

7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(h) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 v03 – 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 x RBW
5. Detector = RMS
6. Number of sweep points \geq 2 x 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.

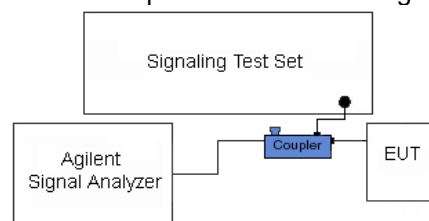


Figure 7-3. Test Instrument & Measurement Setup

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Test Notes

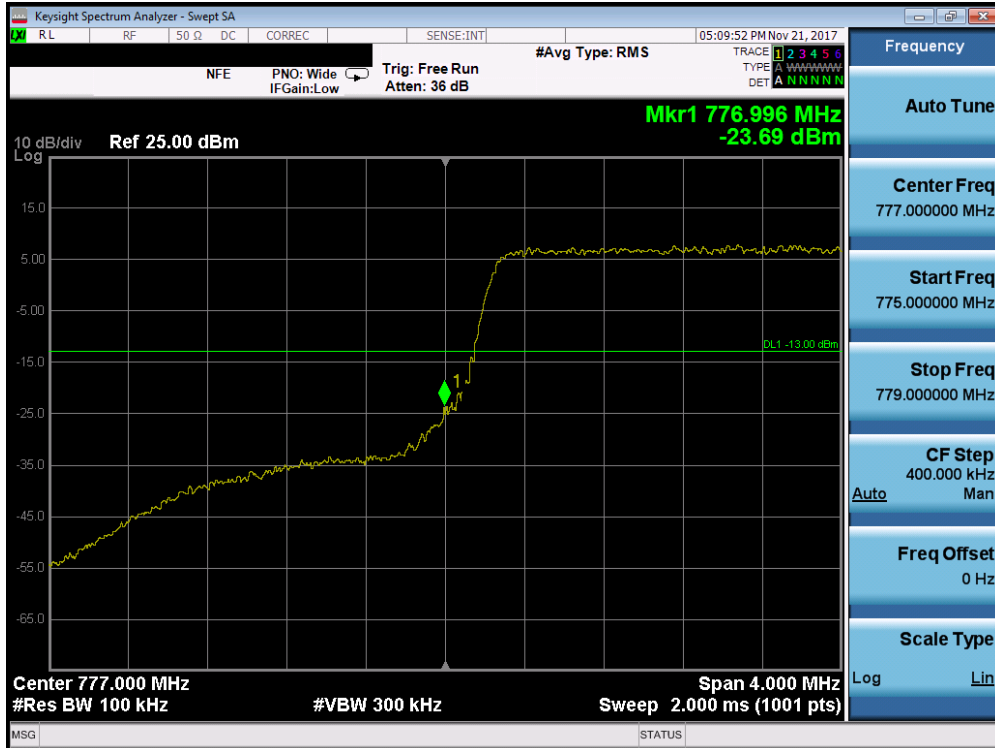
Per 22.917(b), 24.238(a), 27.53(h), RSS-130(4.6), RSS-132(5.5), RSS-133(6.5), and RSS-139(6.5) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed 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(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

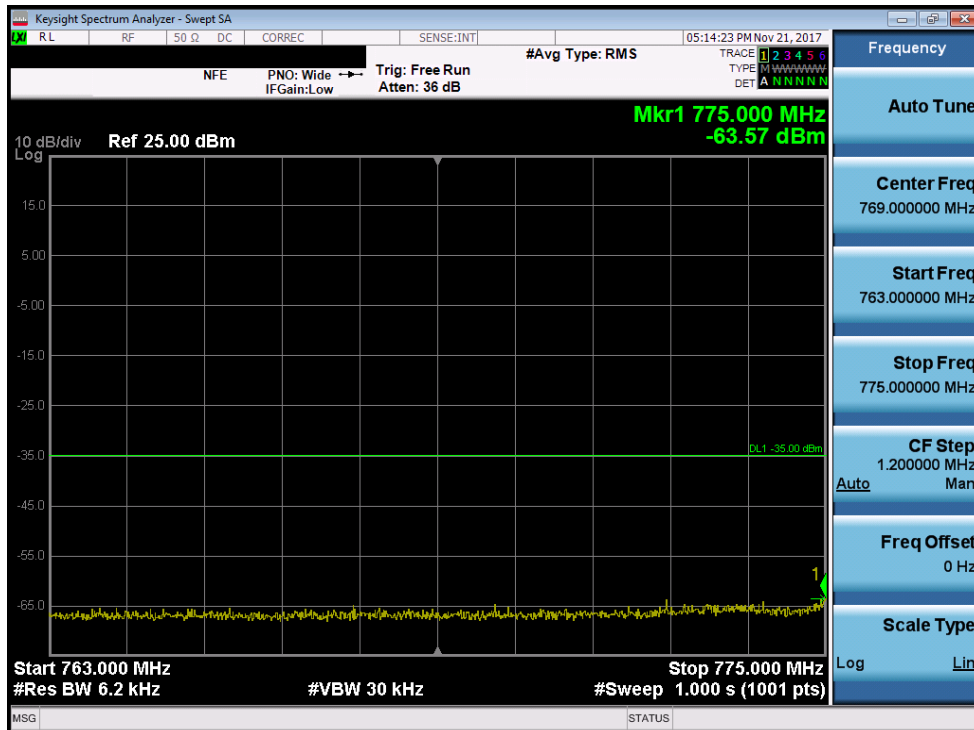
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is $65 + 10\log_{10}(P) = -35\text{dBm}$ in a 6.25kHz bandwidth.

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Band 13

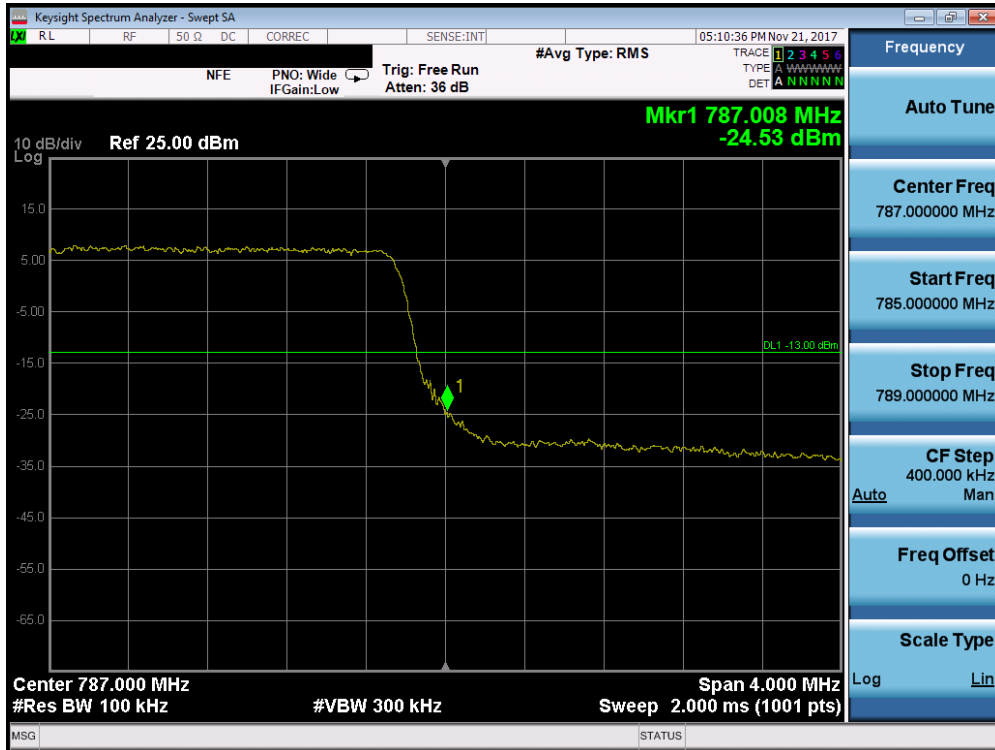


Plot 7-73. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

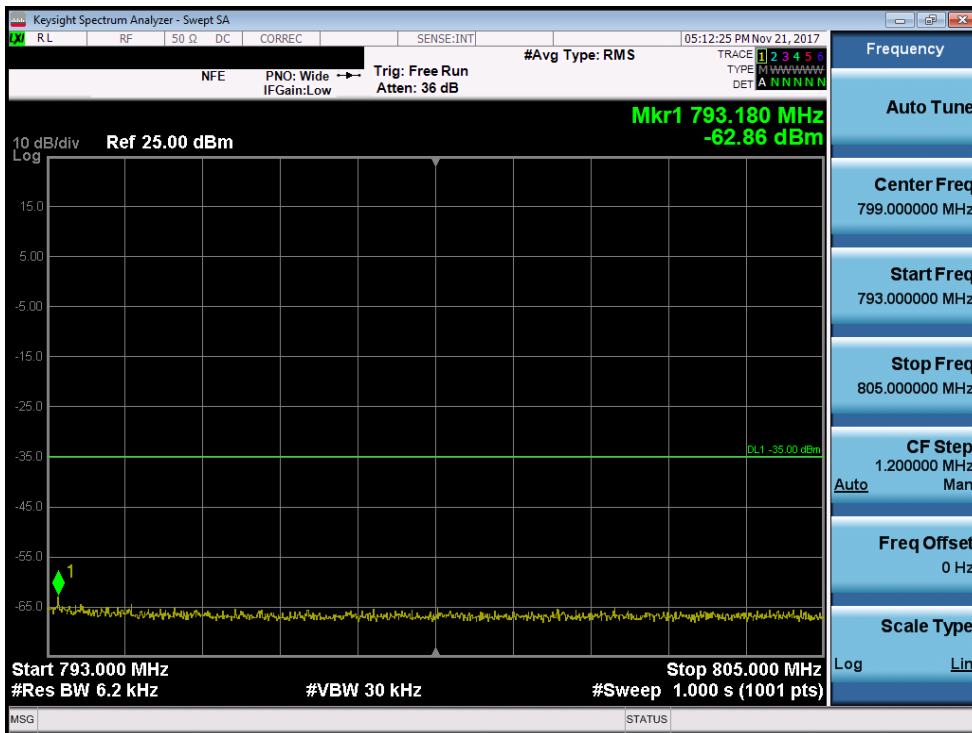


Plot 7-74. Lower Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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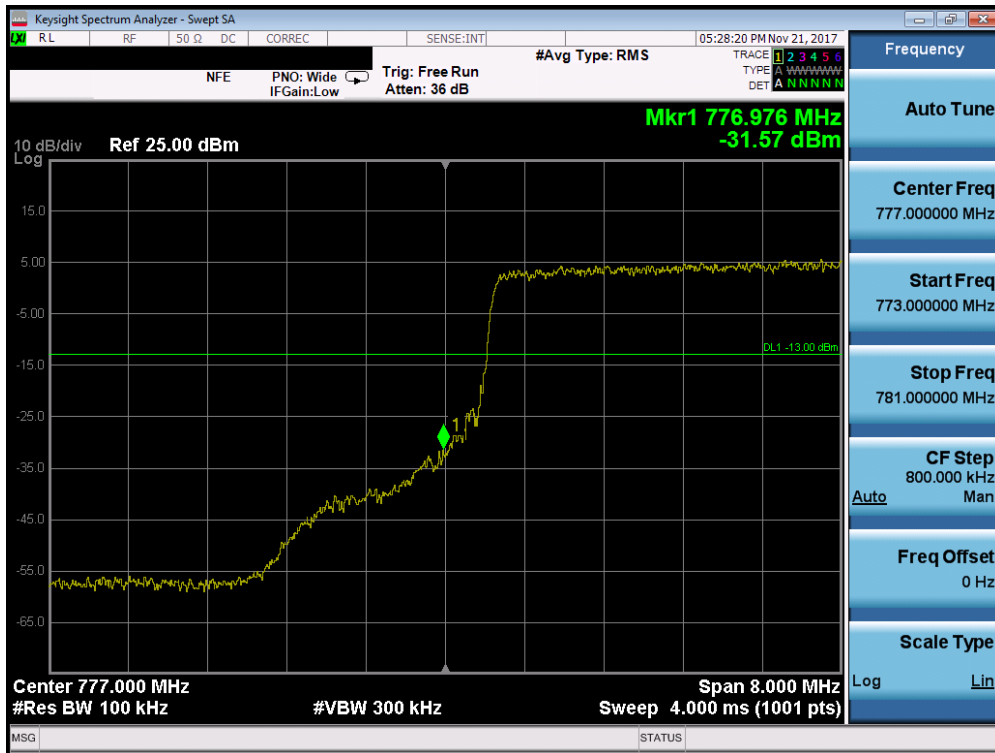
Plot 7-75. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



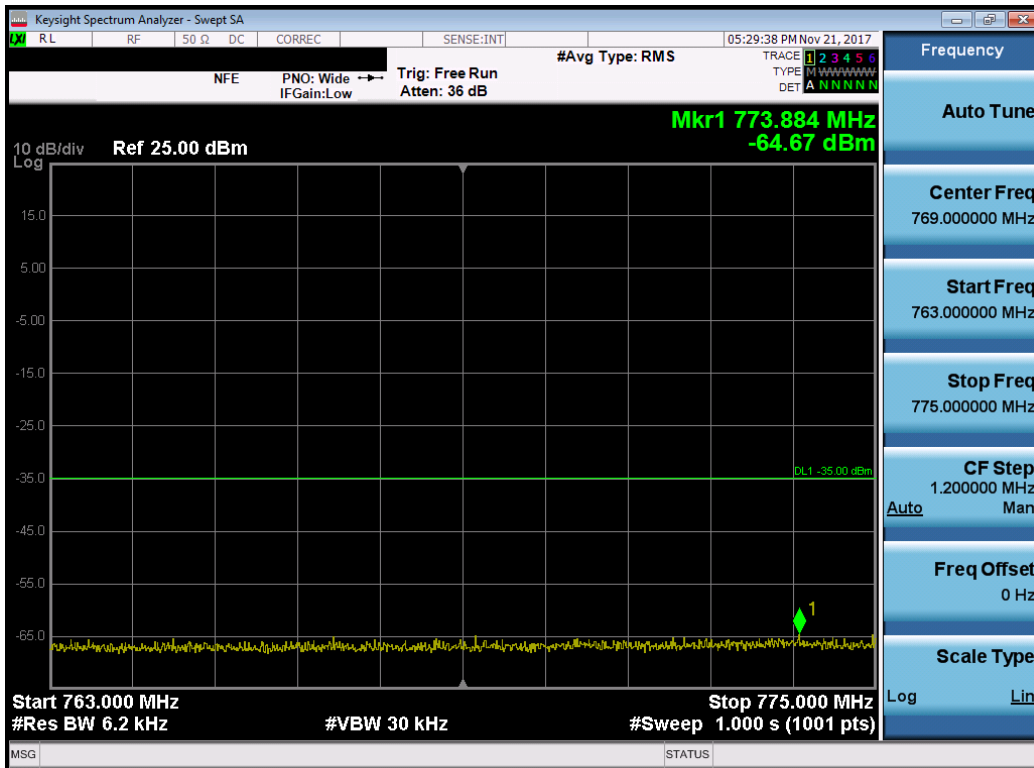
Plot 7-76. Upper Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Band 13

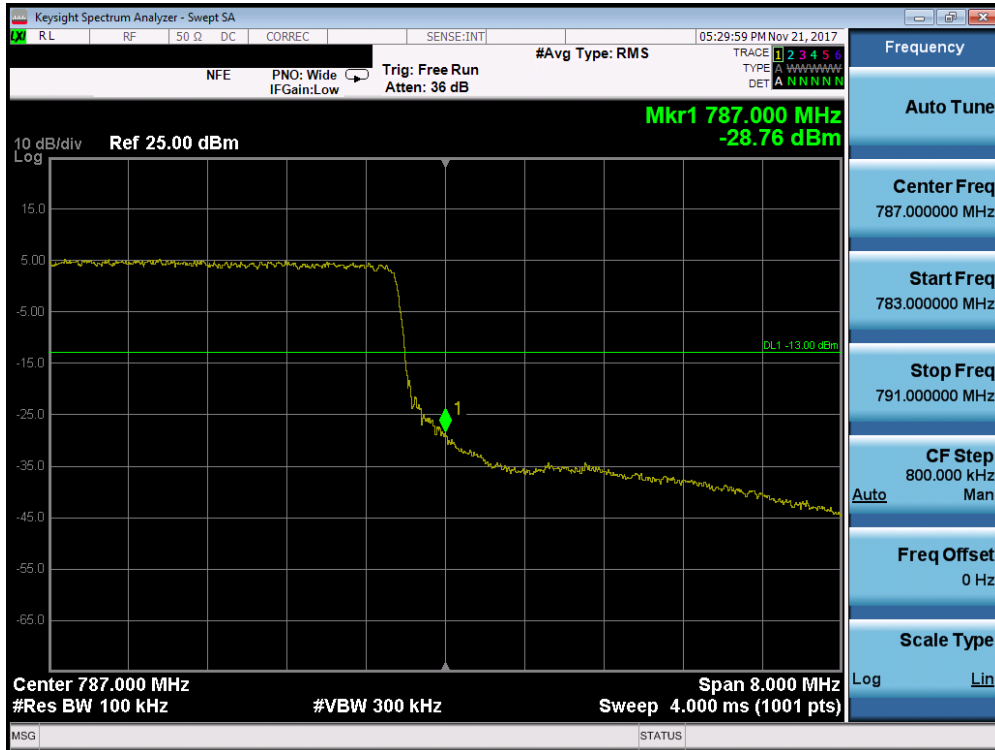


Plot 7-77. Lower Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

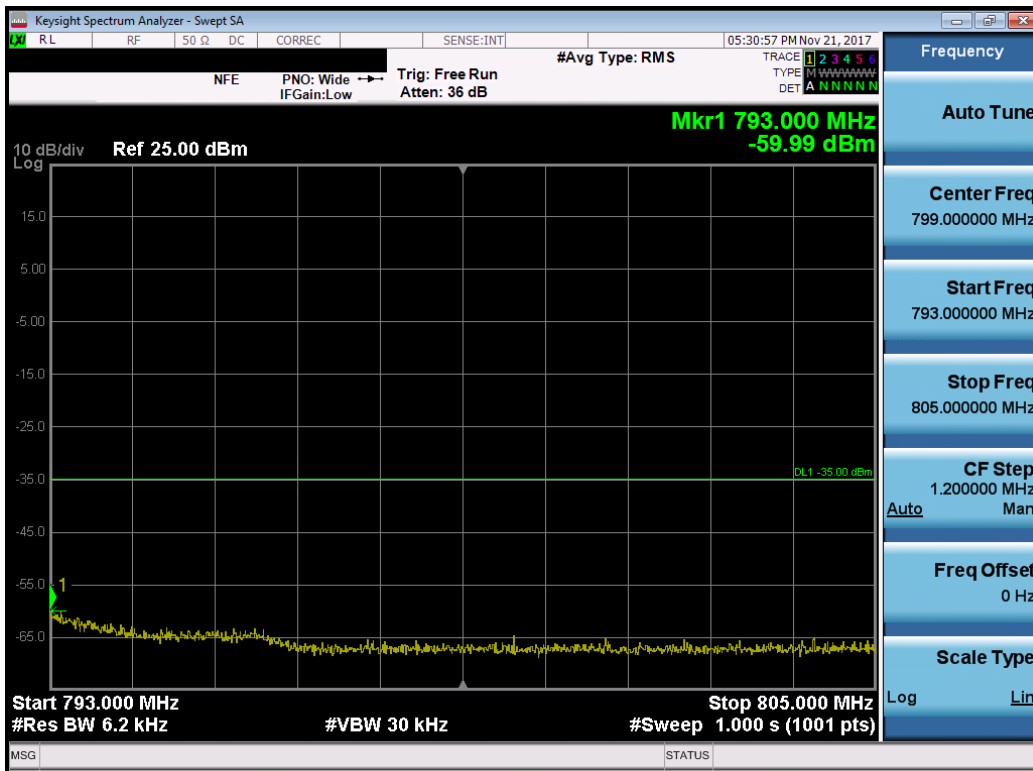


Plot 7-78. Lower Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
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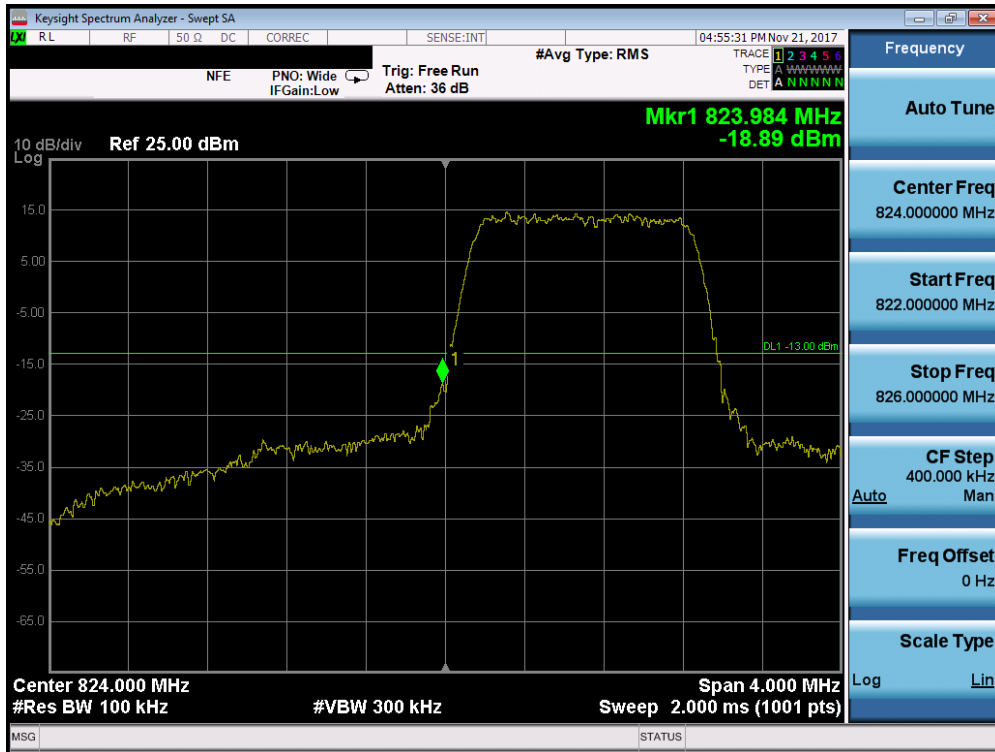
Plot 7-79. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



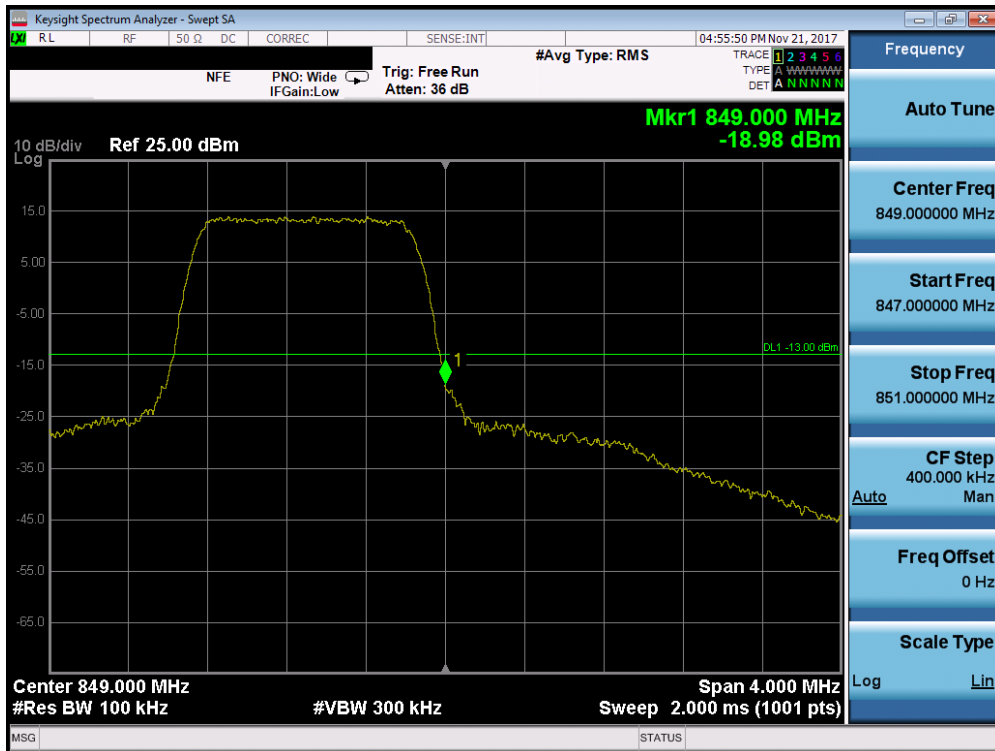
Plot 7-80. Upper Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Band 5



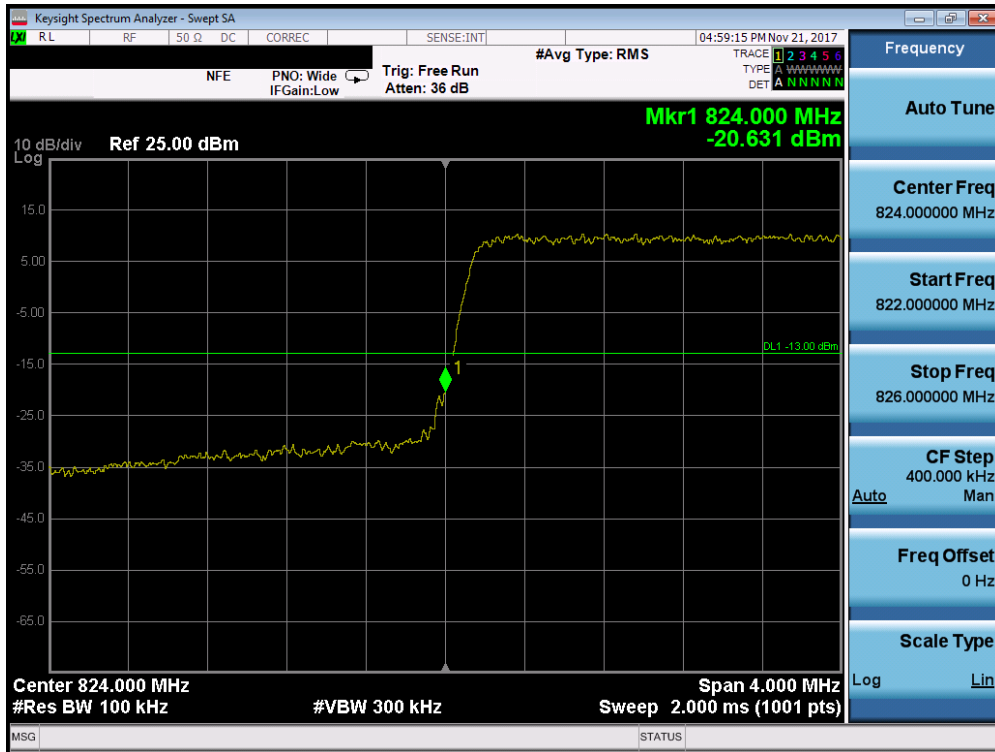
Plot 7-81. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



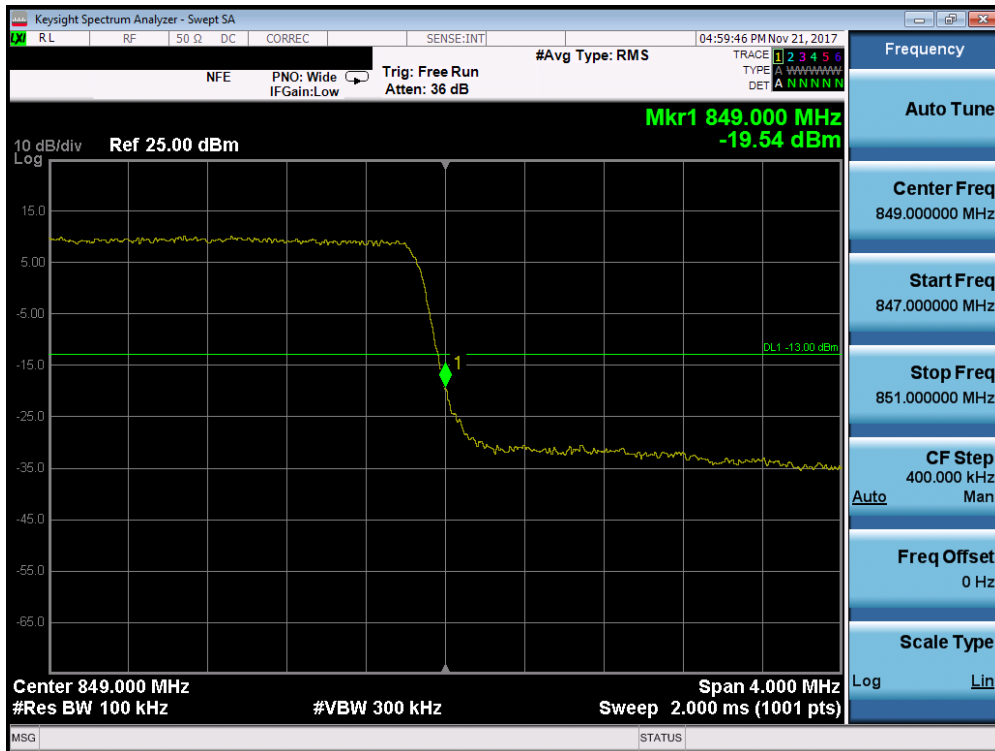
Plot 7-82. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Band 5



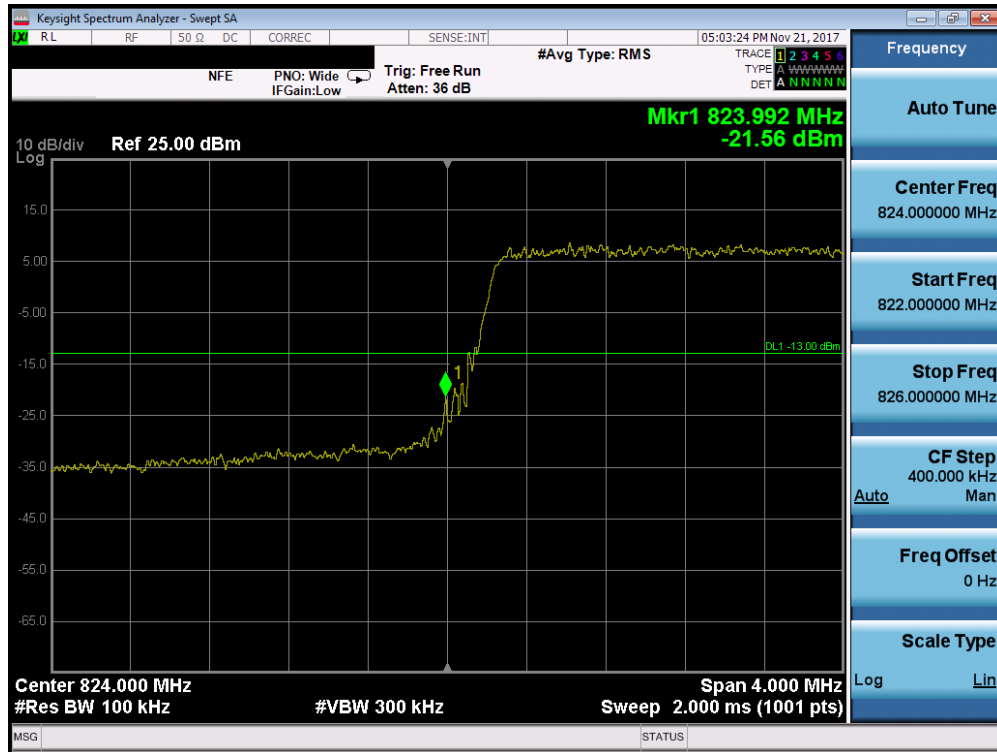
Plot 7-83. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-84. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Band 5



