

## 6.4 Band Edge Emissions at Antenna Terminal

§2.1051 §24.238(a) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

### Test Overview

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

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

*The minimum permissible attenuation level for Band 7 is  $> 43 + 10\log_{10}(P[Watts])$  at channel edges and  $> 55 + 10\log_{10}(P[Watts])$  at 5.5 MHz away and beyond channel edges.*

### Test Procedure Used

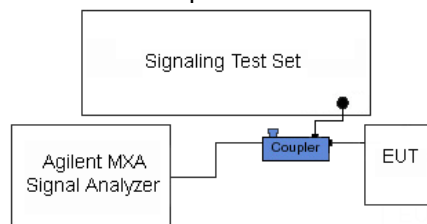
KDB 971168 v02r01 – Section 6.0

### 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 = max hold
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.

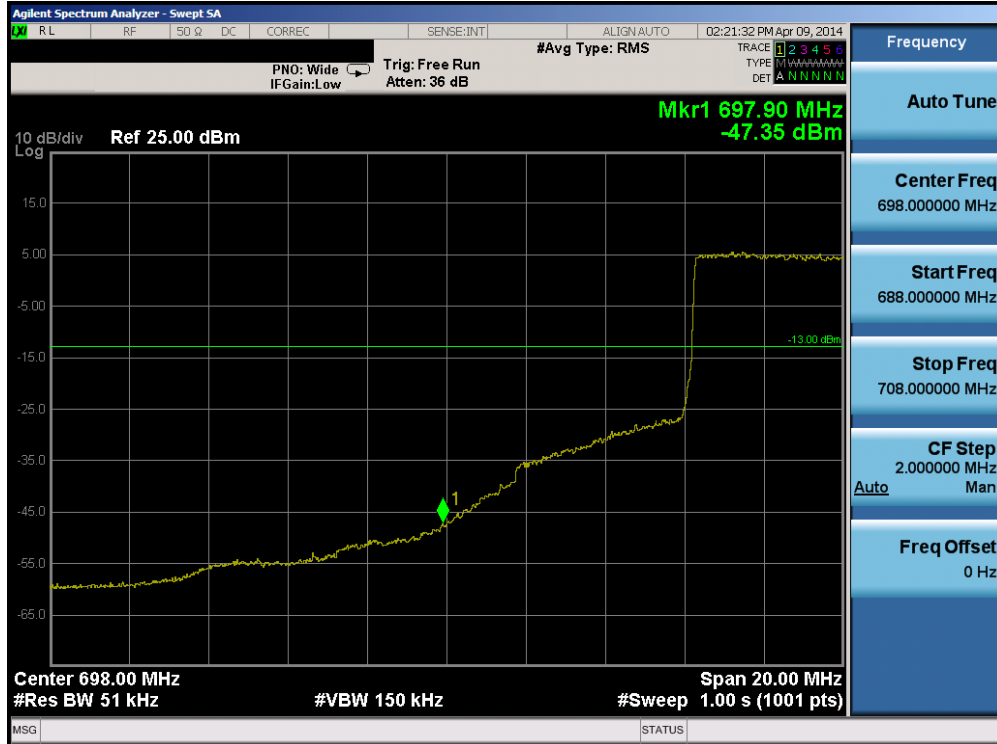


**Figure 6-3. Test Instrument & Measurement Setup**

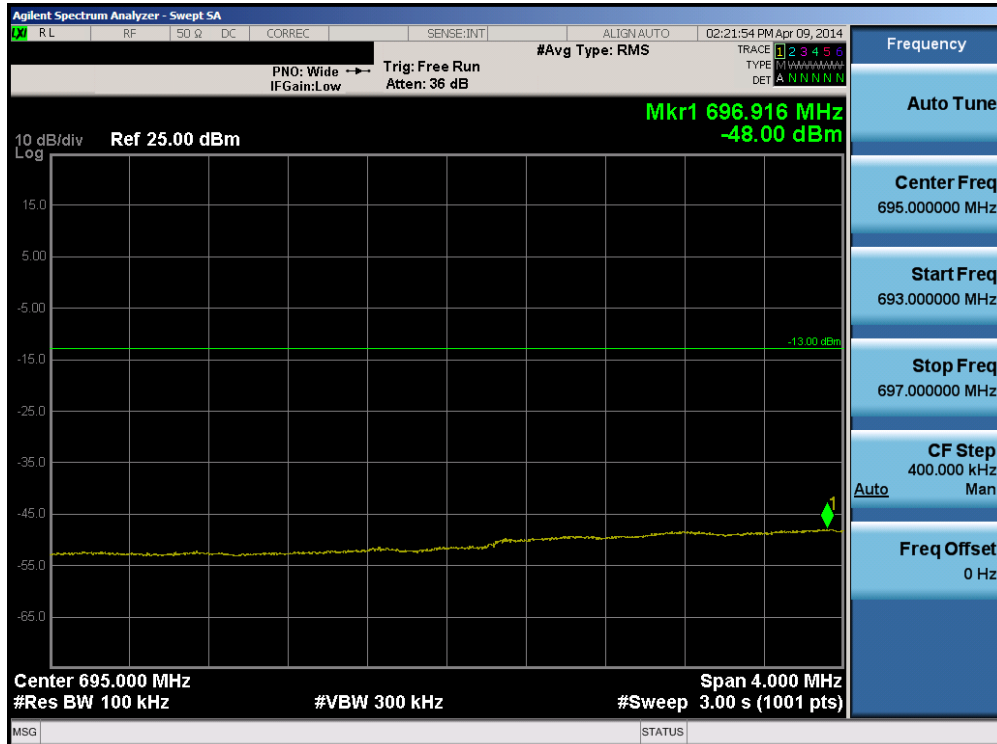
### Test Notes

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

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 62 of 126

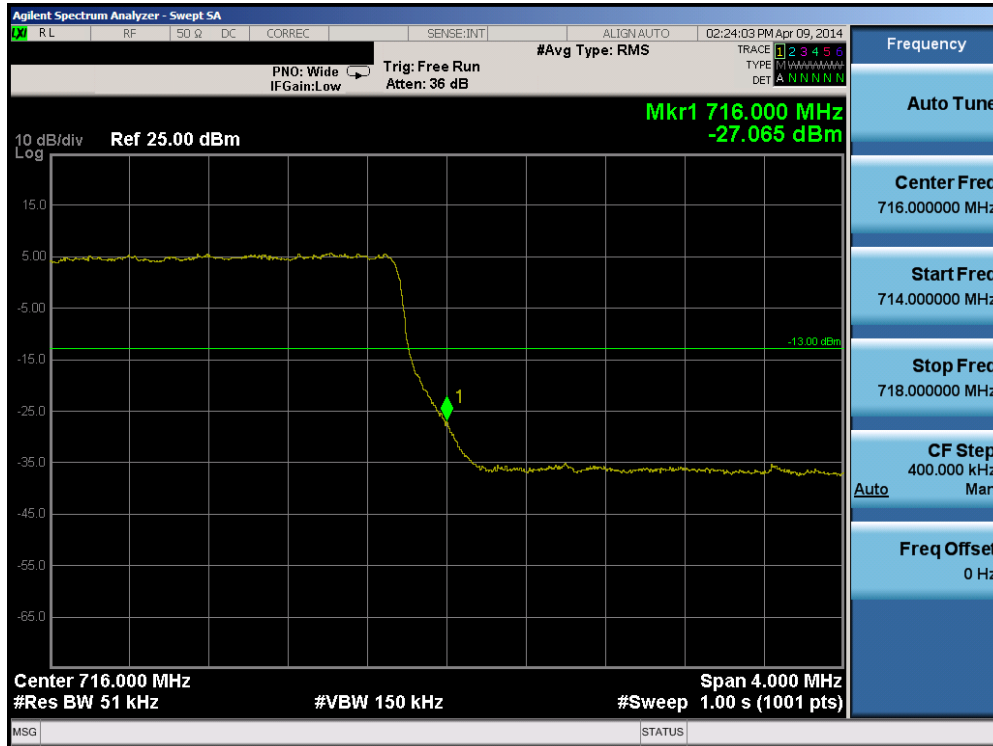


Plot 6-97. Lower Band Edge Plot (Band 17 – 5.0MHz QPSK – RB Size 25)



Plot 6-98. Lower Extended Band Edge Plot (Band 17 – 5.0MHz QPSK – RB Size 25)



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Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 63 of 126

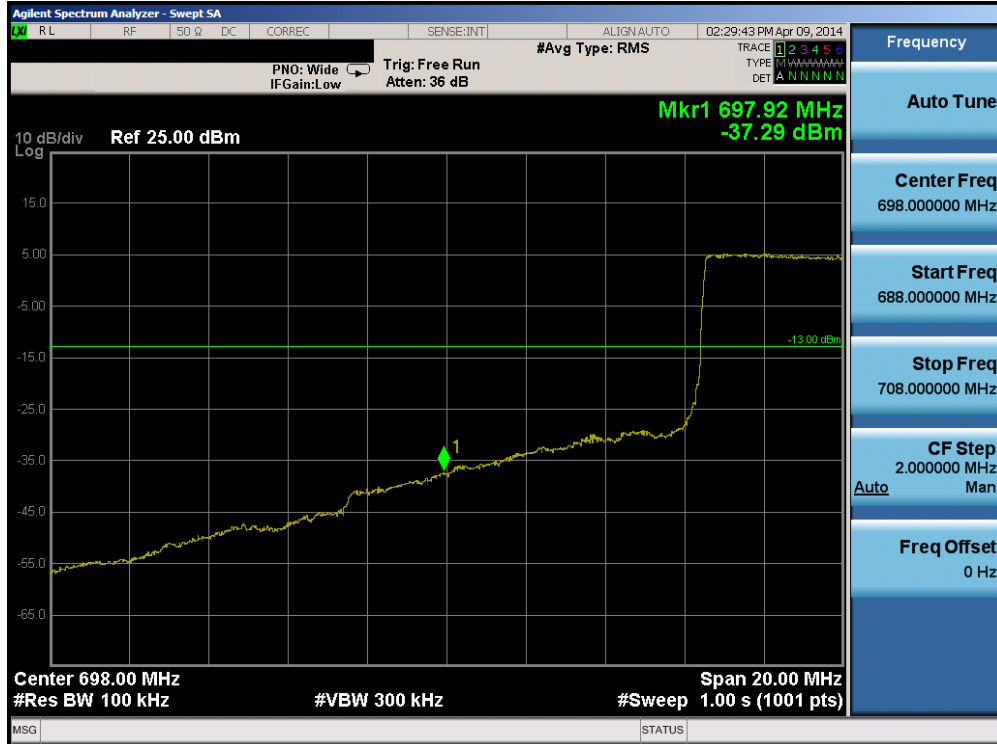


Plot 6-99. Upper Band Edge Plot (Band 17 – 5.0MHz QPSK – RB Size 25)

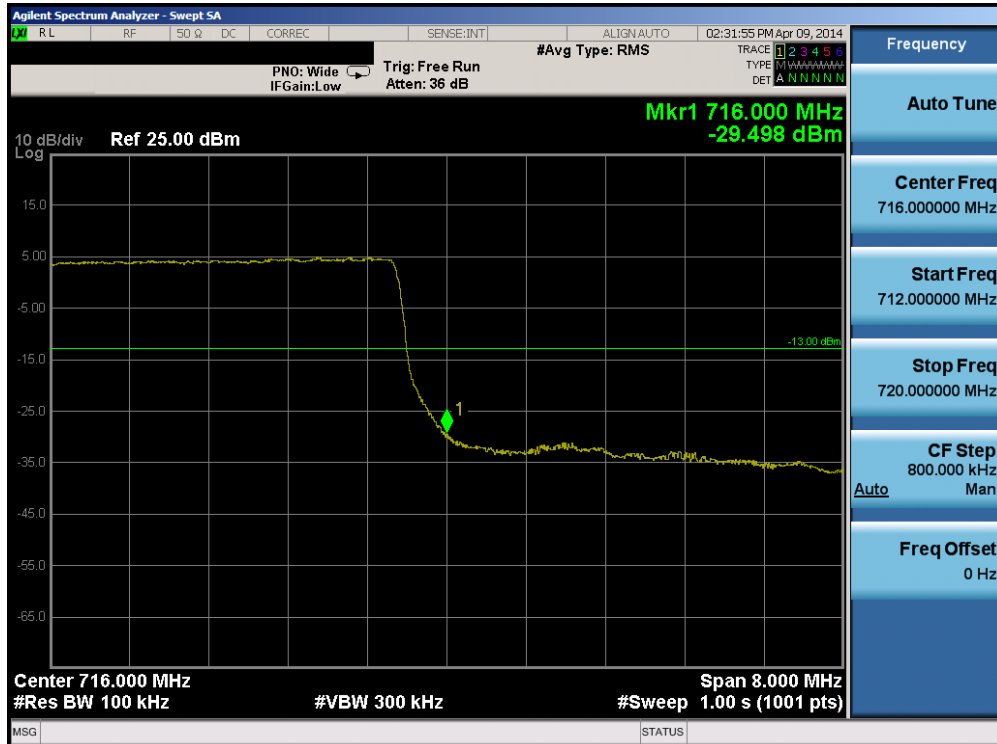


Plot 6-100. Upper Extended Band Edge Plot (Band 17 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 64 of 126

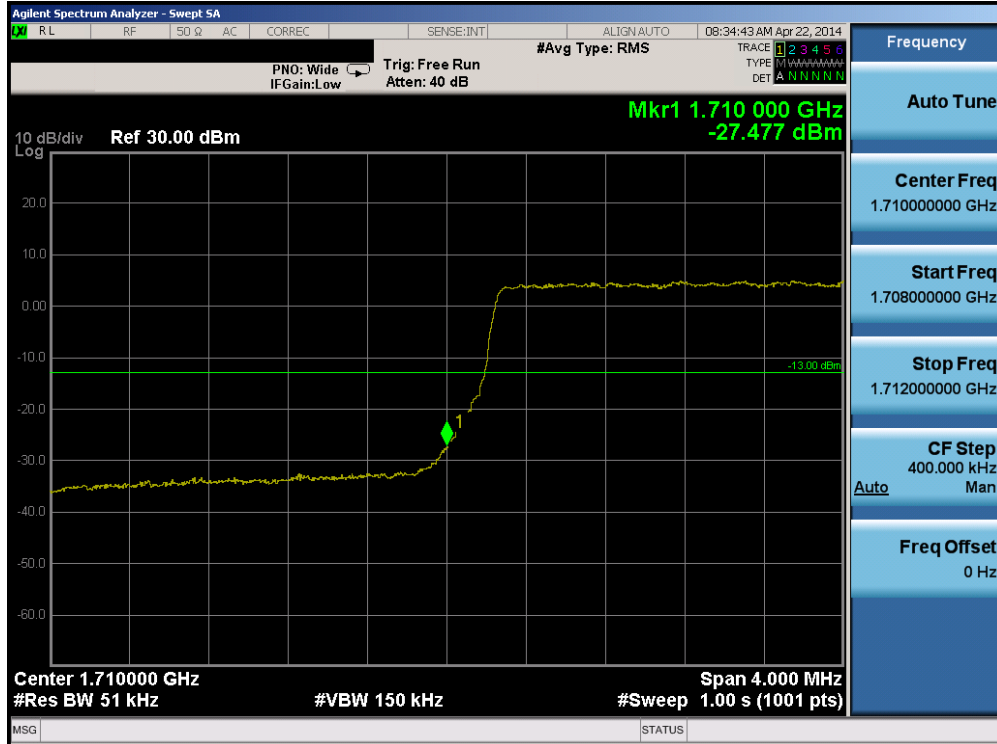


Plot 6-101. Lower Band Edge Plot (Band 17 – 10.0MHz QPSK – RB Size 50)

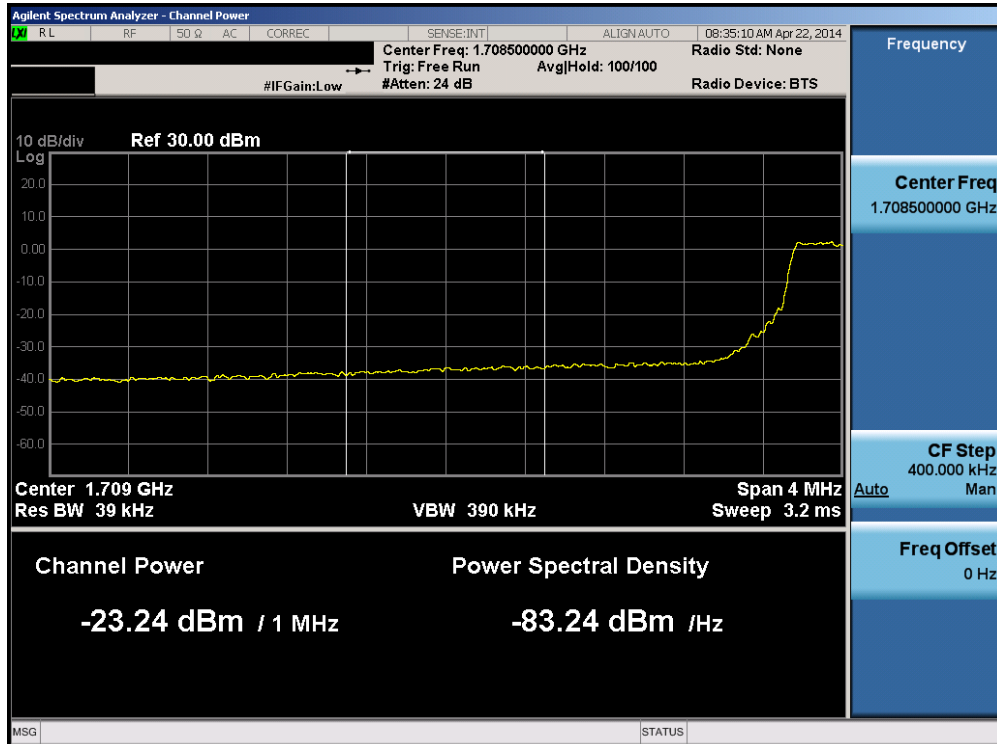


Plot 6-102. Upper Band Edge Plot (Band 17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 65 of 126



