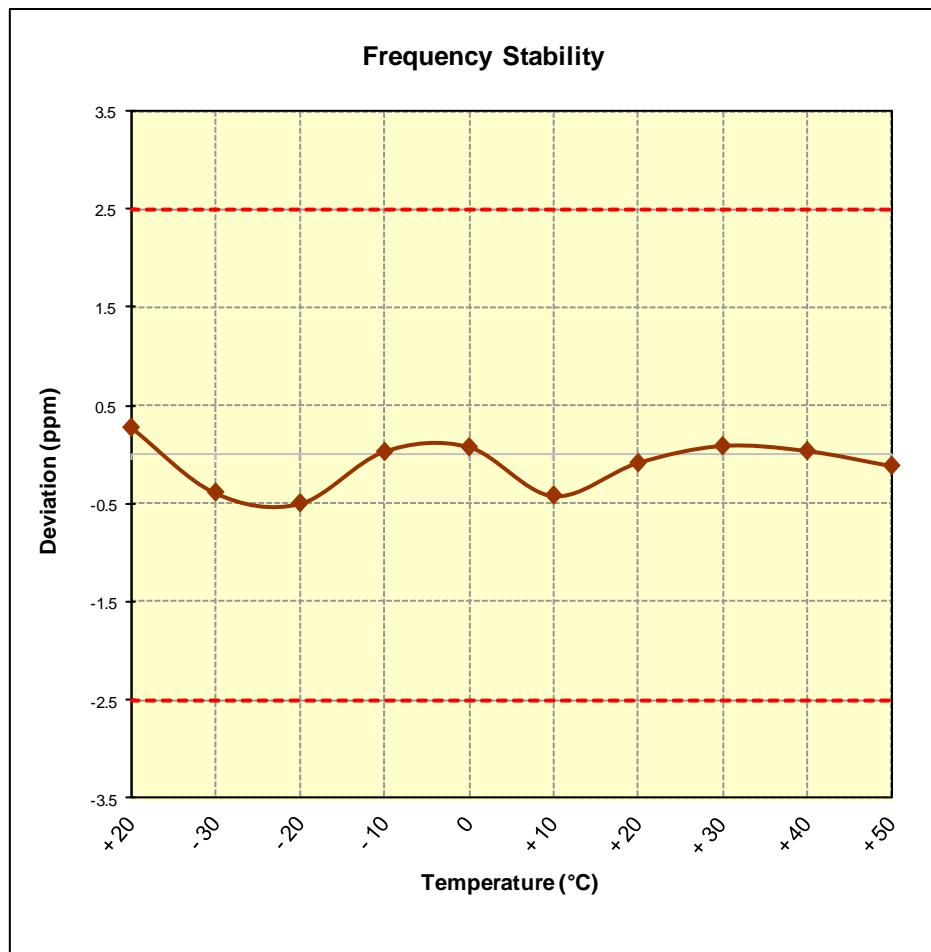


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 111 of 116

## Band 4 Frequency Stability Measurements

[\\$2.1055](#) [\\$27.54](#)

OPERATING FREQUENCY: 1,732,500,000 Hz  
 CHANNEL: 20175  
 REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,500,139	139	0.0000080
100 %		- 30	1,732,499,948	-52	-0.0000030
100 %		- 20	1,732,499,800	-200	-0.0000115
100 %		- 10	1,732,500,080	80	0.0000046
100 %		0	1,732,500,034	34	0.0000020
100 %		+ 10	1,732,499,677	-323	-0.0000186
100 %		+ 20	1,732,500,115	115	0.0000066
100 %		+ 30	1,732,499,830	-170	-0.0000098
100 %		+ 40	1,732,499,996	-4	-0.0000002
100 %		+ 50	1,732,499,995	-5	-0.0000003
BATT. ENDPOINT	3.40	+ 20	1,732,500,038	38	0.0000022

Table 7-20. Frequency Stability Data (Band 4)