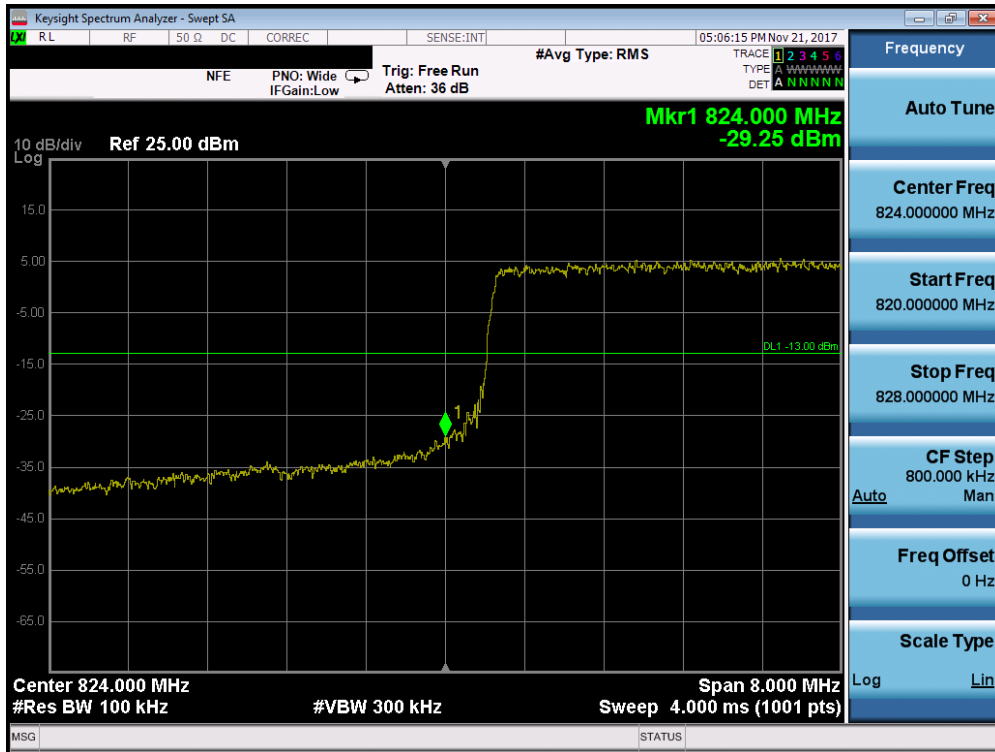
Plot 7-85. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



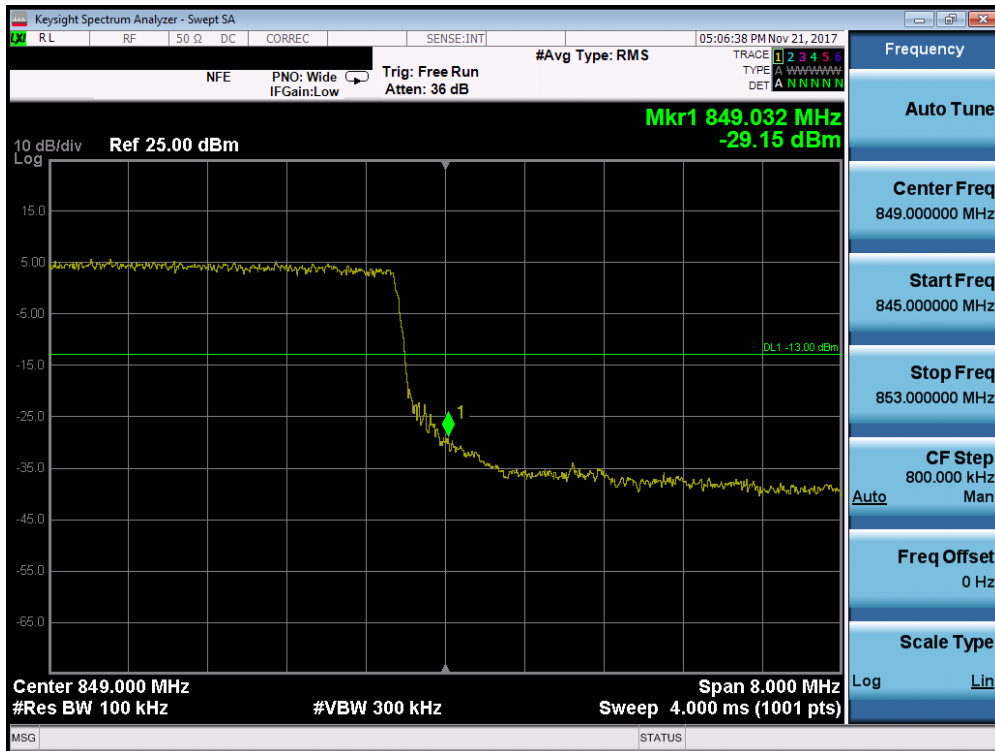
Plot 7-86. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 5



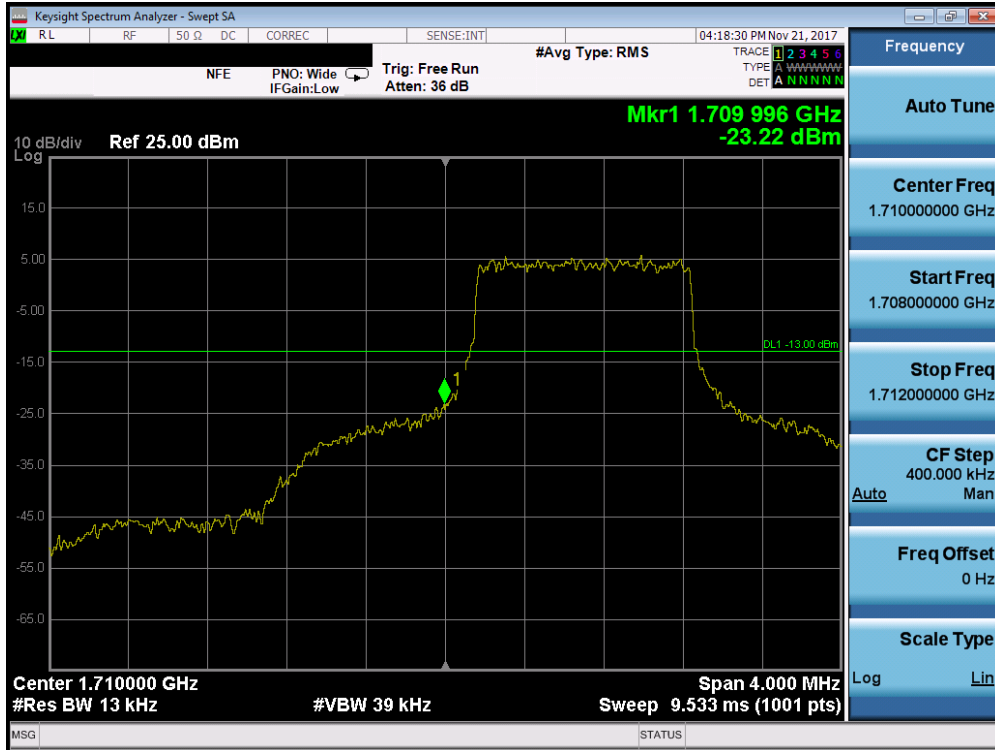
Plot 7-87. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



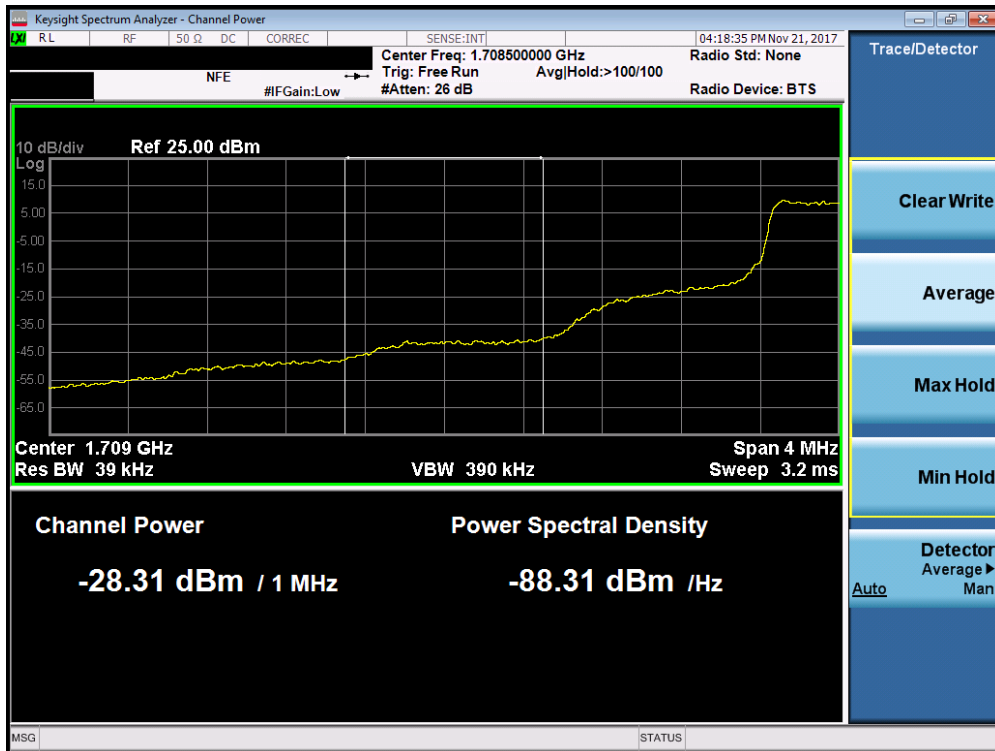
Plot 7-88. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Plot 7-89. Lower Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

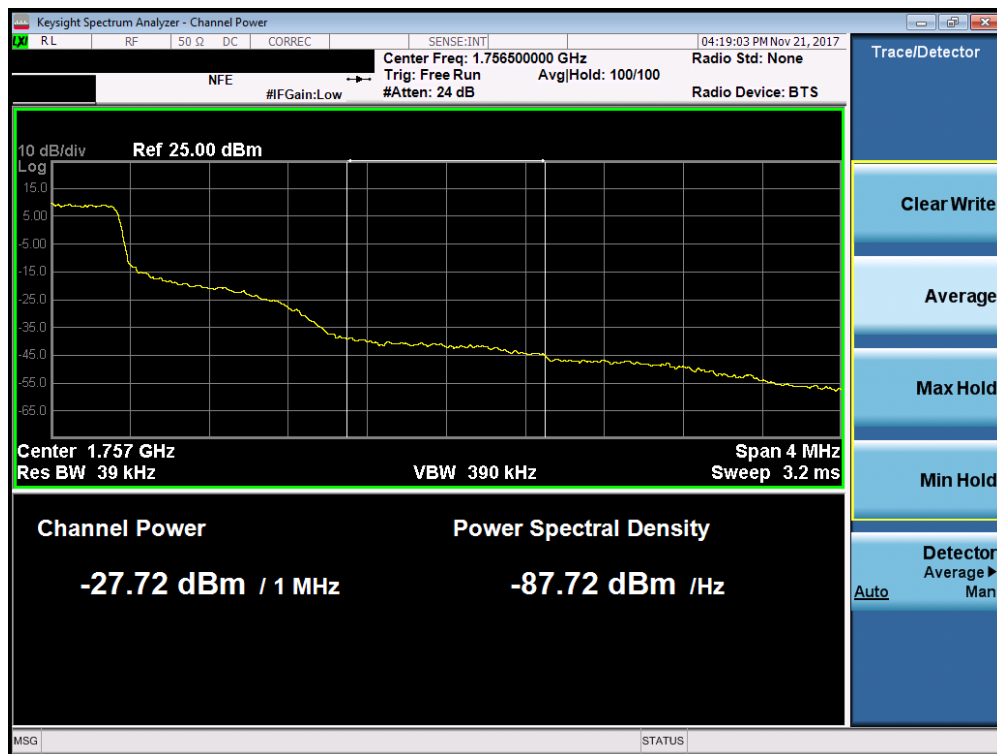


Plot 7-90. Lower Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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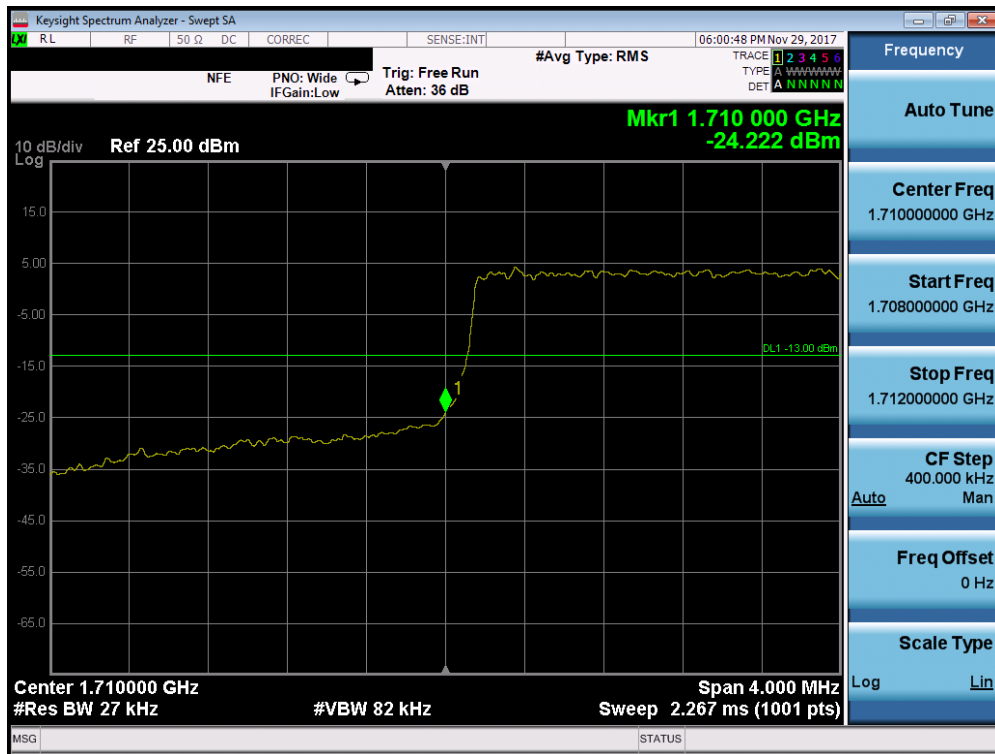
Plot 7-91. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



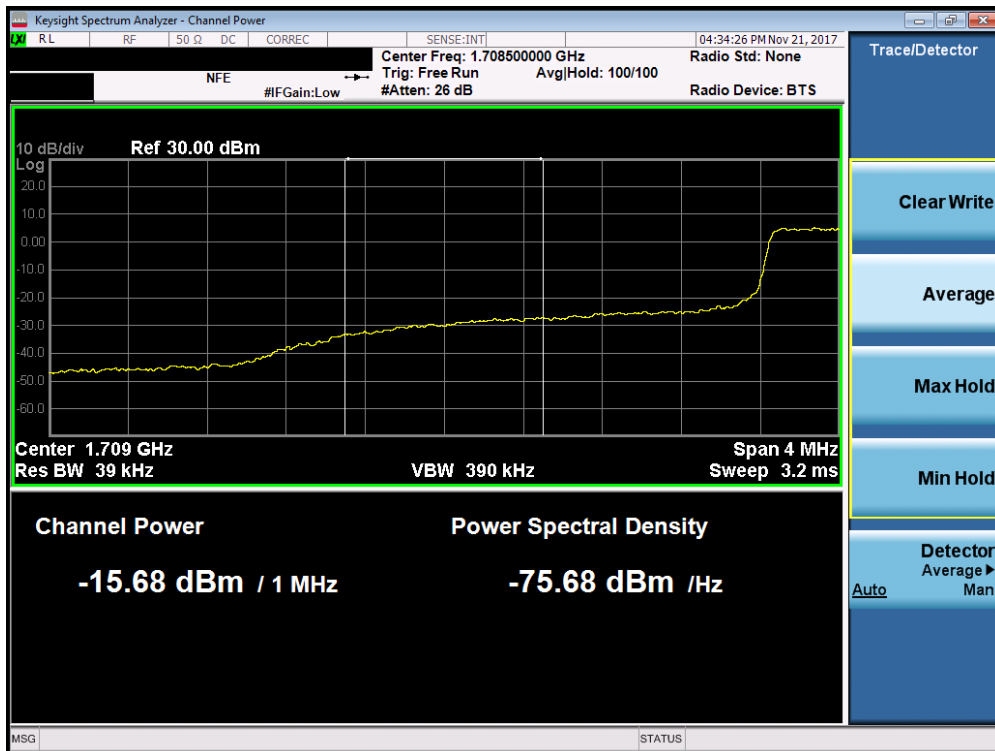
Plot 7-92. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-93. Lower Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

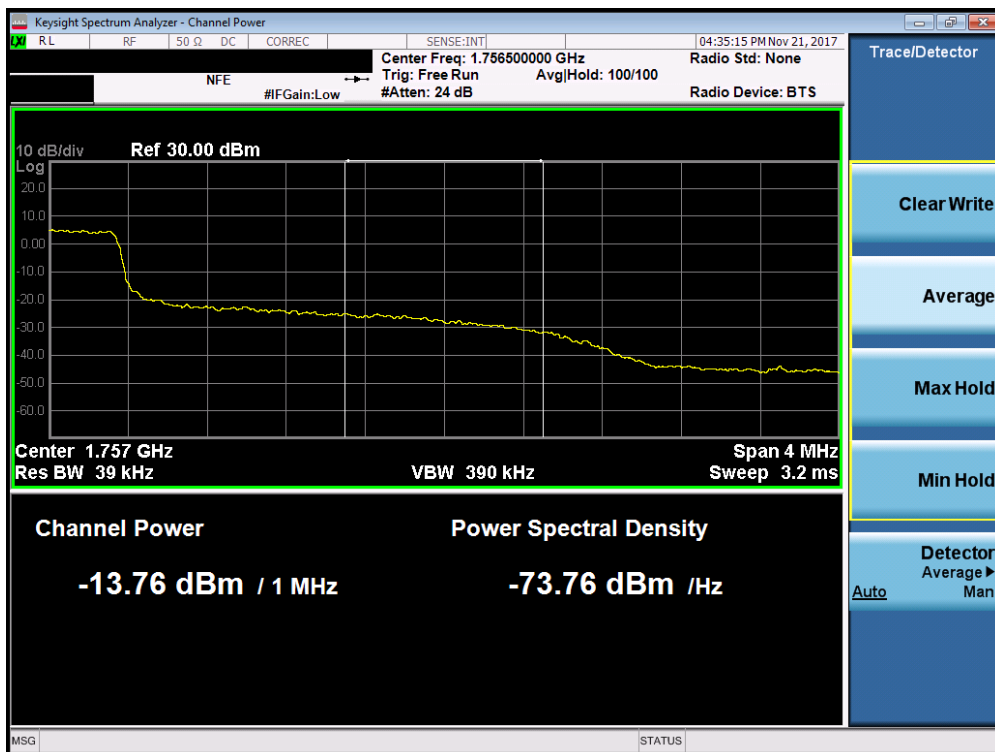


Plot 7-94. Lower Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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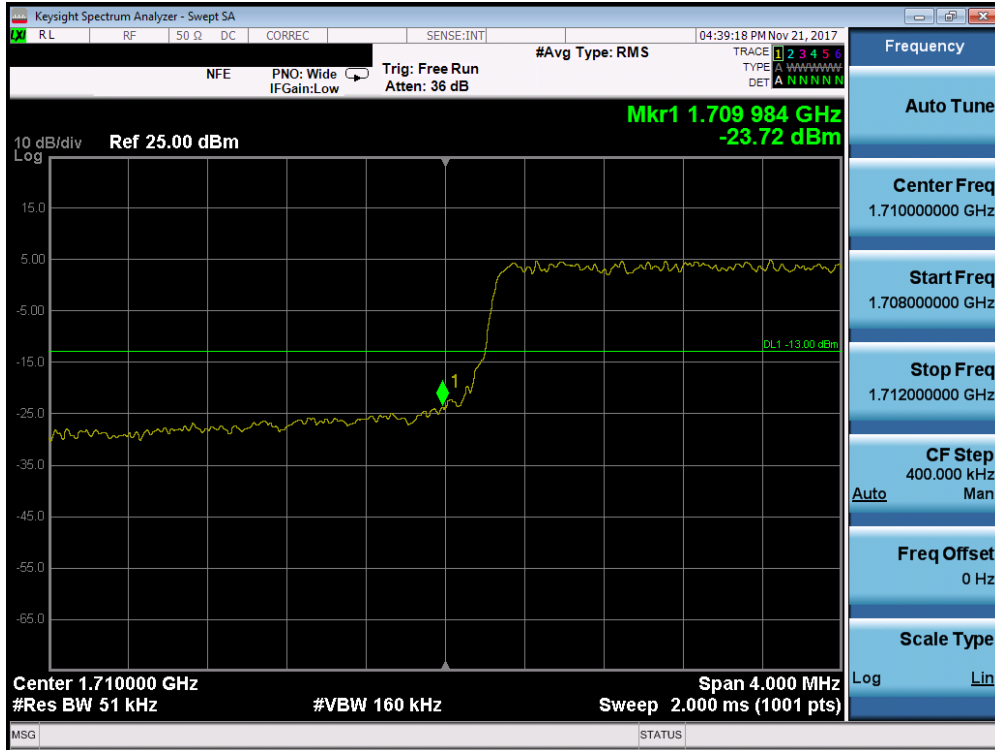
Plot 7-95. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



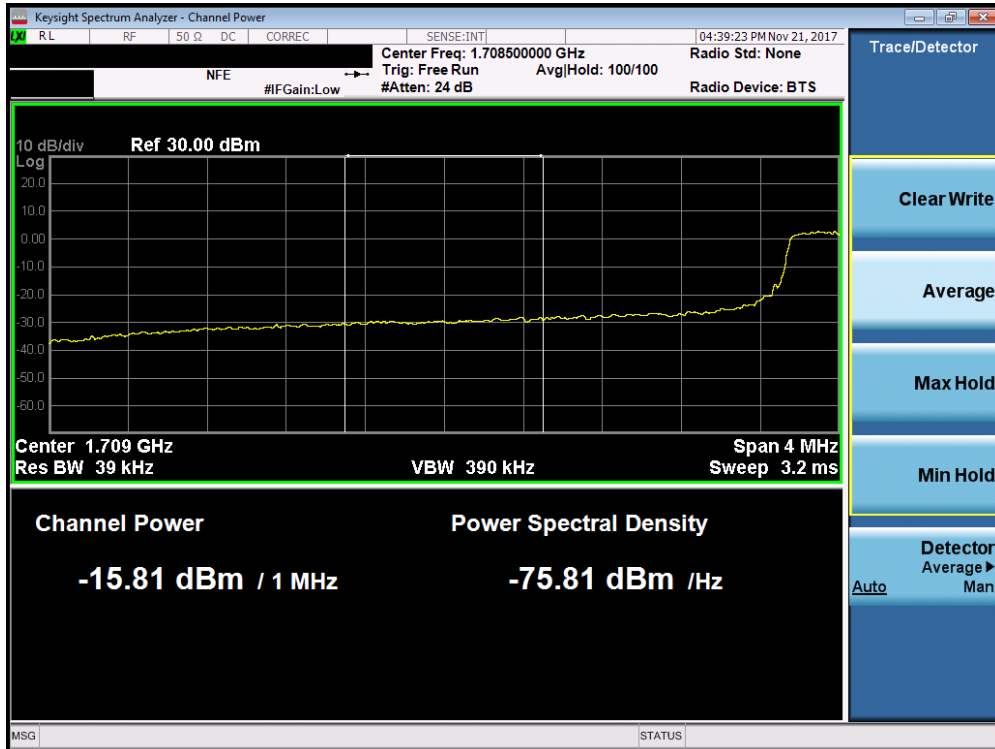
Plot 7-96. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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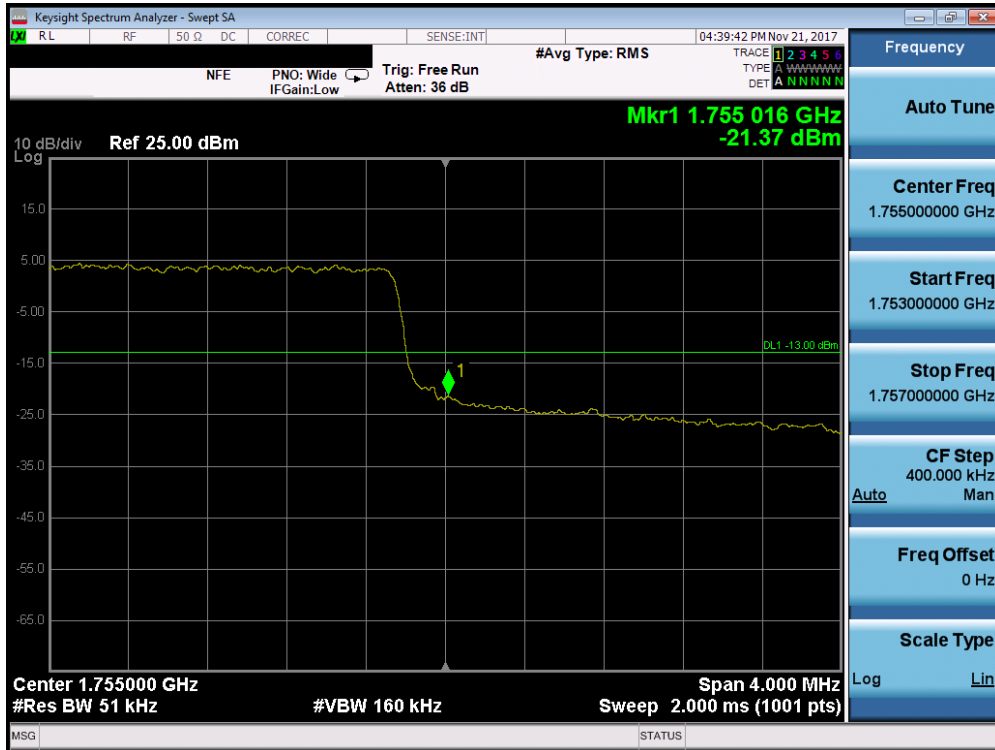


Plot 7-97. Lower Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

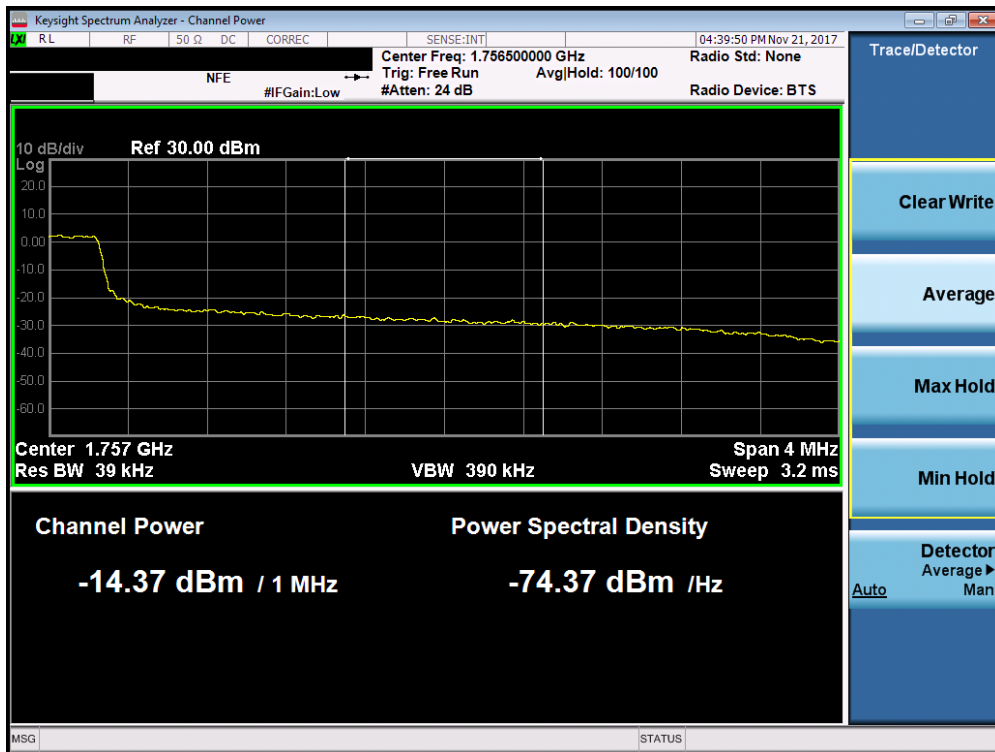


Plot 7-98. Lower Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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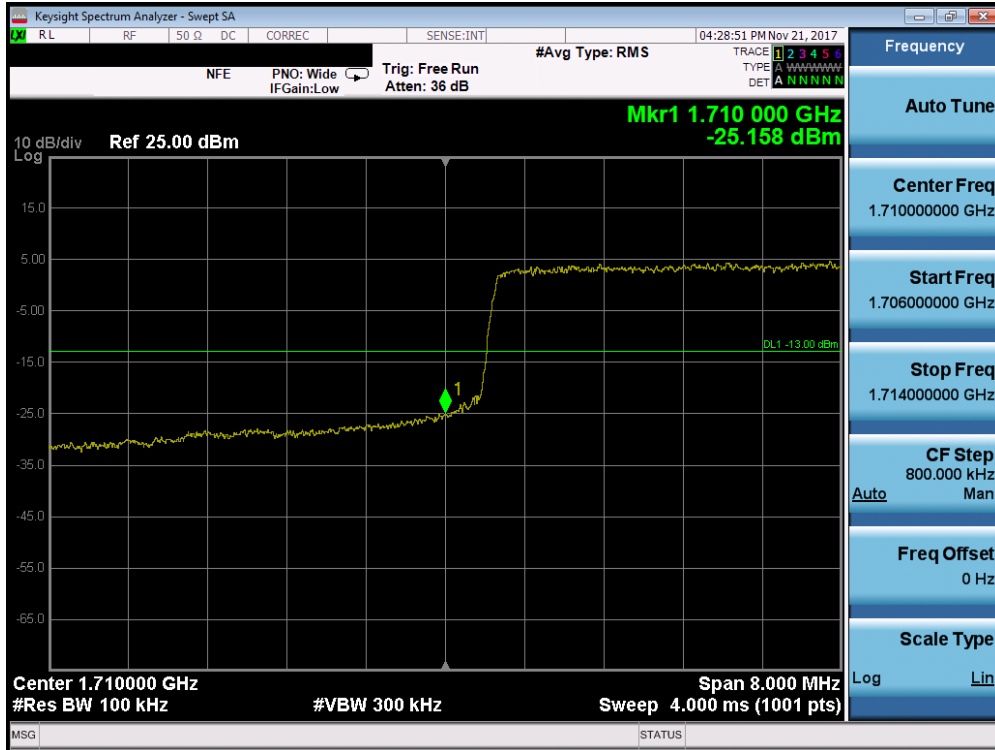
Plot 7-99. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



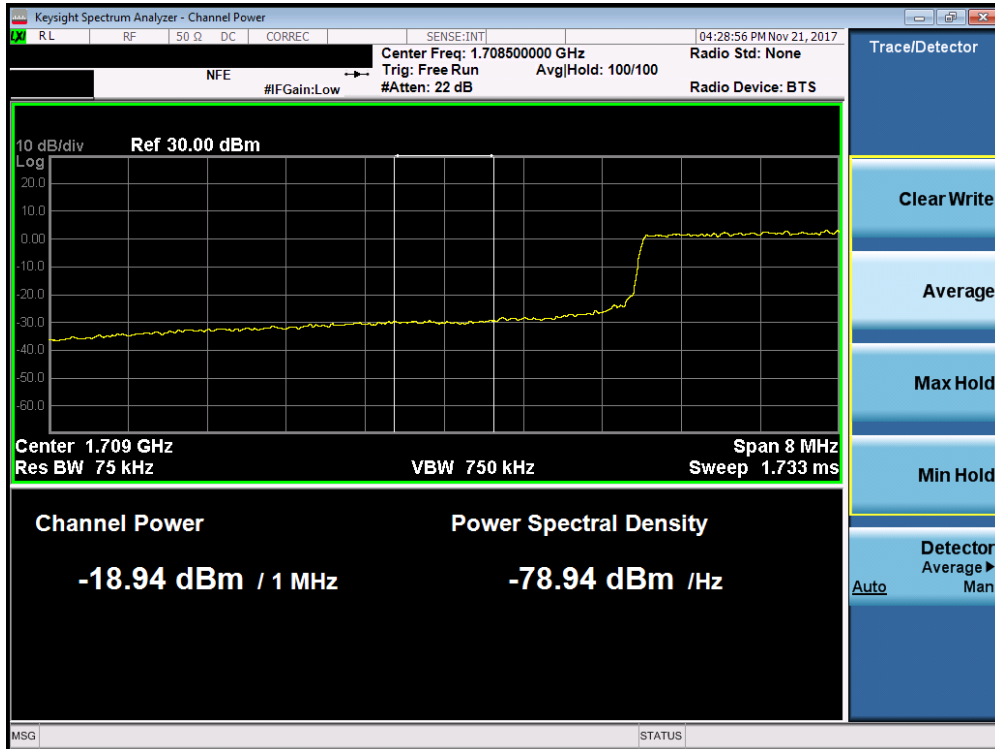
Plot 7-100. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 4