Plot 6-103. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

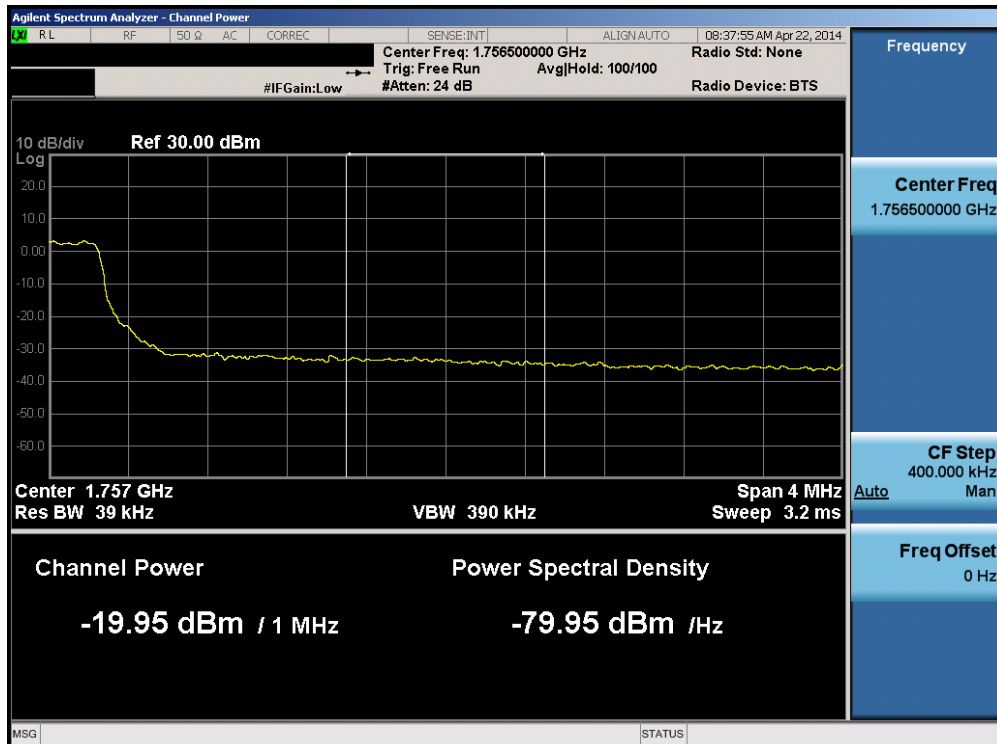


Plot 6-104. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 66 of 126

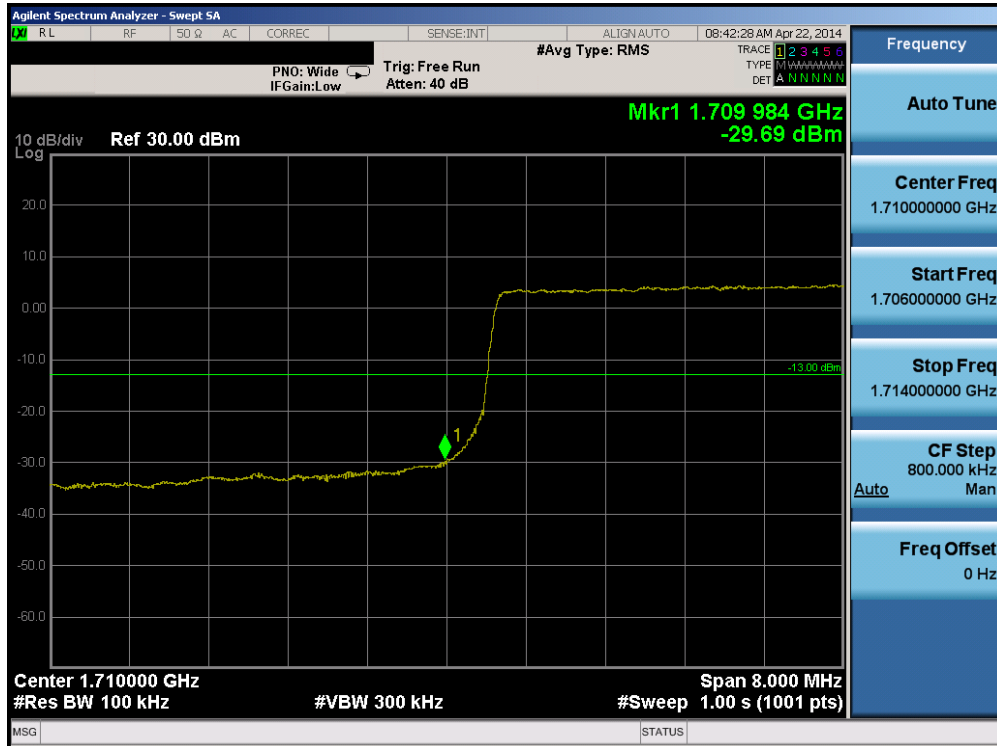


Plot 6-105. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

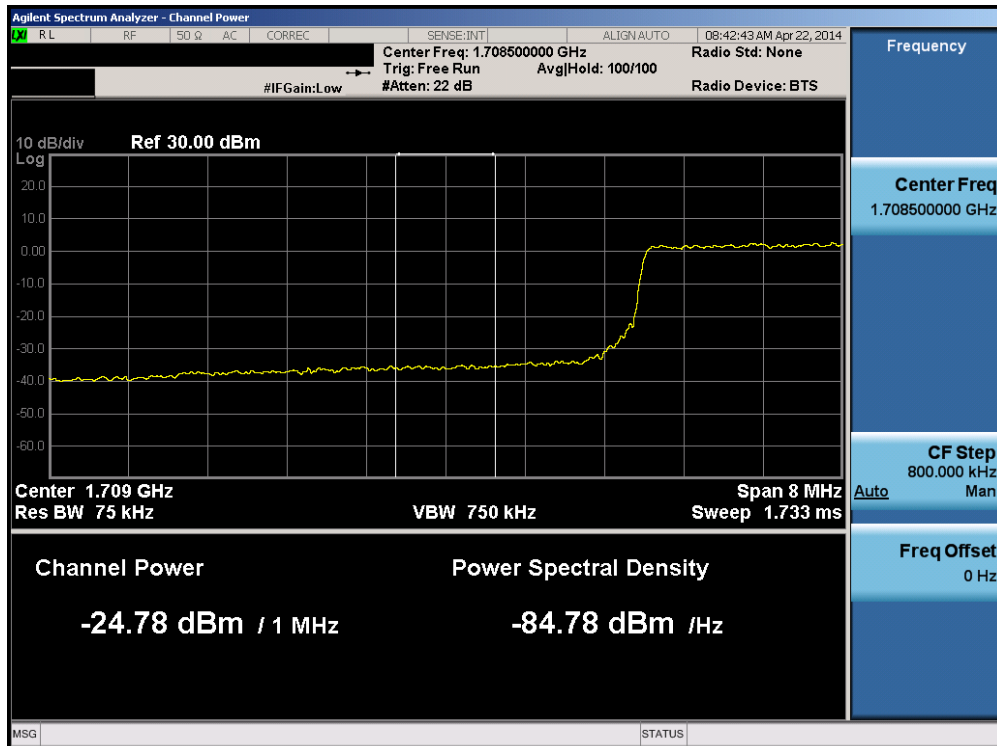


Plot 6-106. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 67 of 126

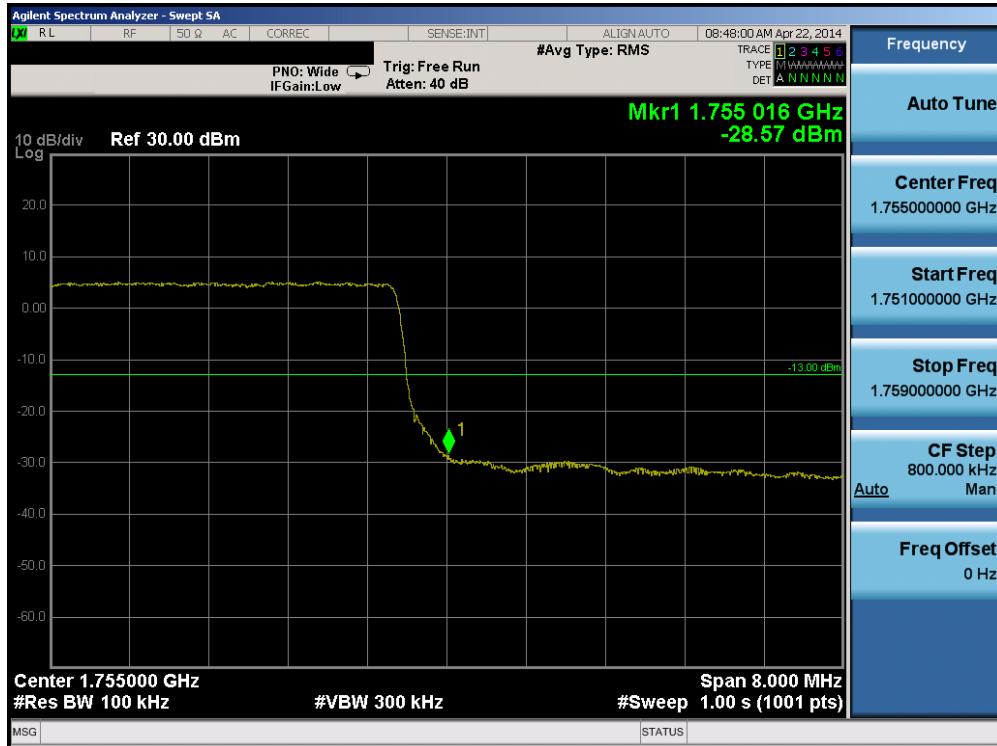


Plot 6-107. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

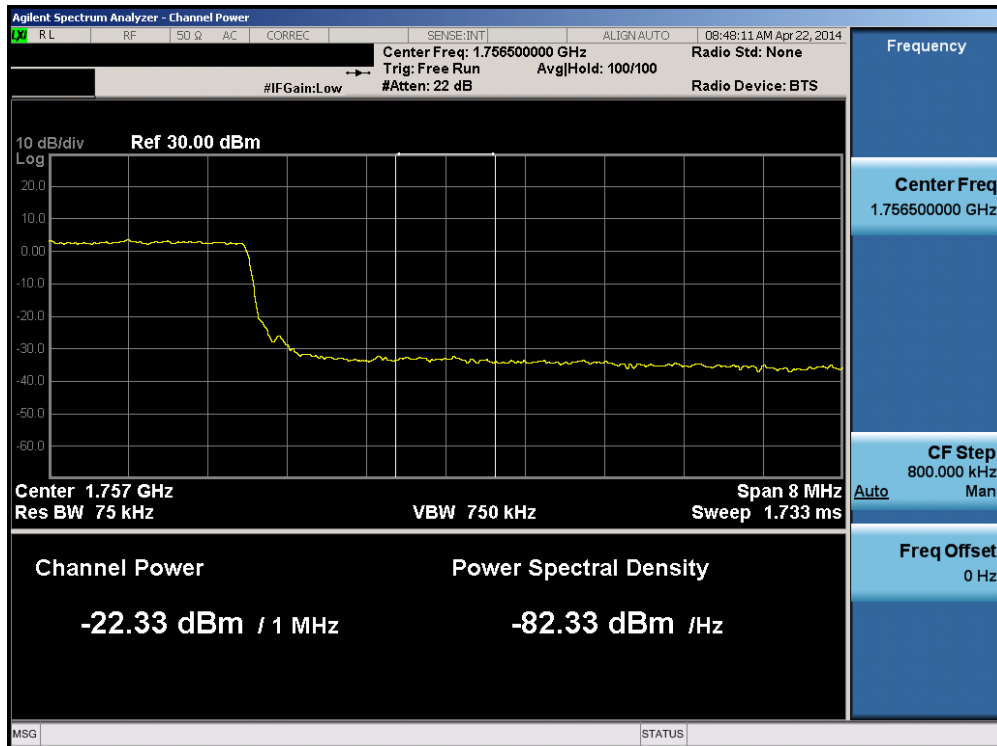


Plot 6-108. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 68 of 126



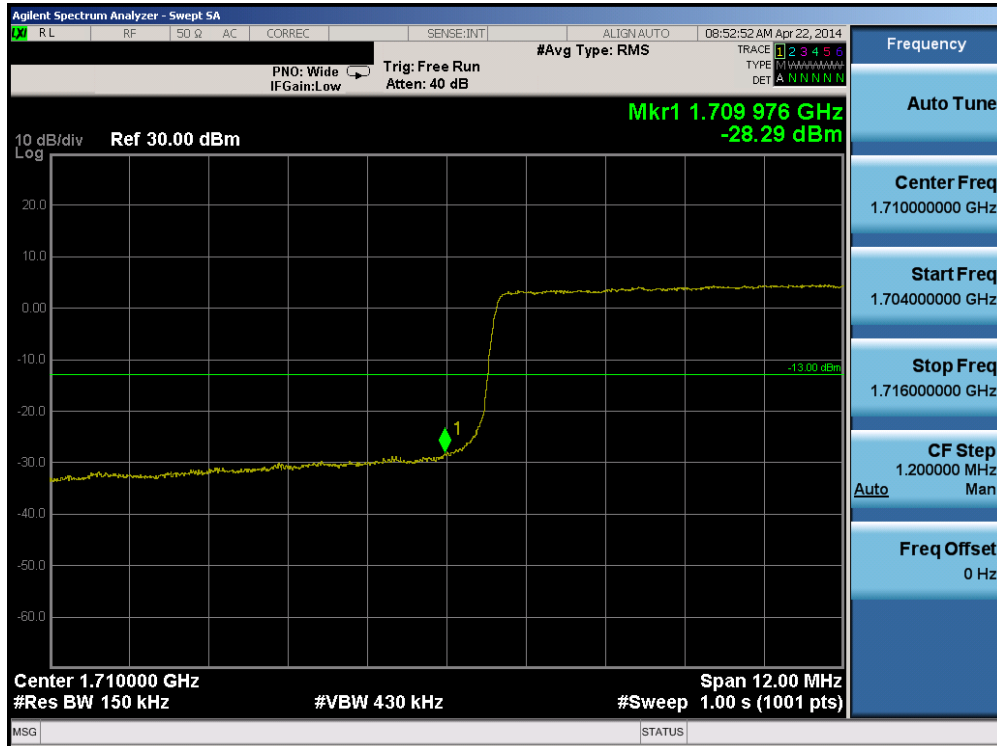
Plot 6-109. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



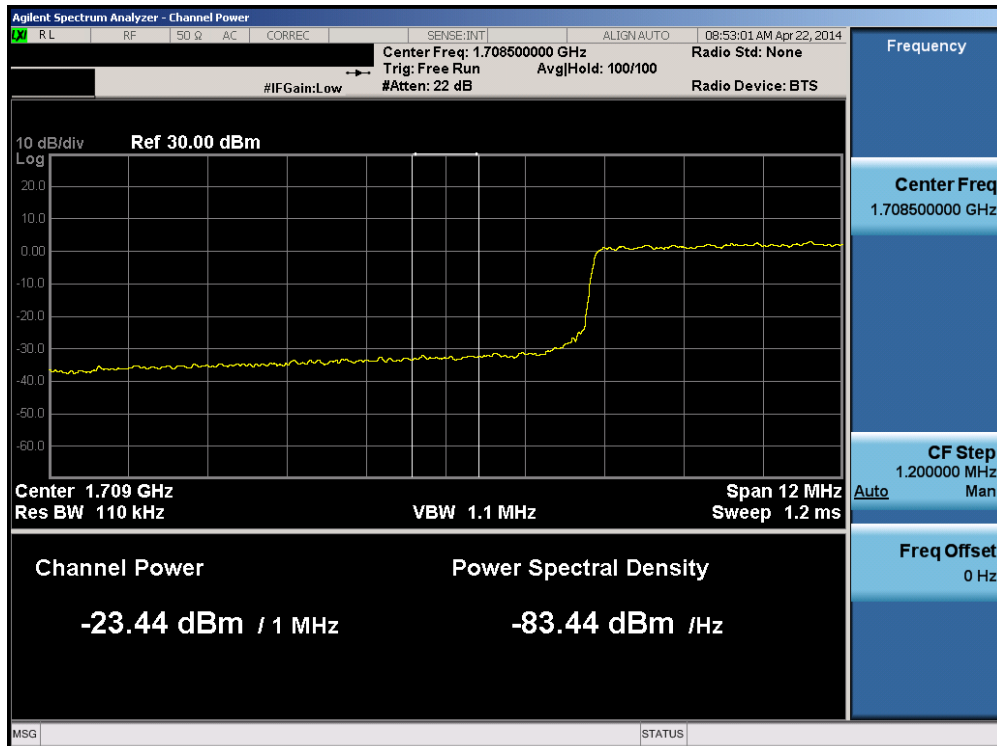
Plot 6-110. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 69 of 126