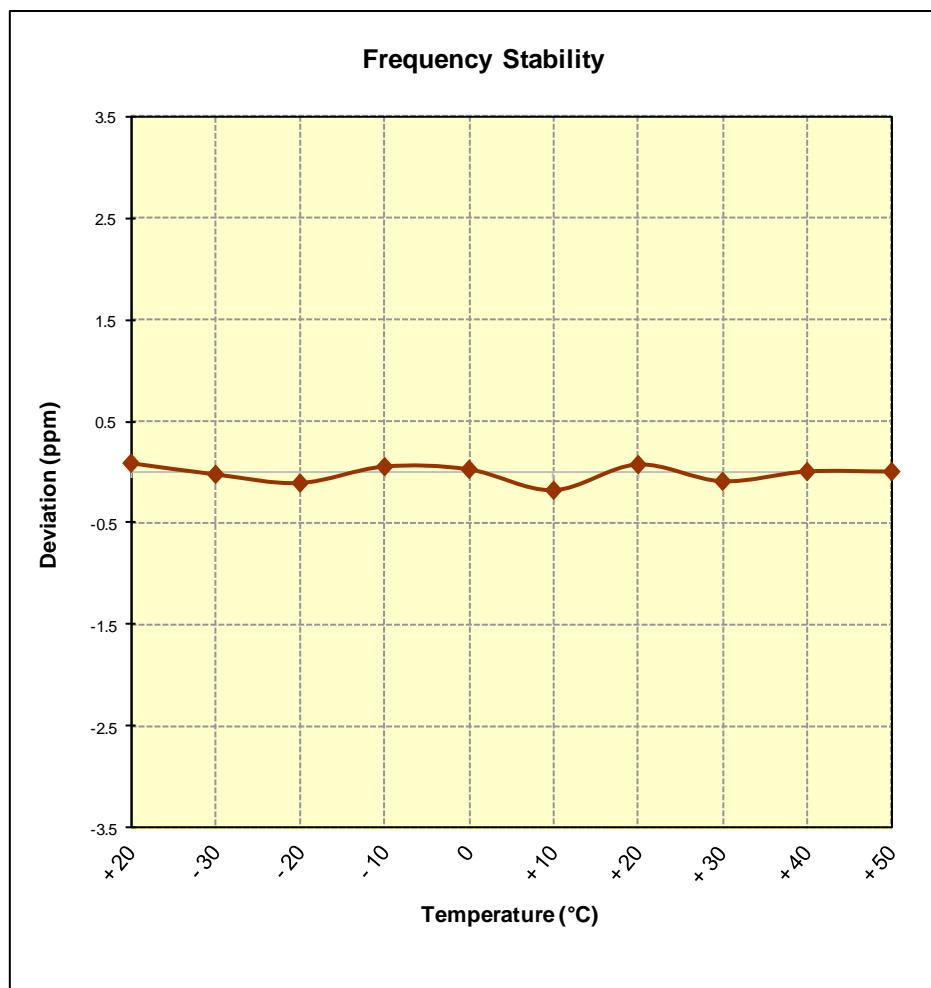
**Note:**

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

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 112 of 116

## Band 4 Frequency Stability Measurements

**\$2.1055 \$27.54**



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

FCC ID: A3LSMG550T	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 113 of 116



## Band 2 Frequency Stability Measurements

[\\$2.1055](#) [\\$24.235](#)

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,880,000,000	0	0.0000000
100 %		- 30	1,880,000,014	14	0.0000007
100 %		- 20	1,880,000,020	20	0.0000011
100 %		- 10	1,880,000,330	330	0.0000176
100 %		0	1,879,999,830	-170	-0.0000090
100 %		+ 10	1,880,000,122	122	0.0000065
100 %		+ 20	1,879,999,873	-127	-0.0000068
100 %		+ 30	1,879,999,866	-134	-0.0000071
100 %		+ 40	1,880,000,182	182	0.0000097
100 %		+ 50	1,880,000,046	46	0.0000024
BATT. ENDPOINT	3.40	+ 20	1,880,000,065	65	0.0000035

Table 7-21. 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.

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 114 of 116

## Band 2 Frequency Stability Measurements

[\\$2.1055](#) [\\$24.235](#)

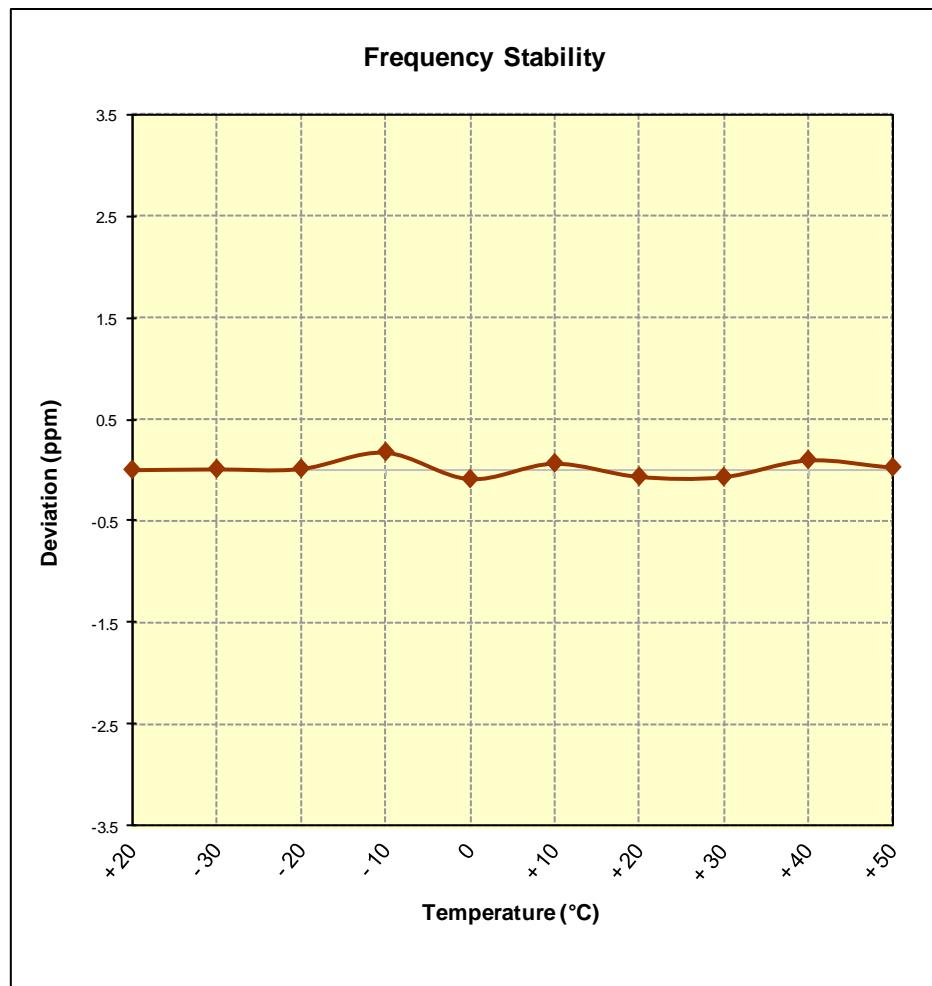


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset		Page 115 of 116

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset** **FCC ID: A3LSMG550T** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: A3LSMG550T		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		SAMSUNG	Reviewed by: Quality Manager
Test Report S/N: 0Y1604050705.A3L	Test Dates: 4/5-4/15/2016, 5/2/2016	EUT Type: Portable Handset			Page 116 of 116