Plot 7-101. Lower Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

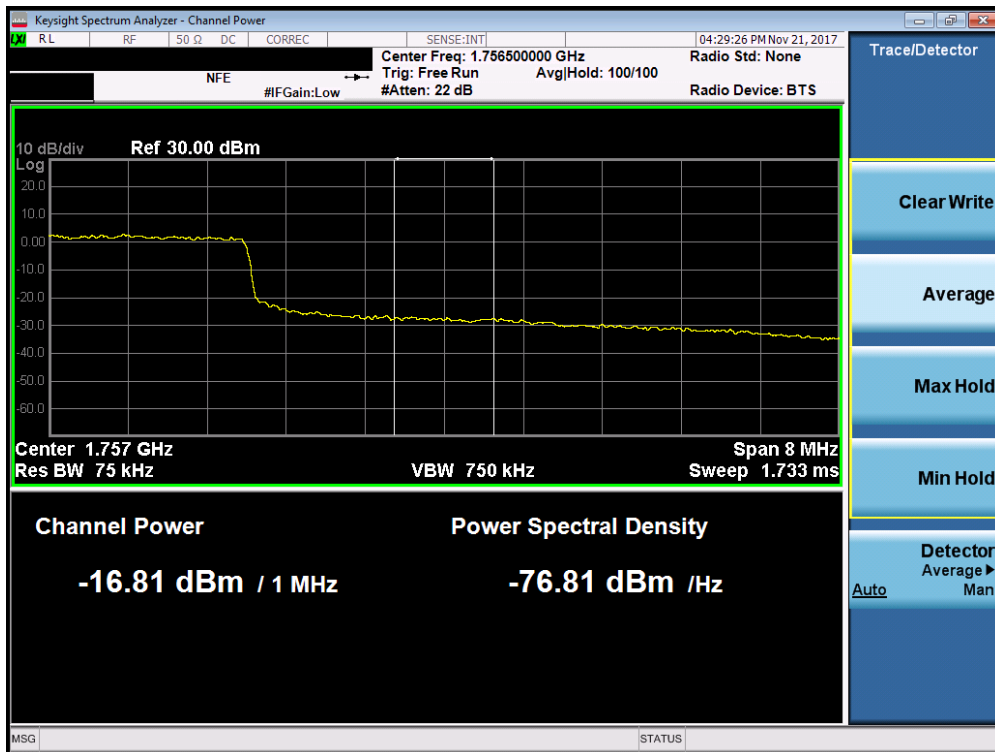


Plot 7-102. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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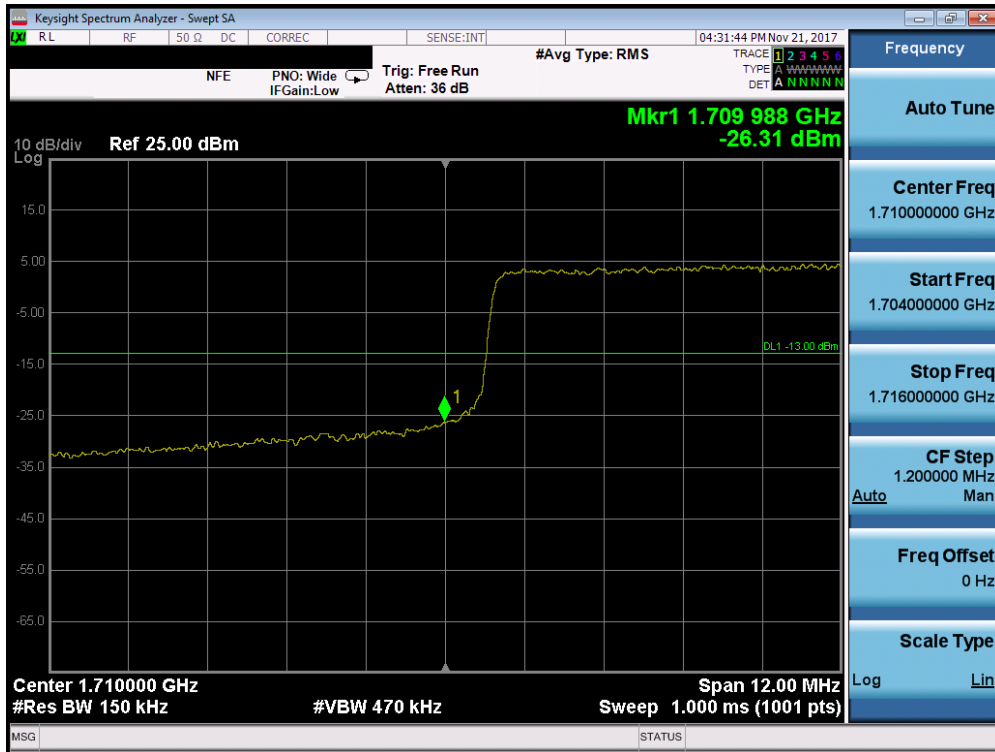
Plot 7-103. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



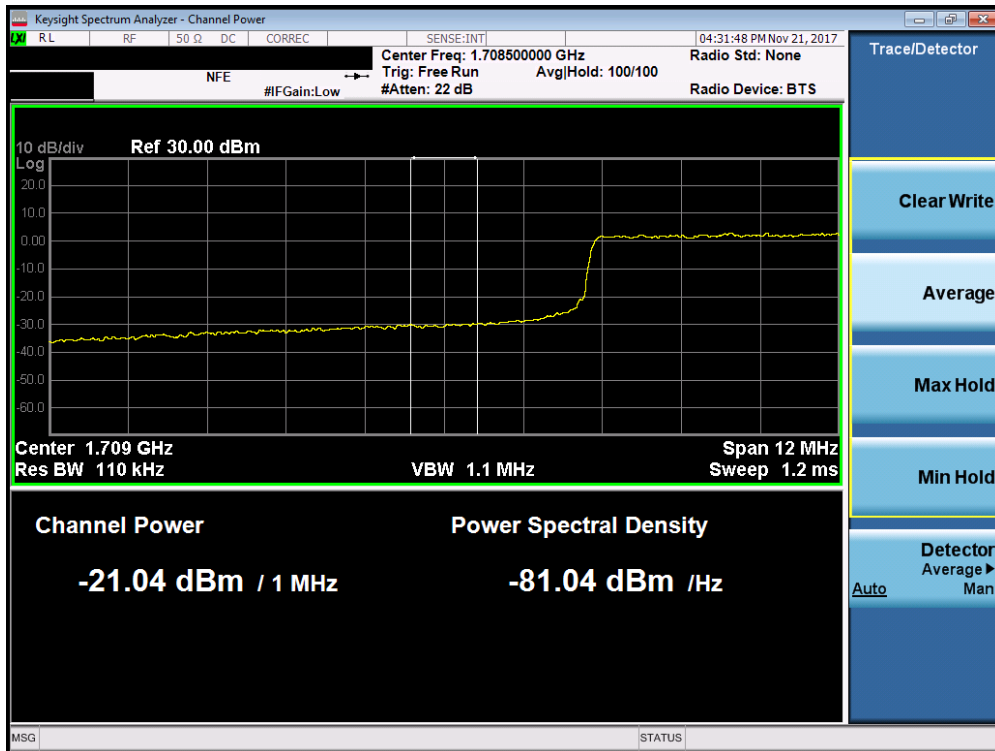
Plot 7-104. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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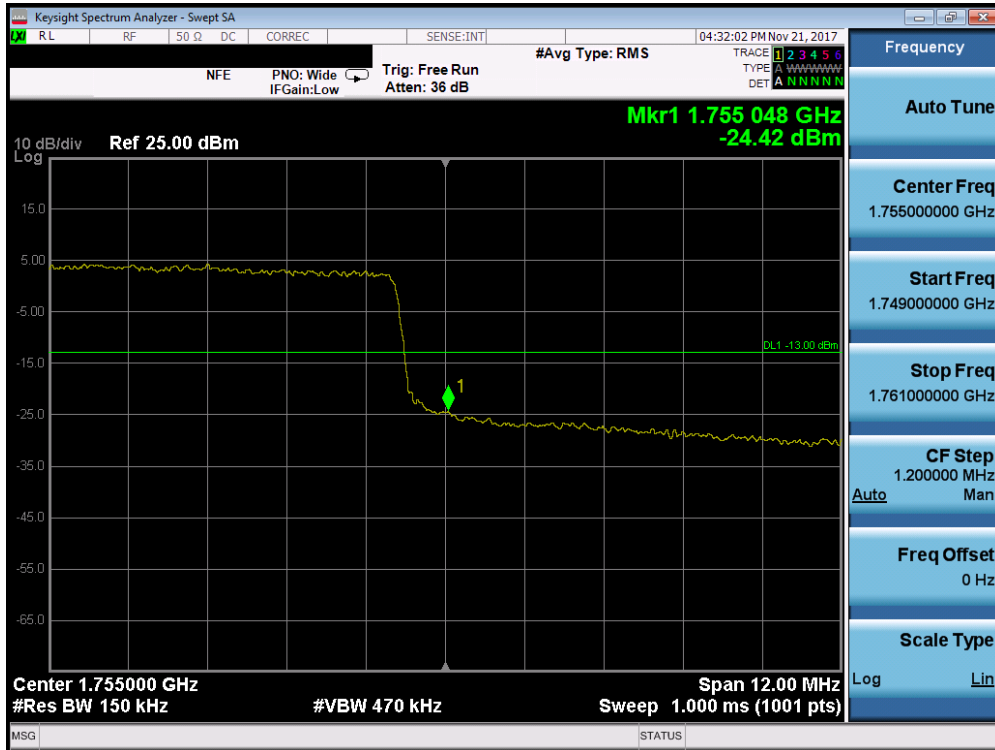


Plot 7-105. Lower Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

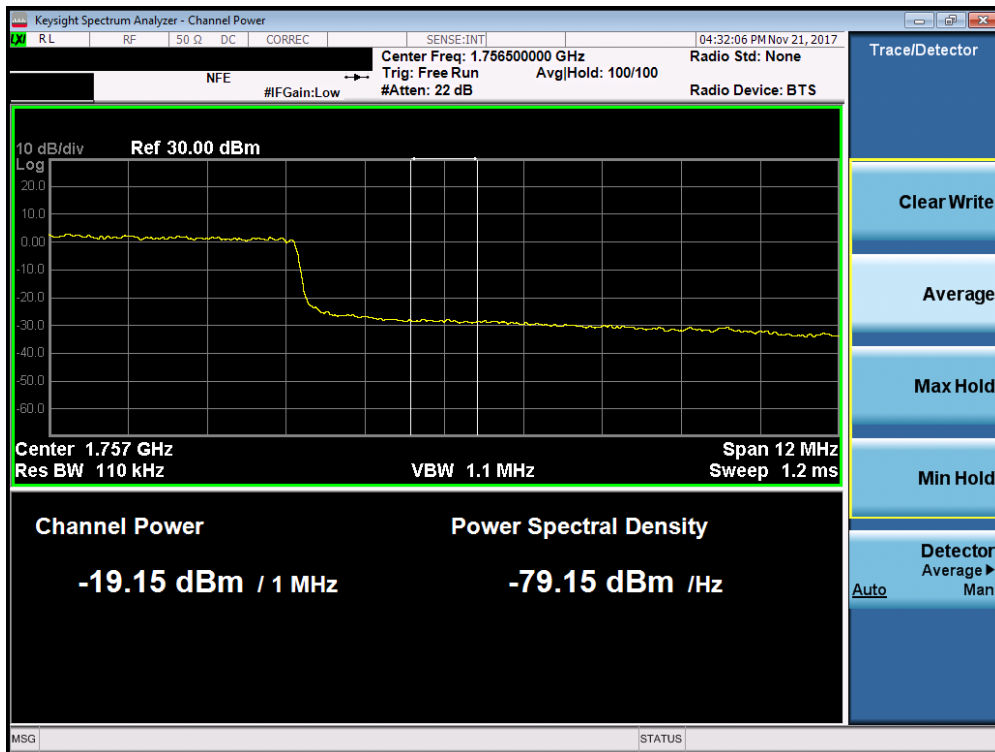


Plot 7-106. Lower Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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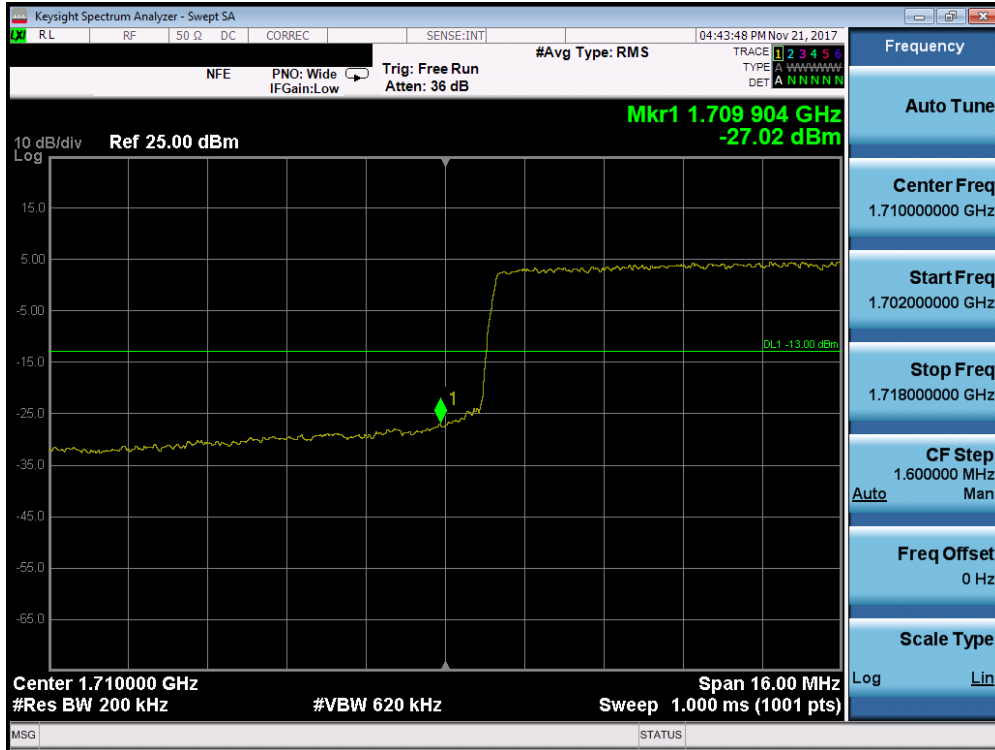
Plot 7-107. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



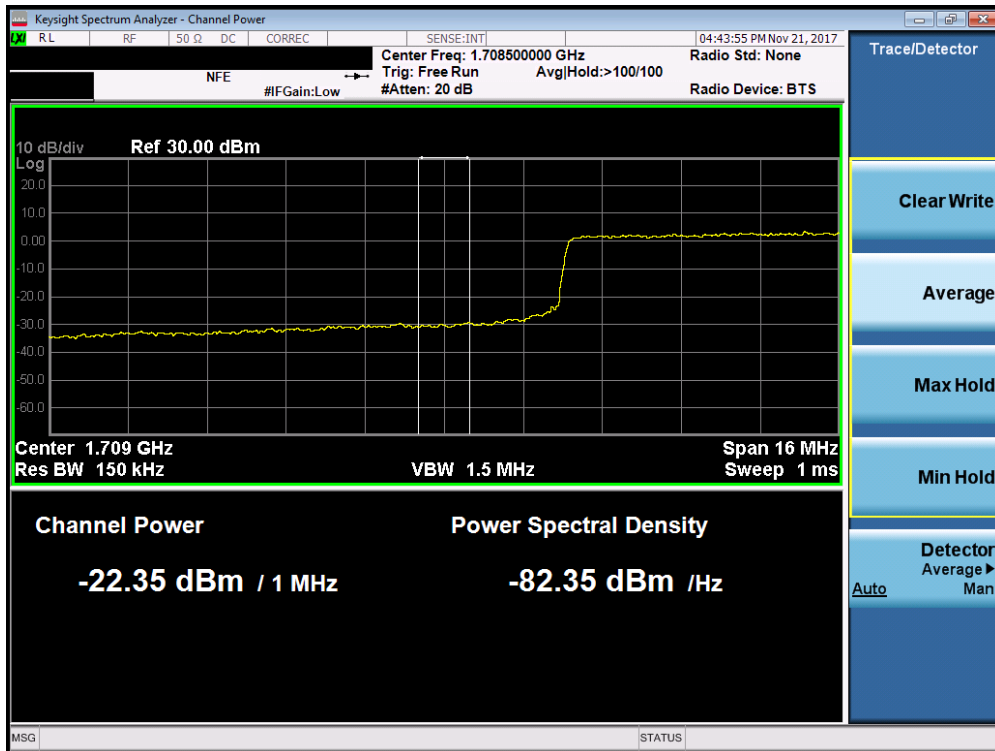
Plot 7-108. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 4



Plot 7-109. Lower Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-110. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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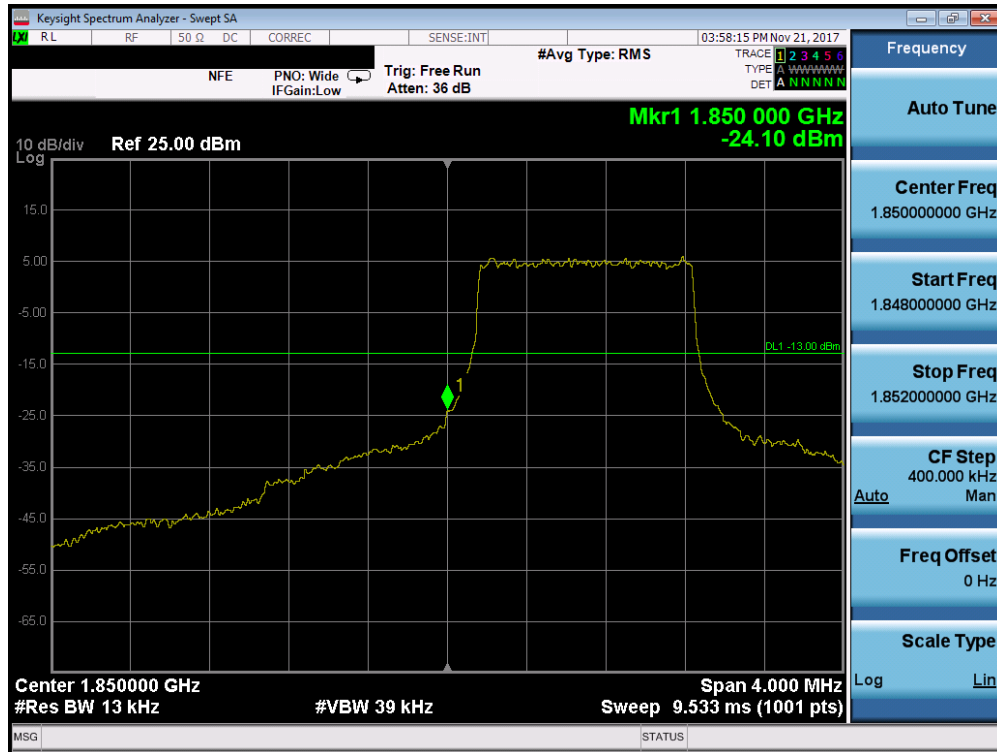
Plot 7-111. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



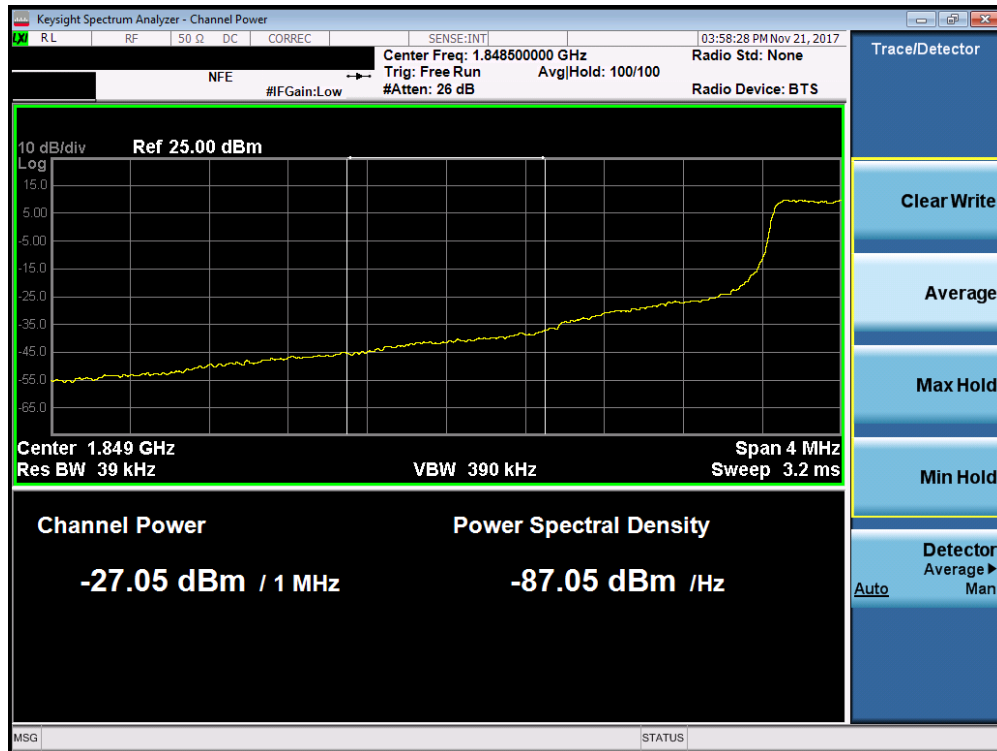
Plot 7-112. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Band 2



Plot 7-113. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

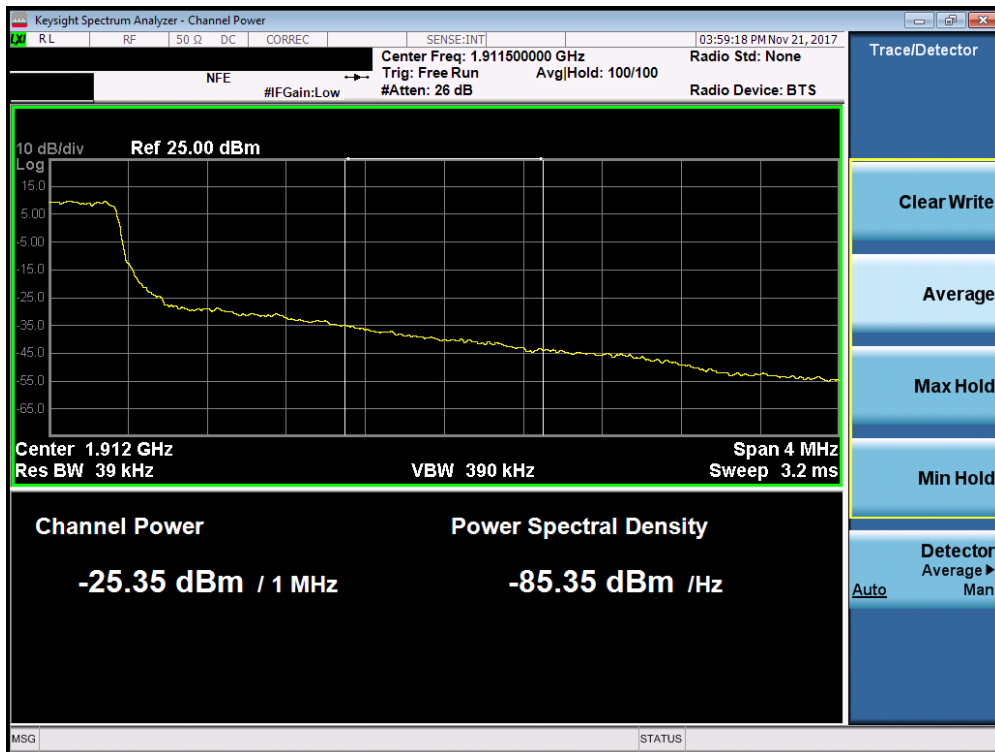


Plot 7-114. Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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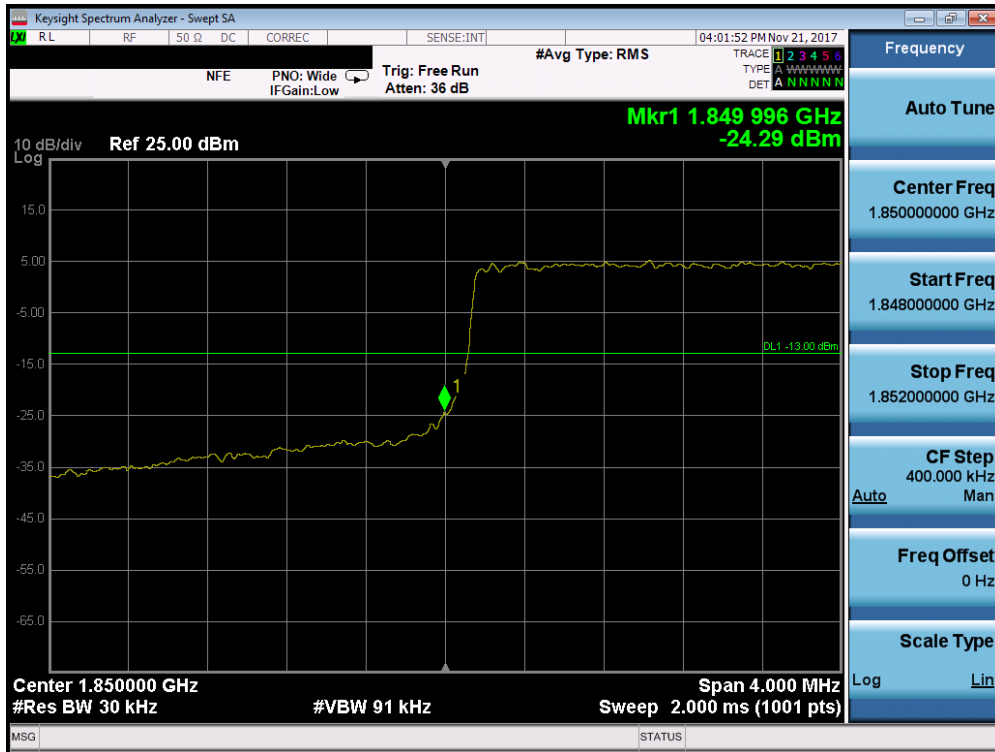
Plot 7-115. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



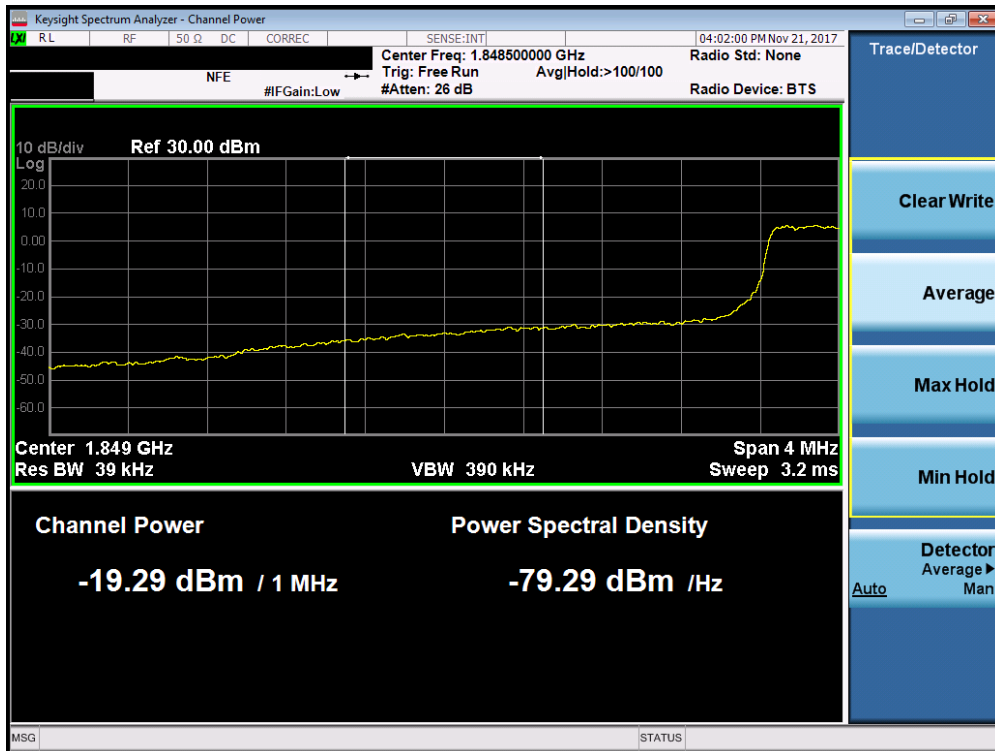
Plot 7-116. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 2