Plot 6-111. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

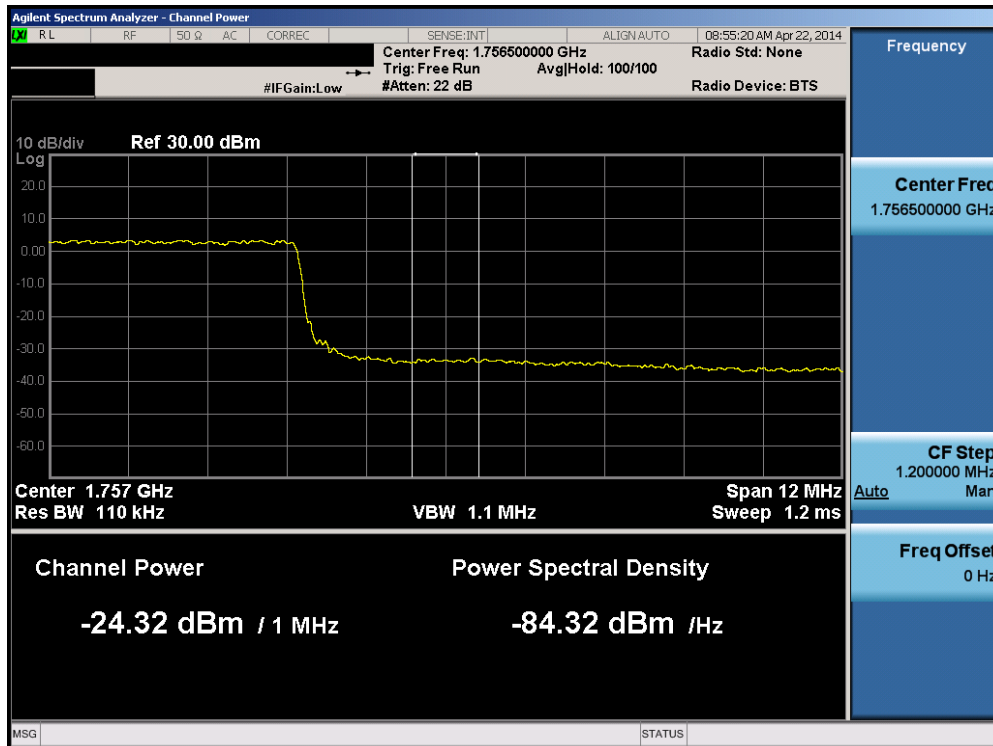


Plot 6-112. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 70 of 126

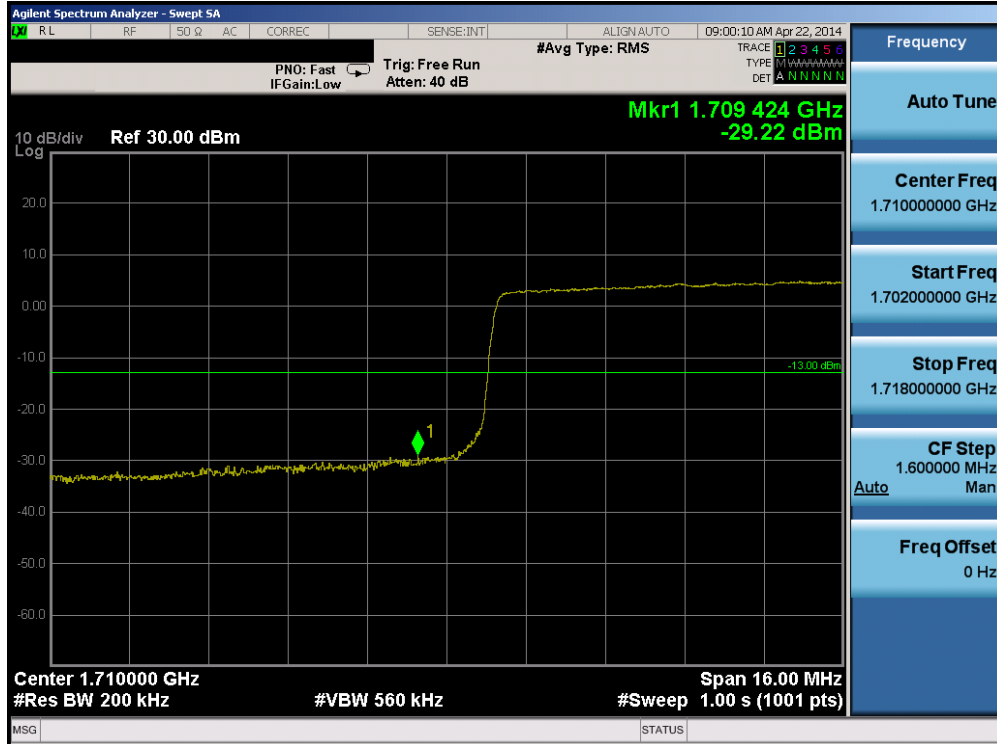


Plot 6-113. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

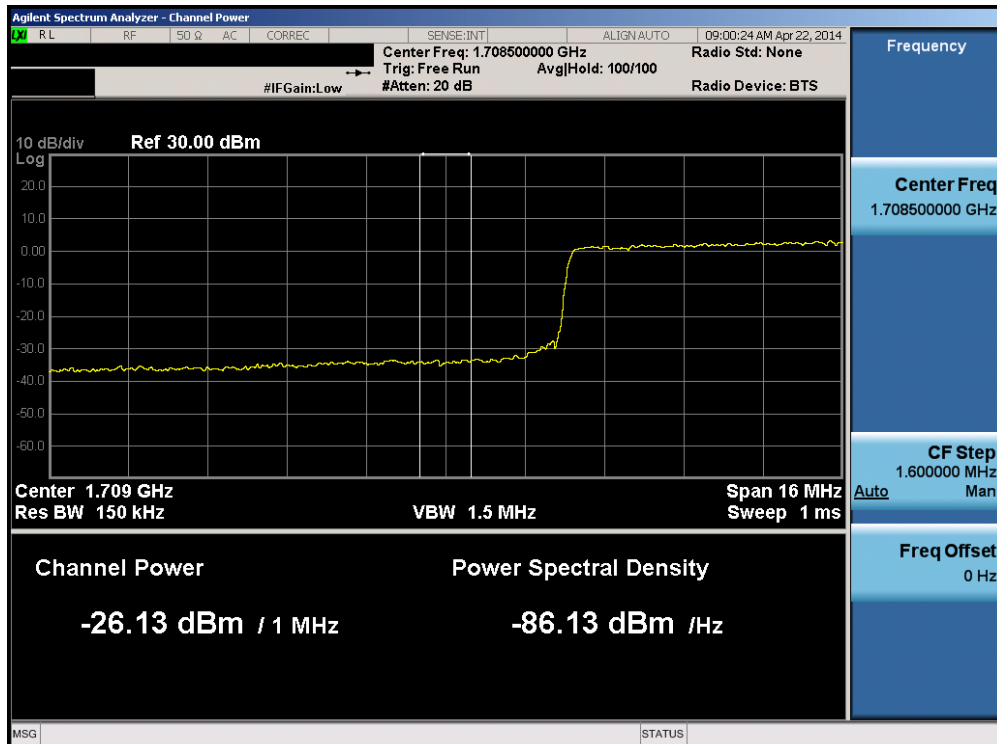


Plot 6-114. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 71 of 126

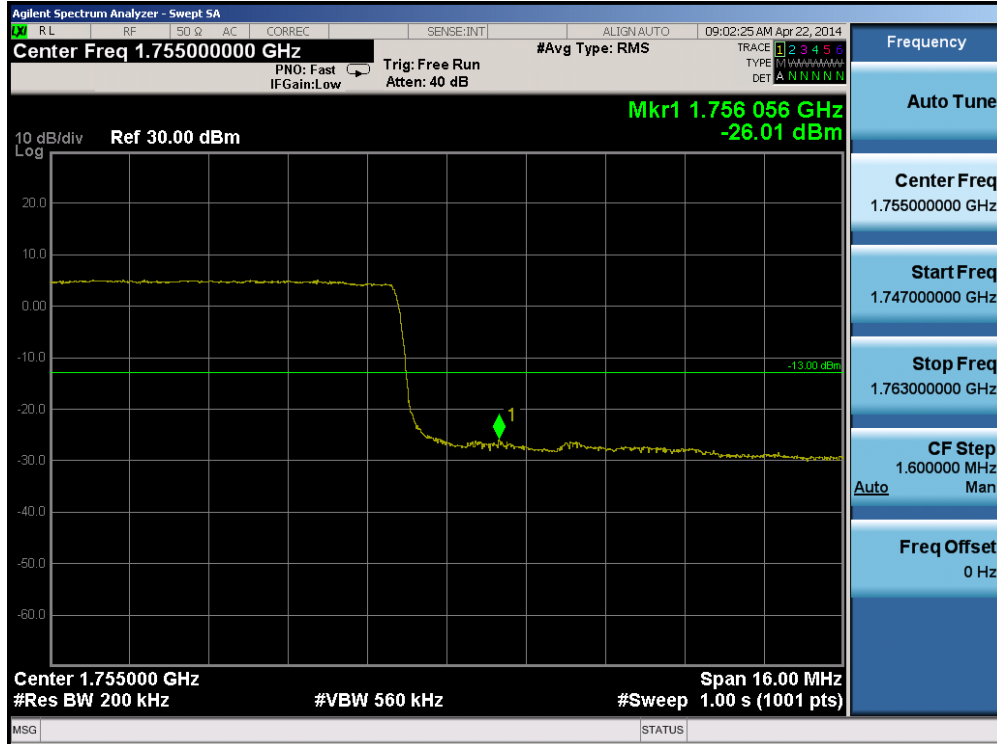


Plot 6-115. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

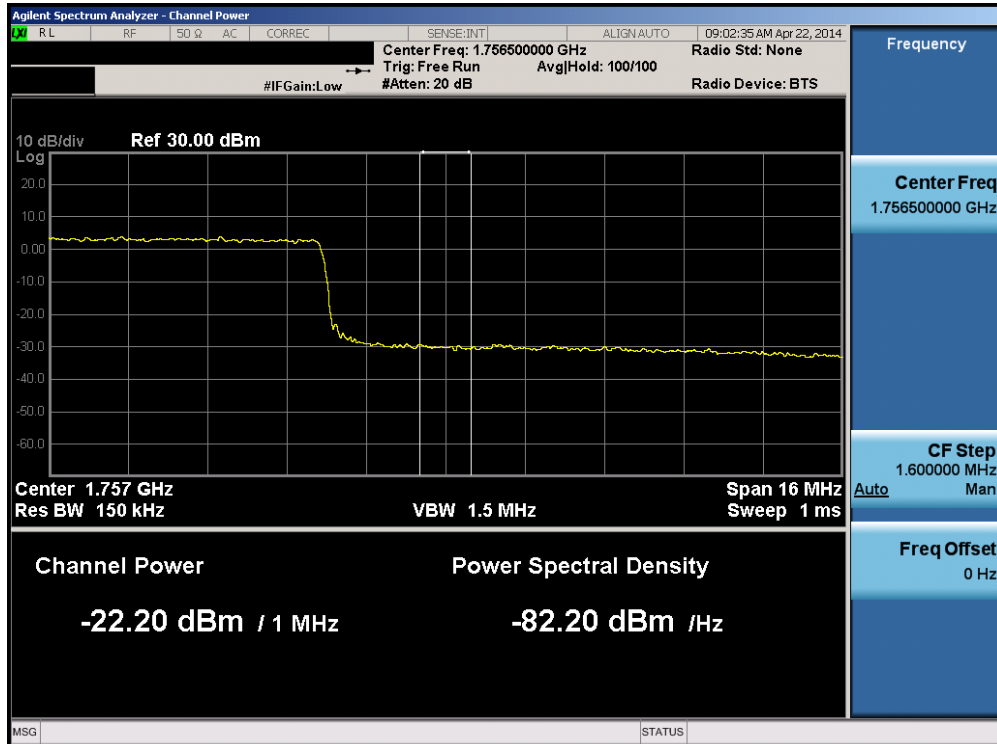


Plot 6-116. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 72 of 126

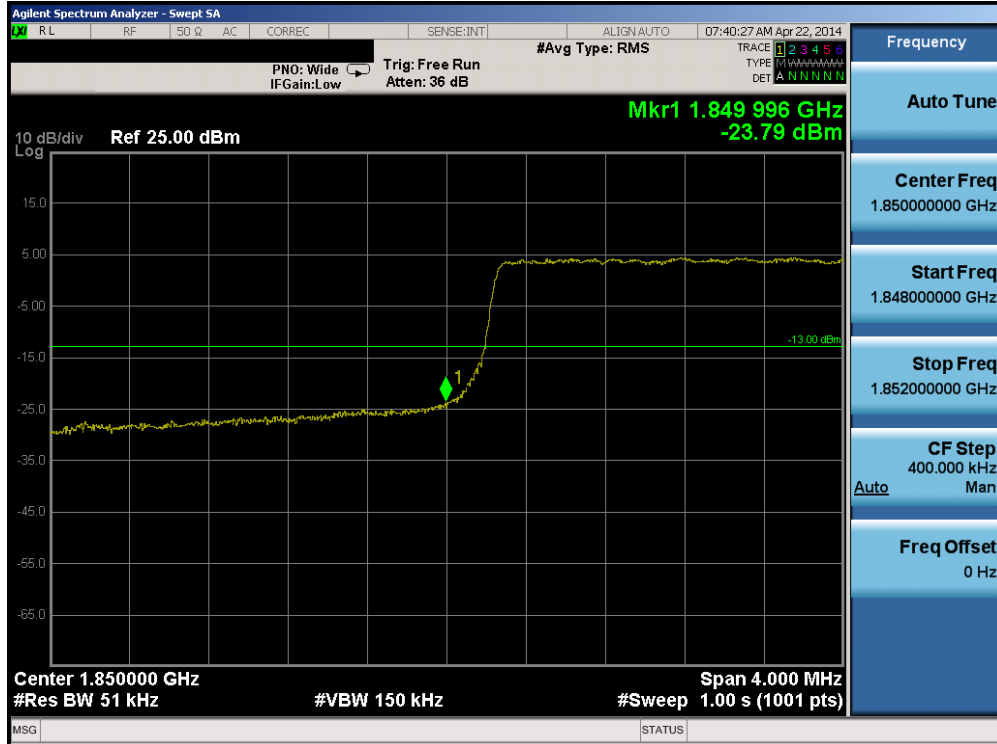


Plot 6-117. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

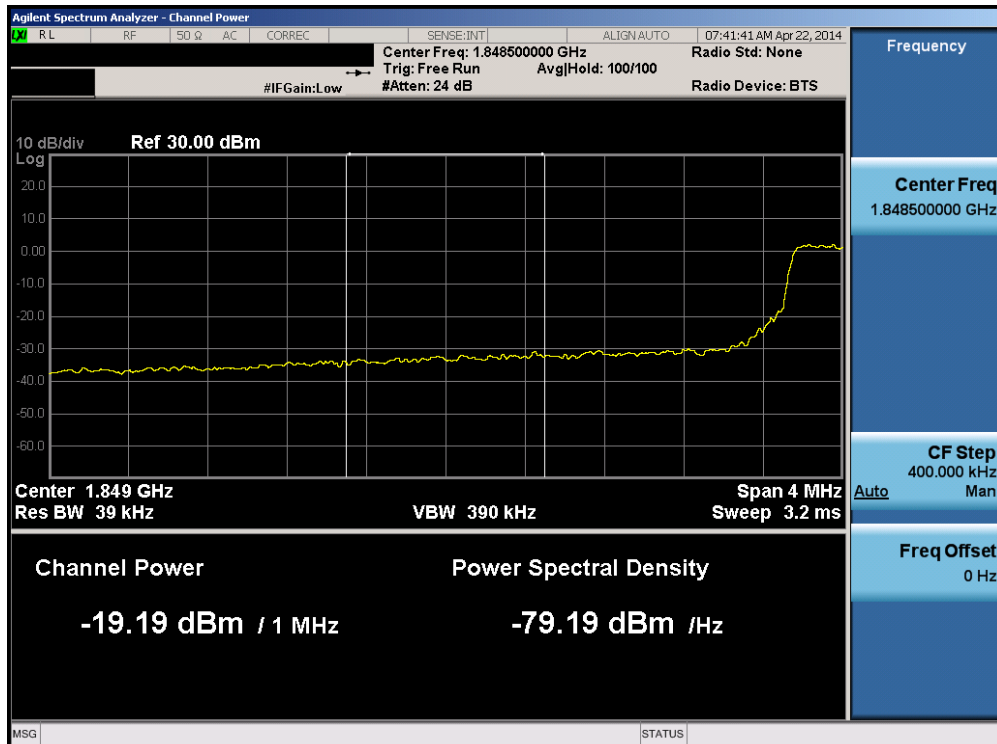


Plot 6-118. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 73 of 126

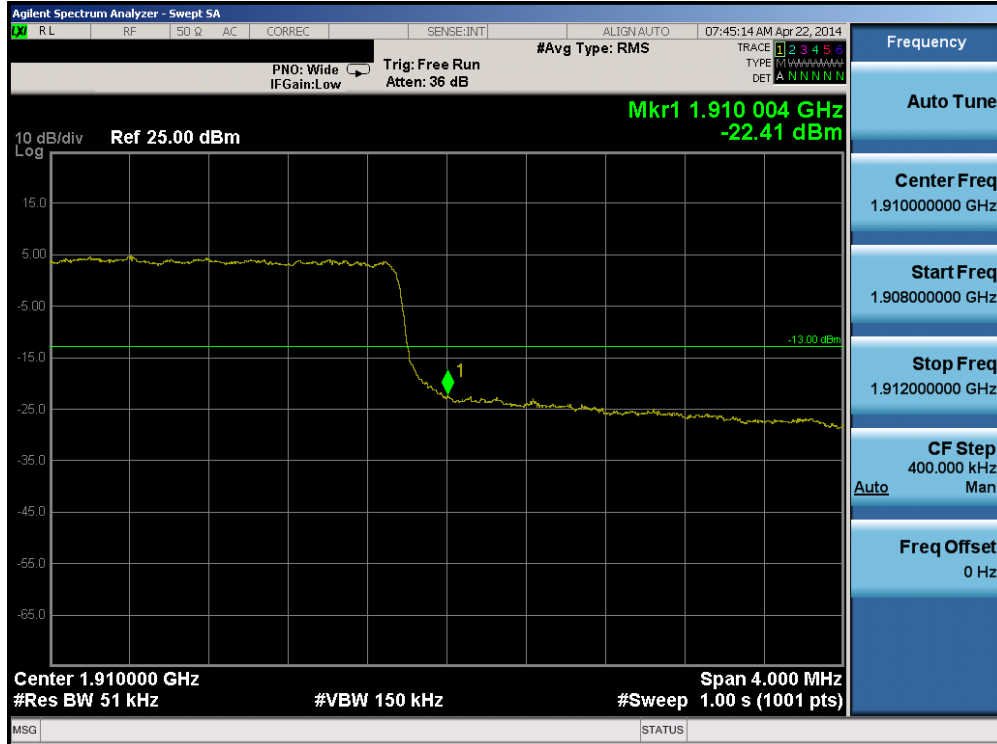


Plot 6-119. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

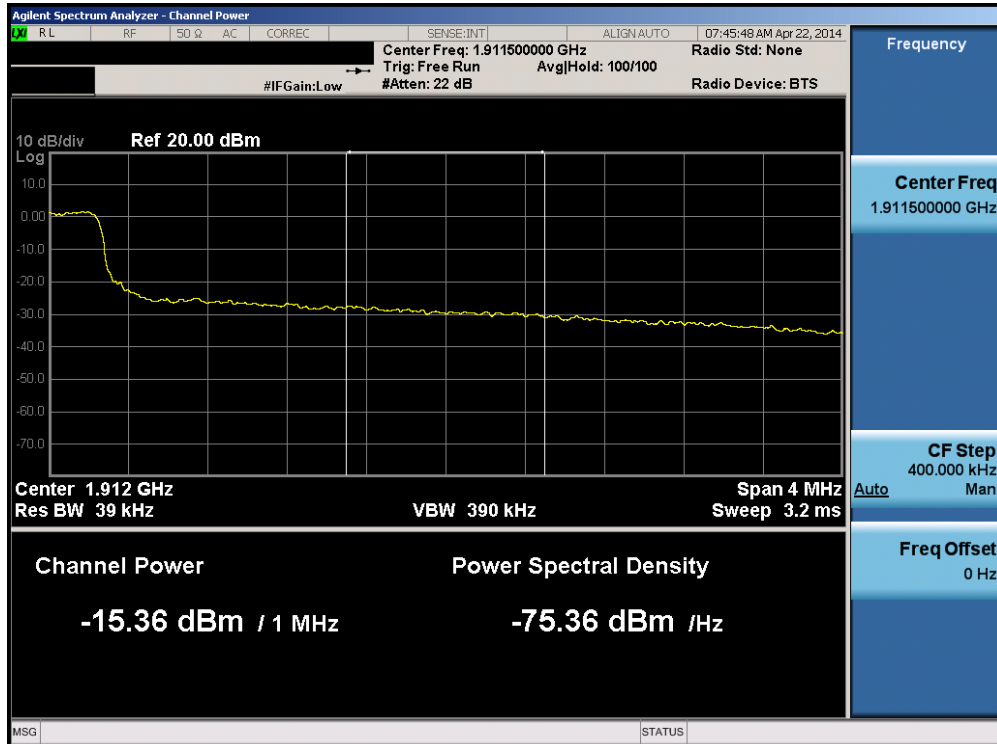


Plot 6-120. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 74 of 126

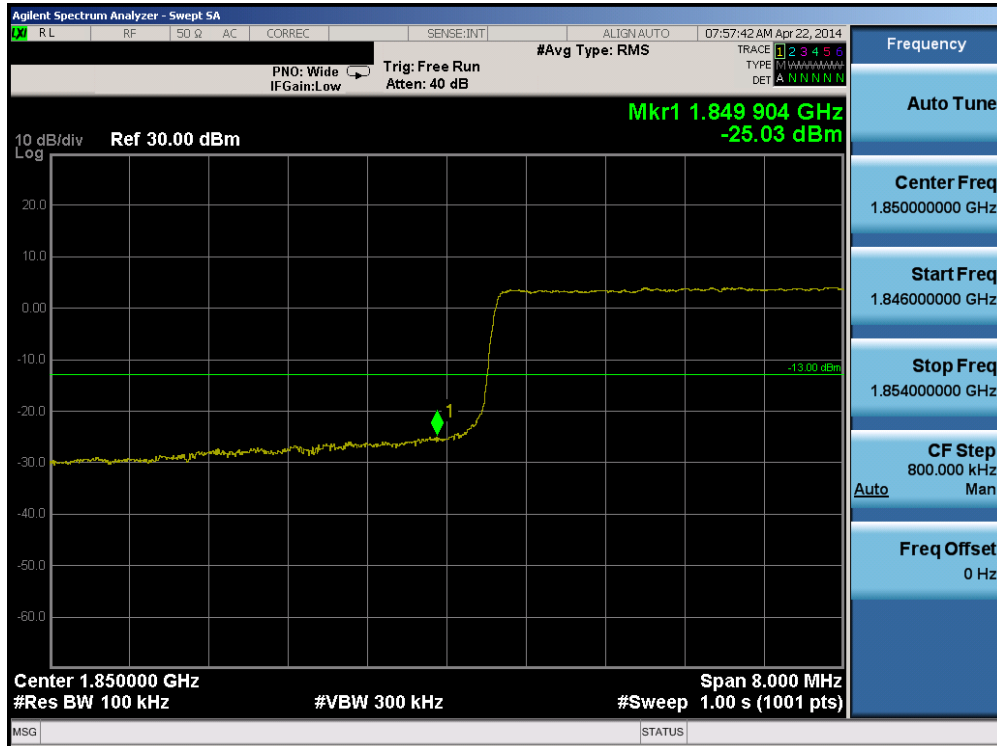


Plot 6-121. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

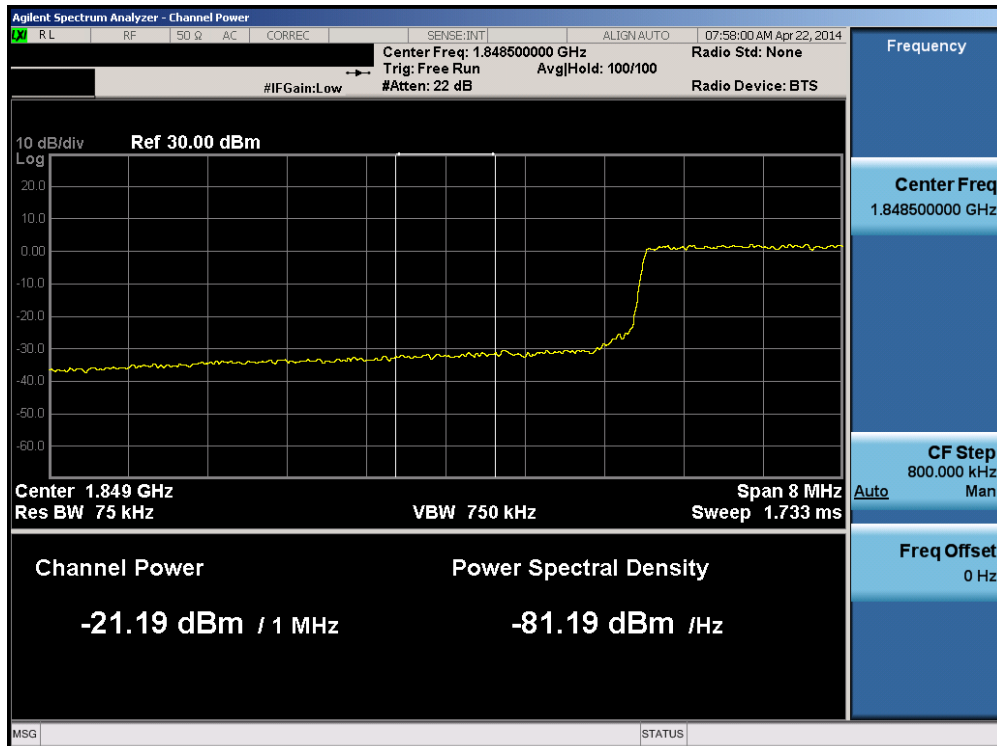