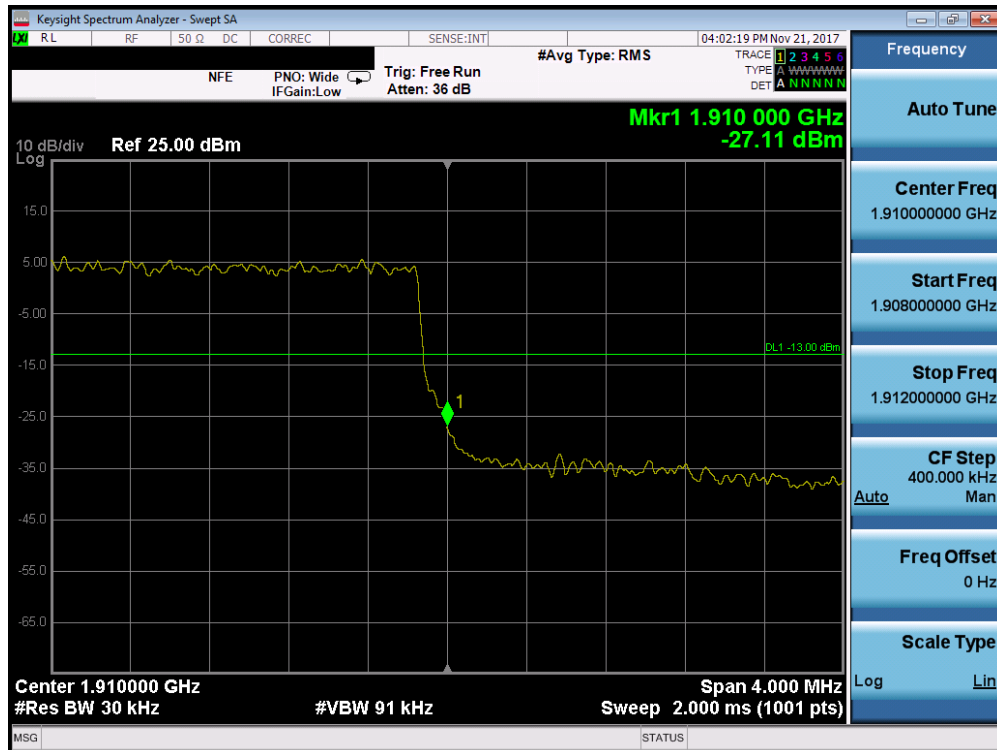


Plot 7-117. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

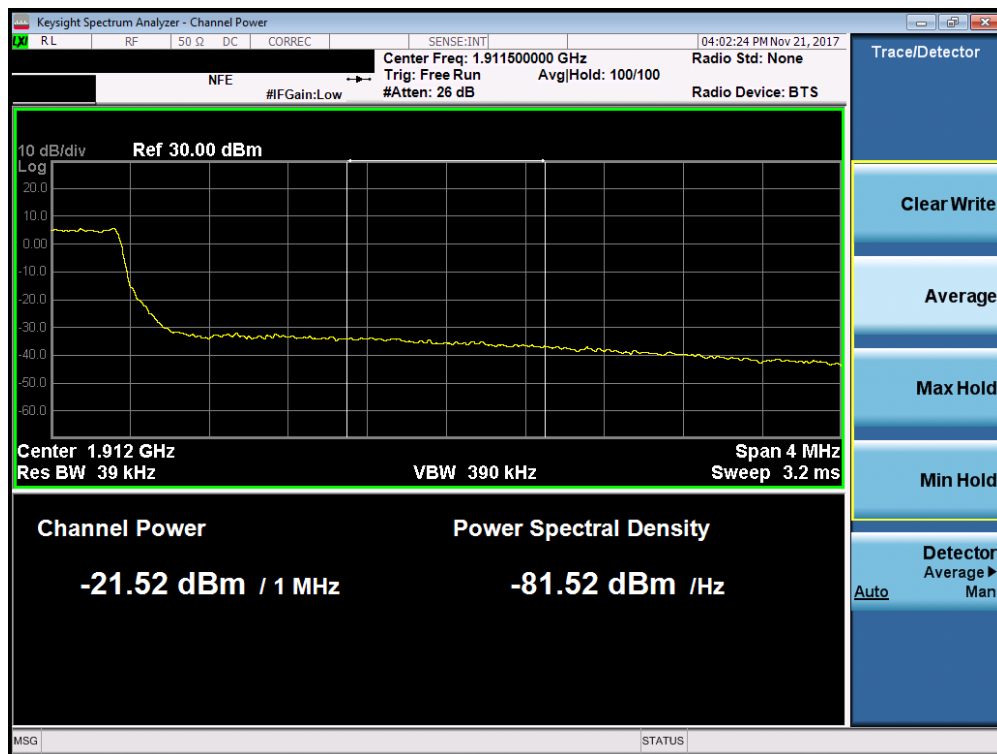


Plot 7-118. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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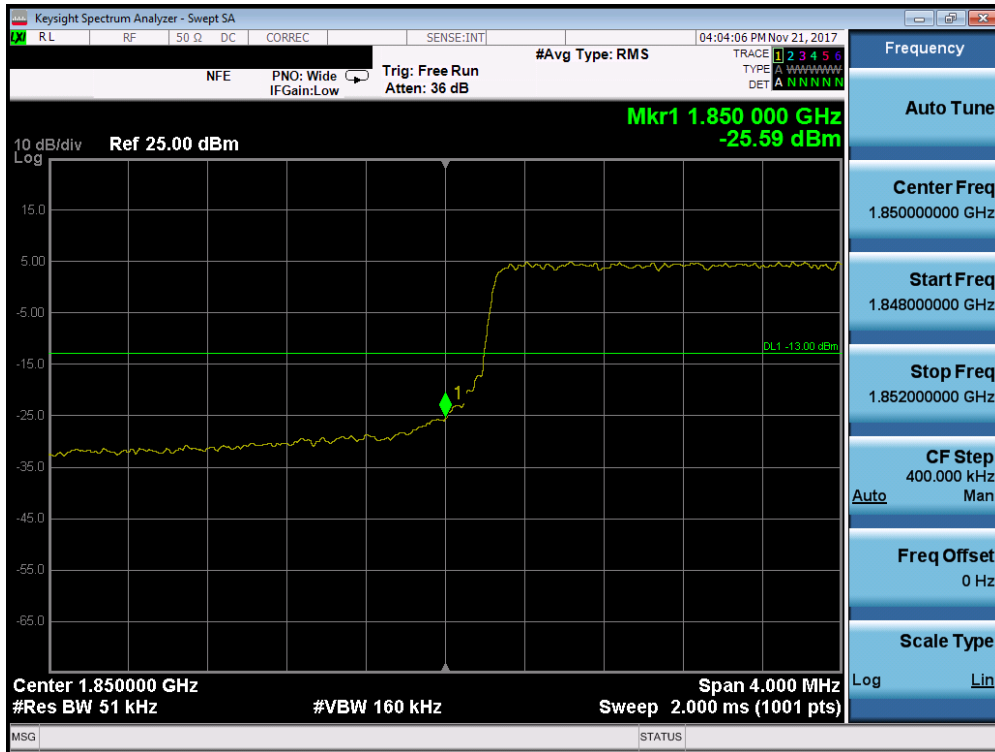
Plot 7-119. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



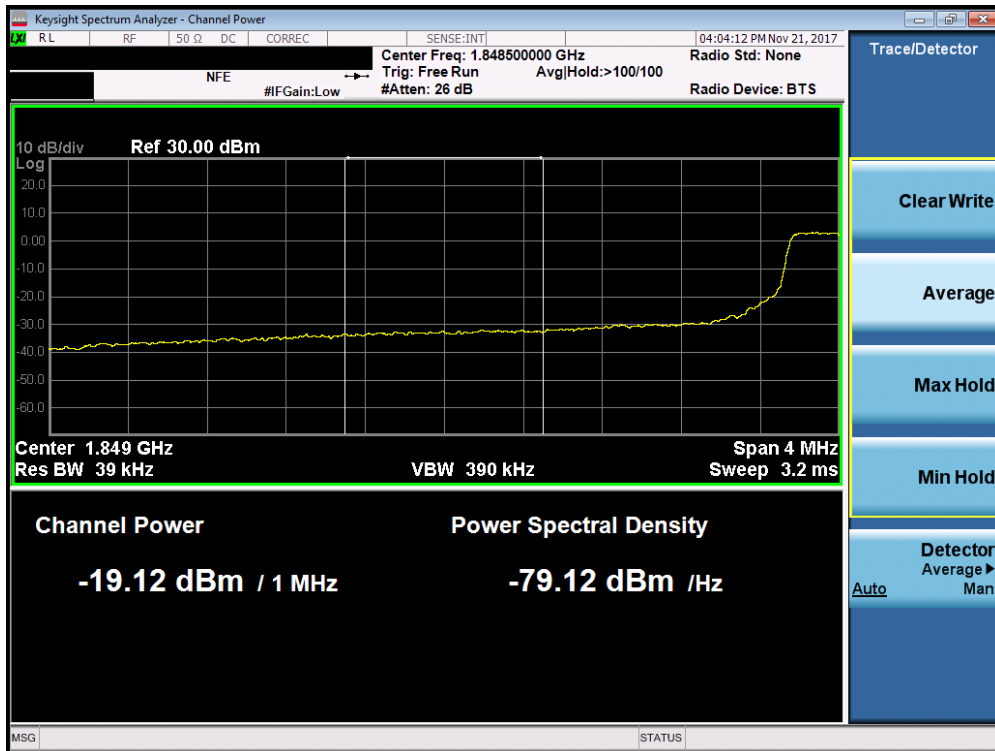
Plot 7-120. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2-ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 79 of 127

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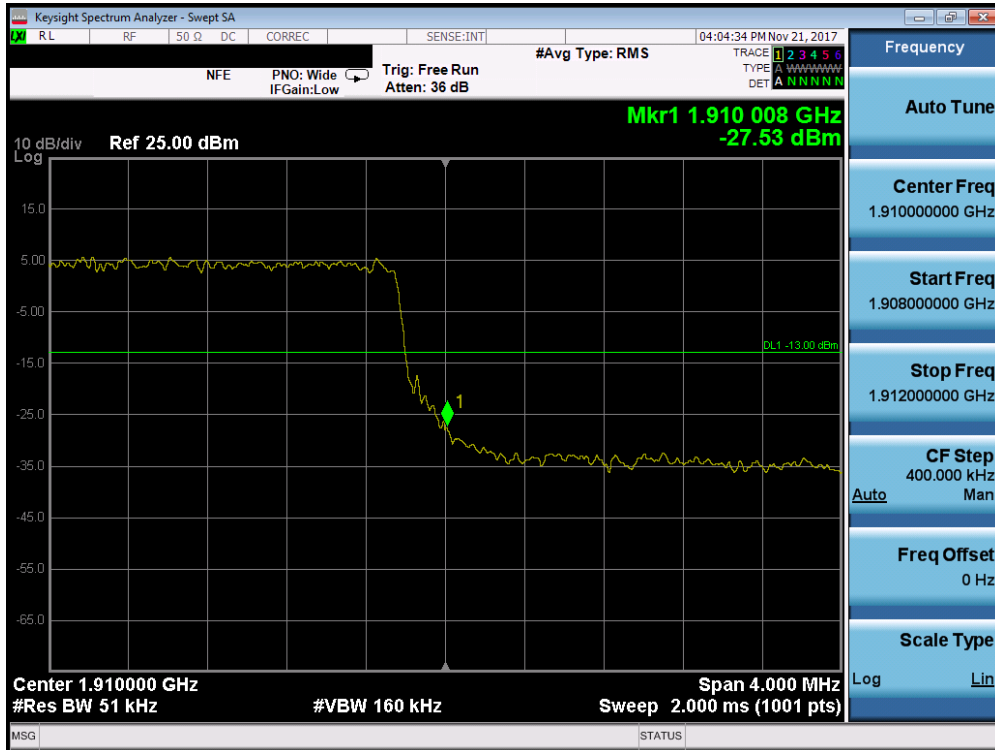


Plot 7-121. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

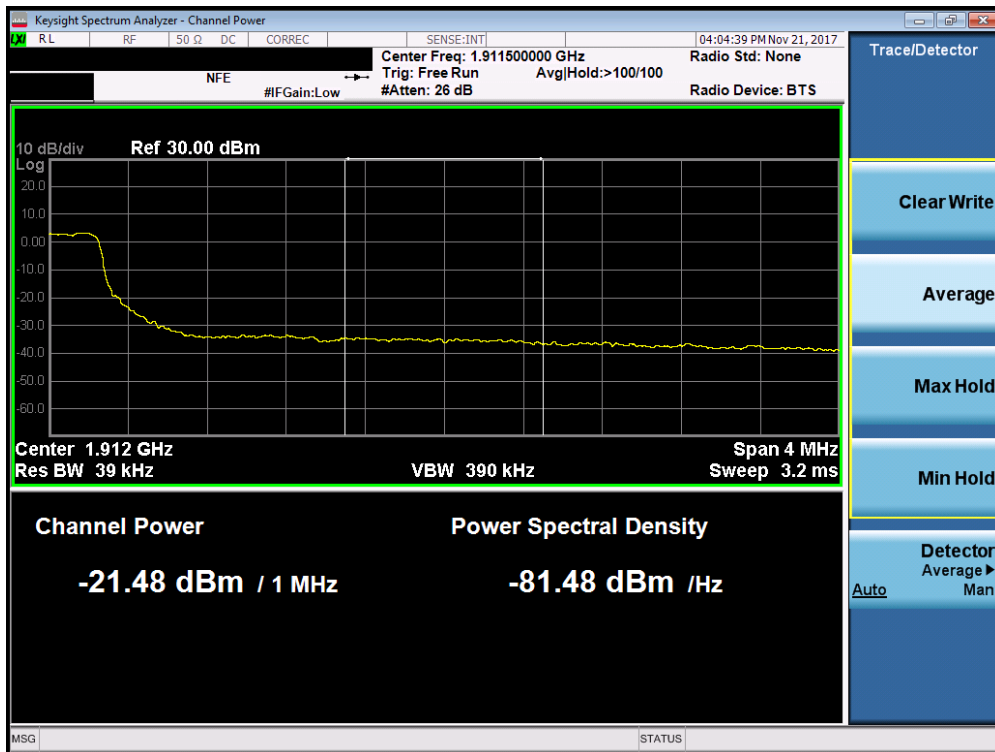


Plot 7-122. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 80 of 127



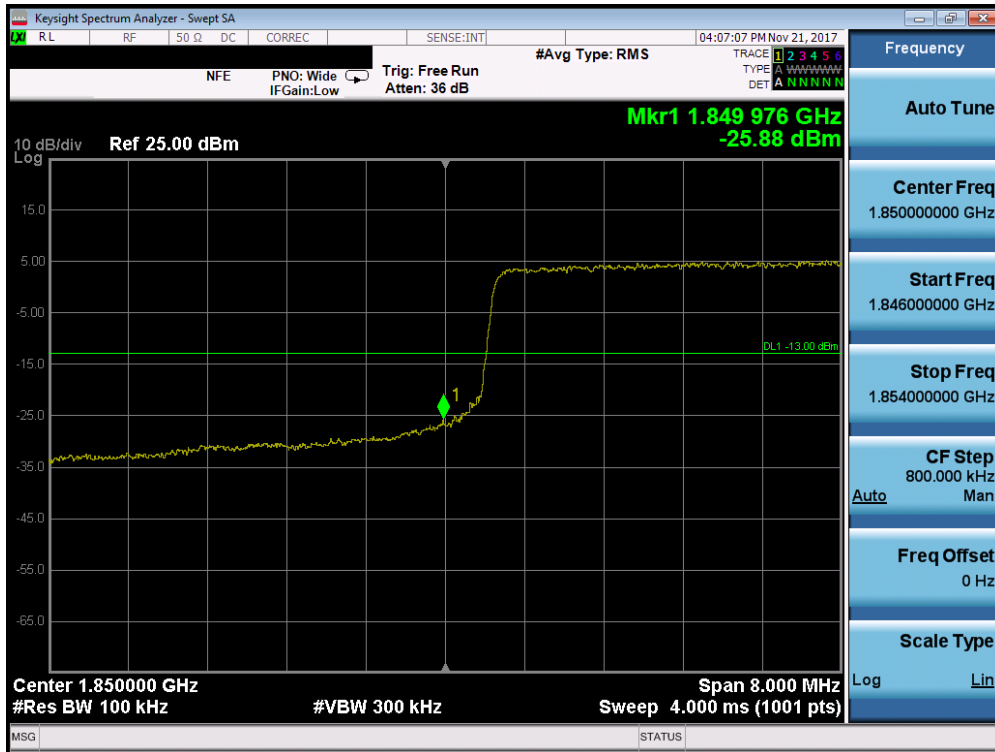
Plot 7-123. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



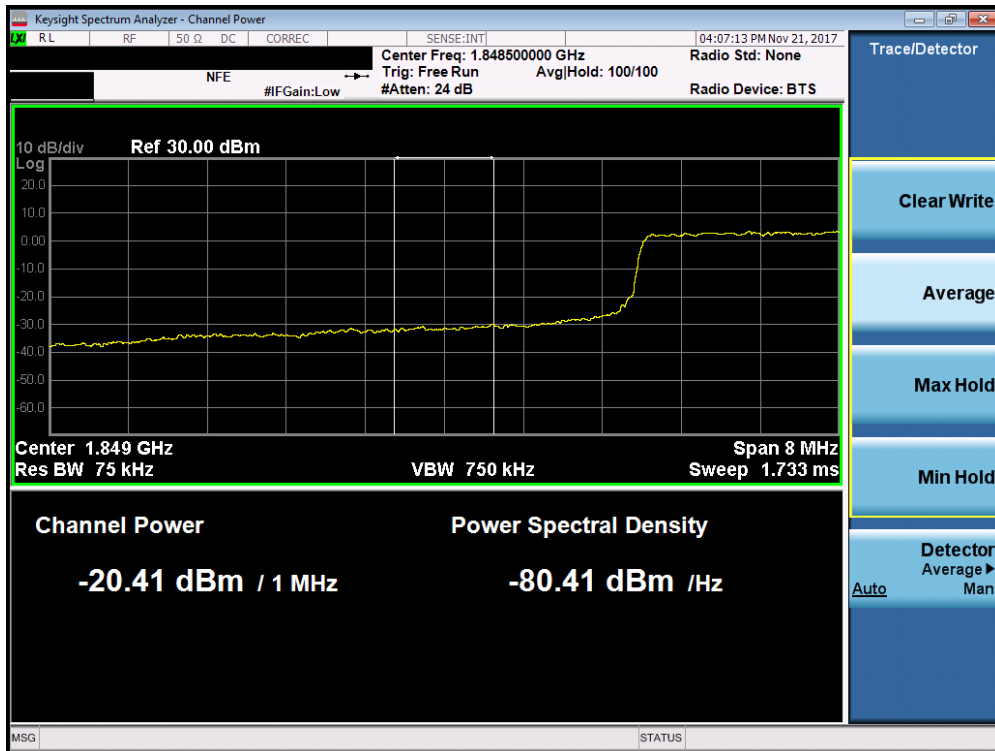
Plot 7-124. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2-ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 81 of 127

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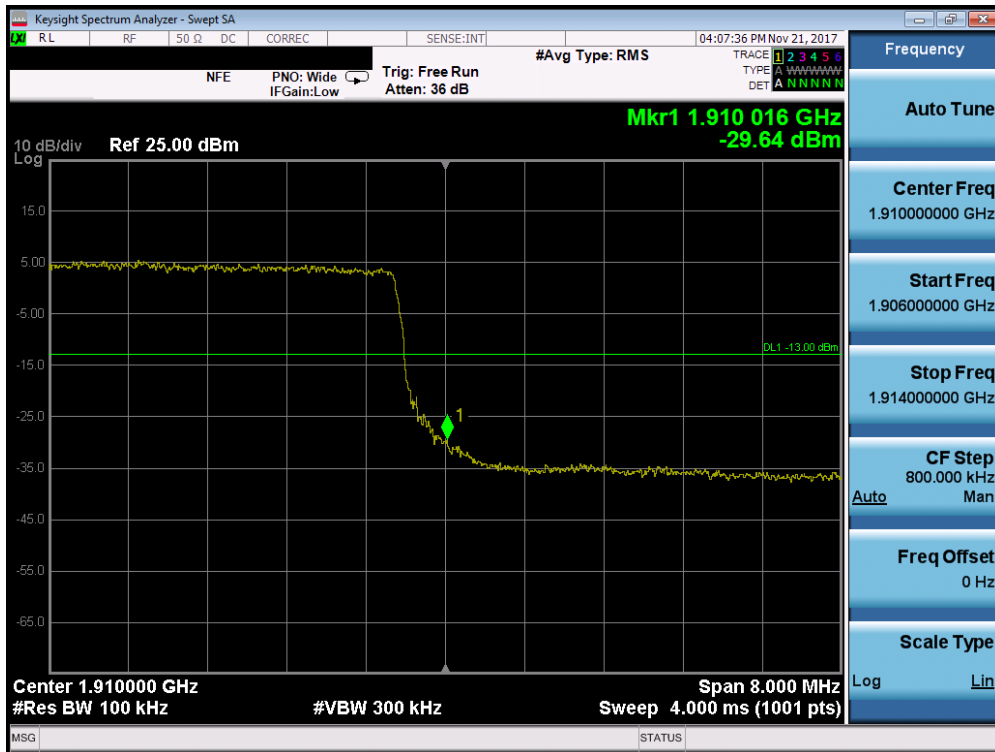


Plot 7-125. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

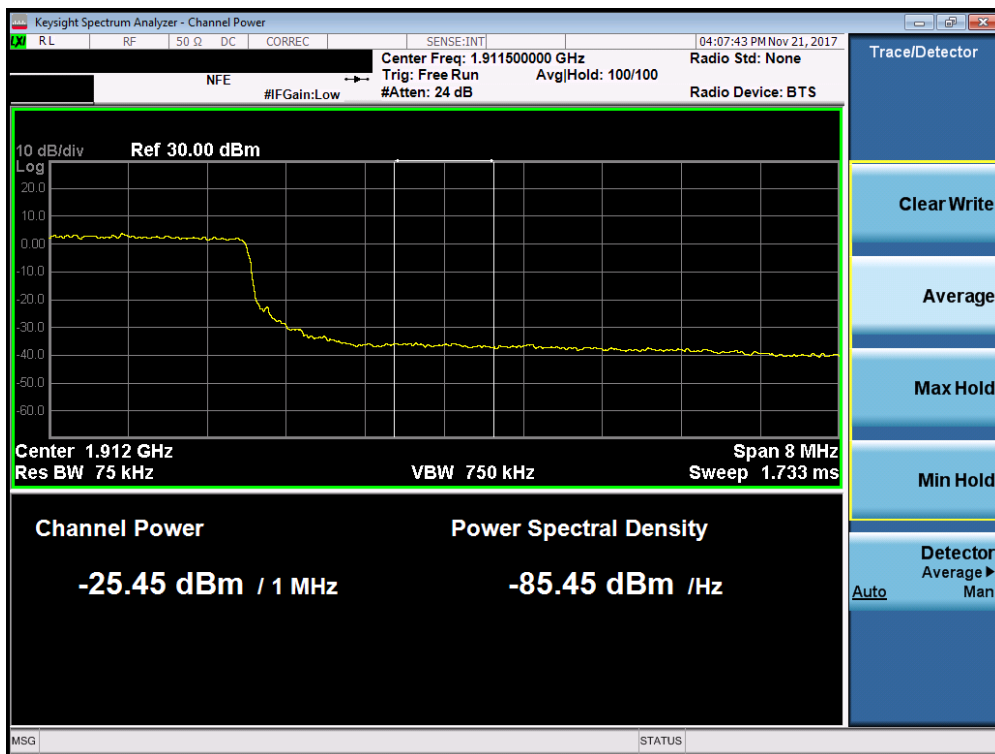


Plot 7-126. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 82 of 127



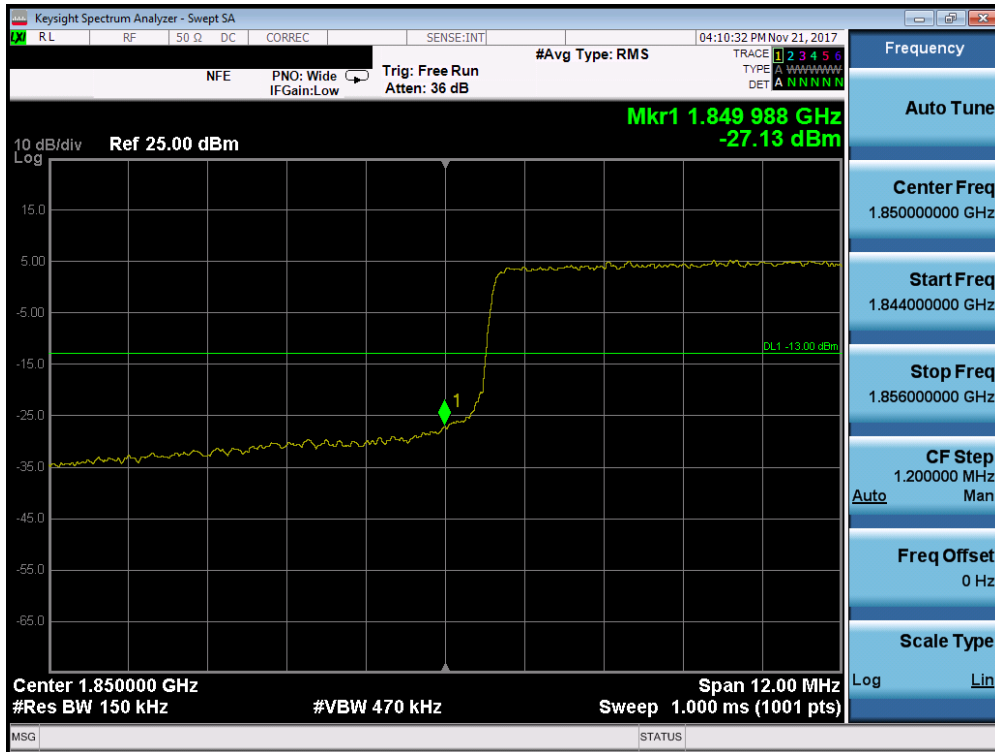
Plot 7-127. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



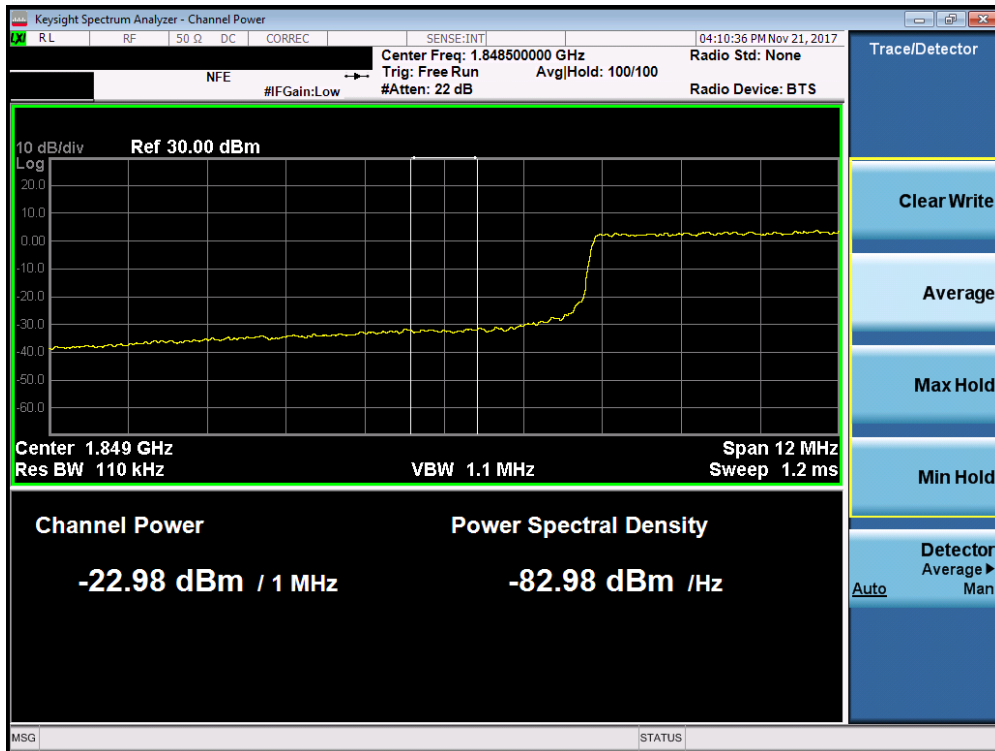
Plot 7-128. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 83 of 127

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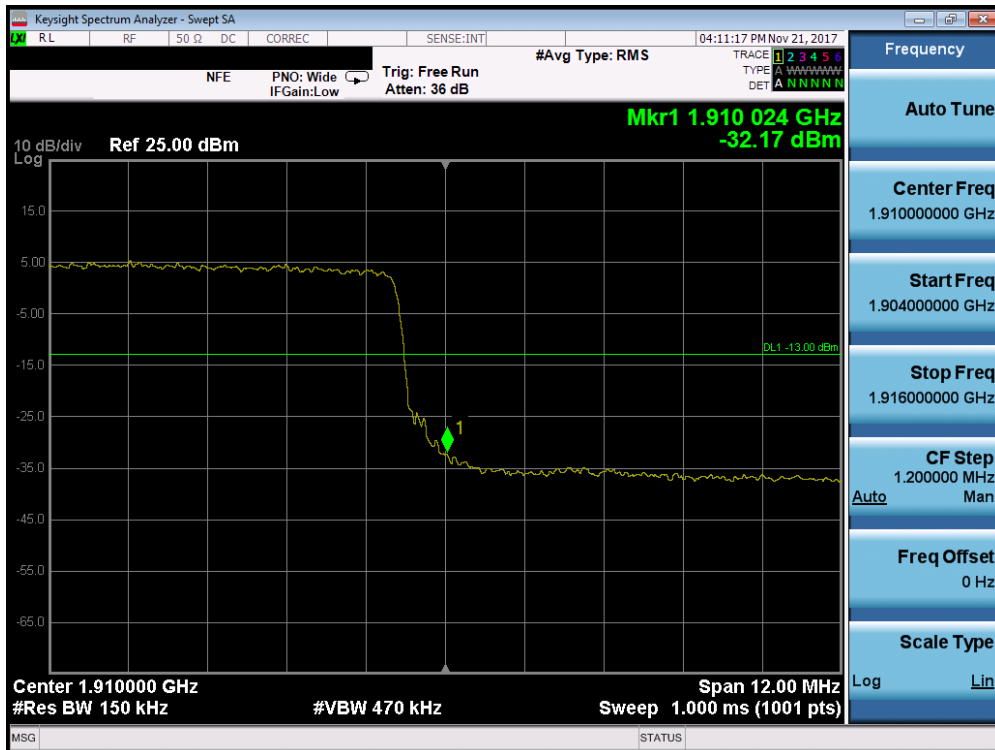


Plot 7-129. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

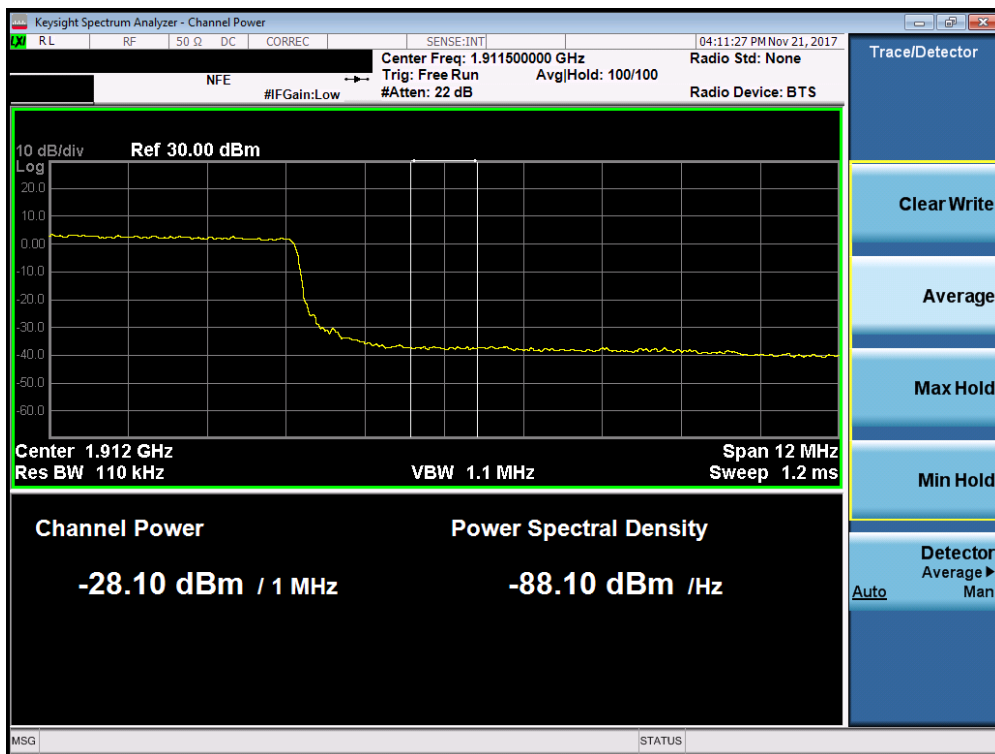


Plot 7-130. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 84 of 127



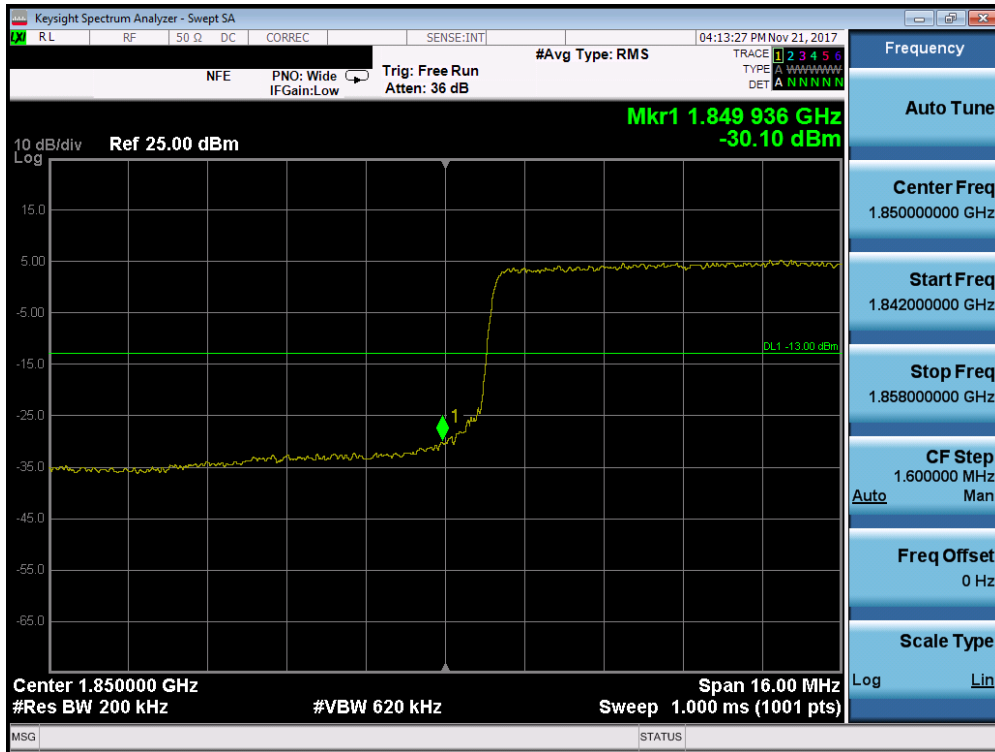
Plot 7-131. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



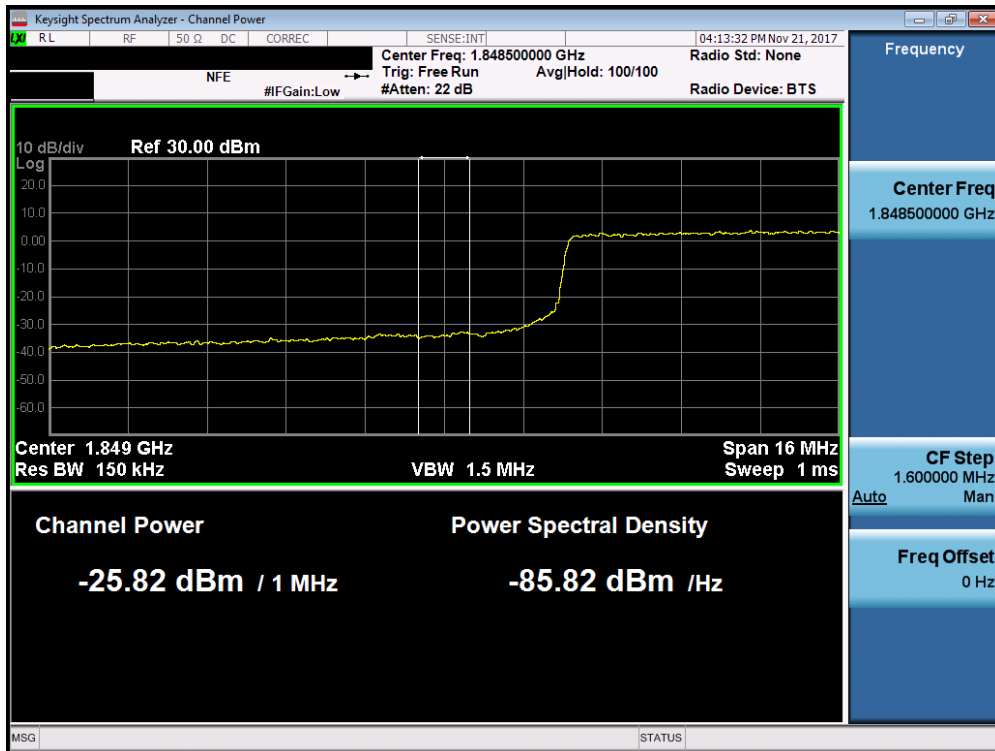
Plot 7-132. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 85 of 127

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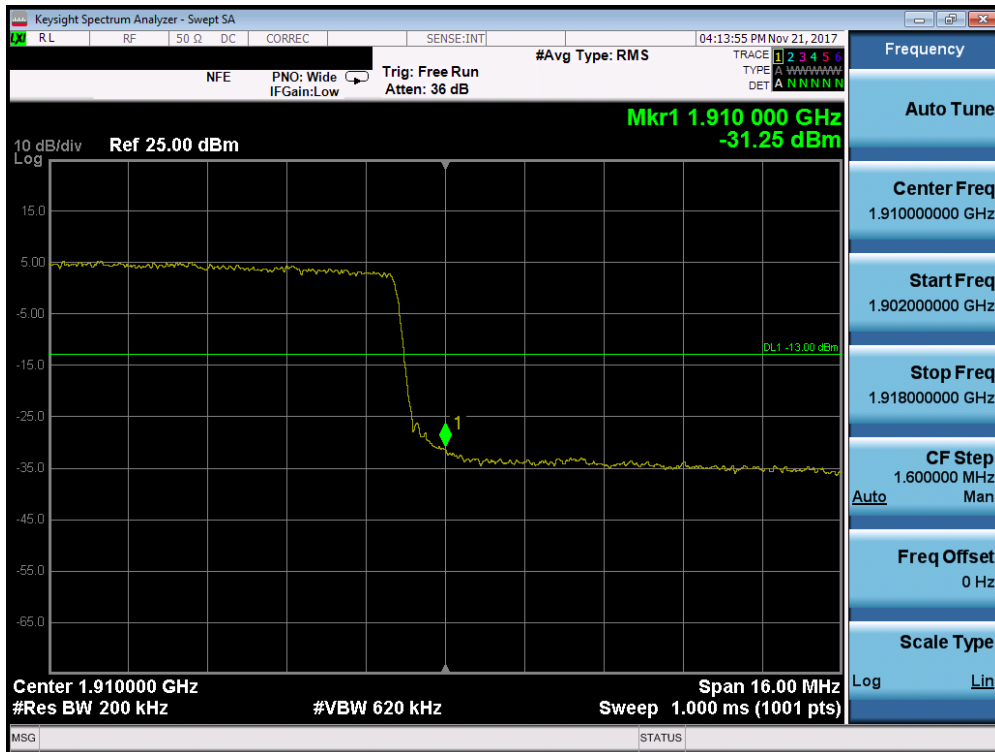


Plot 7-133. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

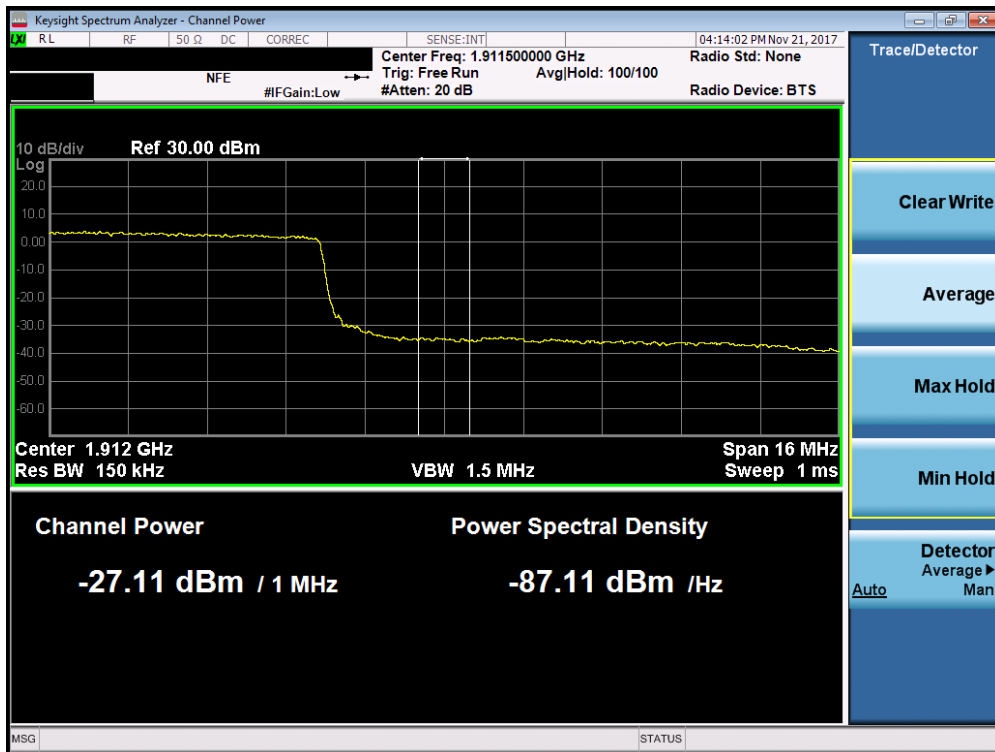


Plot 7-134. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 86 of 127



Plot 7-135. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-136. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 87 of 127

7.5 Peak-Average Ratio

§24.232(d) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

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 v03 – 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.

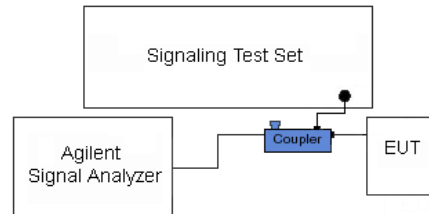


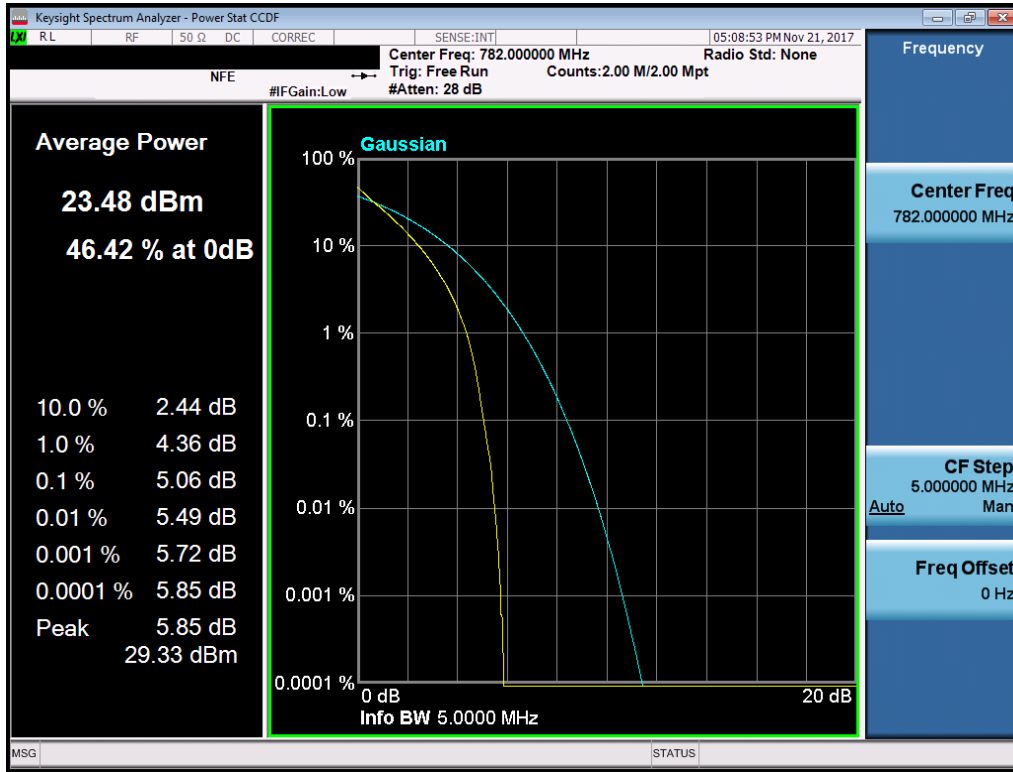
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

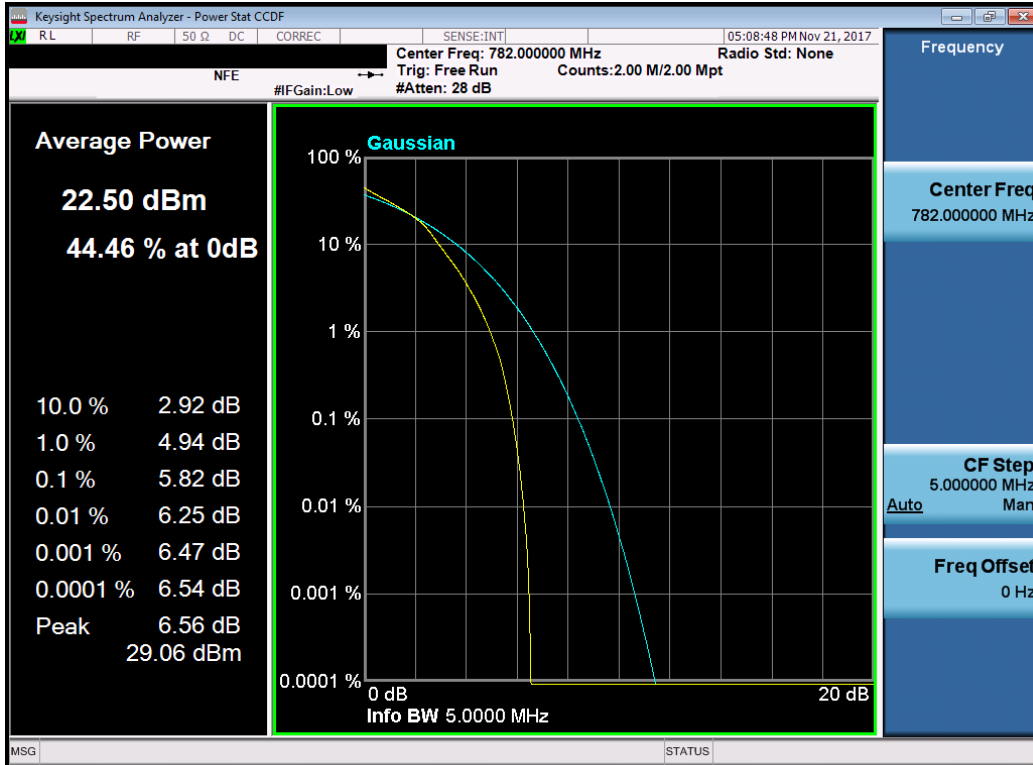
None.

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 13



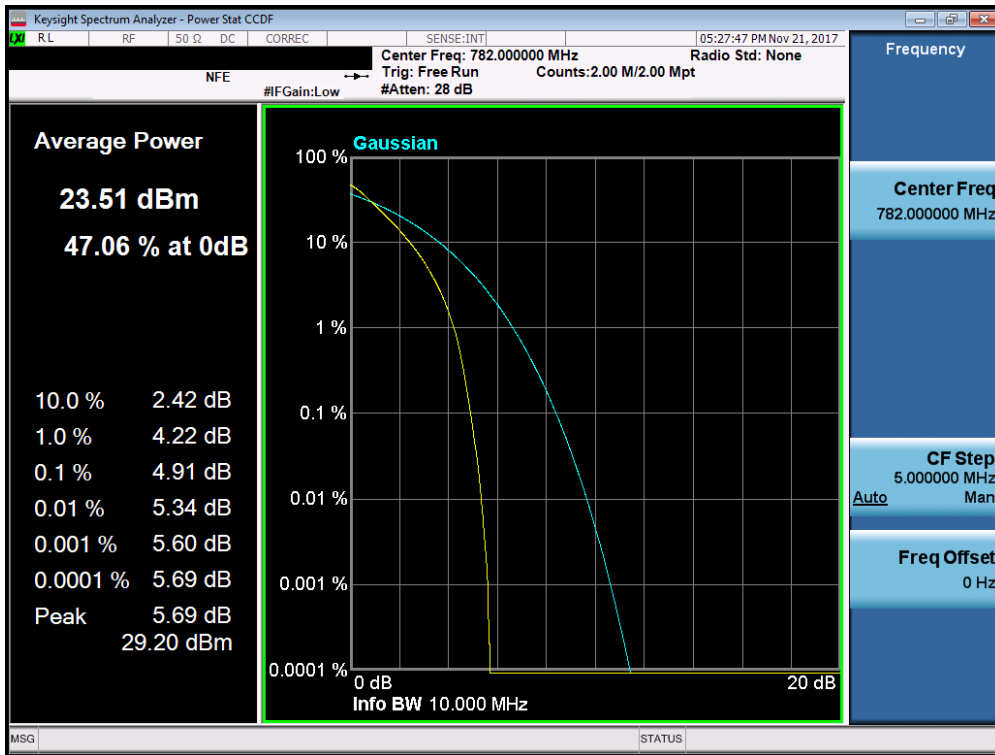
Plot 7-137. PAR Plot (Band 13 - 5MHz QPSK - Full RB Configuration)



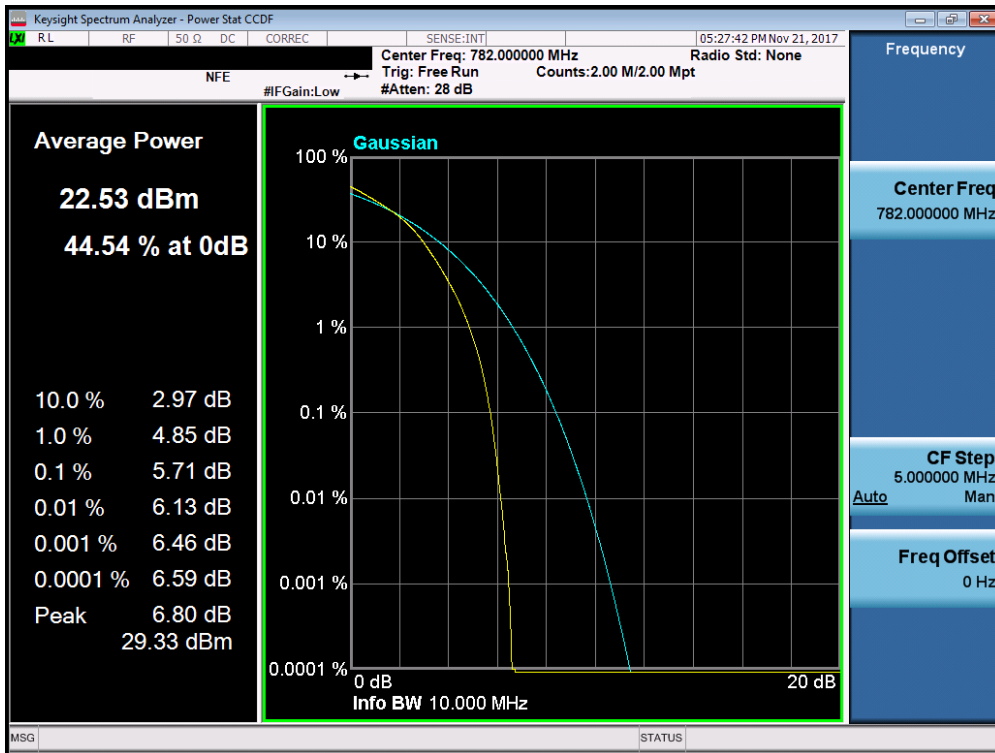
Plot 7-138. PAR Plot (Band 13 - 5MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 89 of 127

Band 13



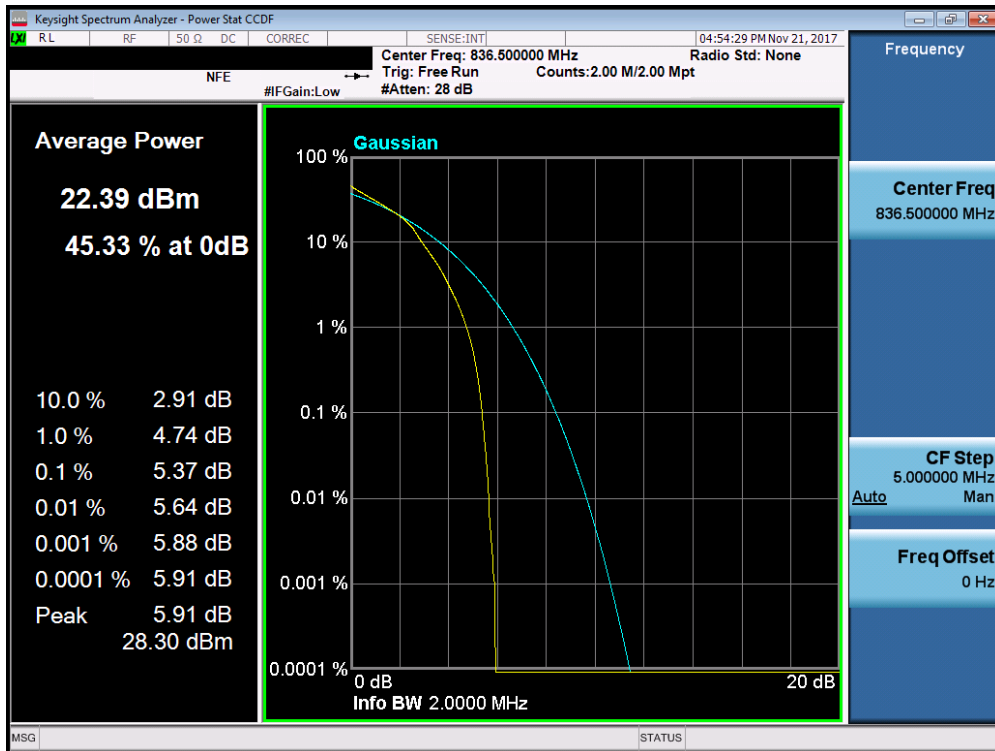
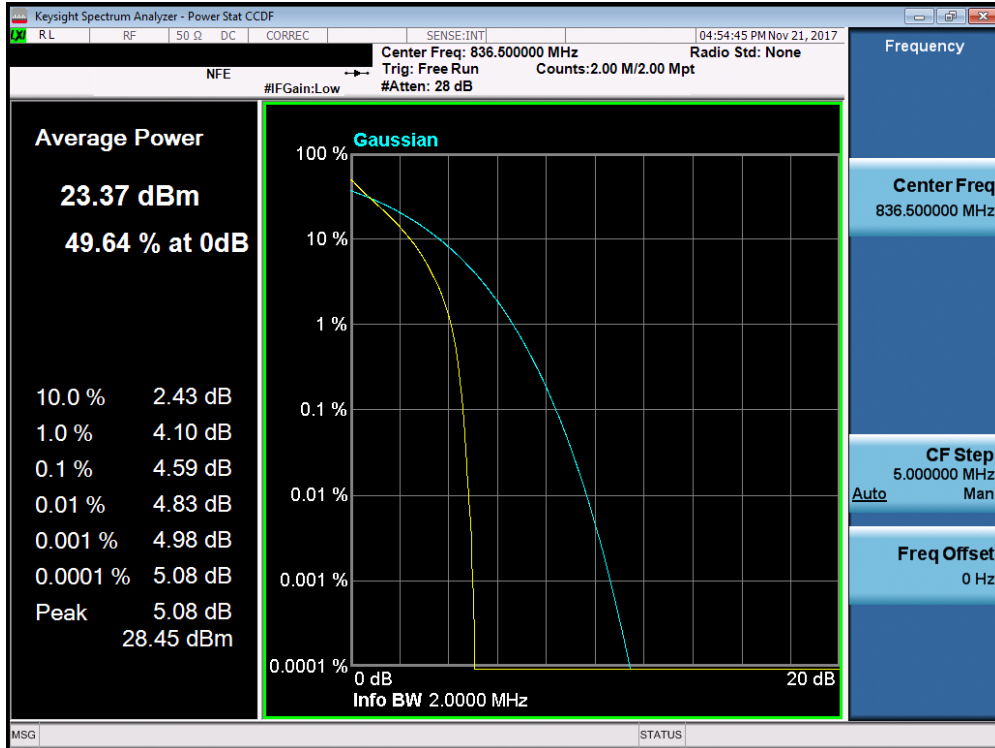
Plot 7-139. PAR Plot (Band 13 - 10MHz QPSK - Full RB Configuration)



Plot 7-140. PAR Plot (Band 13 - 10MHz 16-QAM - Full RB Configuration)

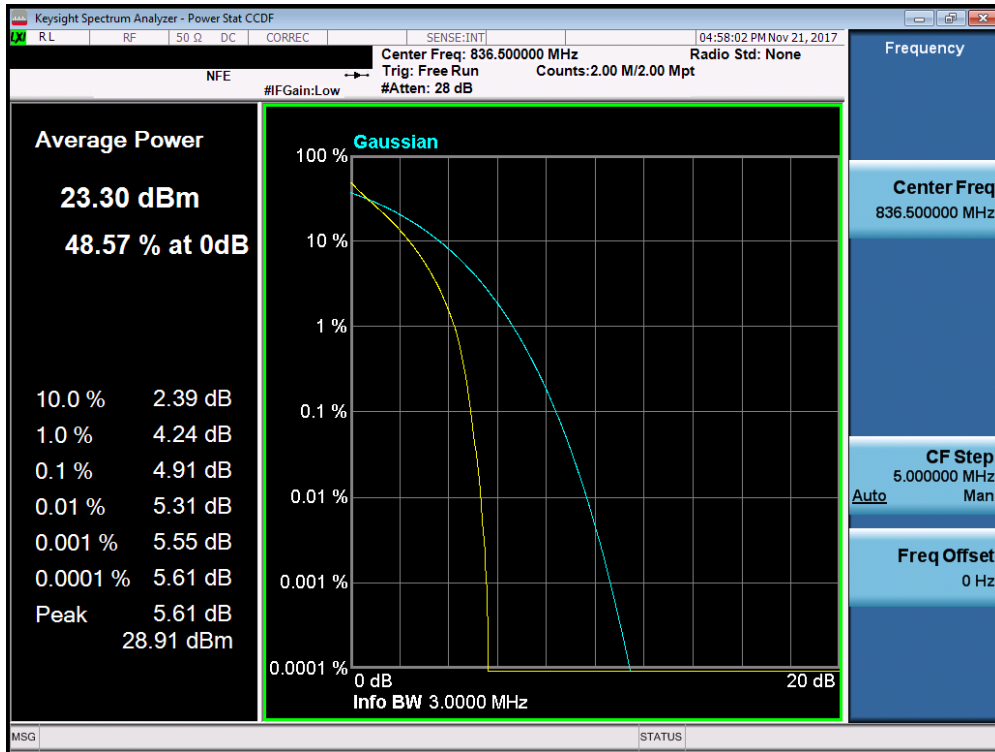
FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2-ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 90 of 127

Band 5

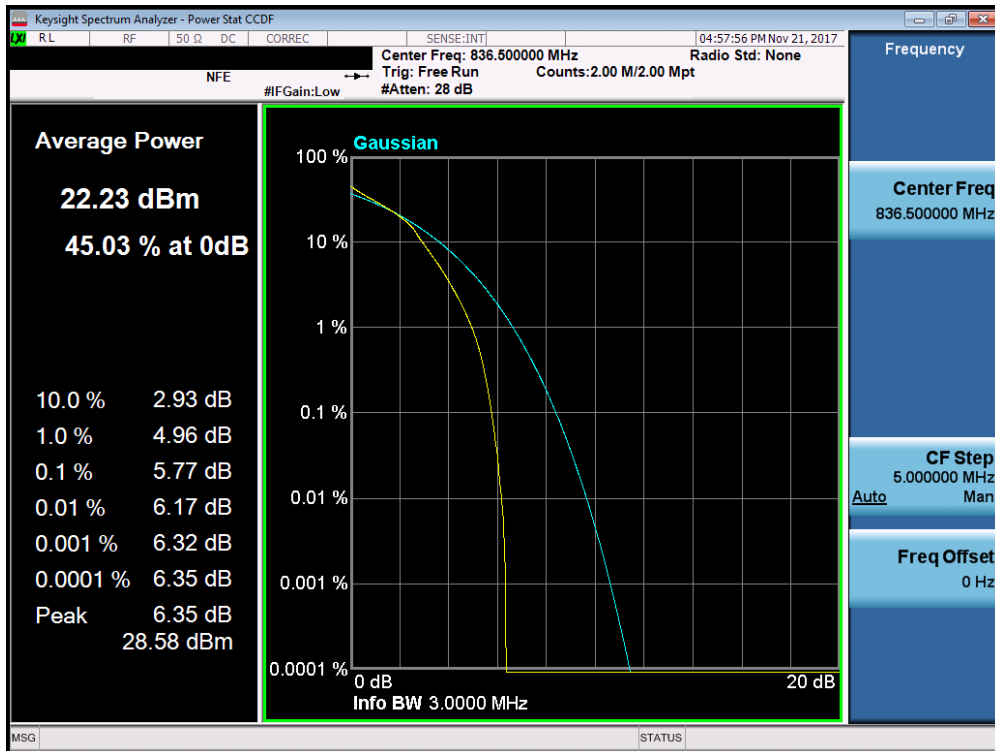


FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 91 of 127

Band 5



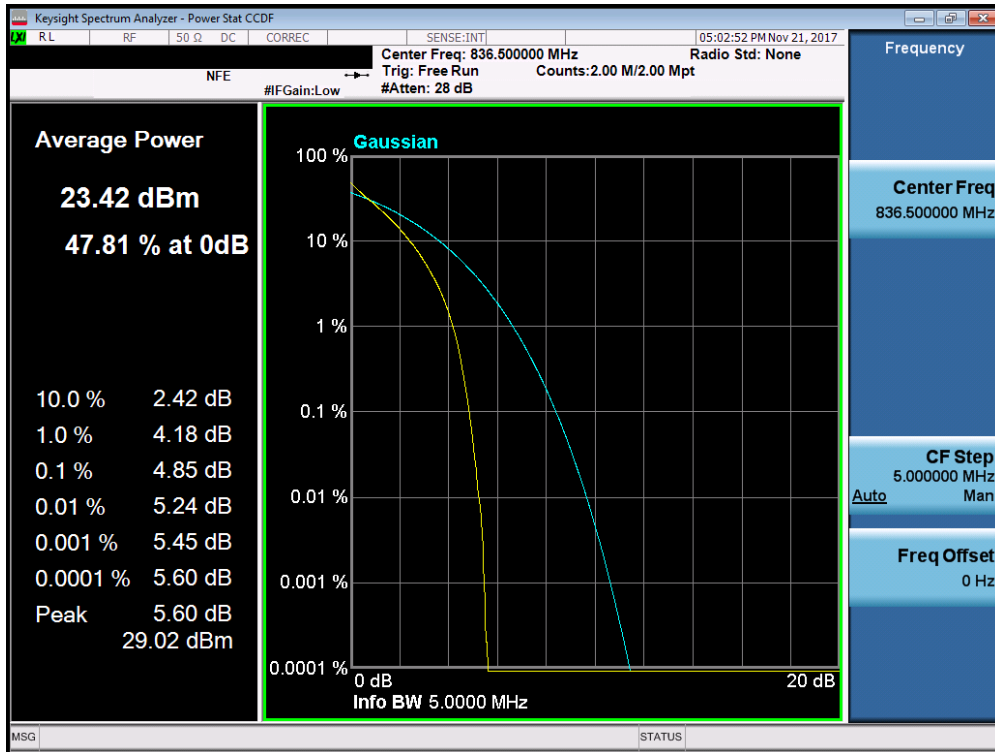
Plot 7-143. PAR Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



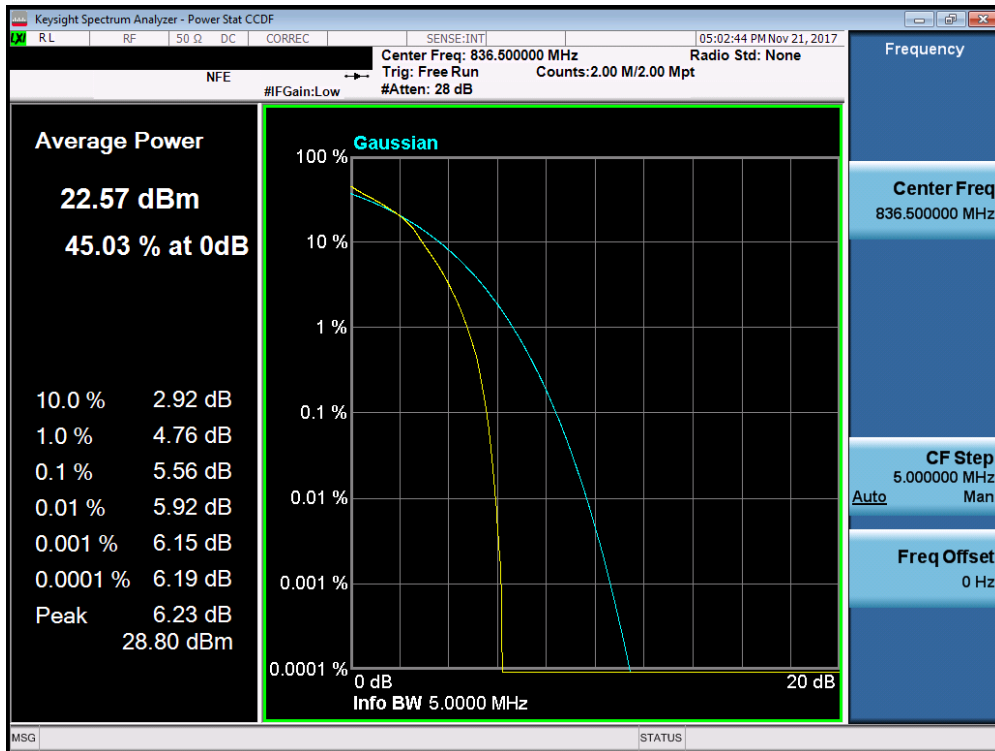
Plot 7-144. PAR Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 92 of 127