Plot 6-122. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 75 of 126

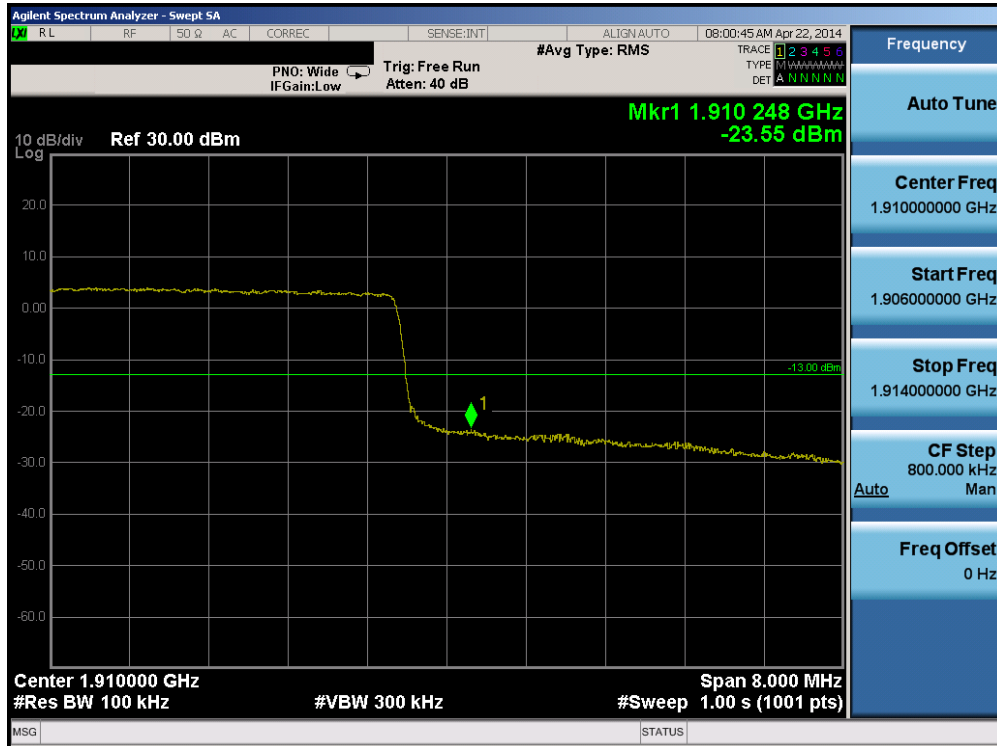


Plot 6-123. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

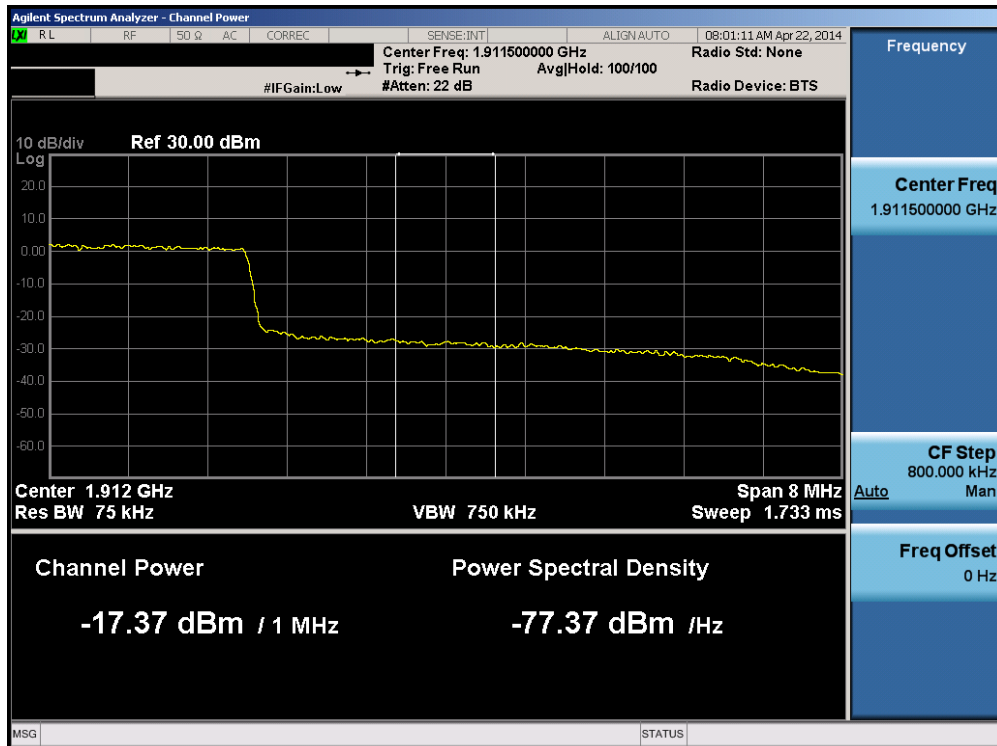


Plot 6-124. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 76 of 126



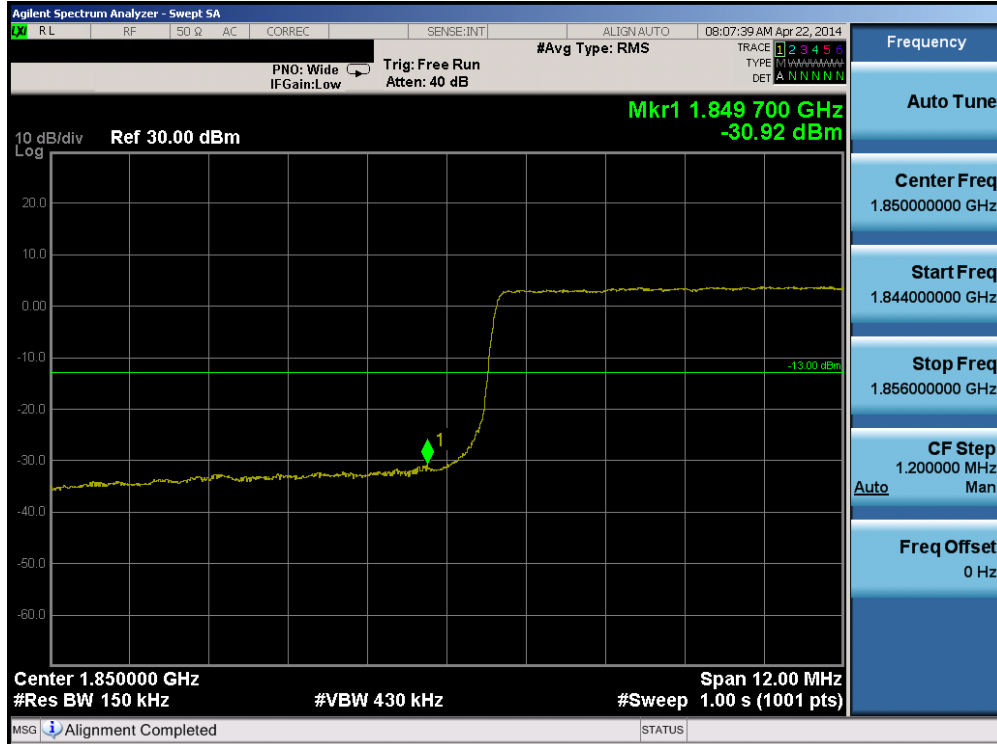
Plot 6-125. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



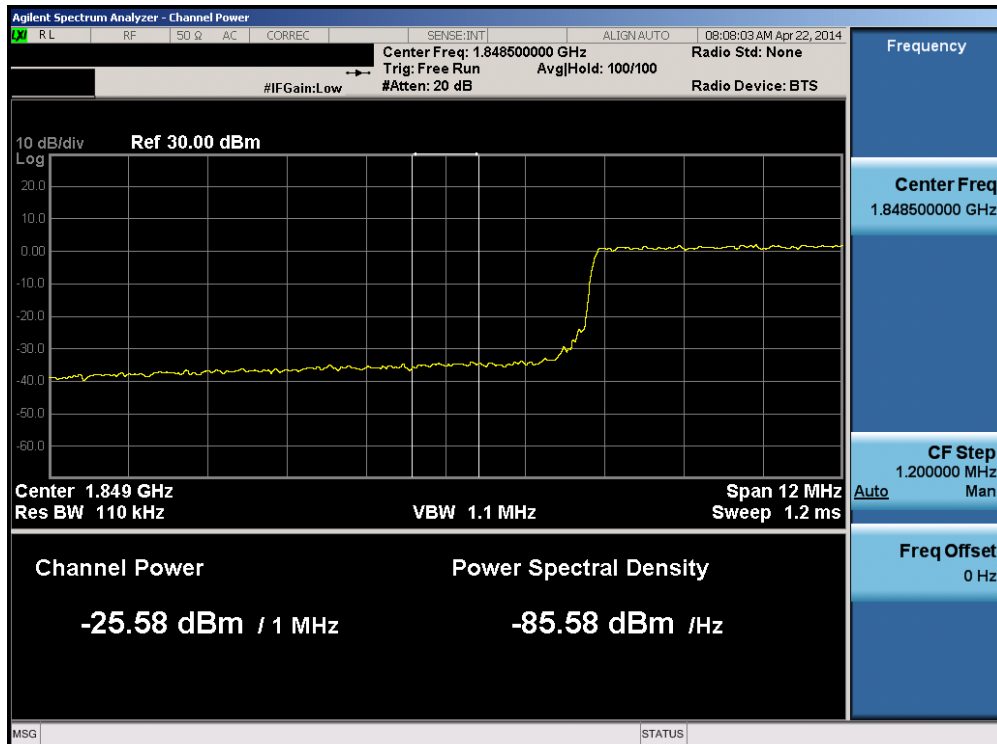
Plot 6-126. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 77 of 126





Plot 6-127. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

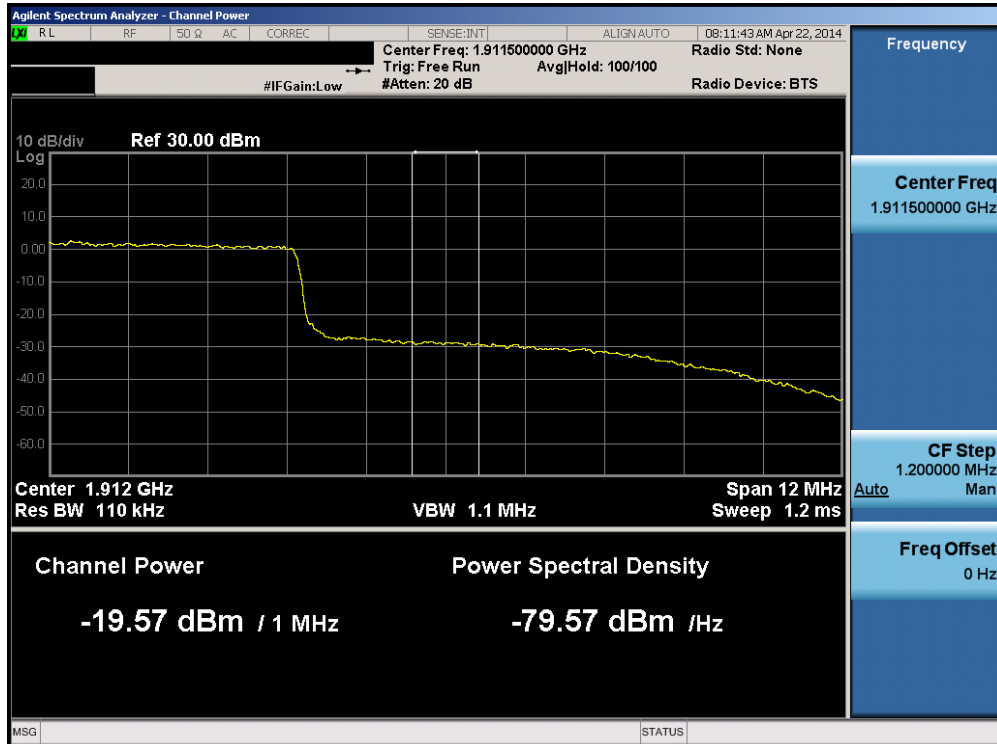


Plot 6-128. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 78 of 126

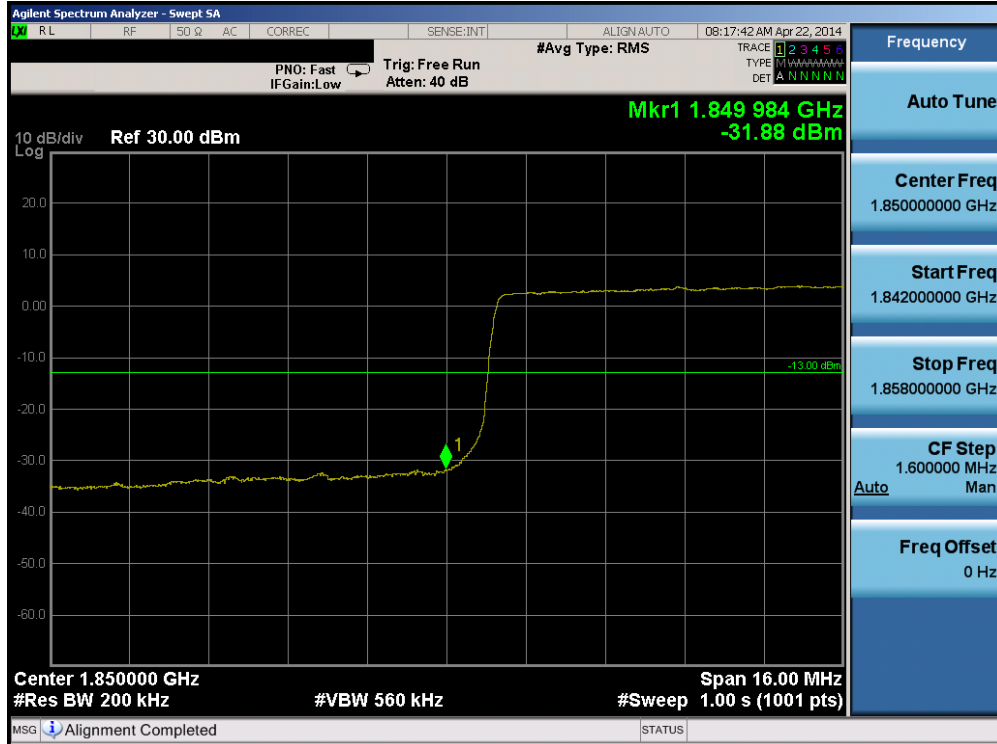


Plot 6-129. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

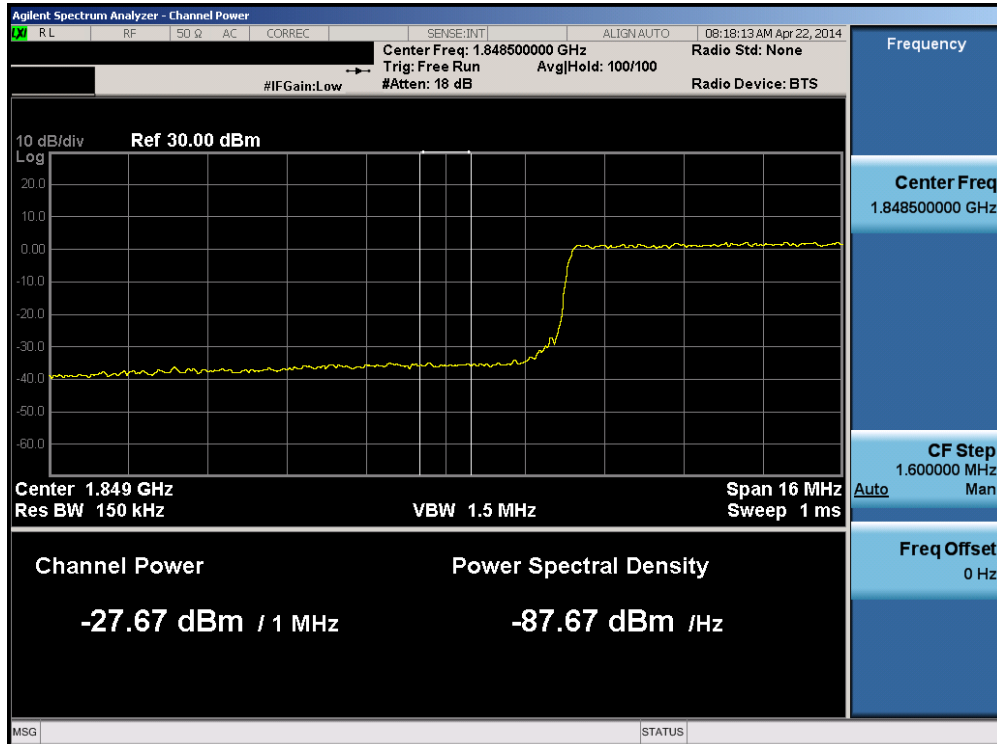


Plot 6-130. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 79 of 126



Plot 6-131. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

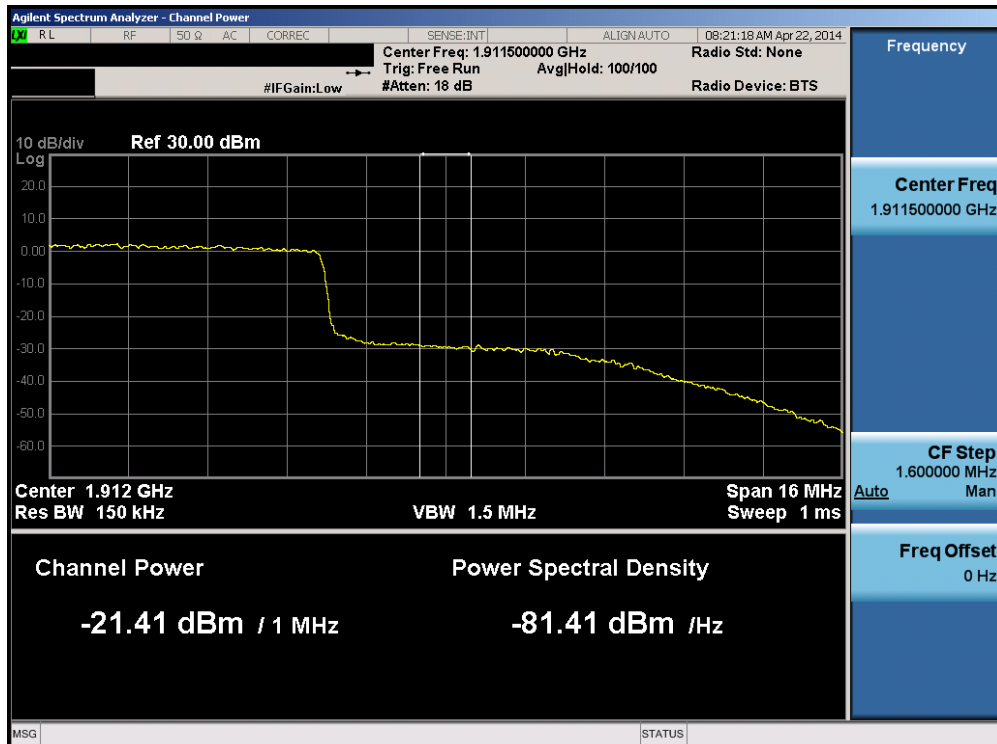


Plot 6-132. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 80 of 126

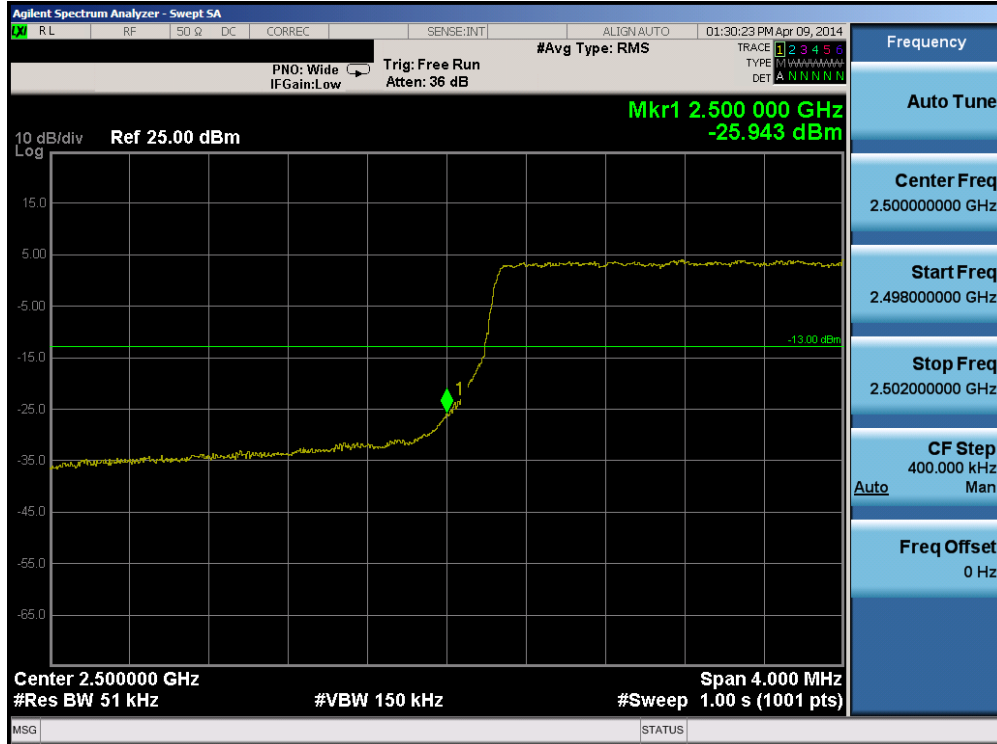


Plot 6-133. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-134. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 81 of 126