Band 5



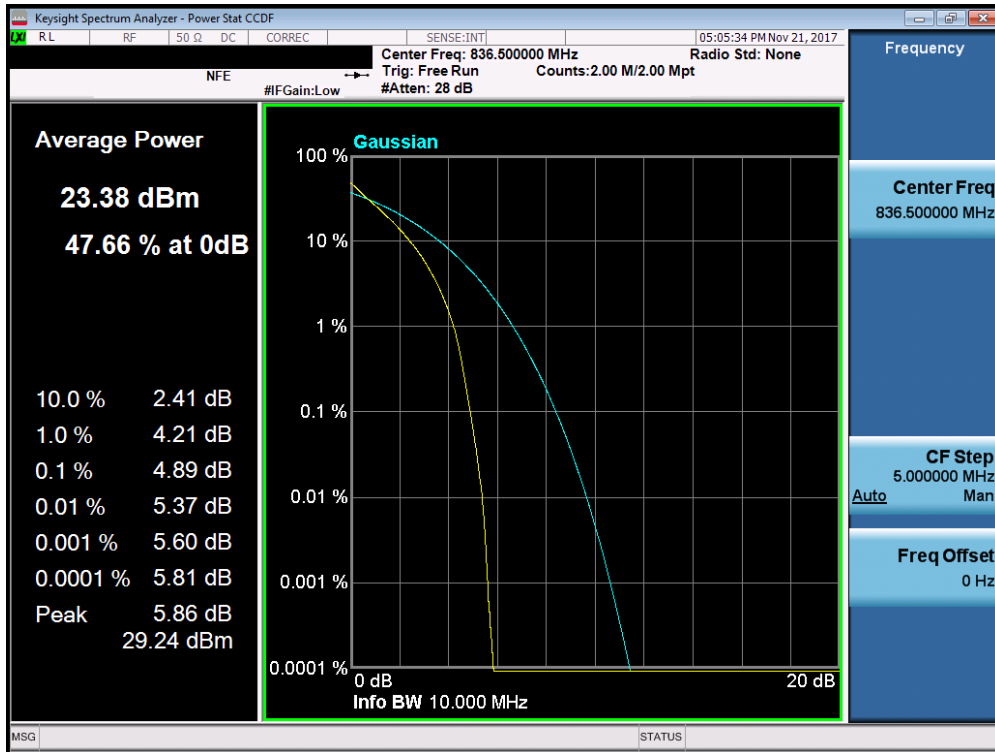
Plot 7-145. PAR Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



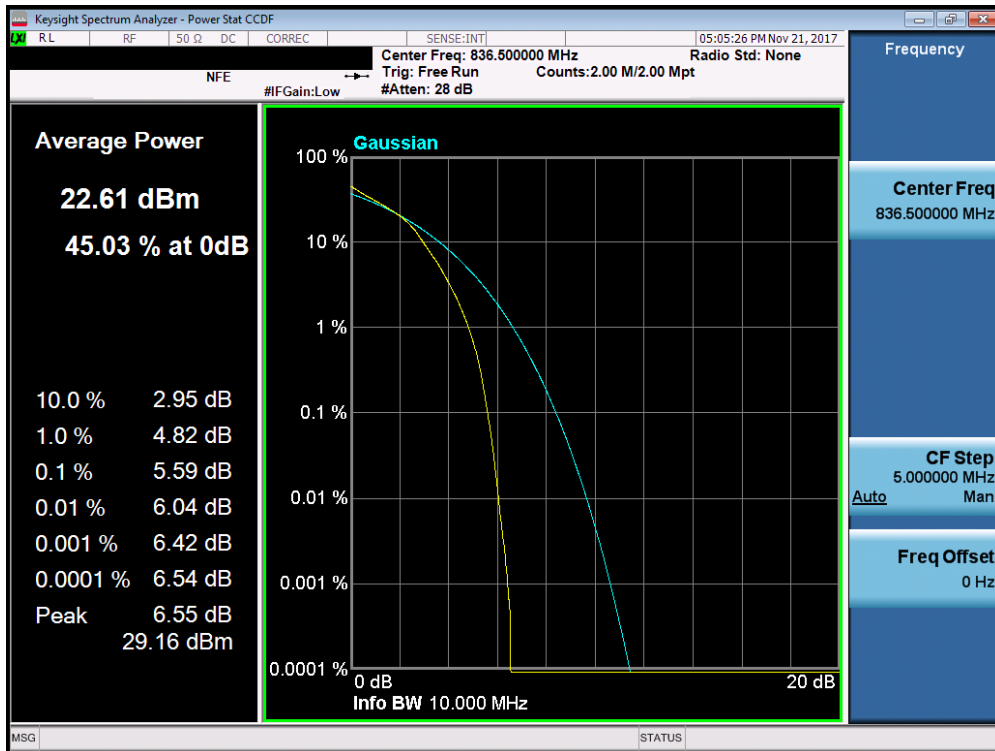
Plot 7-146. PAR Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 93 of 127

Band 5



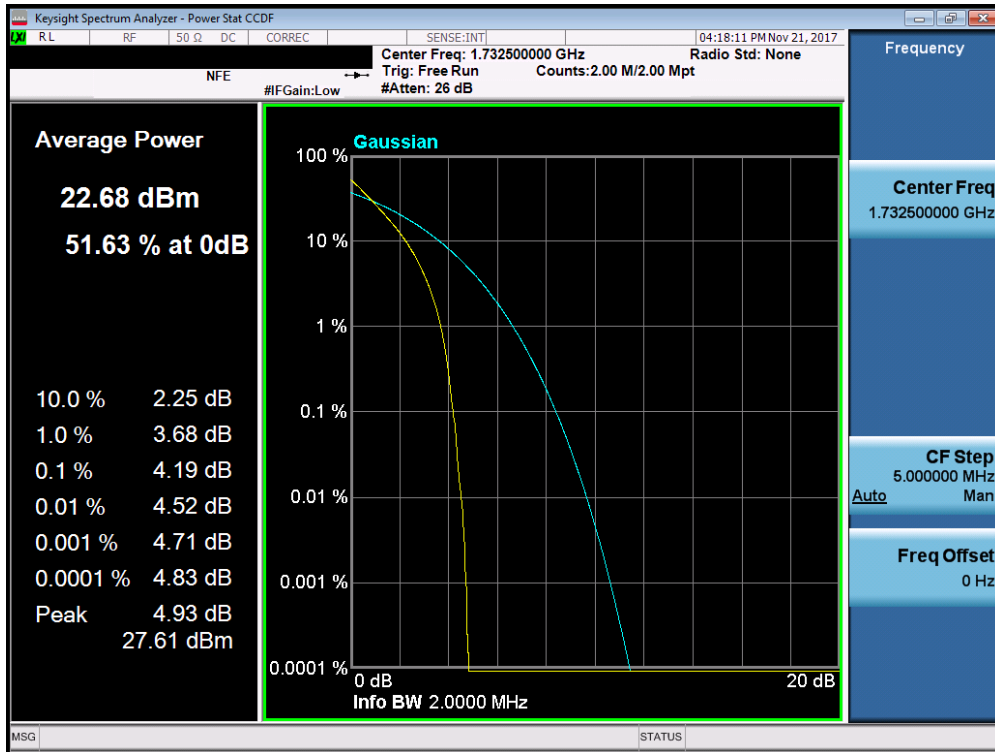
Plot 7-147. PAR Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



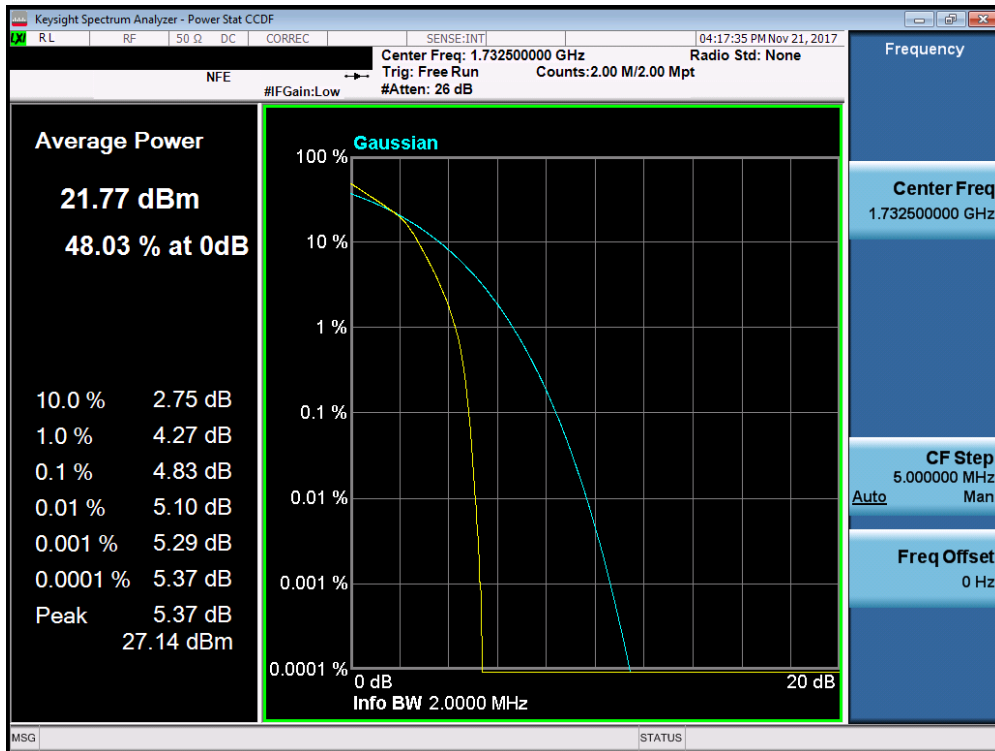
Plot 7-148. PAR Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 94 of 127

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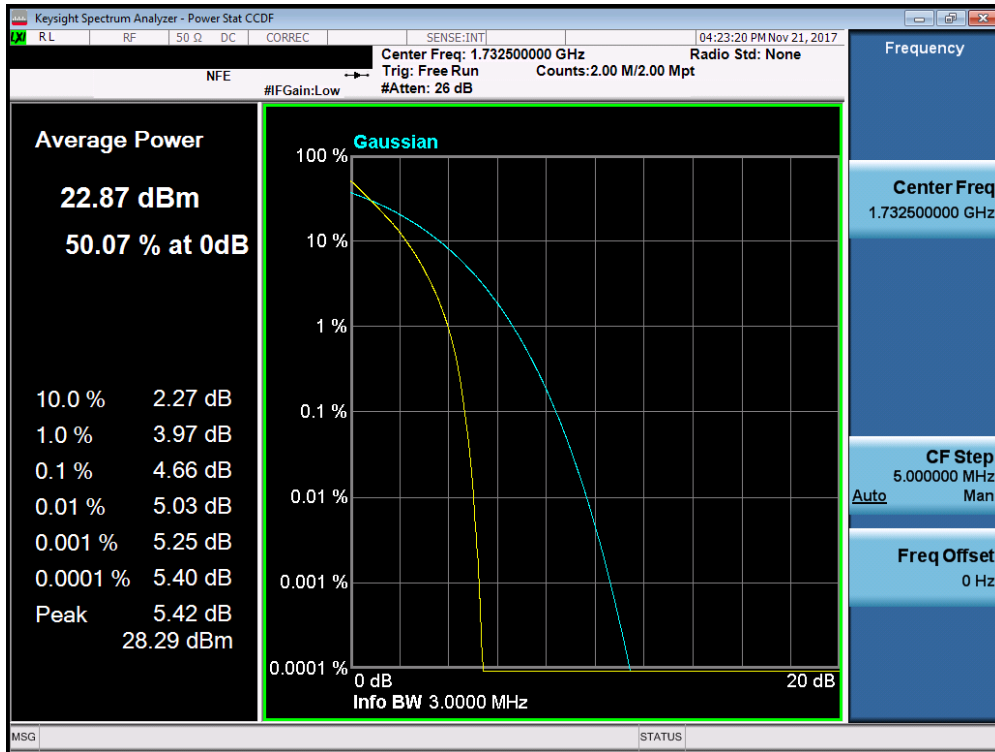
Plot 7-149. PAR Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



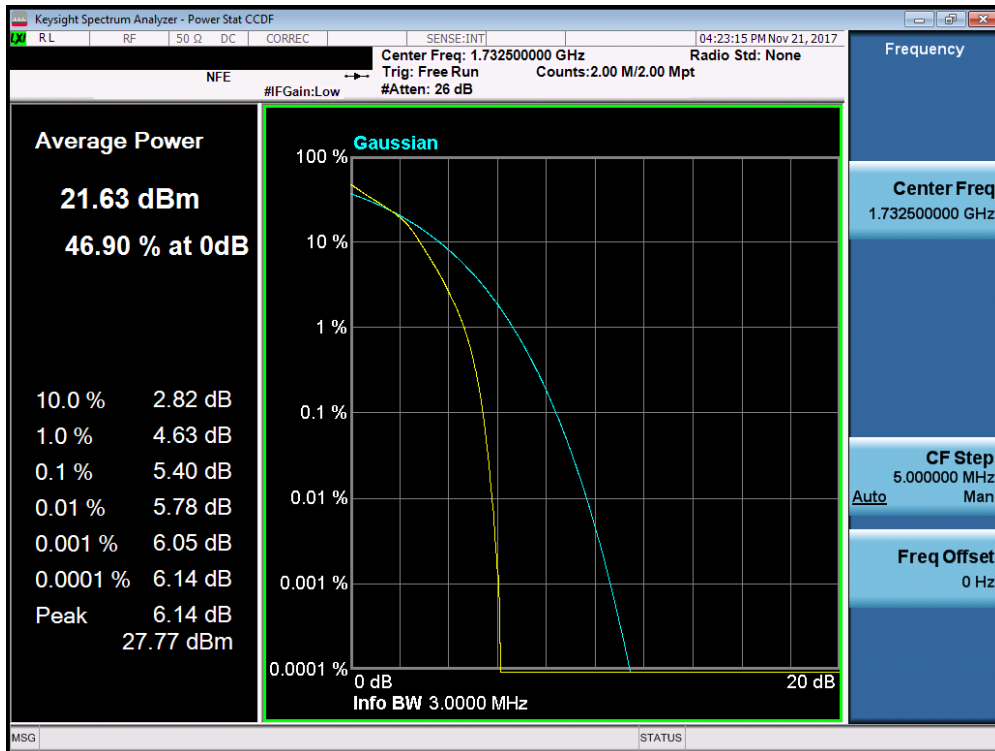
Plot 7-150. PAR Plot (Band 4 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 95 of 127

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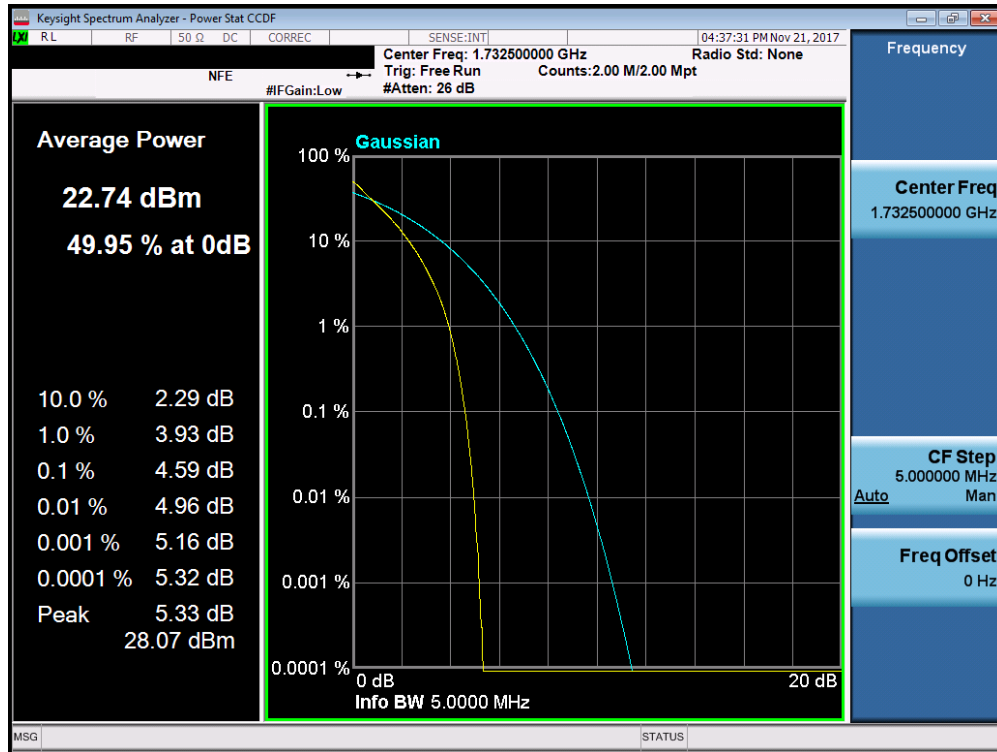
Plot 7-151. PAR Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



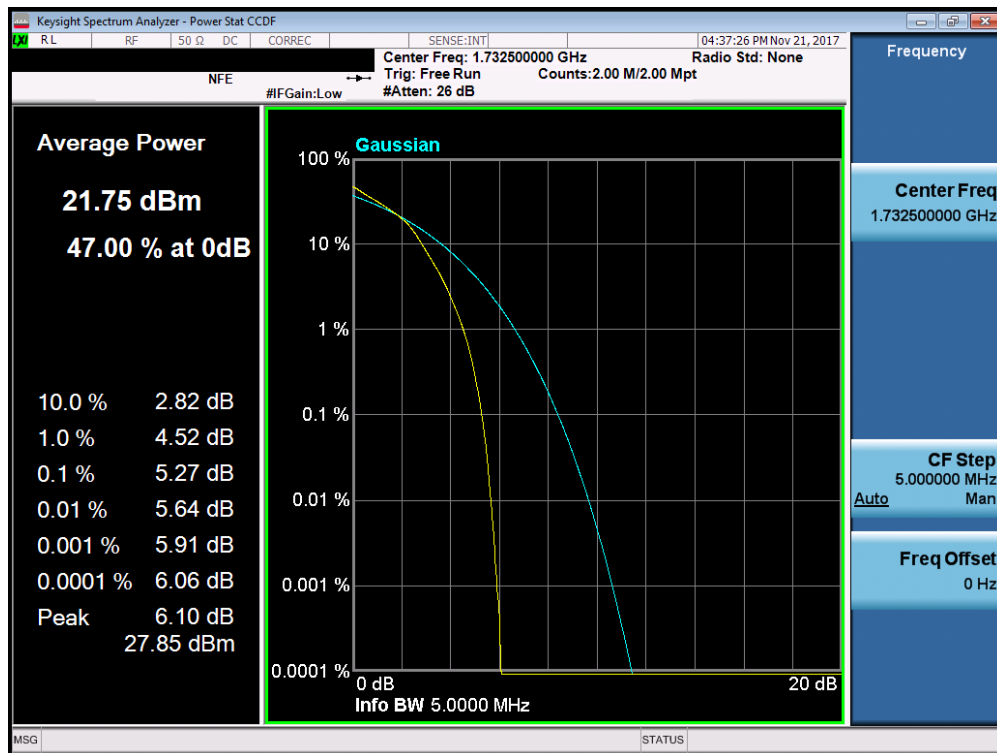
Plot 7-152. PAR Plot (Band 4 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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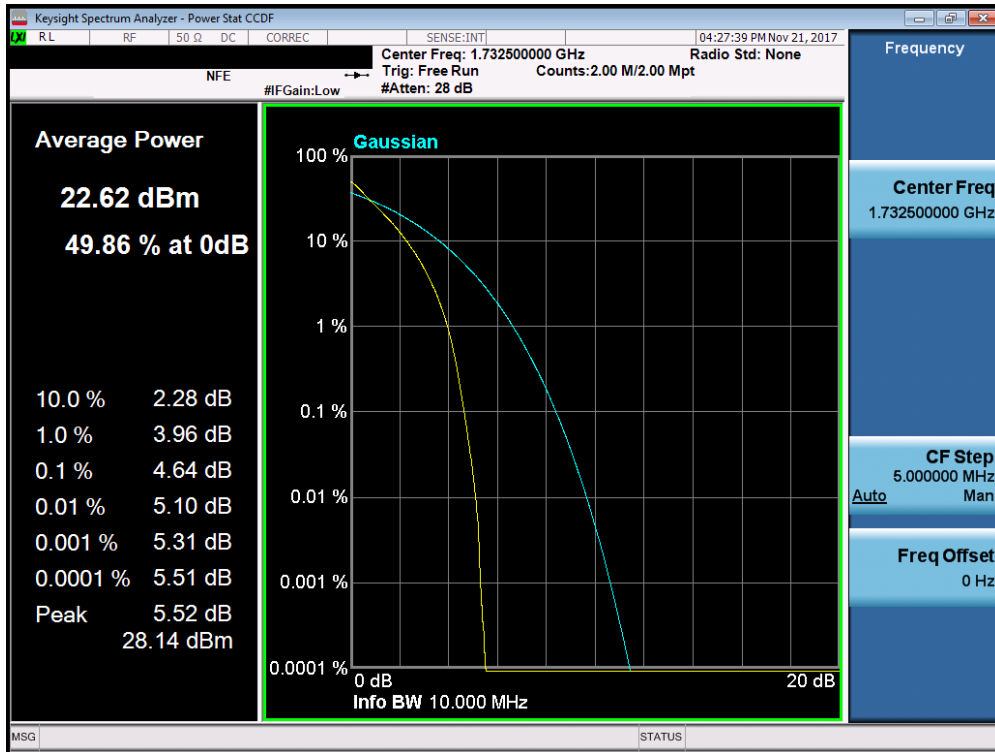
Plot 7-153. PAR Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



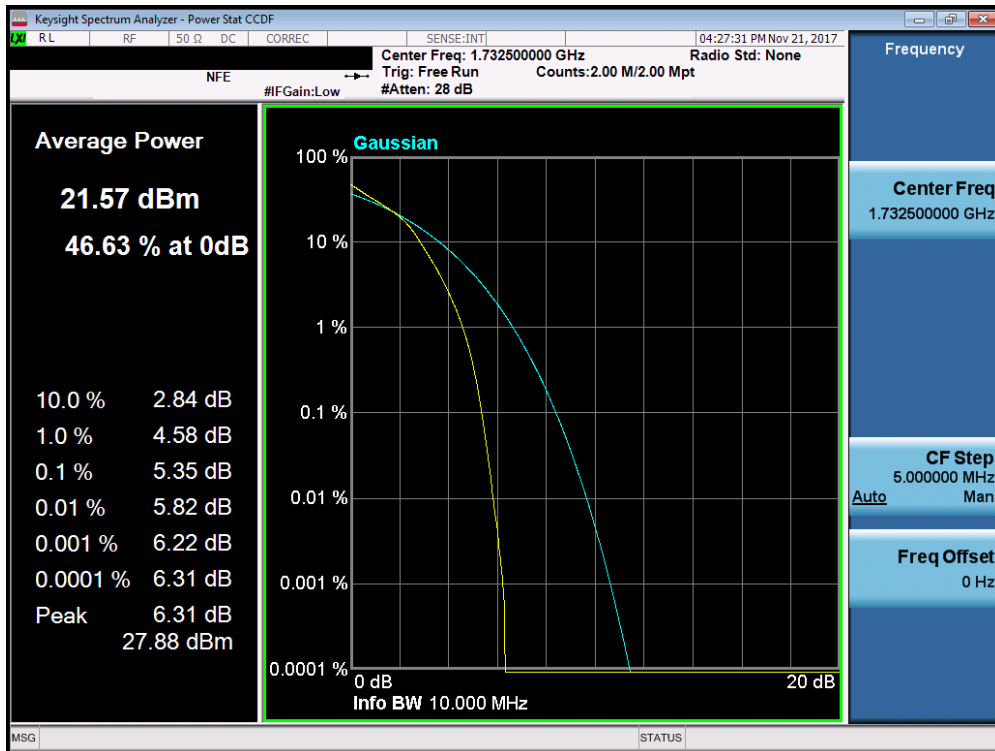
Plot 7-154. PAR Plot (Band 4 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 97 of 127

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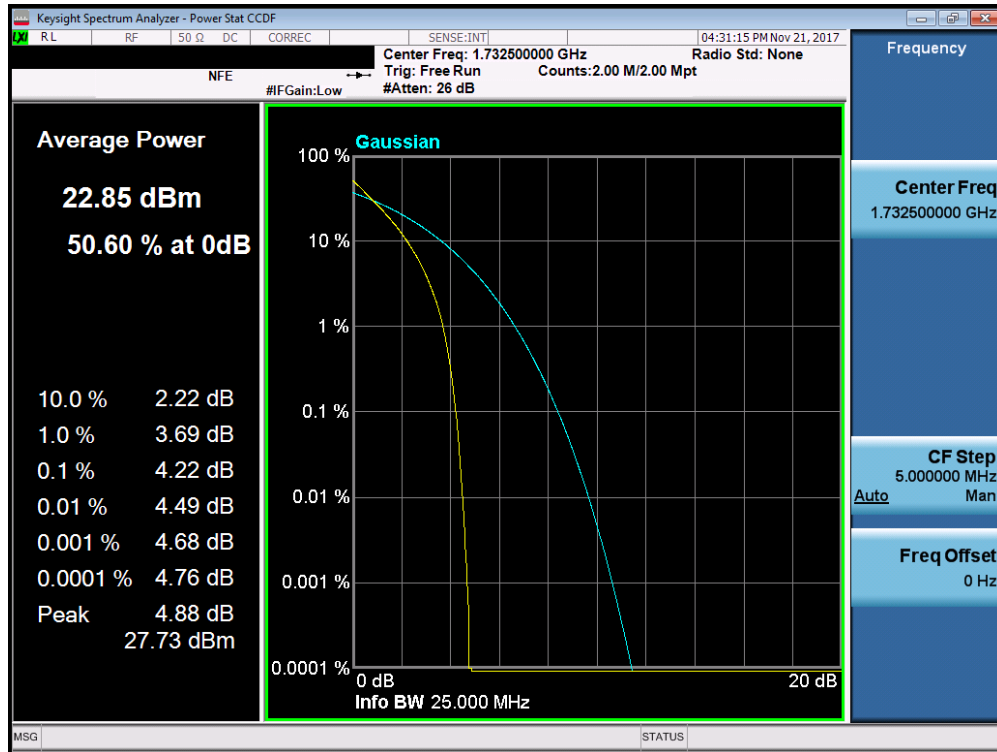
Plot 7-155. PAR Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



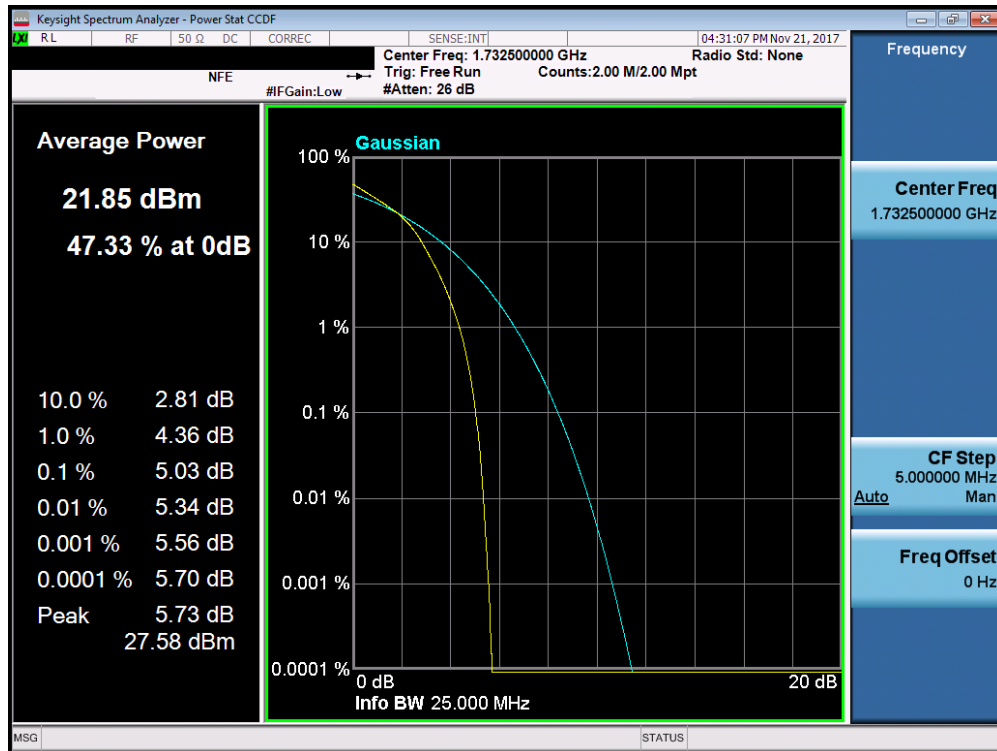
Plot 7-156. PAR Plot (Band 4 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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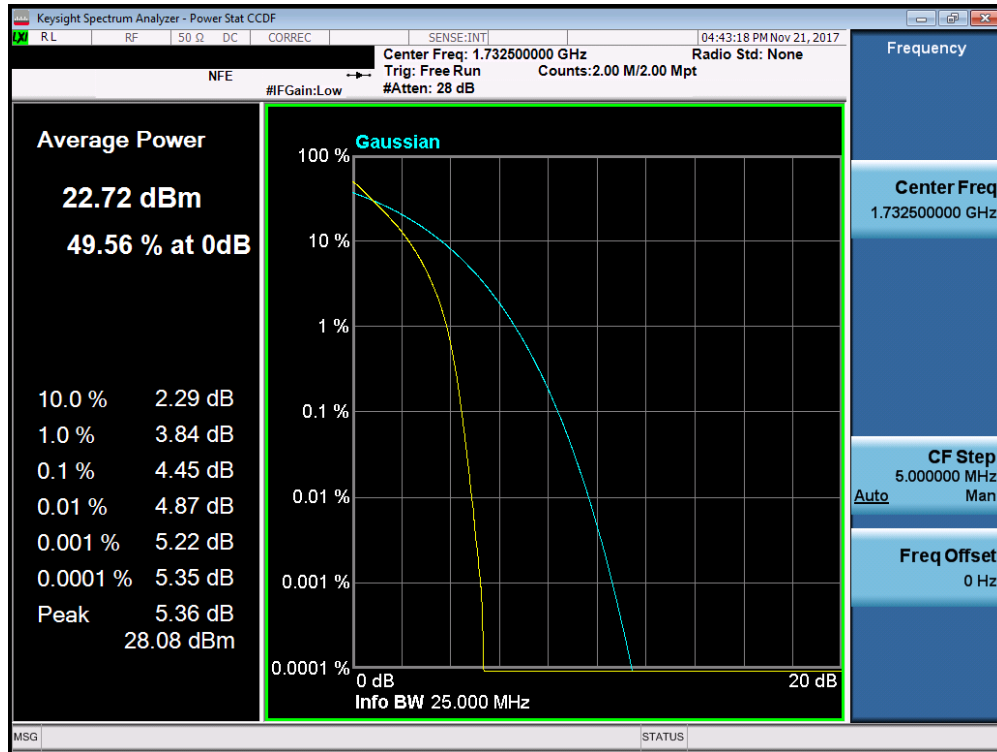
Plot 7-157. PAR Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