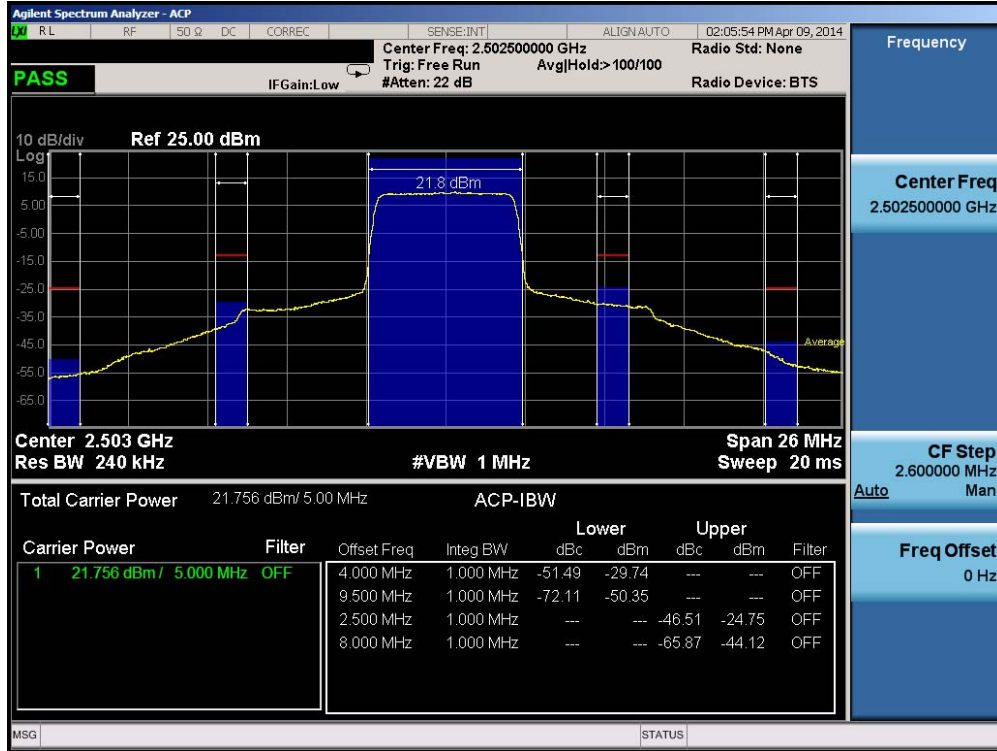


Plot 6-135. Lower Band Edge Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

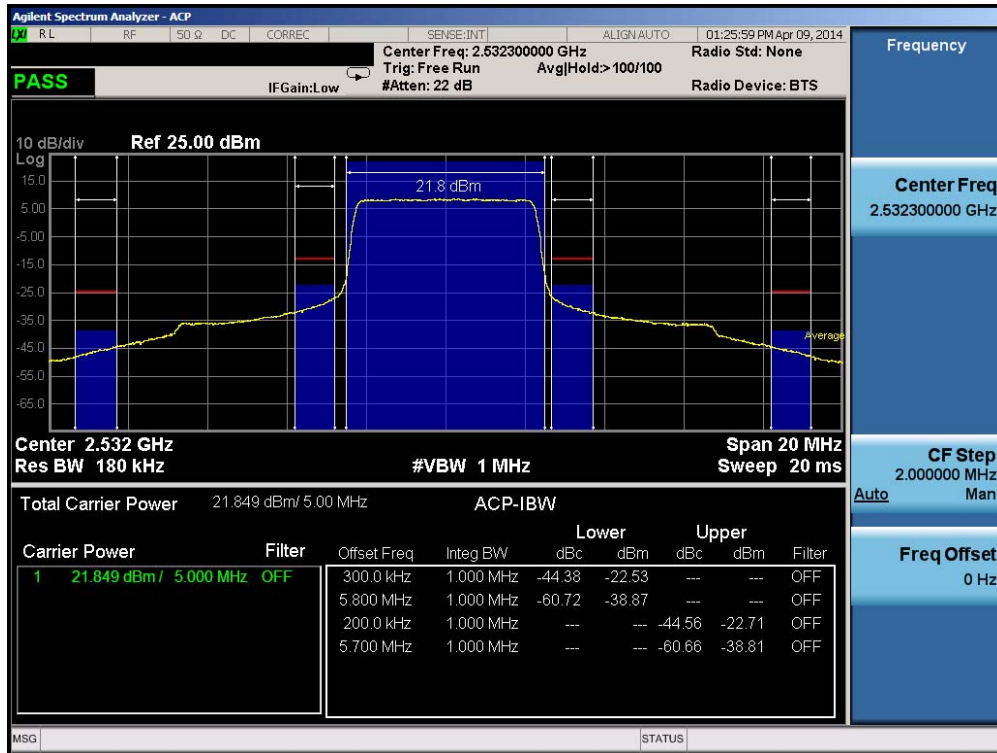


Plot 6-136. Upper Band Edge Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 82 of 126

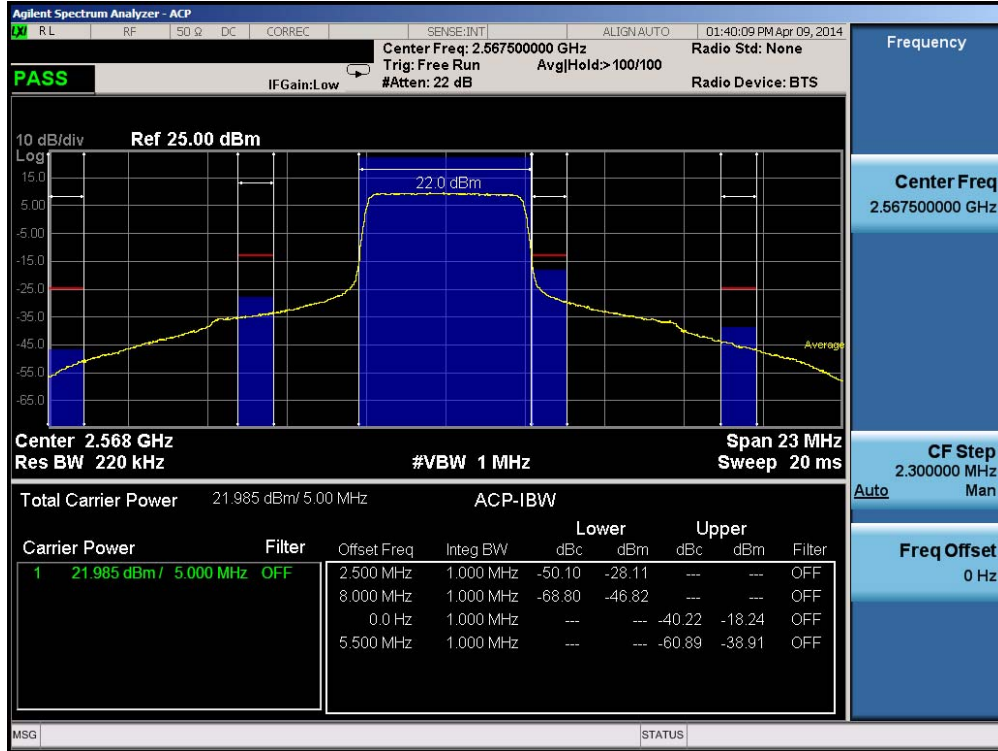


Plot 6-137. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

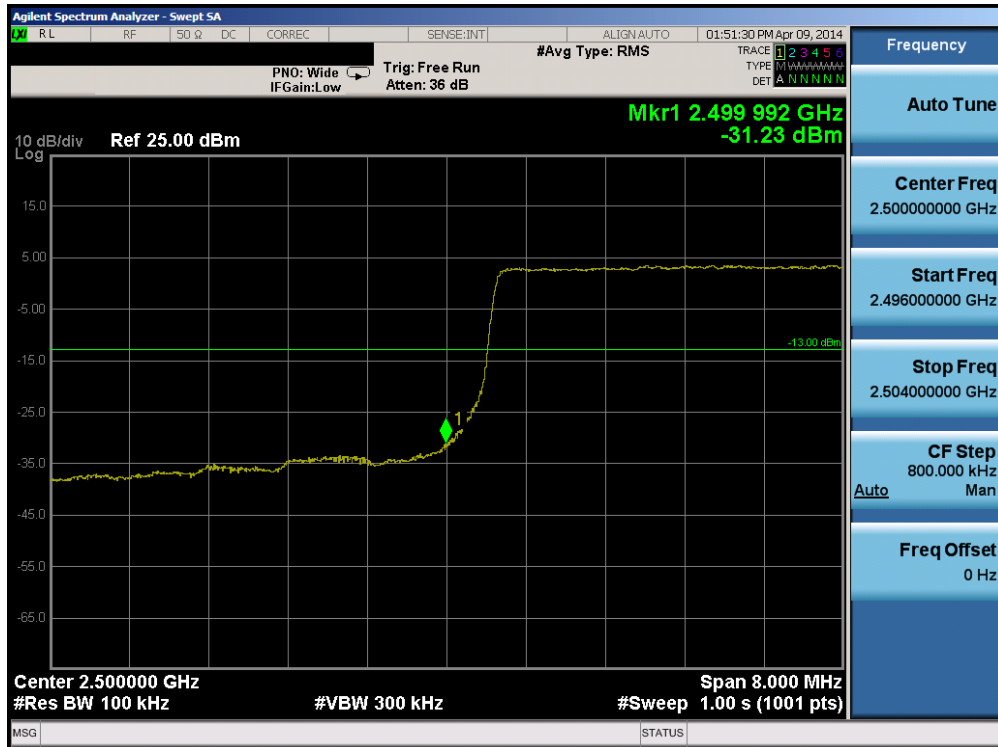


Plot 6-138. Mid ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 83 of 126

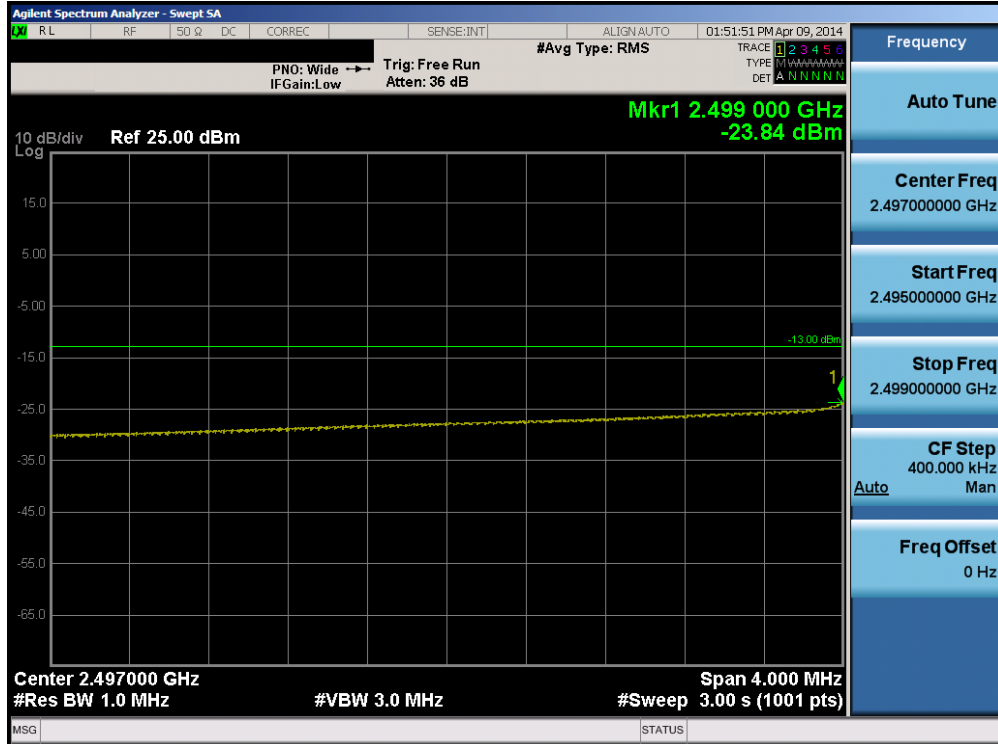


Plot 6-139. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

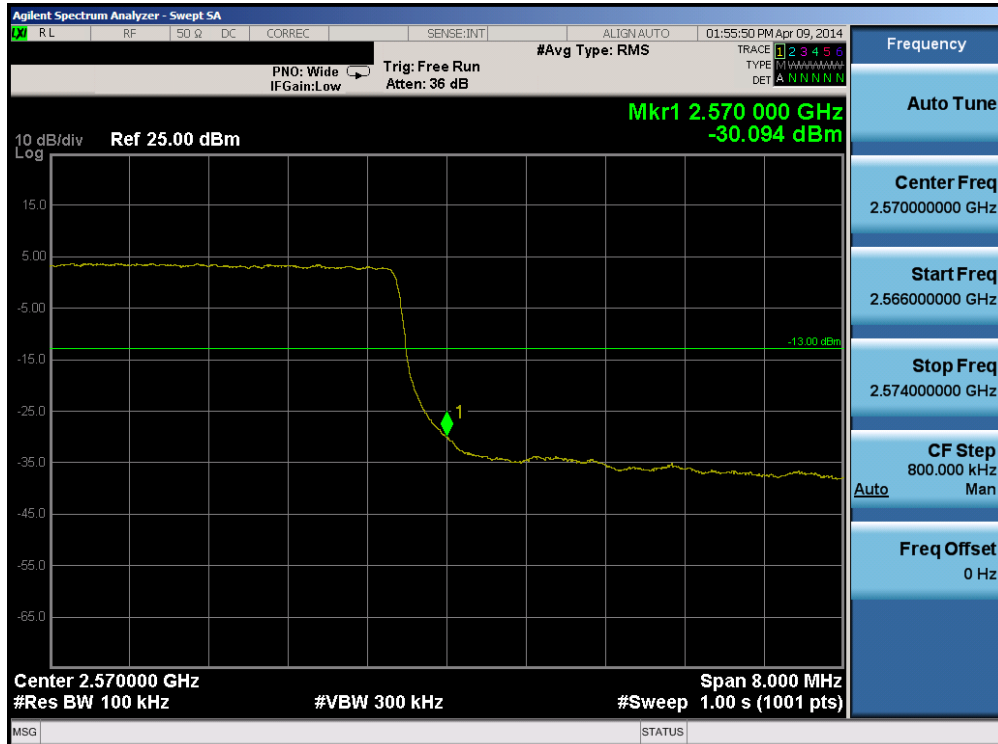


Plot 6-140. Lower Band Edge Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 84 of 126



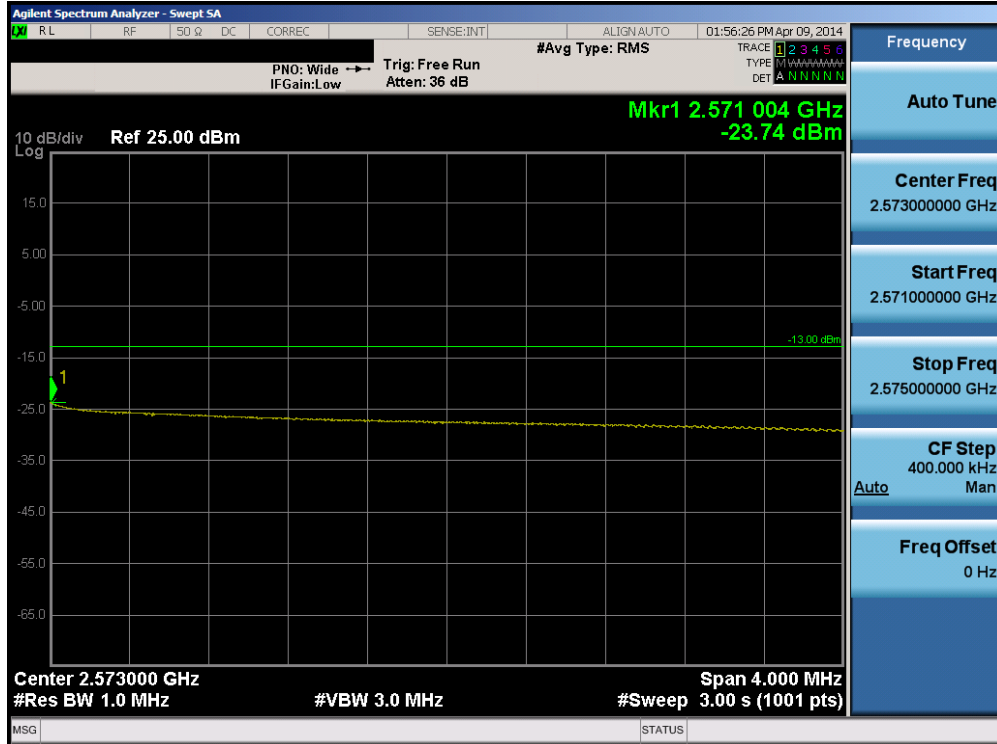
Plot 6-141. Lower Extended Band Edge Plot (Band 7 – 10.0MHz QPSK – RB Size 50)



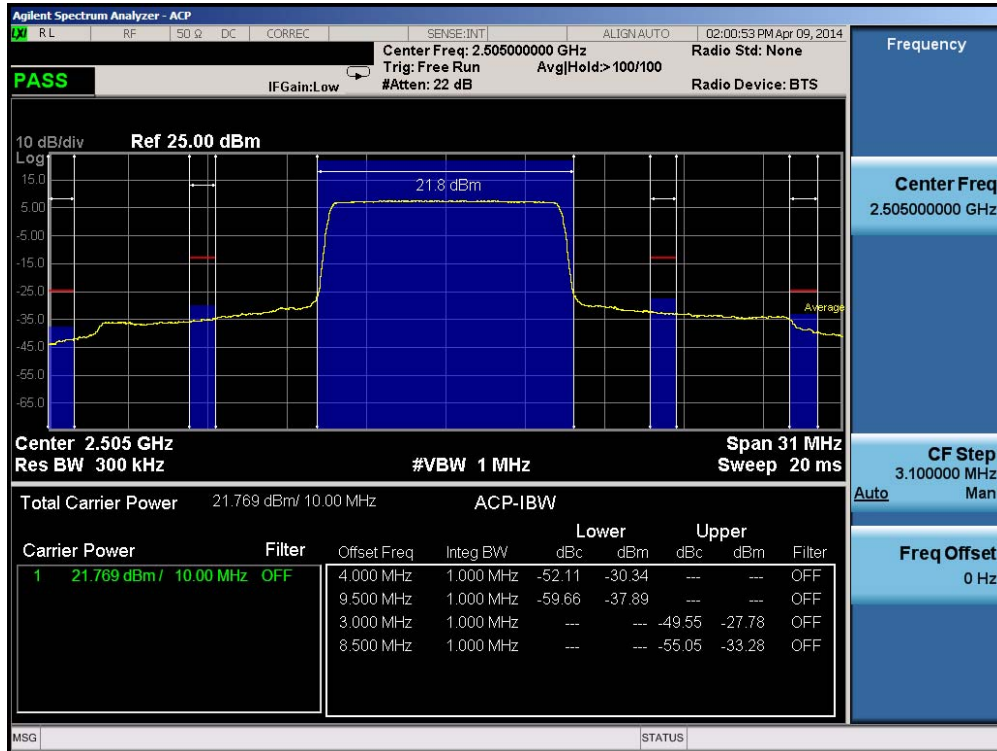
Plot 6-142. Upper Band Edge Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 85 of 126



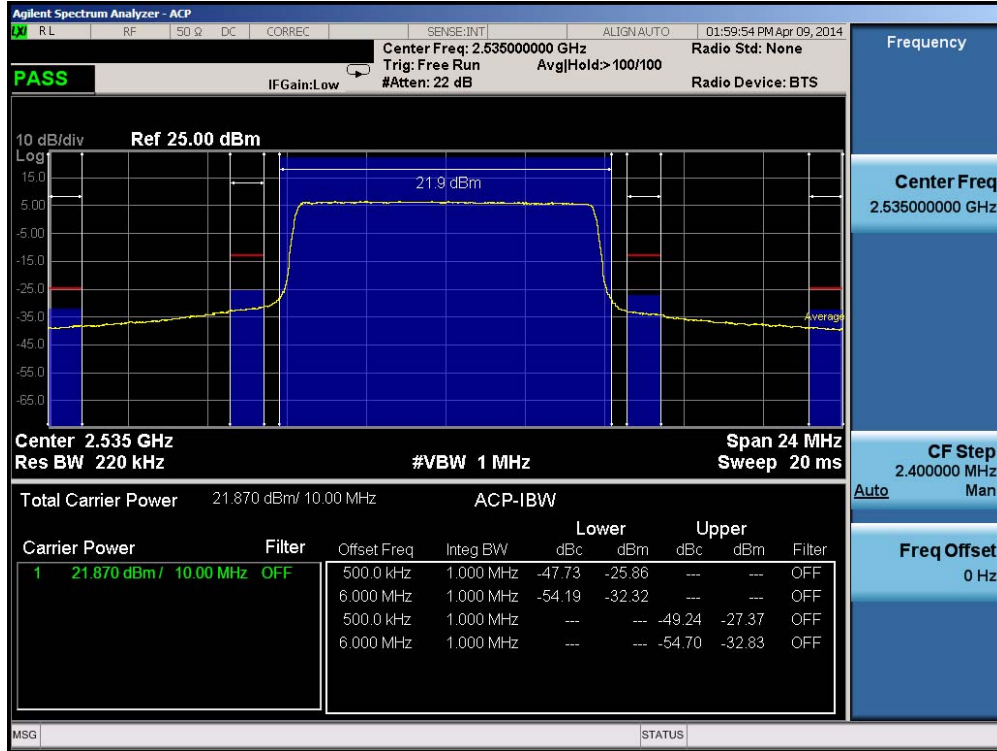


Plot 6-143. Upper Extended Band Edge Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