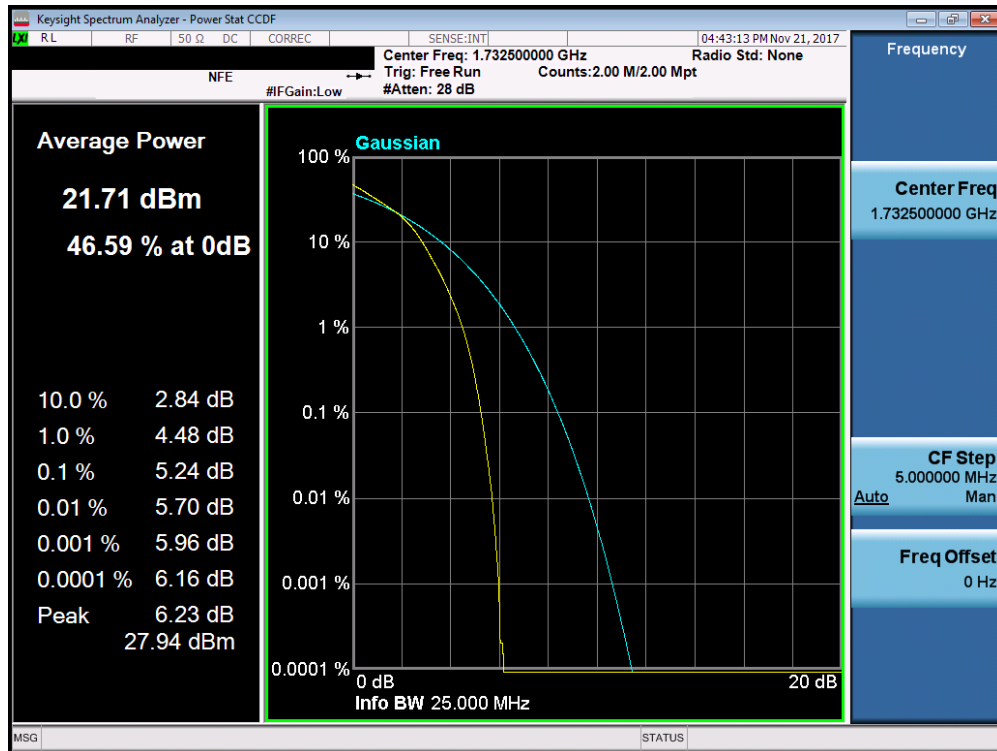
Plot 7-158. PAR Plot (Band 4 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2-ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 99 of 127

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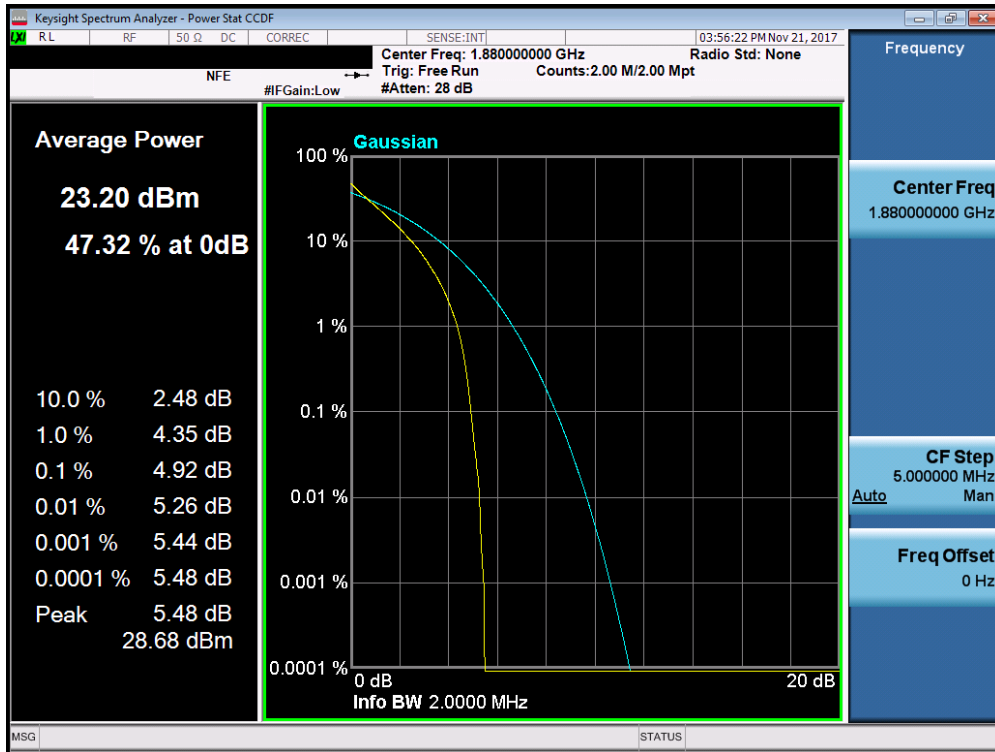
Plot 7-159. PAR Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



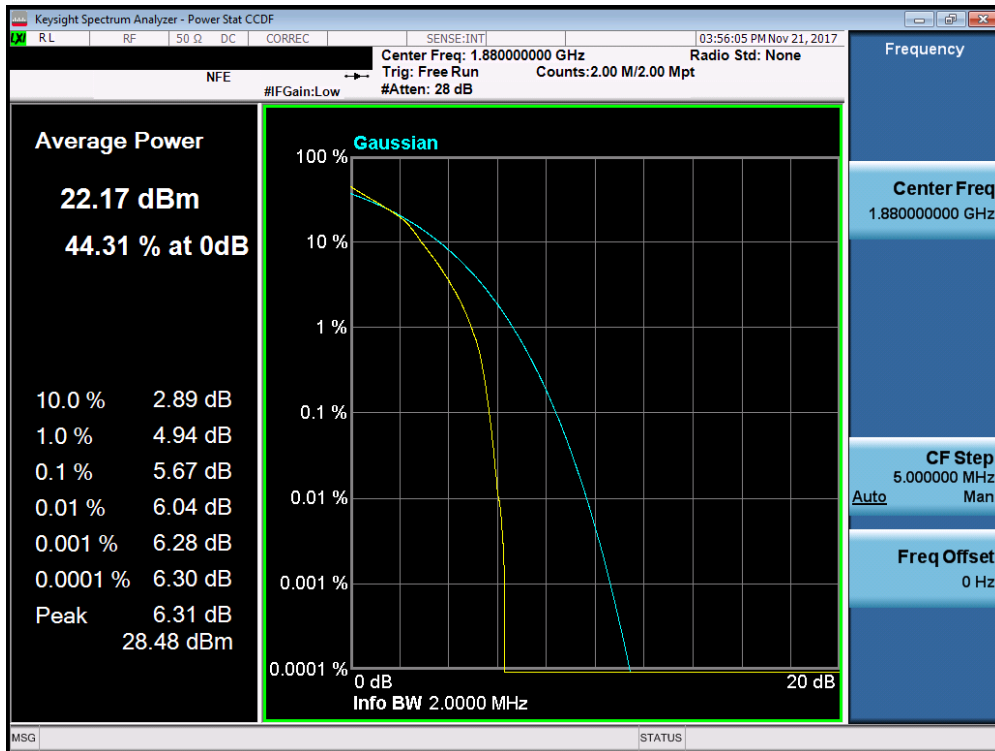
Plot 7-160. PAR Plot (Band 4 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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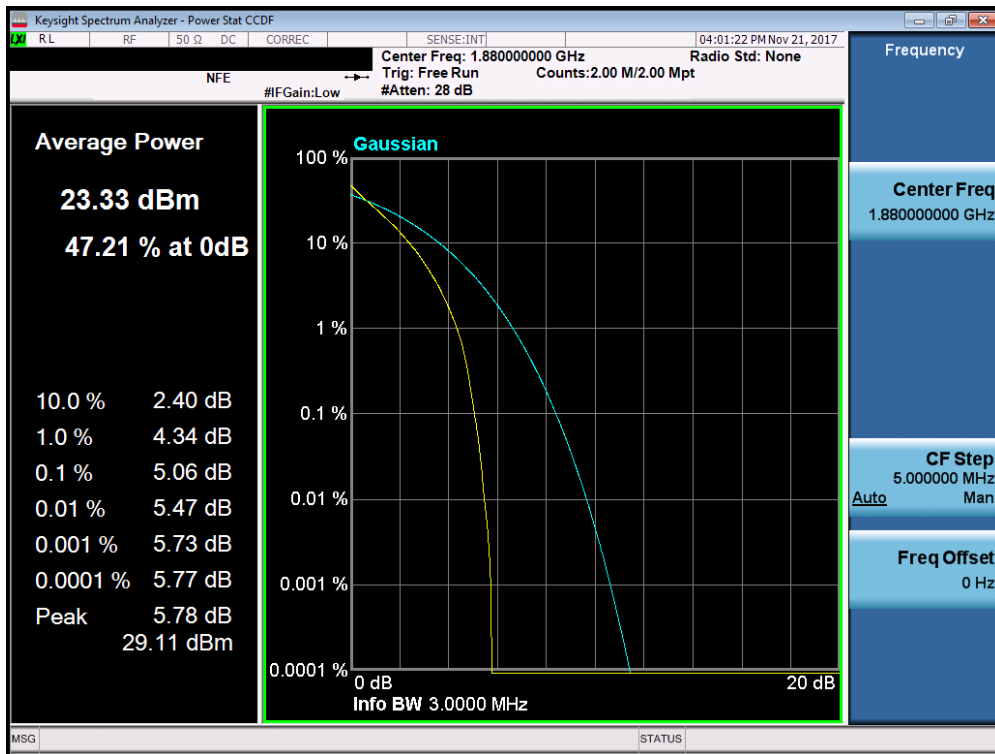
Plot 7-161. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



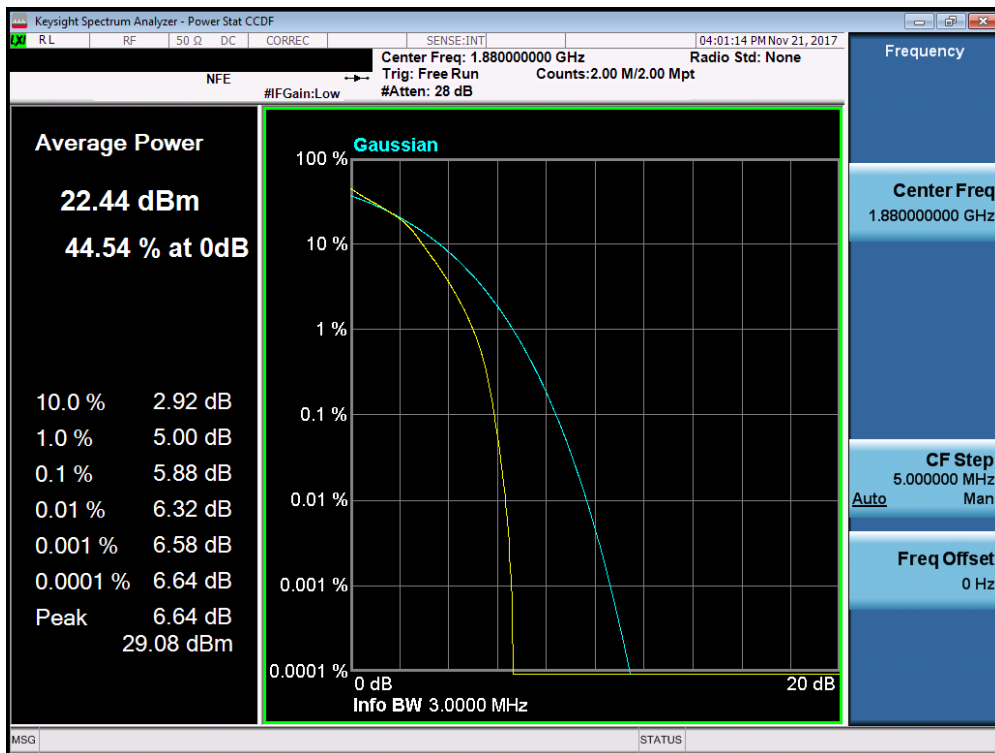
Plot 7-162. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2-ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 101 of 127

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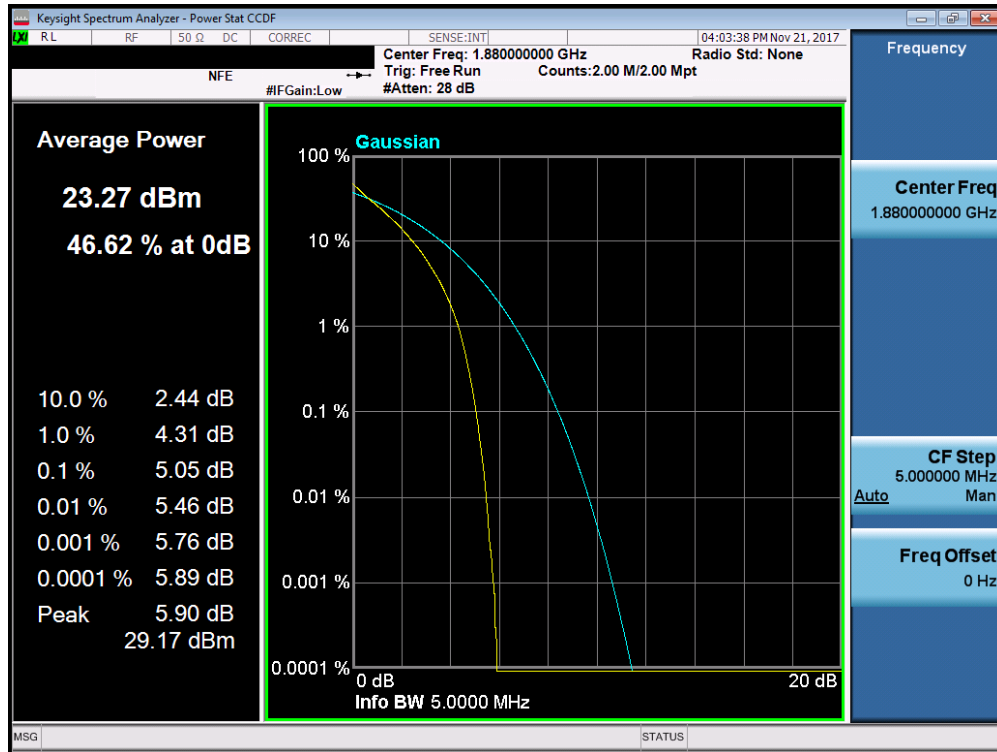
Plot 7-163. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



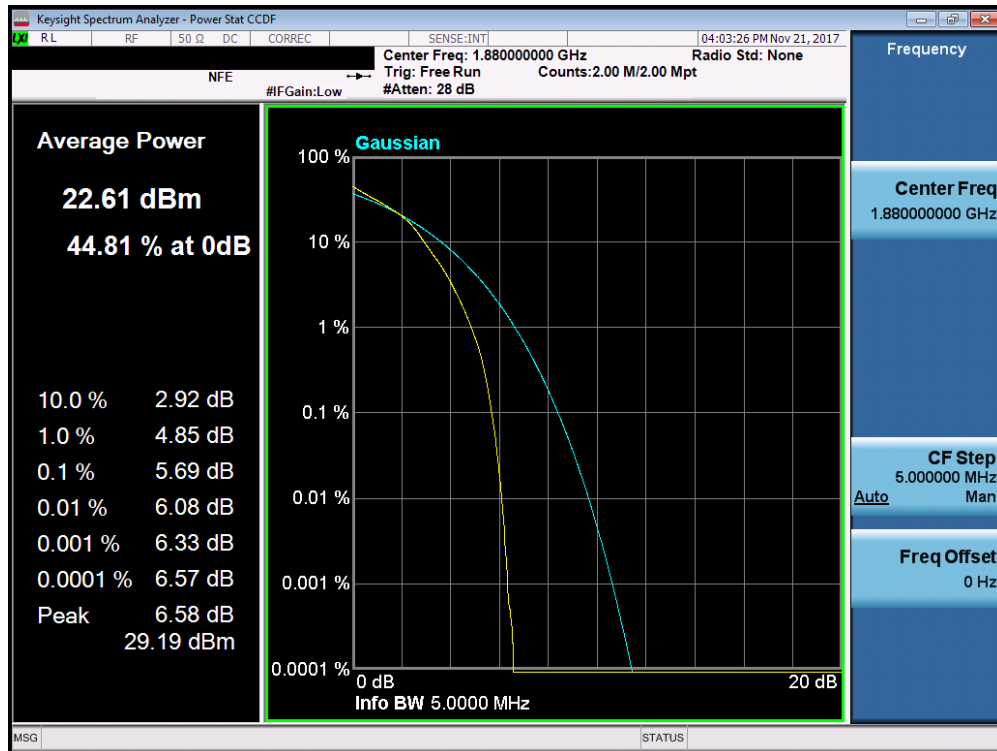
Plot 7-164. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1711080291-03-R2.ZNF	Test Dates: 11/10 - 11/29/2017	EUT Type: Portable Handset		Page 102 of 127

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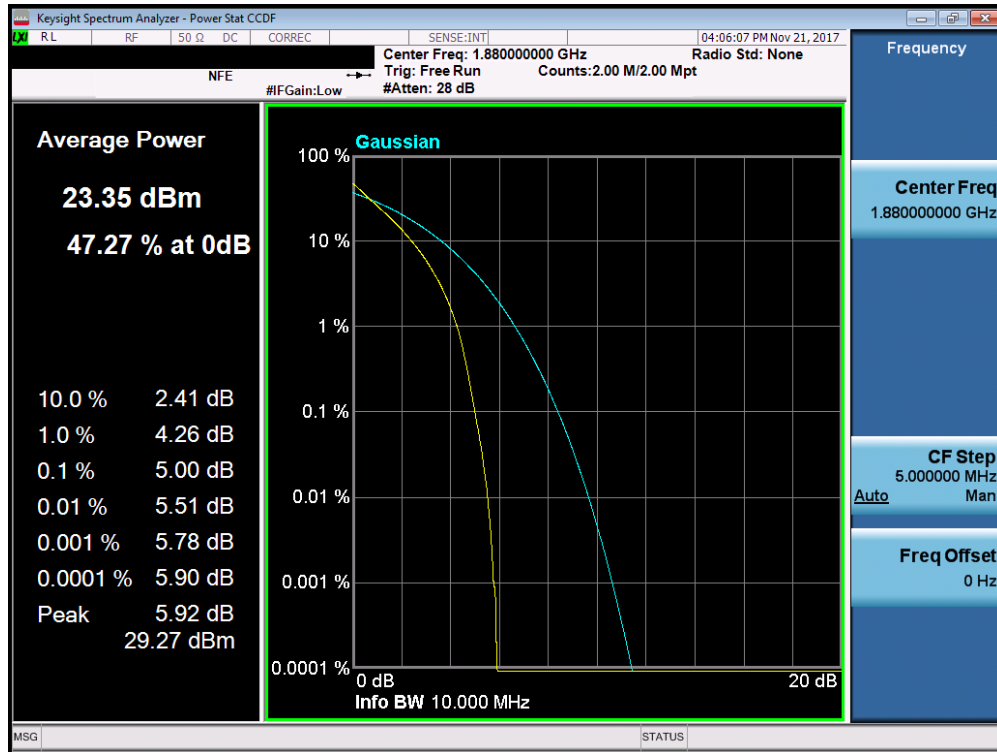
Plot 7-165. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



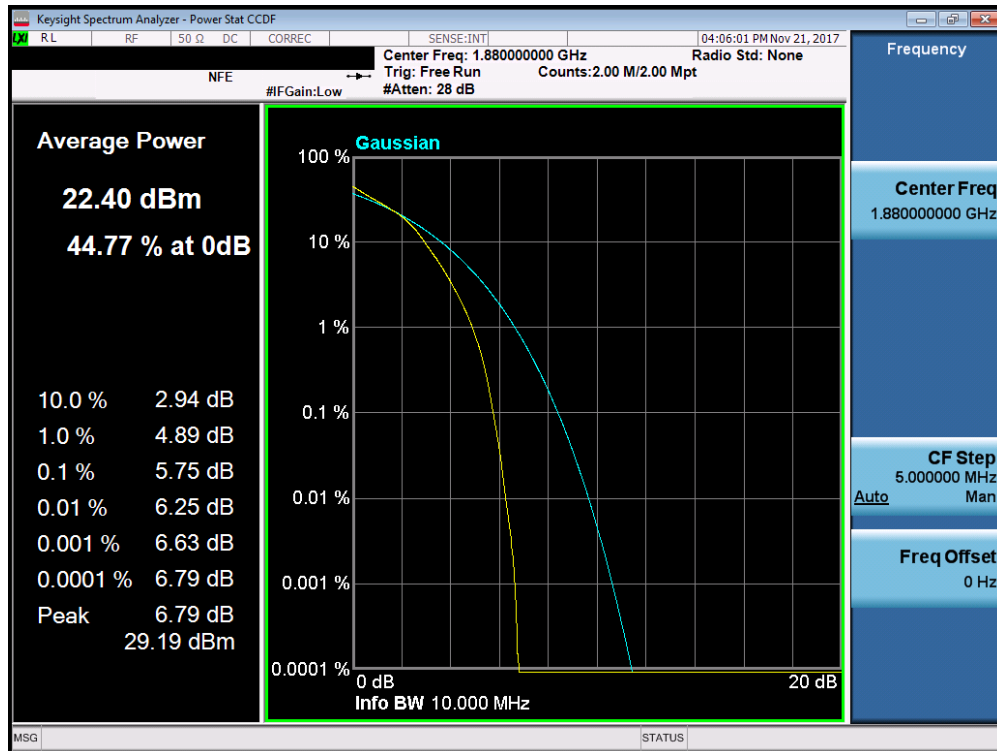
Plot 7-166. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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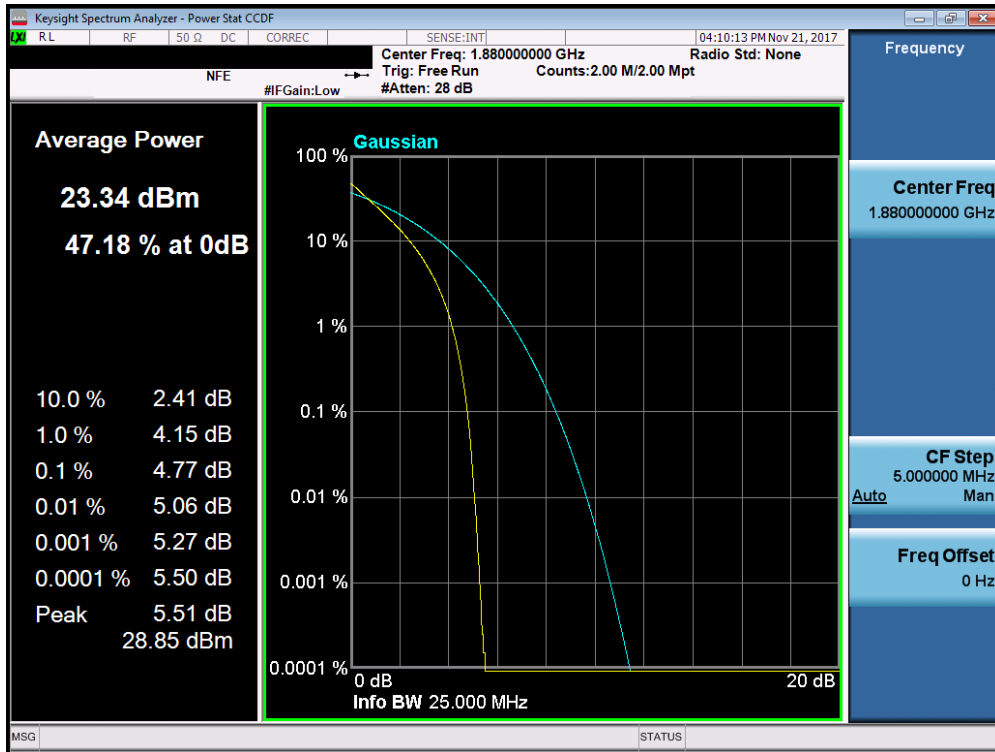
Plot 7-167. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



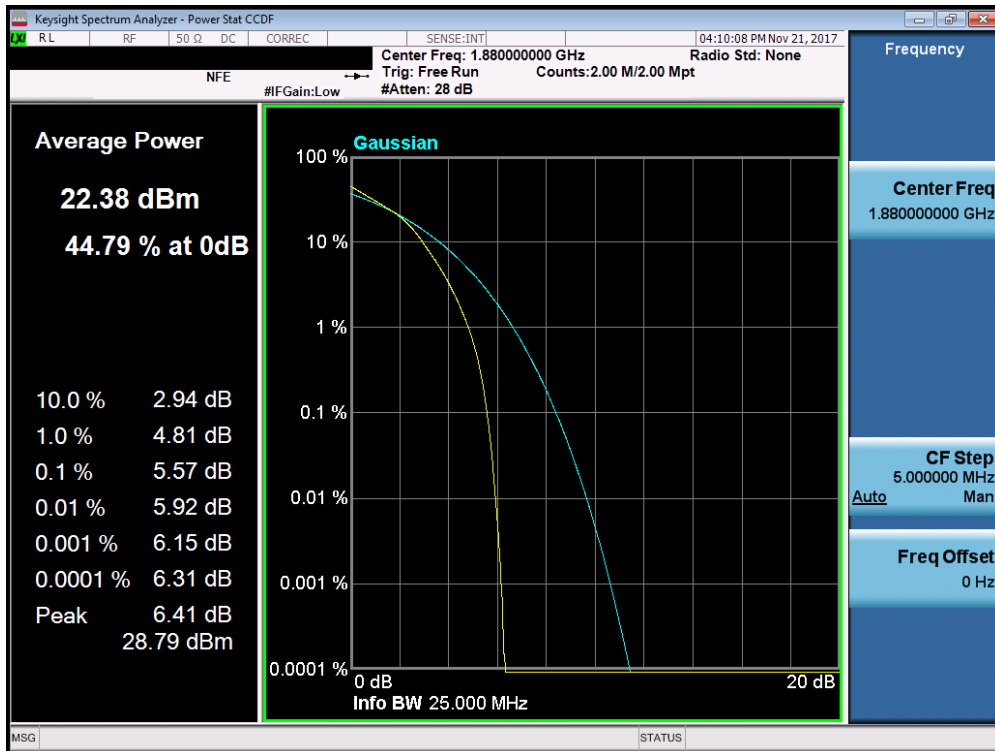
Plot 7-168. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 2



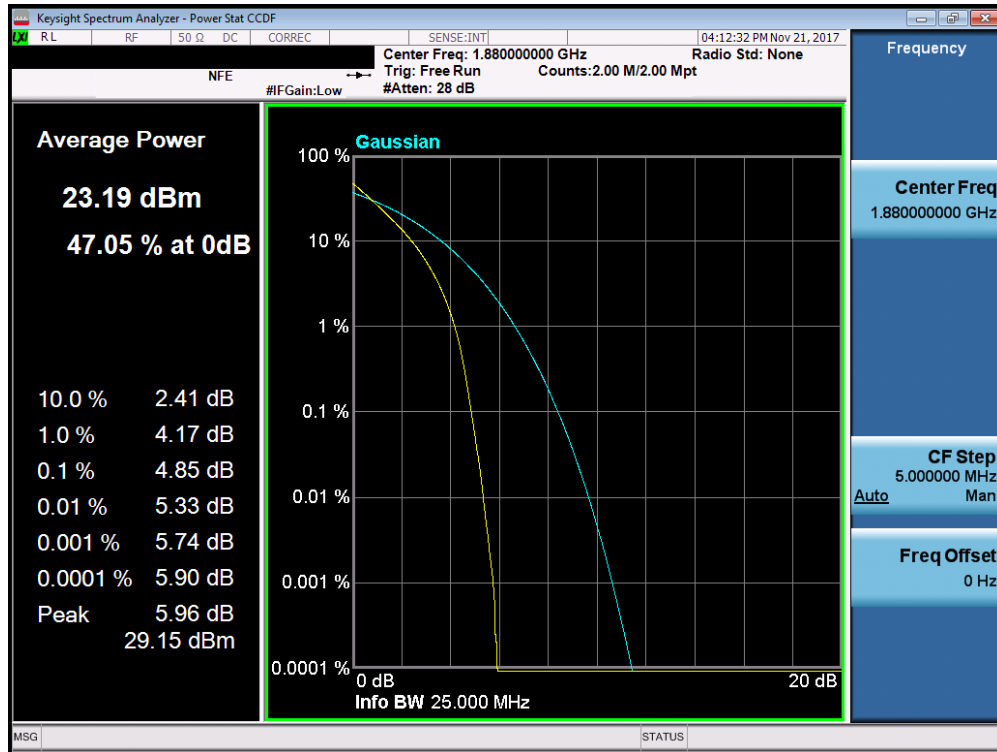
Plot 7-169. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



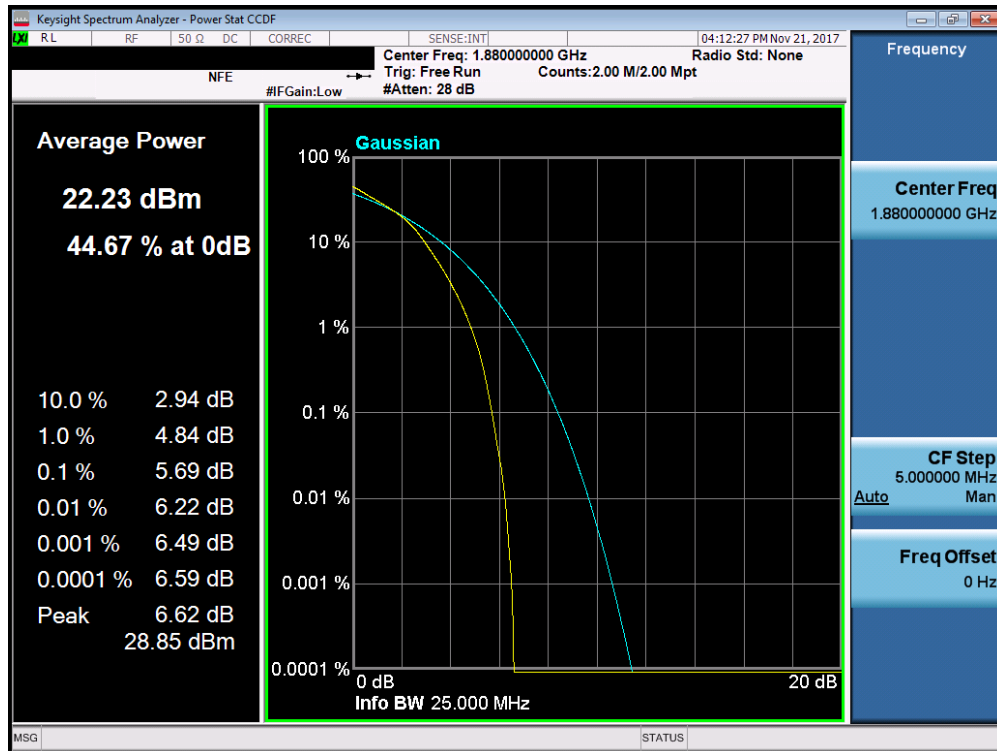
Plot 7-170. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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Band 2



Plot 7-171. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-172. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

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7.6 Radiated Power (ERP/EIRP)

§22.913(a)(2) §24.232(c.2) §27.50(b)(10) §27.50(d)(4) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 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 v03 – Section 5.2.1