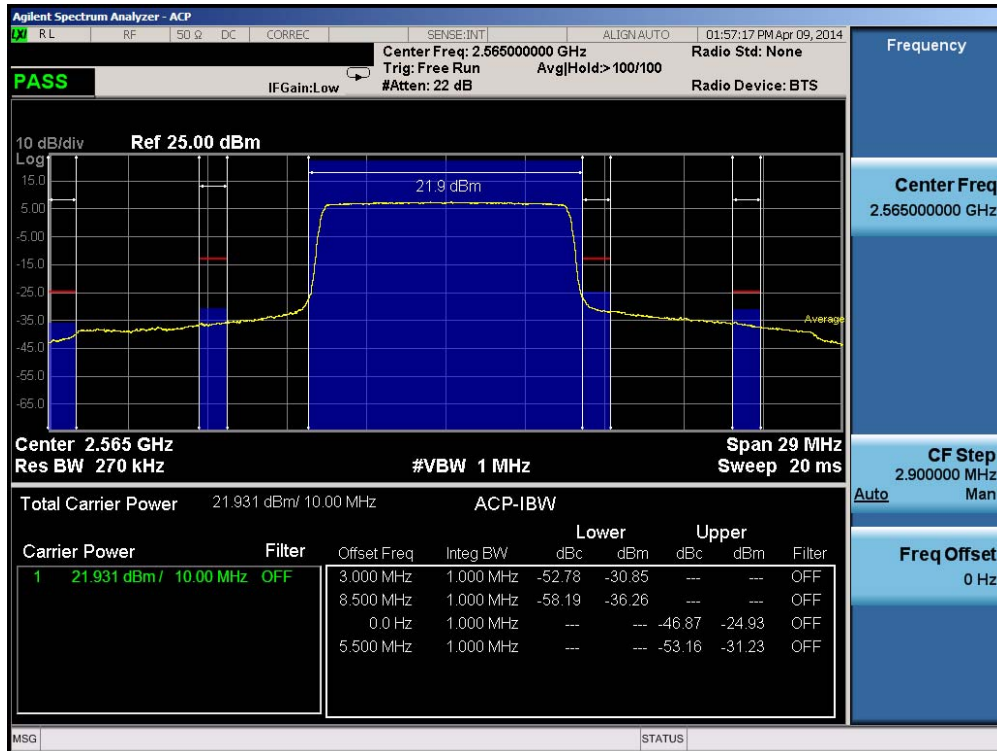


Plot 6-144. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 86 of 126



Plot 6-145. Mid ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)



Plot 6-146. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 87 of 126

## 6.5 Peak-Average Ratio

§24.232(d) §27.50(d.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

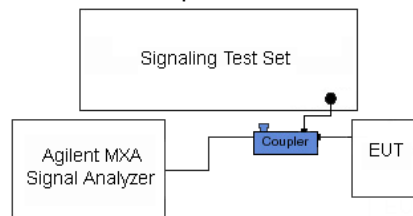
KDB 971168 v02r01 – Section 5.7.1

### Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

### Test Setup



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

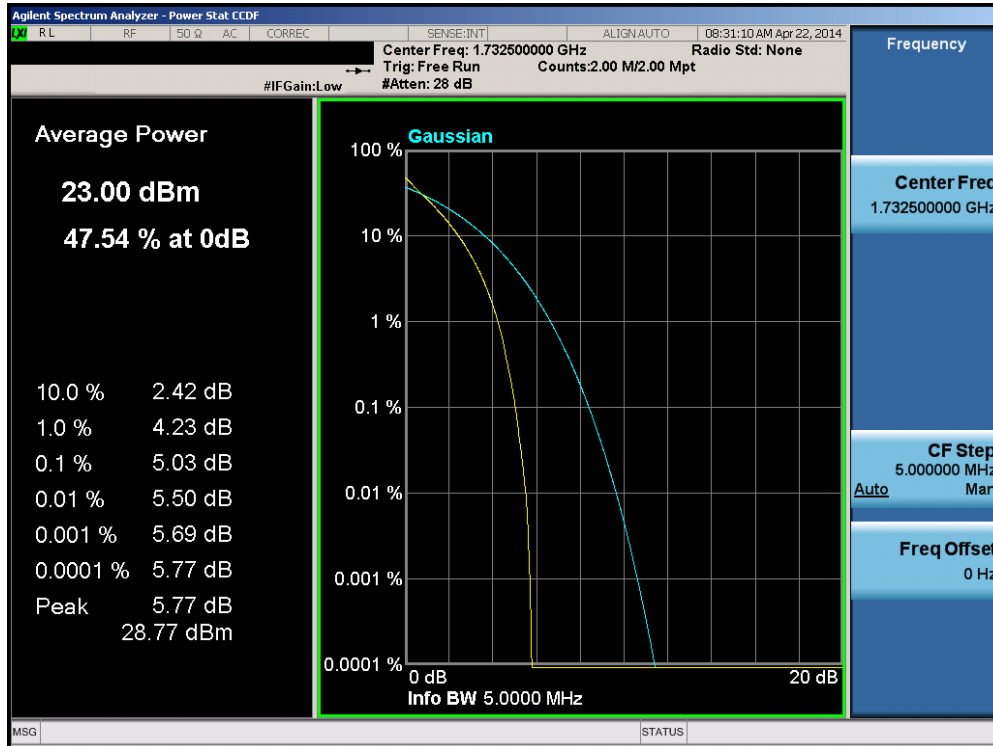


**Figure 6-4. Test Instrument & Measurement Setup**

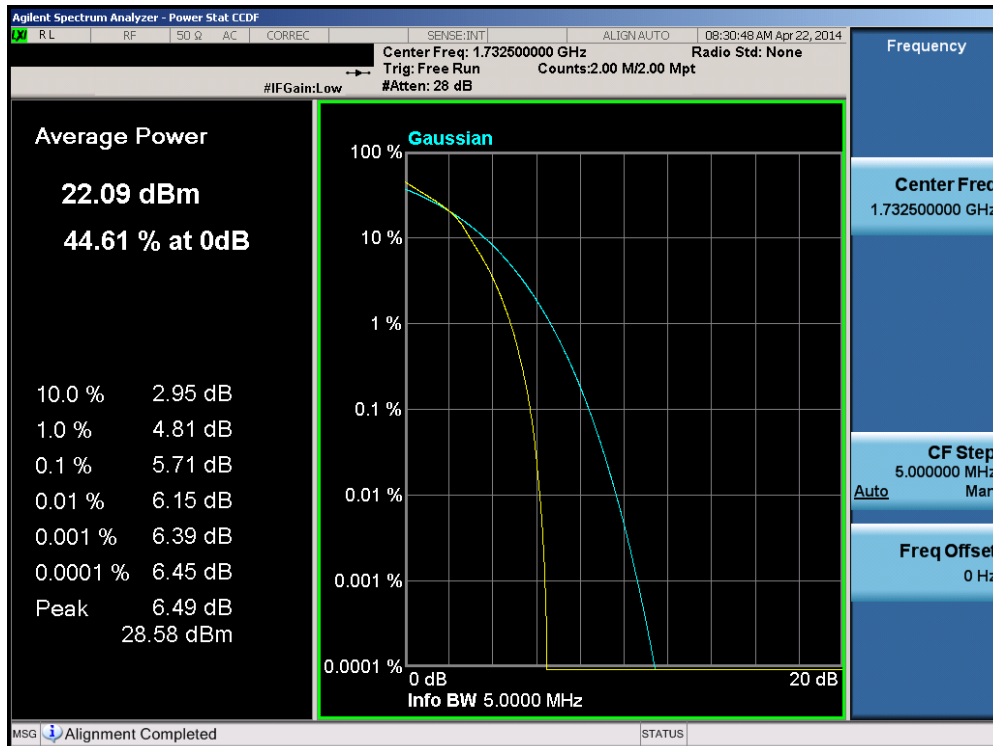
### Test Notes

None.

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 88 of 126	

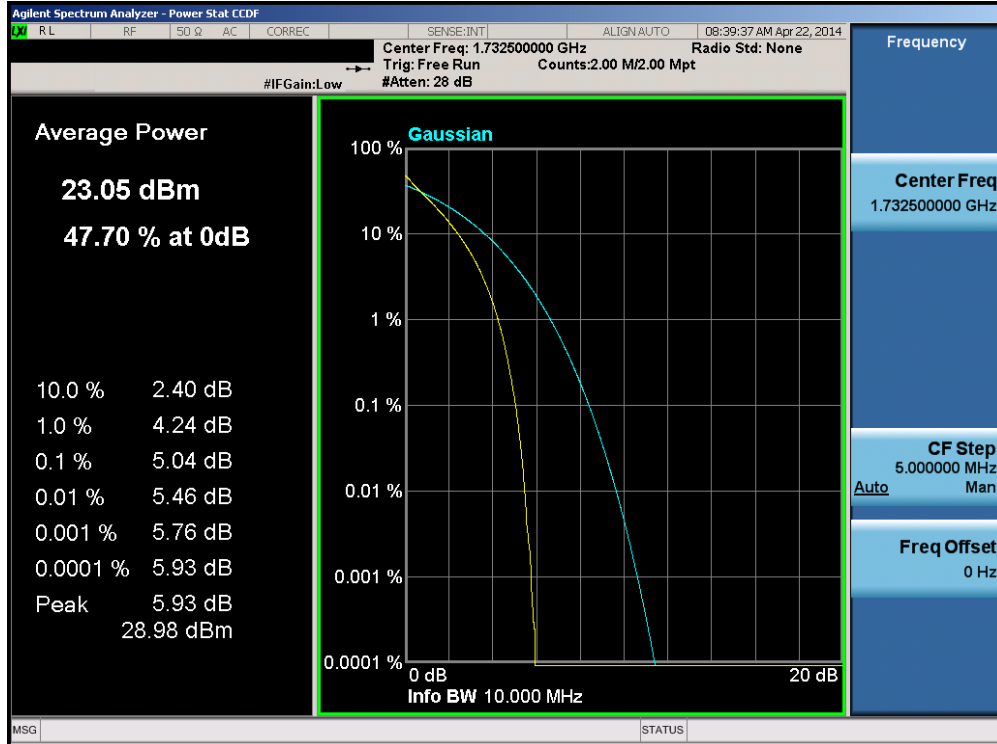


Plot 6-147. PAR Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

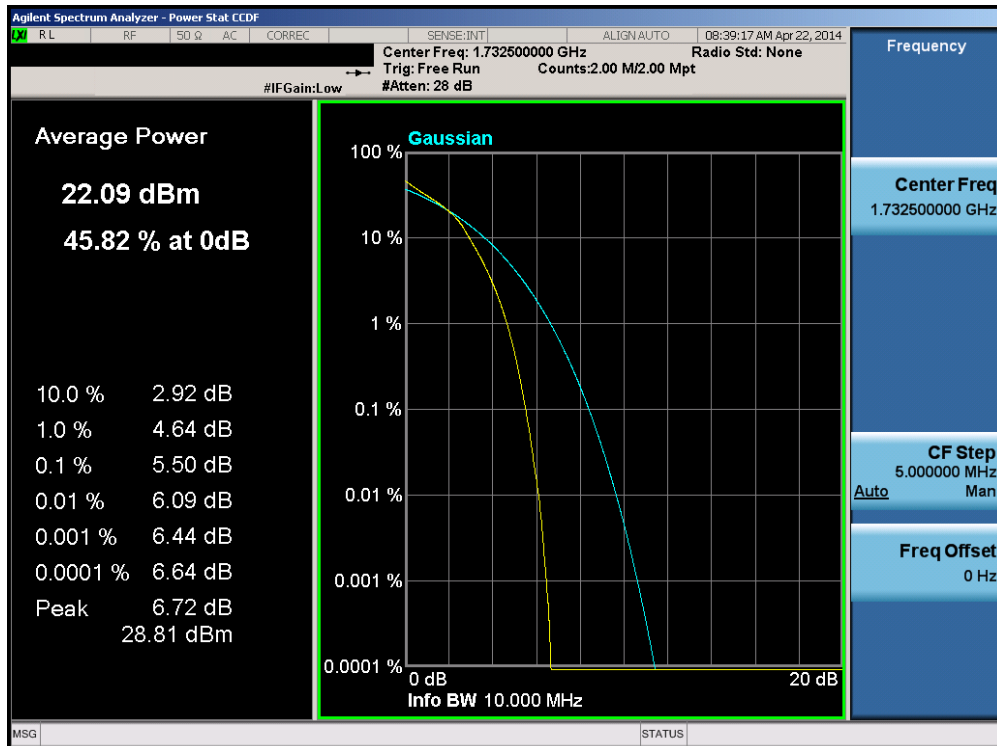


Plot 6-148. PAR Plot (Band 4 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 89 of 126

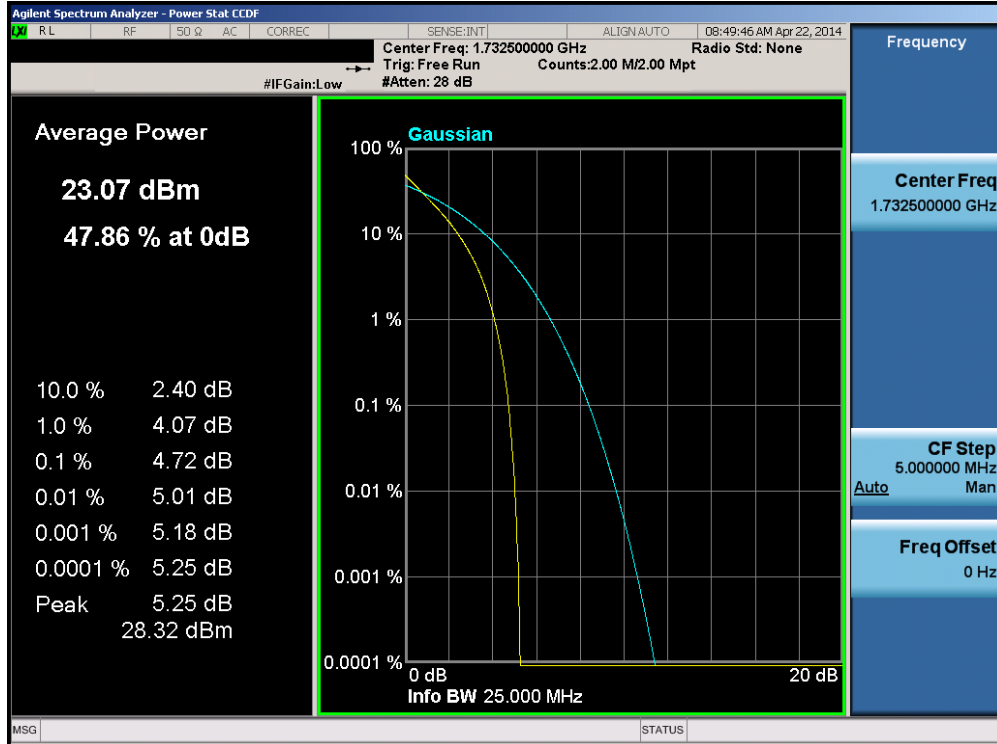


Plot 6-149. PAR Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

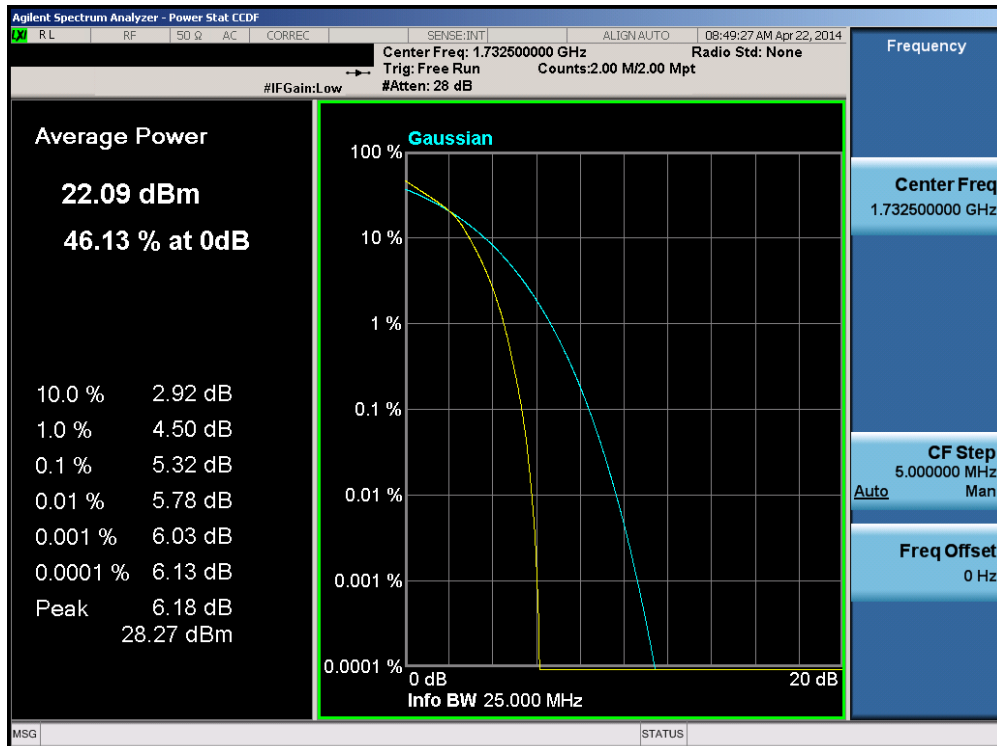


Plot 6-150. PAR Plot (Band 4 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 90 of 126

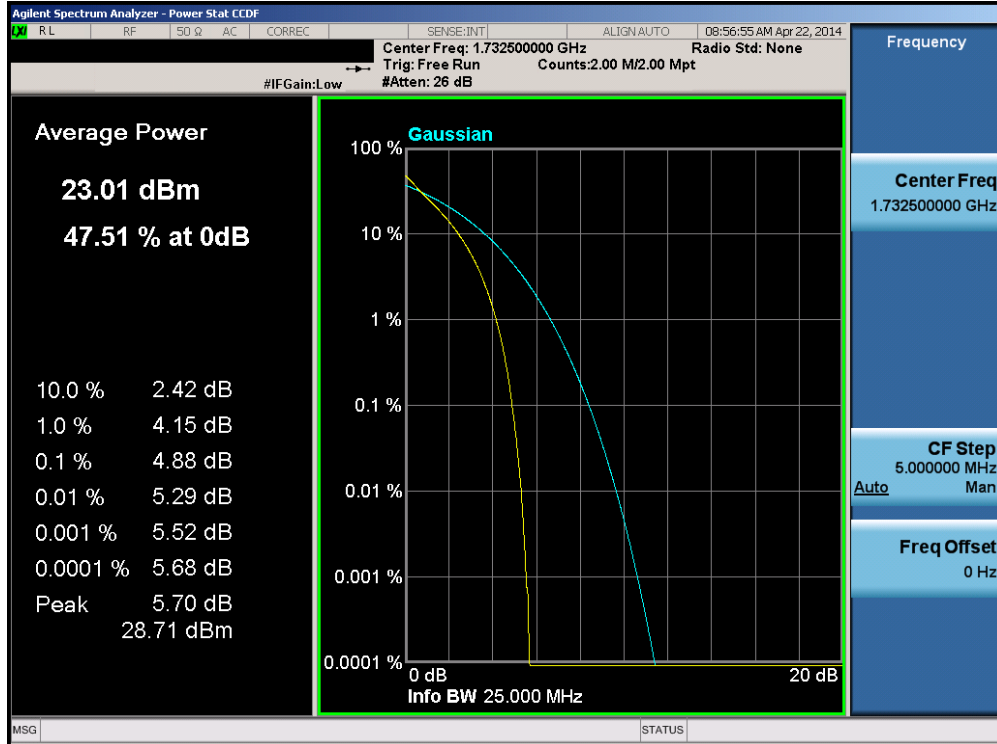


Plot 6-151. PAR Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

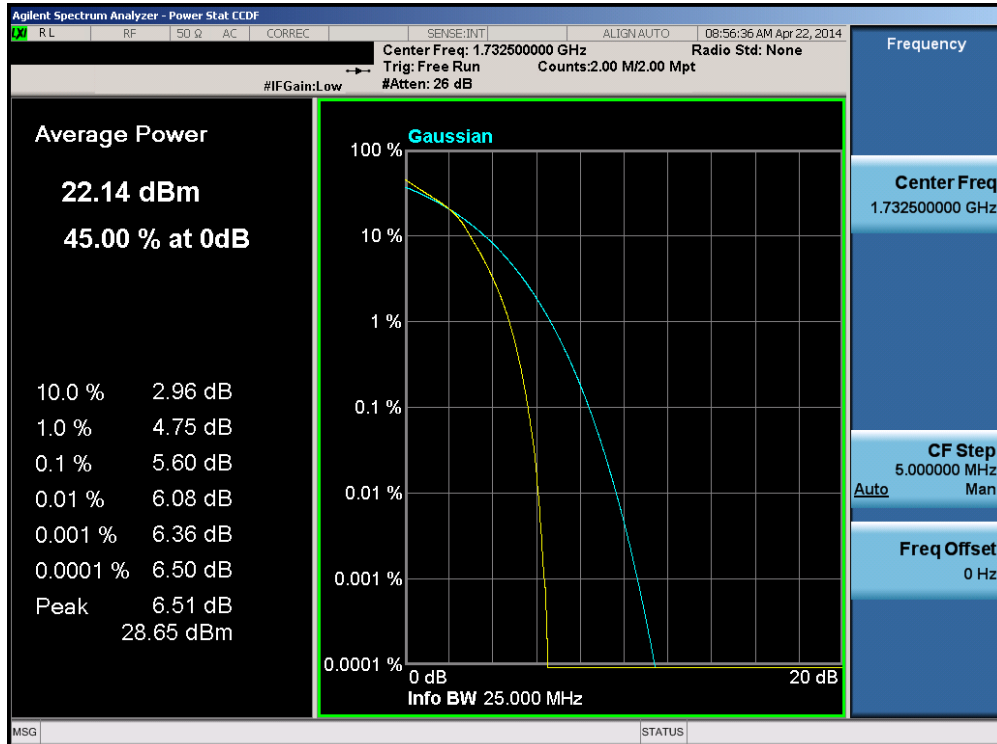


Plot 6-152. PAR Plot (Band 4 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 91 of 126

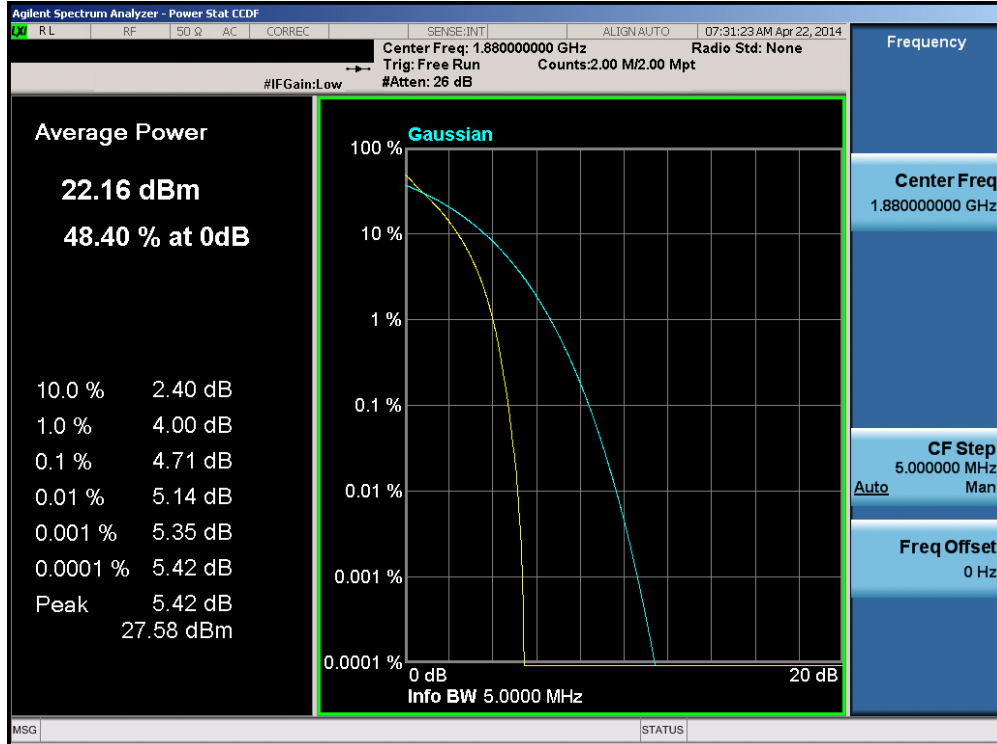


Plot 6-153. PAR Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

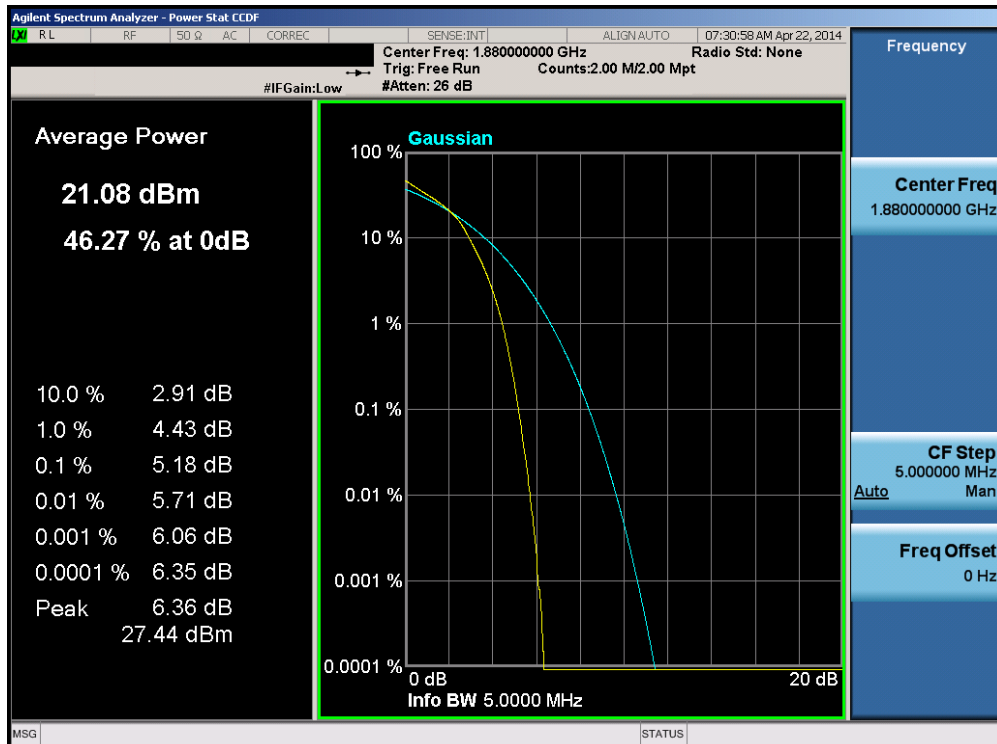


Plot 6-154. PAR Plot (Band 4 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 92 of 126



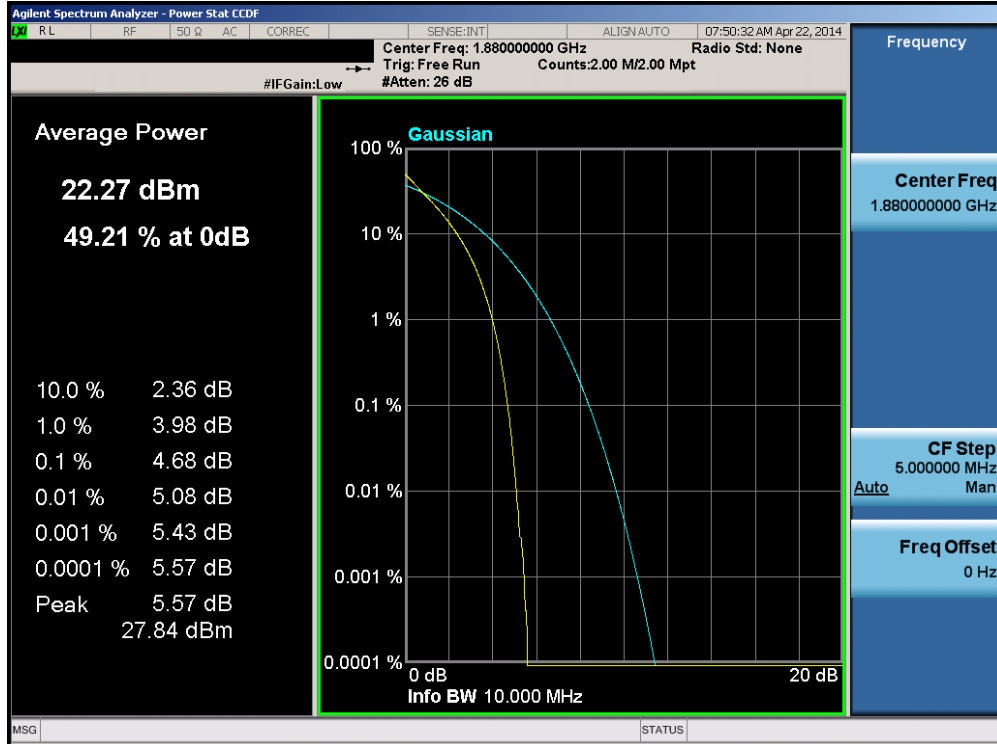
Plot 6-155. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



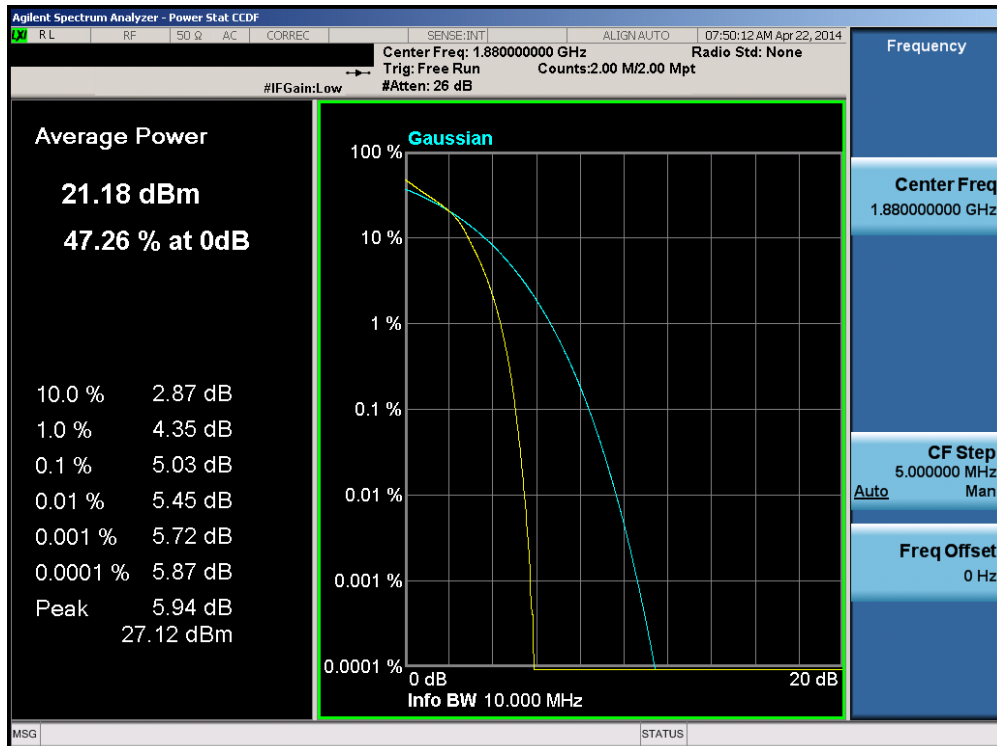
Plot 6-156. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 93 of 126