ANSI/TIA-603-E-2016 – 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

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Test Setup

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

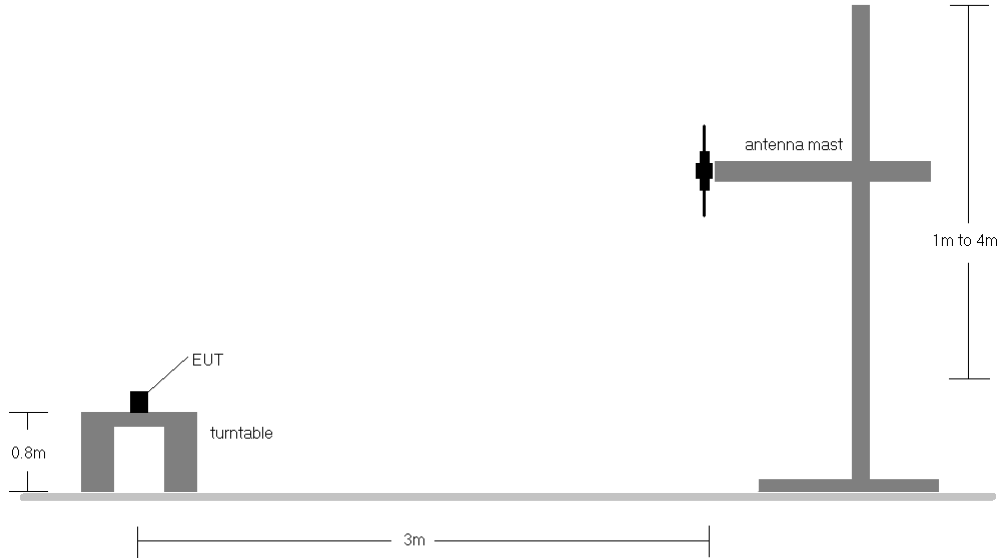


Figure 7-5. Radiated Test Setup <1GHz

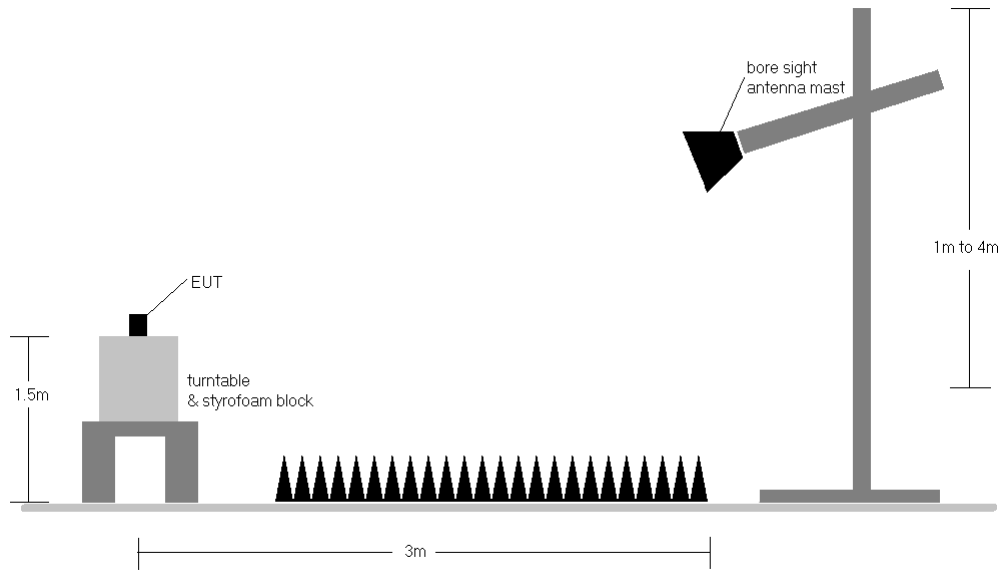


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

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

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	344	303	1 / 0	20.90	1.32	20.07	0.102	34.77	-14.70	22.22	0.167	36.99	-14.77
782.00	5	QPSK	H	334	316	1 / 0	20.94	1.33	20.12	0.103	34.77	-14.65	22.27	0.169	36.99	-14.72
784.50	5	QPSK	H	329	306	1 / 24	20.89	1.34	20.08	0.102	34.77	-14.69	22.23	0.167	36.99	-14.76
784.50	5	16-QAM	H	329	306	1 / 0	19.55	1.34	18.74	0.075	34.77	-16.03	20.89	0.123	36.99	-16.10
782.00	10	QPSK	H	341	308	1 / 49	20.97	1.33	20.15	0.103	34.77	-14.62	22.30	0.170	36.99	-14.69
782.00	10	16-QAM	H	341	308	1 / 49	19.90	1.33	19.08	0.081	34.77	-15.69	21.23	0.133	36.99	-15.76
782.00	10	QPSK	V	26	351	1 / 0	20.73	1.33	19.91	0.098	34.77	-14.86	22.06	0.161	36.99	-14.93

Table 7-3. ERP/EIRP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	345	6	1 / 0	22.15	1.50	21.50	0.141	38.45	-16.95	23.65	0.232	40.61	-16.96
836.50	1.4	QPSK	V	171	10	1 / 5	22.49	1.50	21.84	0.153	38.45	-16.61	23.99	0.251	40.61	-16.62
848.30	1.4	QPSK	V	356	3	1 / 0	22.39	1.50	21.74	0.149	38.45	-16.71	23.89	0.245	40.61	-16.72
836.50	1.4	16-QAM	V	171	10	1 / 0	21.65	1.50	21.00	0.126	38.45	-17.45	23.15	0.207	40.61	-17.46
825.50	3	QPSK	V	167	9	1 / 0	22.42	1.50	21.77	0.150	38.45	-16.68	23.92	0.247	40.61	-16.69
836.50	3	QPSK	V	182	14	1 / 14	22.43	1.50	21.78	0.151	38.45	-16.67	23.93	0.247	40.61	-16.68
847.50	3	QPSK	V	174	15	1 / 14	22.79	1.50	22.14	0.164	38.45	-16.31	24.29	0.269	40.61	-16.32
825.50	3	16-QAM	V	167	9	1 / 0	21.28	1.50	20.63	0.116	38.45	-17.82	22.78	0.190	40.61	-17.83
826.50	5	QPSK	V	170	19	1 / 0	22.21	1.50	21.56	0.143	38.45	-16.89	23.71	0.235	40.61	-16.90
836.50	5	QPSK	V	169	21	1 / 0	22.63	1.50	21.98	0.158	38.45	-16.47	24.13	0.259	40.61	-16.48
846.50	5	QPSK	V	171	11	1 / 0	22.45	1.50	21.80	0.151	38.45	-16.65	23.95	0.248	40.61	-16.66
836.50	5	16-QAM	V	169	21	1 / 0	21.03	1.50	20.38	0.109	38.45	-18.07	22.53	0.179	40.61	-18.08
829.00	10	QPSK	V	353	15	1 / 49	22.19	1.50	21.54	0.143	38.45	-16.91	23.69	0.234	40.61	-16.92
836.50	10	QPSK	V	162	9	1 / 49	22.45	1.50	21.80	0.151	38.45	-16.65	23.95	0.248	40.61	-16.66
844.00	10	QPSK	V	359	15	1 / 0	22.49	1.50	21.84	0.153	38.45	-16.61	23.99	0.251	40.61	-16.62
829.00	10	16-QAM	V	353	15	1 / 0	21.37	1.50	20.72	0.118	38.45	-17.73	22.87	0.194	40.61	-17.74
847.50	3	QPSK	H	325	311	1 / 0	21.43	1.50	20.78	0.120	38.45	-17.67	22.93	0.196	40.61	-17.68

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

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	188	1 / 5	19.21	5.56	24.77	0.300	30.00	-5.23
1732.50	1.4	QPSK	H	150	188	1 / 5	19.34	5.41	24.75	0.298	30.00	-5.25
1754.30	1.4	QPSK	H	150	188	1 / 5	19.27	5.26	24.53	0.284	30.00	-5.47
1732.50	1.4	16-QAM	H	150	188	1 / 5	17.95	5.41	23.36	0.217	30.00	-6.64
1711.50	3	QPSK	H	150	188	1 / 14	19.01	5.55	24.56	0.286	30.00	-5.44
1732.50	3	QPSK	H	150	188	1 / 14	19.33	5.41	24.74	0.298	30.00	-5.26
1753.50	3	QPSK	H	150	188	1 / 14	19.06	5.26	24.32	0.271	30.00	-5.68
1711.50	3	16-QAM	H	150	188	1 / 14	17.78	5.55	23.33	0.215	30.00	-6.67
1712.50	5	QPSK	H	150	188	1 / 24	18.59	5.55	24.14	0.259	30.00	-5.86
1732.50	5	QPSK	H	150	188	1 / 24	19.20	5.41	24.61	0.289	30.00	-5.39
1752.50	5	QPSK	H	150	188	1 / 24	19.17	5.27	24.44	0.278	30.00	-5.56
1732.50	5	16-QAM	H	150	188	1 / 24	17.56	5.41	22.97	0.198	30.00	-7.03
1715.00	10	QPSK	H	150	188	1 / 49	18.57	5.53	24.10	0.257	30.00	-5.90
1732.50	10	QPSK	H	150	188	1 / 49	18.55	5.41	23.96	0.249	30.00	-6.04
1750.00	10	QPSK	H	150	188	1 / 49	18.84	5.29	24.13	0.259	30.00	-5.87
1732.50	10	16-QAM	H	150	188	1 / 49	17.35	5.41	22.76	0.189	30.00	-7.24
1717.50	15	QPSK	H	150	188	1 / 74	18.71	5.51	24.22	0.264	30.00	-5.78
1732.50	15	QPSK	H	150	188	1 / 74	18.80	5.41	24.21	0.263	30.00	-5.79
1747.50	15	QPSK	H	150	188	1 / 74	18.75	5.31	24.06	0.254	30.00	-5.94
1747.50	15	16-QAM	H	150	188	1 / 74	17.46	5.31	22.77	0.189	30.00	-7.23
1720.00	20	QPSK	H	150	188	1 / 99	19.16	5.49	24.65	0.292	30.00	-5.35
1732.50	20	QPSK	H	150	188	1 / 99	19.17	5.41	24.58	0.287	30.00	-5.42
1745.00	20	QPSK	H	150	188	1 / 99	19.14	5.32	24.46	0.279	30.00	-5.54
1720.00	20	16-QAM	H	150	188	1 / 99	17.66	5.49	23.15	0.207	30.00	-6.85
1710.70	1.4	QPSK	V	107	277	1 / 99	19.04	5.41	24.45	0.278	30.00	-5.55

Table 7-5. EIRP Data (Band 4)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	150	286	1 / 0	20.76	4.79	25.55	0.359	33.01	-7.46
1880.00	1.4	QPSK	V	150	286	1 / 0	20.55	4.84	25.39	0.346	33.01	-7.62
1909.30	1.4	QPSK	V	150	286	1 / 0	19.96	4.86	24.82	0.303	33.01	-8.19
1850.70	1.4	16-QAM	V	150	286	1 / 0	19.57	4.79	24.36	0.273	33.01	-8.65
1851.50	3	QPSK	V	150	286	1 / 0	20.85	4.79	25.64	0.366	33.01	-7.37
1880.00	3	QPSK	V	150	286	1 / 0	20.52	4.84	25.36	0.344	33.01	-7.65
1908.50	3	QPSK	V	150	286	1 / 0	19.77	4.86	24.63	0.291	33.01	-8.38
1851.50	3	16-QAM	V	150	286	1 / 0	19.77	4.79	24.56	0.286	33.01	-8.45
1852.50	5	QPSK	V	150	286	1 / 0	20.58	4.79	25.37	0.344	33.01	-7.64
1880.00	5	QPSK	V	150	286	1 / 0	20.41	4.84	25.25	0.335	33.01	-7.76
1907.50	5	QPSK	V	150	286	1 / 0	20.07	4.87	24.94	0.312	33.01	-8.07
1852.50	5	16-QAM	V	150	286	1 / 0	19.05	4.79	23.84	0.242	33.01	-9.17
1855.00	10	QPSK	V	150	286	1 / 0	20.63	4.80	25.43	0.349	33.01	-7.58
1880.00	10	QPSK	V	150	286	1 / 0	20.37	4.84	25.21	0.332	33.01	-7.80
1905.00	10	QPSK	V	150	286	1 / 0	20.28	4.87	25.15	0.327	33.01	-7.86
1855.00	10	16-QAM	V	150	286	1 / 0	18.98	4.80	23.78	0.239	33.01	-9.23
1857.50	15	QPSK	V	150	286	1 / 0	20.89	4.80	25.69	0.371	33.01	-7.32
1880.00	15	QPSK	V	150	286	1 / 0	20.29	4.84	25.13	0.326	33.01	-7.88
1902.50	15	QPSK	V	150	286	1 / 0	19.94	4.88	24.82	0.303	33.01	-8.19
1902.50	15	16-QAM	V	150	286	1 / 0	19.67	4.88	24.55	0.285	33.01	-8.46
1860.00	20	QPSK	V	150	286	1 / 0	20.64	4.81	25.45	0.350	33.01	-7.57
1880.00	20	QPSK	V	150	286	1 / 0	20.19	4.84	25.03	0.319	33.01	-7.98
1900.00	20	QPSK	V	150	286	1 / 0	20.45	4.88	25.33	0.342	33.01	-7.68
1860.00	20	16-QAM	V	150	286	1 / 0	19.63	4.81	24.44	0.278	33.01	-8.58
1857.50	15	QPSK	H	150	112	1 / 0	20.38	4.84	25.22	0.333	33.01	-7.79

Table 7-6. EIRP Data (Band 2)

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(h) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 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.

Test Procedures Used

KDB 971168 D01 v03 – Section 5.8

ANSI/TIA-603-E-2016 – 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: ZNFX210VPP	 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.

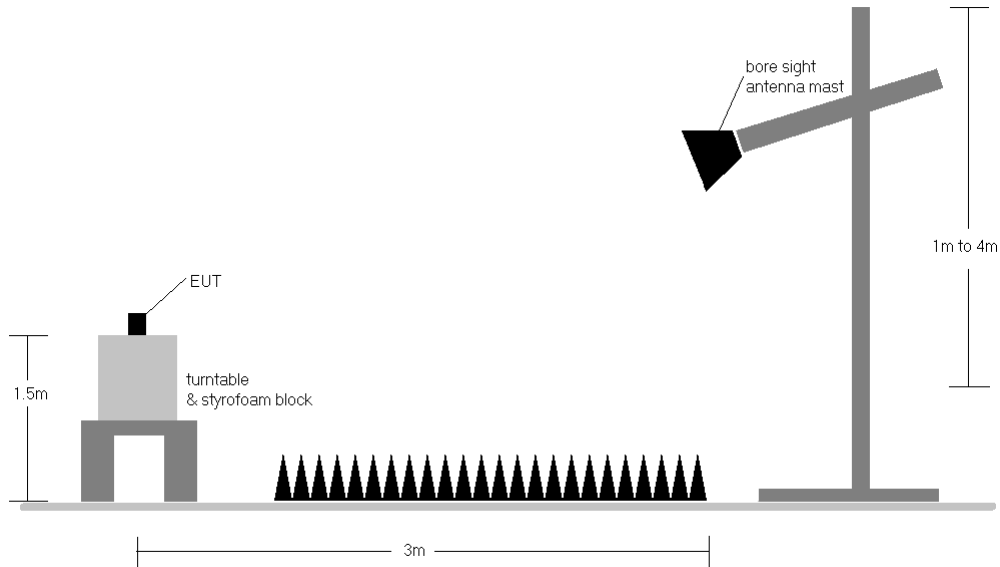


Figure 7-7. Test Instrument & Measurement Setup

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.

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Band 13

OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
2346.00	H	150	2	-77.08	9.45	-67.63	-54.6
3128.00	H	-	-	-75.28	9.59	-65.69	-52.7

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

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 [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	117	213	-67.87	8.83	-59.05	-19.0

Table 7-8. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 5

OPERATING FREQUENCY: 825.50 MHz
 CHANNEL: 20415
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1651.00	H	150	224	-73.83	8.85	-64.99	-52.0
2476.50	H	238	338	-75.99	9.18	-66.80	-53.8
3302.00	H	-	-	-74.95	9.43	-65.52	-52.5

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

OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1673.00	H	106	226	-67.27	8.71	-58.56	-45.6
2509.50	H	-	-	-77.35	9.24	-68.11	-55.1

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

OPERATING FREQUENCY: 847.50 MHz
 CHANNEL: 20635
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1695.00	H	100	212	-71.59	8.57	-63.03	-50.0
2542.50	H	-	-	-77.73	9.20	-68.53	-55.5

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

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 4

OPERATING FREQUENCY: 1710.70 MHz
 CHANNEL: 19957
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3421.40	V	-	-	-73.75	9.50	-64.25	-51.2

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

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 20175
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3465.00	V	-	-	-74.34	9.57	-64.77	-51.8

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

OPERATING FREQUENCY: 1754.30 MHz
 CHANNEL: 20393
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3508.60	V	-	-	-74.16	9.65	-64.50	-51.5

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

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Band 2

OPERATING FREQUENCY: 1857.50 MHz
 CHANNEL: 18675
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3715.00	V	124	208	-73.57	9.79	-63.78	-50.8
5572.50	V	-	-	-72.44	11.00	-61.44	-48.4

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

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3760.00	V	-	-	-74.00	9.62	-64.38	-51.4

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

OPERATING FREQUENCY: 1902.50 MHz
 CHANNEL: 19125
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3805.00	V	110	244	-71.67	9.31	-62.36	-49.4
5707.50	V	-	-	-73.31	11.27	-62.04	-49.0

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

FCC ID: ZNFX210VPP		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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7.8 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54 RSS-130(4.3) RSS-132(5.3) RSS-133(6.3) RSS-139(6.3) RSS-195(5.4)

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. 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, RSS-132 and RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, RSS-130, and RSS-139, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

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 13 Frequency Stability Measurements
§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY: 782,000,000 Hz
 CHANNEL: 23230
 REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	782,000,265	265	0.0000339
100 %		- 30	781,999,716	-284	-0.0000363
100 %		- 20	781,999,881	-119	-0.0000152
100 %		- 10	782,000,185	185	0.0000237
100 %		0	781,999,803	-197	-0.0000252
100 %		+ 10	782,000,104	104	0.0000133
100 %		+ 20	781,999,841	-159	-0.0000203
100 %		+ 30	781,999,996	-4	-0.0000005
100 %		+ 40	781,999,686	-314	-0.0000402
100 %		+ 50	782,000,110	110	0.0000141
BATT. ENDPOINT	3.40	+ 20	782,000,080	80	0.0000102

Table 7-18. Frequency Stability Data (Band 13)

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 13 Frequency Stability Measurements
§2.1055 §27.54 RSS-130(4.3)

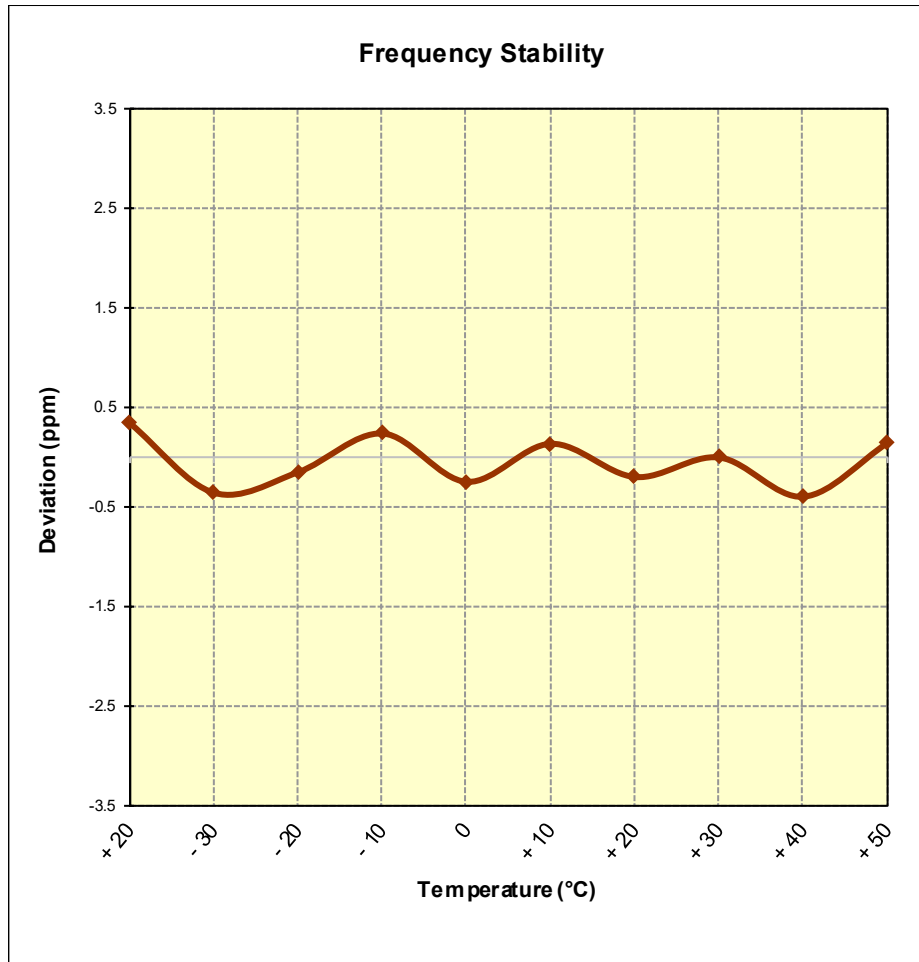


Figure 7-8. Frequency Stability Graph (Band 13)

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements
§2.1055 §22.355 RSS-132(5.3)

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)	836,499,892	-108	-0.0000129
100 %		- 30	836,500,137	137	0.0000164
100 %		- 20	836,499,853	-147	-0.0000176
100 %		- 10	836,500,417	417	0.0000499
100 %		0	836,499,746	-254	-0.0000304
100 %		+ 10	836,500,199	199	0.0000238
100 %		+ 20	836,499,720	-280	-0.0000335
100 %		+ 30	836,500,049	49	0.0000059
100 %		+ 40	836,499,656	-344	-0.0000411
100 %		+ 50	836,499,639	-361	-0.0000432
BATT. ENDPOINT	3.40	+ 20	836,499,900	-100	-0.0000120

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

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements
§2.1055 §22.355 RSS-132(5.3)

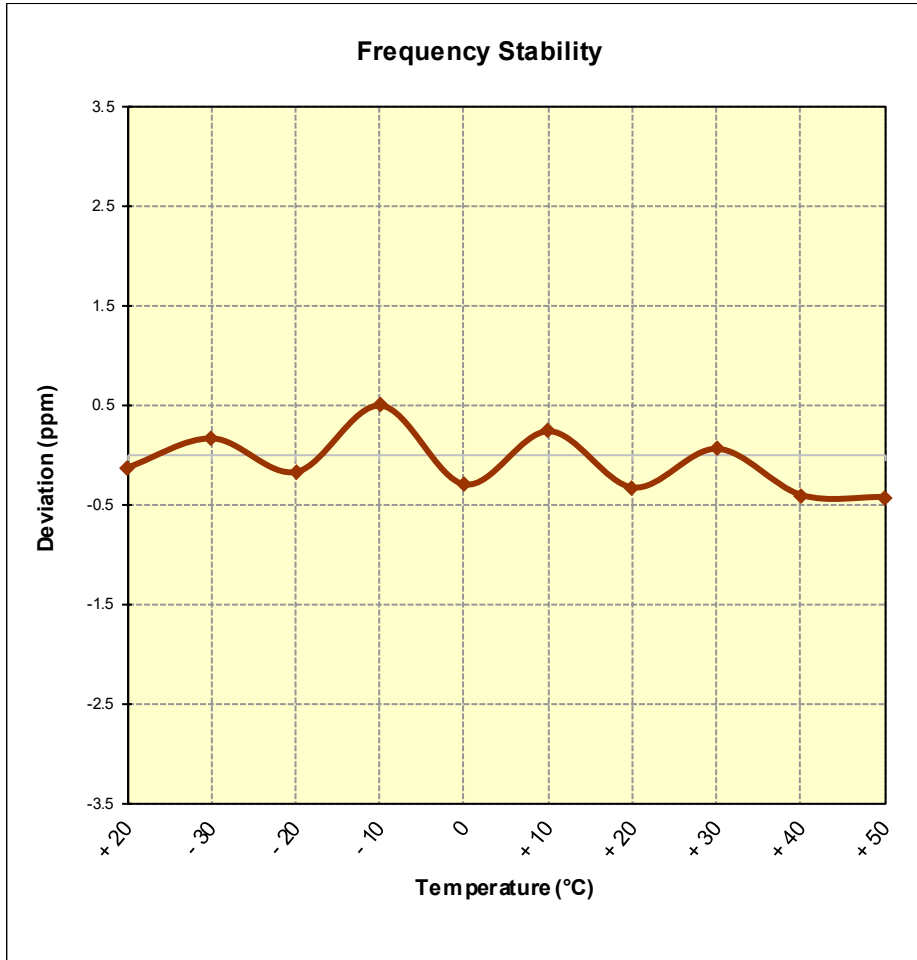


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 4 Stability Measurements
§2.1055 §27.54 RSS-139(6.4)

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)	1,732,500,158	158	0.0000091
100 %		- 30	1,732,500,068	68	0.0000039
100 %		- 20	1,732,499,886	-114	-0.0000066
100 %		- 10	1,732,499,693	-307	-0.0000177
100 %		0	1,732,500,042	42	0.0000024
100 %		+ 10	1,732,500,359	359	0.0000207
100 %		+ 20	1,732,500,032	32	0.0000018
100 %		+ 30	1,732,499,959	-41	-0.0000024
100 %		+ 40	1,732,499,853	-147	-0.0000085
100 %		+ 50	1,732,500,002	2	0.0000001
BATT. ENDPOINT	3.40	+ 20	1,732,499,997	-3	-0.0000002

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.

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Band 4 Frequency Stability Measurements
§2.1055 §§27.54 RSS-139(6.4)

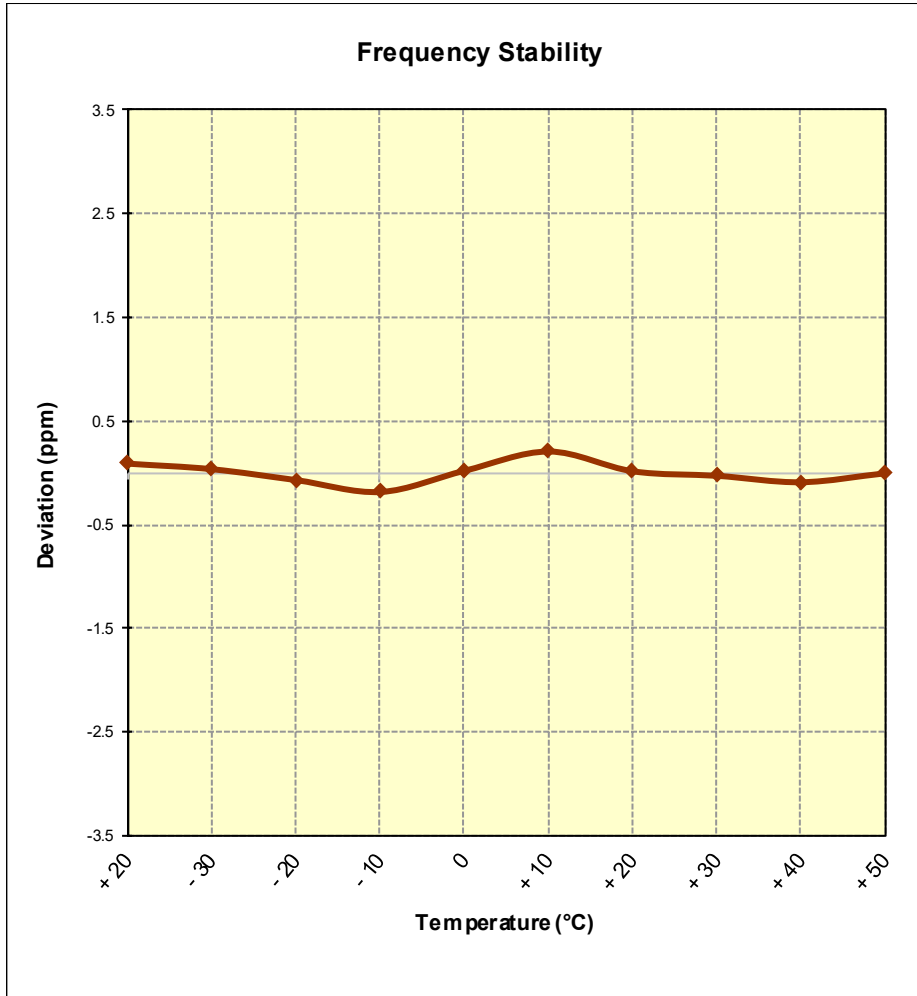


Figure 7-10. Frequency Stability Graph (Band 4)

FCC ID: ZNFX210VPP	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 2 Frequency Stability Measurements
§2.1055 §24.235 RSS-133(6.3)

OPERATING FREQUENCY: 1,880,000,000 Hz
 CHANNEL: 18900
 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)	1,879,999,942	-58	-0.0000031
100 %		- 30	1,880,000,239	239	0.0000127
100 %		- 20	1,880,000,296	296	0.0000157
100 %		- 10	1,879,999,979	-21	-0.0000011
100 %		0	1,880,000,104	104	0.0000055
100 %		+ 10	1,880,000,217	217	0.0000115
100 %		+ 20	1,879,999,812	-188	-0.0000100
100 %		+ 30	1,880,000,061	61	0.0000032
100 %		+ 40	1,880,000,173	173	0.0000092
100 %		+ 50	1,879,999,603	-397	-0.0000211
BATT. ENDPOINT	3.40	+ 20	1,879,999,990	-10	-0.0000005

Table 7-21. Frequency Stability Data (Band 2)

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 2 Frequency Stability Measurements
§2.1055 §24.235 RSS-133(6.3)

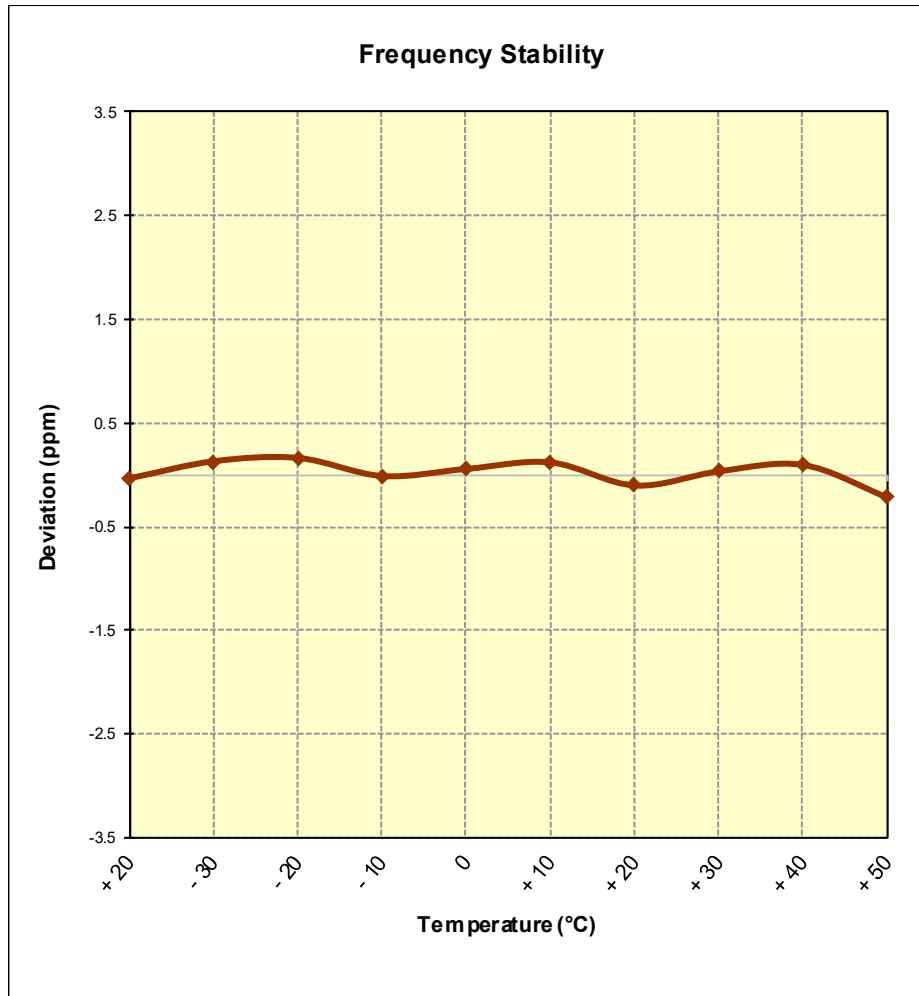


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: ZNFX210VPP	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFX210VPP** complies with all the requirements of Part of the FCC Rules for LTE operation only.

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