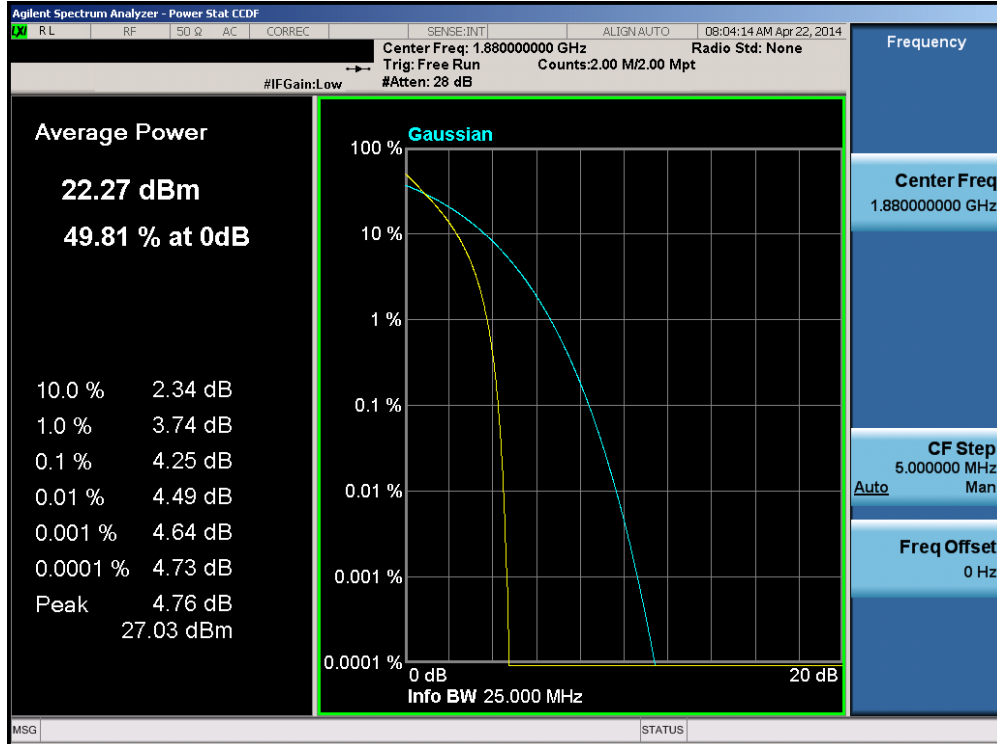


Plot 6-157. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

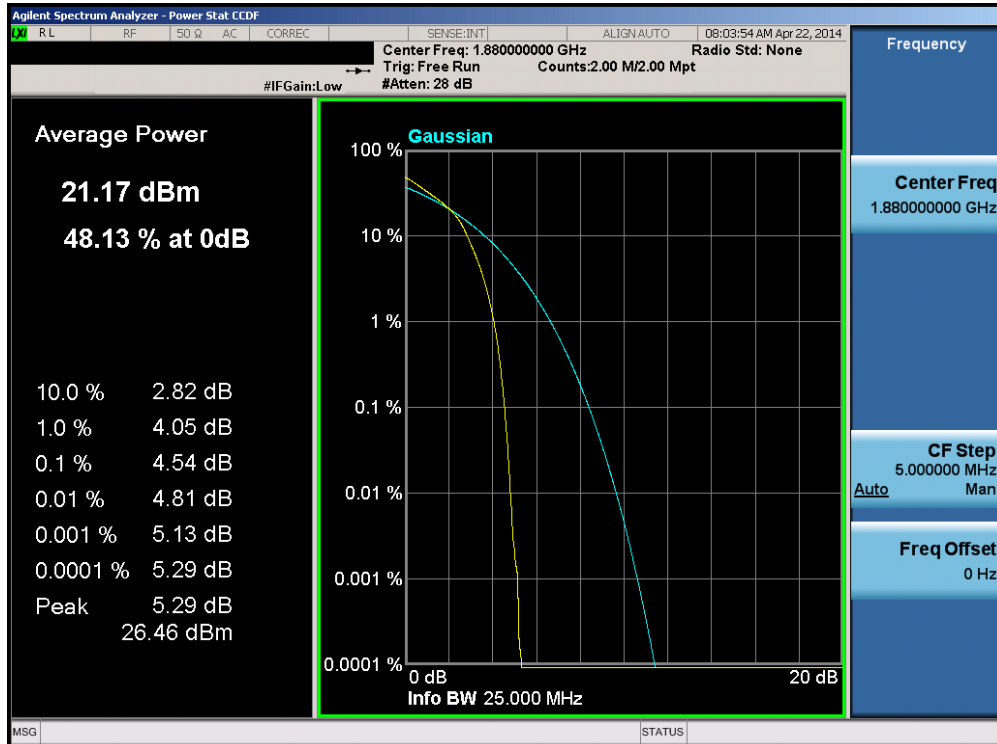


Plot 6-158. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 94 of 126

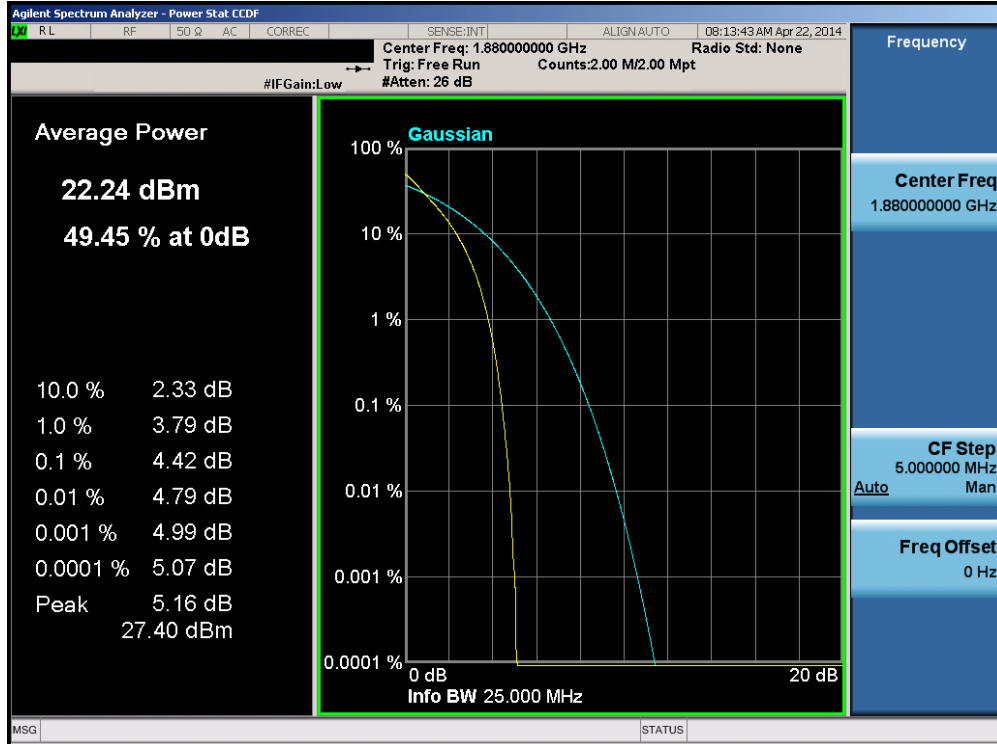


Plot 6-159. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

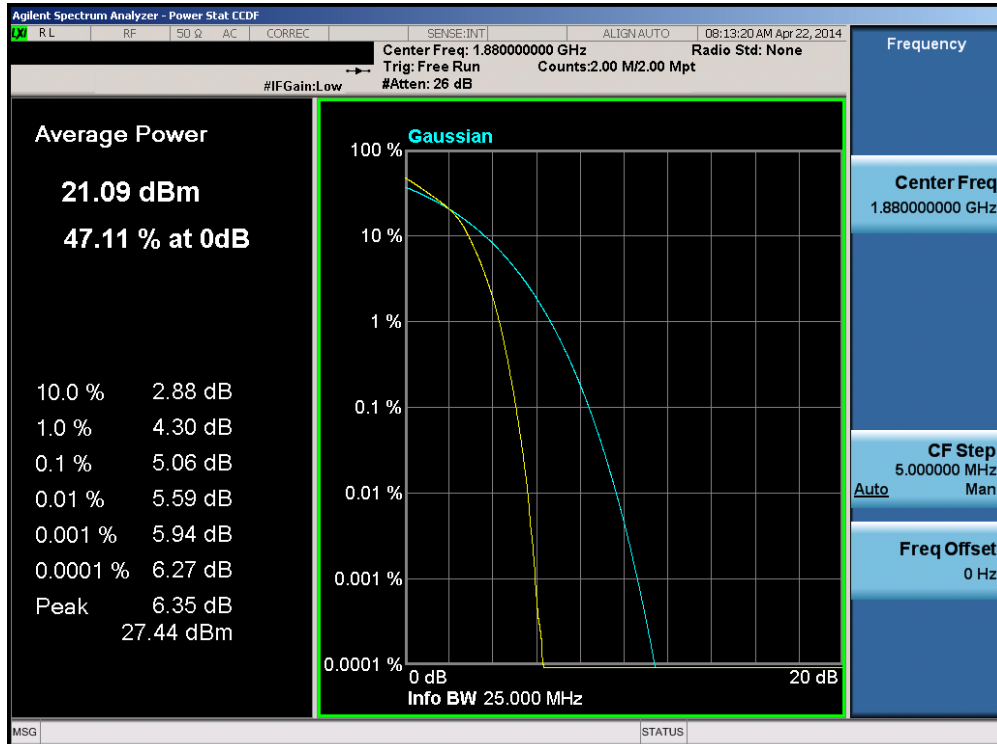


Plot 6-160. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 95 of 126

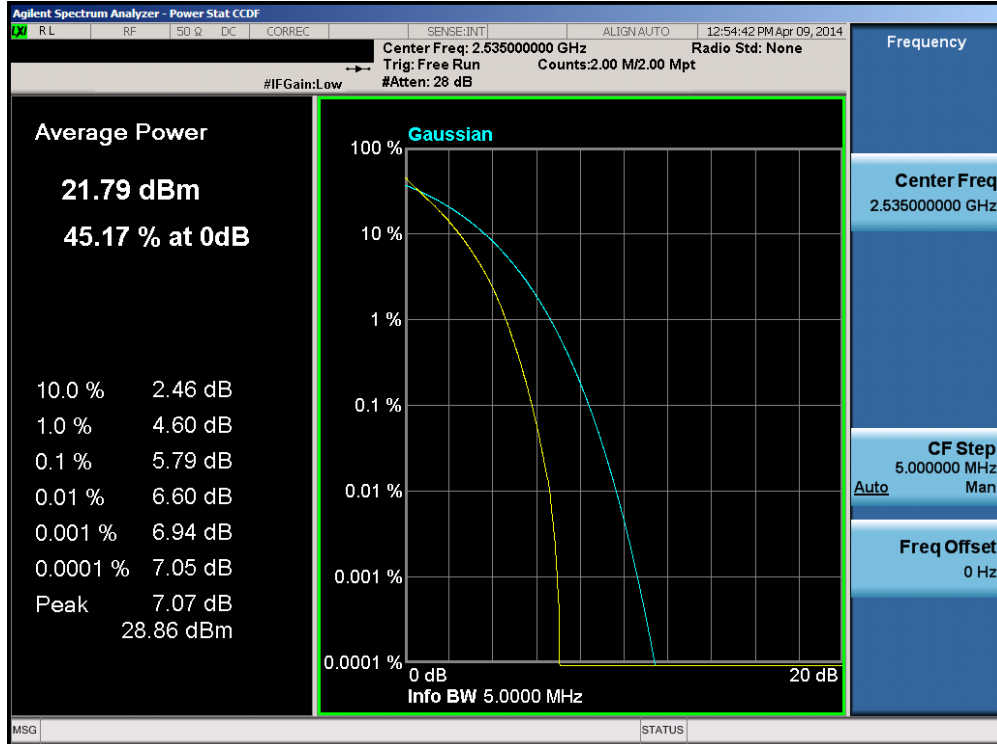


Plot 6-161. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

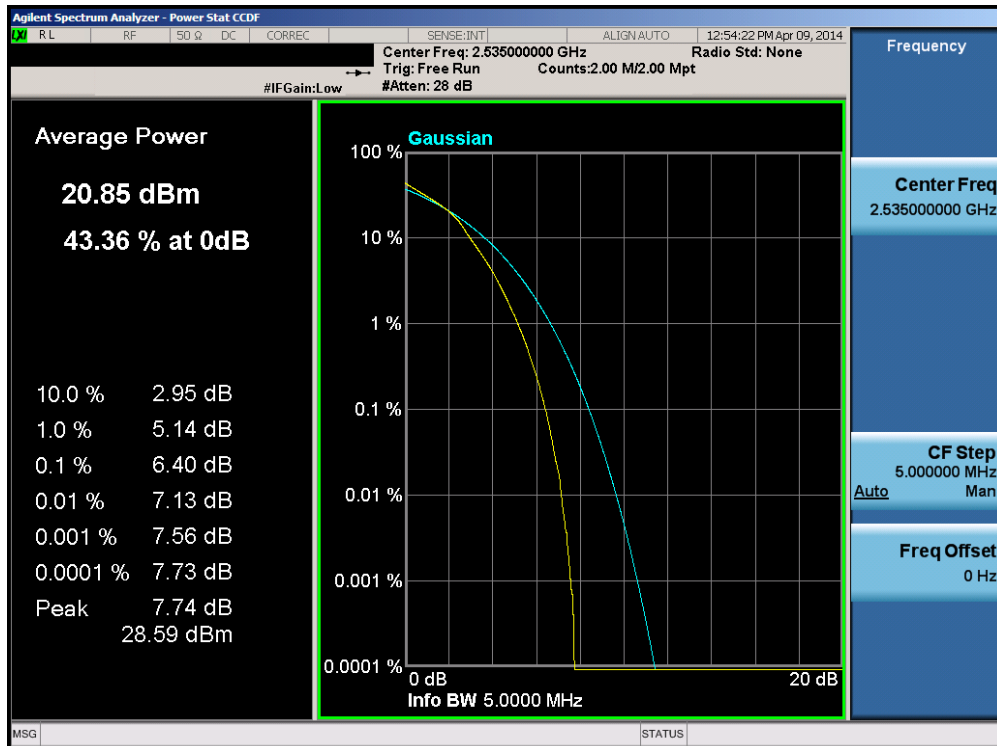


Plot 6-162. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 96 of 126

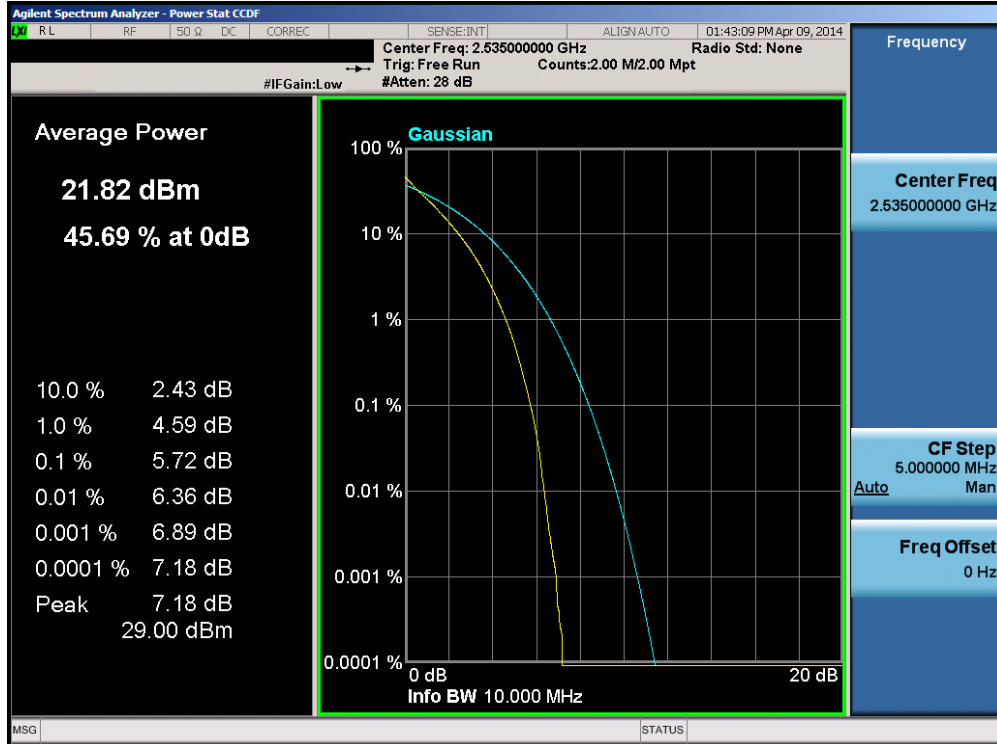


Plot 6-163. PAR Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

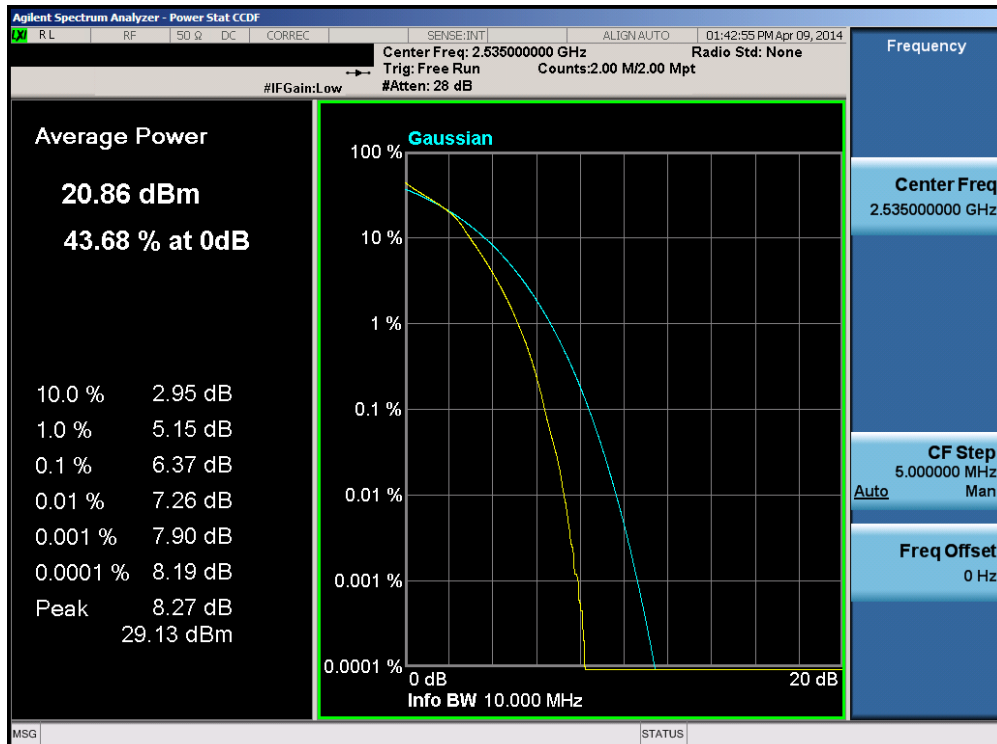


Plot 6-164. PAR Plot (Band 7 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 97 of 126



Plot 6-165. PAR Plot (Band 7 – 10.0MHz QPSK – RB Size 50)



Plot 6-166. PAR Plot (Band 7 – 10.0MHz 16-QAM – RB Size 50)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 98 of 126

## 6.6 Radiated Power (ERP/EIRP)

§24.232(c) §27.50(h.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 polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically 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 v02r01 – 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. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW  $\geq$  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".  
Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 99 of 126

## Test Setup

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

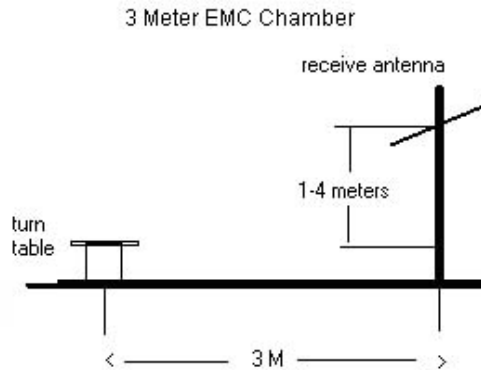




Figure 6-5. Test Instrument & Measurement Setup

## Test Notes

- 1) 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.


Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery Cover	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	Ant. Pol. [H/V]	EUT Pol.	ERP [dBm]	ERP [Watts]	Margin [dB]
706.50	5	QPSK	Standard	1 / 24	13.40	2.35	V	V	15.75	0.038	-19.02
710.00	5	QPSK	Standard	1 / 0	13.45	2.42	V	V	15.87	0.039	-18.90
713.50	5	QPSK	Standard	1 / 0	13.50	2.49	V	V	15.99	0.040	-18.78
706.50	5	16-QAM	Standard	1 / 24	12.21	2.35	V	V	14.56	0.029	-20.21
710.00	5	16-QAM	Standard	1 / 0	12.22	2.42	V	V	14.64	0.029	-20.13
713.50	5	16-QAM	Standard	1 / 0	12.24	2.49	V	V	14.73	0.030	-20.04
709.00	10	QPSK	Standard	1 / 49	13.13	2.40	V	V	15.53	0.036	-19.24
710.00	10	QPSK	Standard	1 / 49	13.07	2.42	V	V	15.49	0.035	-19.28
711.00	10	QPSK	Standard	1 / 49	12.97	2.44	V	V	15.41	0.035	-19.36
709.00	10	16-QAM	Standard	1 / 49	11.92	2.40	V	V	14.32	0.027	-20.45
710.00	10	16-QAM	Standard	1 / 49	11.92	2.42	V	V	14.34	0.027	-20.43
711.00	10	16-QAM	Standard	1 / 49	11.71	2.44	V	V	14.15	0.026	-20.62
713.50	5	QPSK	WCC	1 / 0	3.21	2.35	V	H	5.56	0.004	-29.21

Table 6-2. ERP Data (Band 17)

FCC ID: ZNFD851			FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset			Page 100 of 126

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery Cover	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	Ant. Pol. [H/V]	EUT Pol.	EIRP [dBm]	EIRP [Watts]	Margin [dB]
1712.50	5	QPSK	Standard	1 / 0	16.00	9.89	V	V	25.89	0.388	-4.11
1732.50	5	QPSK	Standard	1 / 0	15.89	9.85	V	V	25.74	0.375	-4.26
1752.50	5	QPSK	Standard	1 / 24	15.43	9.81	V	V	25.24	0.334	-4.76
1712.50	5	16-QAM	Standard	1 / 0	14.84	9.89	V	V	24.73	0.297	-5.27
1732.50	5	16-QAM	Standard	1 / 0	14.70	9.85	V	V	24.55	0.285	-5.45
1752.50	5	16-QAM	Standard	1 / 24	14.21	9.81	V	V	24.02	0.252	-5.98
1715.00	10	QPSK	Standard	1 / 0	15.76	9.88	V	V	25.64	0.367	-4.36
1732.50	10	QPSK	Standard	1 / 49	16.09	9.85	V	V	25.94	0.392	-4.06
1750.00	10	QPSK	Standard	1 / 0	15.51	9.81	V	V	25.32	0.341	-4.68
1715.00	10	16-QAM	Standard	1 / 0	14.56	9.88	V	V	24.44	0.278	-5.56
1732.50	10	16-QAM	Standard	1 / 49	14.90	9.85	V	V	24.75	0.298	-5.25
1750.00	10	16-QAM	Standard	1 / 0	14.35	9.81	V	V	24.16	0.261	-5.84
1717.50	15	QPSK	Standard	1 / 0	15.78	9.88	V	V	25.66	0.368	-4.34
1732.50	15	QPSK	Standard	1 / 74	15.98	9.85	V	V	25.83	0.383	-4.17
1747.50	15	QPSK	Standard	1 / 0	15.99	9.82	V	V	25.81	0.381	-4.19
1717.50	15	16-QAM	Standard	1 / 0	14.62	9.88	V	V	24.50	0.282	-5.50
1732.50	15	16-QAM	Standard	1 / 74	14.84	9.85	V	V	24.69	0.294	-5.31
1747.50	15	16-QAM	Standard	1 / 0	14.79	9.82	V	V	24.61	0.289	-5.39
1720.00	20	QPSK	Standard	1 / 0	15.97	9.87	V	V	25.84	0.384	-4.16
1732.50	20	QPSK	Standard	1 / 99	15.80	9.85	V	V	25.65	0.367	-4.35
1745.00	20	QPSK	Standard	1 / 0	15.79	9.82	V	V	25.61	0.364	-4.39
1720.00	20	16-QAM	Standard	1 / 0	14.81	9.87	V	V	24.68	0.294	-5.32
1732.50	20	16-QAM	Standard	1 / 99	14.65	9.85	V	V	24.50	0.282	-5.50
1745.00	20	16-QAM	Standard	1 / 0	14.61	9.82	V	V	24.43	0.277	-5.57
1732.50	10	QPSK	WCC	1 / 99	10.81	7.70	V	H	18.51	0.071	-11.49



**Table 6-3. EIRP Data (Band 4)**

FCC ID: ZNFD851	 <b>FCC Pt. 24 &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 101 of 126





Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery Cover	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	Ant. Pol. [H/V]	EUT Pol.	EIRP [dBm]	EIRP [Watts]	Margin [dB]
1852.50	5	QPSK	Standard	1 / 24	16.73	9.59	V	V	26.32	0.429	-6.69
1880.00	5	QPSK	Standard	1 / 0	16.23	9.53	V	V	25.76	0.377	-7.25
1907.50	5	QPSK	Standard	1 / 0	14.59	9.48	V	V	24.07	0.255	-8.94
1852.50	5	16-QAM	Standard	1 / 24	15.59	9.59	V	V	25.18	0.330	-7.83
1880.00	5	16-QAM	Standard	1 / 0	15.09	9.53	V	V	24.62	0.290	-8.39
1907.50	5	16-QAM	Standard	1 / 0	13.41	9.48	V	V	22.89	0.194	-10.12
1855.00	10	QPSK	Standard	1 / 49	16.92	9.59	V	V	26.51	0.448	-6.50
1880.00	10	QPSK	Standard	1 / 0	16.06	9.53	V	V	25.59	0.362	-7.42
1905.00	10	QPSK	Standard	1 / 0	14.54	9.48	V	V	24.02	0.252	-8.99
1855.00	10	16-QAM	Standard	1 / 49	15.58	9.59	V	V	25.17	0.329	-7.84
1880.00	10	16-QAM	Standard	1 / 0	14.92	9.53	V	V	24.45	0.279	-8.56
1905.00	10	16-QAM	Standard	1 / 0	13.39	9.48	V	V	22.87	0.194	-10.14
1857.50	15	QPSK	Standard	1 / 74	17.06	9.58	V	V	26.64	0.462	-6.37
1880.00	15	QPSK	Standard	1 / 0	16.24	9.53	V	V	25.77	0.378	-7.24
1902.50	15	QPSK	Standard	1 / 0	14.62	9.48	V	V	24.10	0.257	-8.91
1857.50	15	16-QAM	Standard	1 / 74	15.88	9.58	V	V	25.46	0.352	-7.55
1880.00	15	16-QAM	Standard	1 / 0	15.01	9.53	V	V	24.54	0.285	-8.47
1902.50	15	16-QAM	Standard	1 / 0	13.40	9.48	V	V	22.88	0.194	-10.13
1860.00	20	QPSK	Standard	1 / 99	16.40	9.58	V	V	25.98	0.396	-7.03
1880.00	20	QPSK	Standard	1 / 0	16.09	9.53	V	V	25.62	0.365	-7.39
1900.00	20	QPSK	Standard	1 / 0	13.93	9.49	V	V	23.42	0.220	-9.59
1860.00	20	16-QAM	Standard	1 / 99	15.20	9.58	V	V	24.78	0.300	-8.23
1880.00	20	16-QAM	Standard	1 / 0	14.88	9.53	V	V	24.41	0.276	-8.60
1900.00	20	16-QAM	Standard	1 / 0	12.78	9.49	V	V	22.27	0.169	-10.74
1857.50	15	QPSK	WCC	1 / 0	12.52	7.43	V	H	19.95	0.099	-13.06

**Table 6-4. EIRP Data (Band 2)**

FCC ID: ZNFD851	 <b>FCC Pt. 24 &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 102 of 126

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery Cover	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	Ant. Pol. [H/V]	EUT Pol.	EIRP [dBm]	EIRP [Watts]	Margin [dB]
2502.50	5	QPSK	Standard	1 / 24	0.92	8.66	V	V	9.58	0.009	-23.43
2532.30	5	QPSK	Standard	1 / 24	0.34	8.68	V	V	9.02	0.008	-23.99
2567.50	5	QPSK	Standard	1 / 0	-0.76	8.70	V	V	7.94	0.006	-25.07
2502.50	5	16-QAM	Standard	1 / 24	-0.40	8.66	V	V	8.26	0.007	-24.75
2532.30	5	16-QAM	Standard	1 / 24	-0.77	8.68	V	V	7.91	0.006	-25.10
2567.50	5	16-QAM	Standard	1 / 0	-1.97	8.70	V	V	6.73	0.005	-26.28
2505.00	10	QPSK	Standard	1 / 49	0.83	8.66	V	V	9.49	0.009	-23.52
2535.00	10	QPSK	Standard	1 / 49	-0.48	8.68	V	V	8.20	0.007	-24.81
2565.00	10	QPSK	Standard	1 / 49	-0.81	8.70	V	V	7.89	0.006	-25.12
2505.00	10	16-QAM	Standard	1 / 49	-0.41	8.66	V	V	8.25	0.007	-24.76
2535.00	10	16-QAM	Standard	1 / 49	-1.66	8.68	V	V	7.02	0.005	-25.99
2565.00	10	16-QAM	Standard	1 / 49	-2.08	8.70	V	V	6.62	0.005	-26.39
2502.50	5	QPSK	WCC	1 / 99	-0.24	6.51	V	H	6.27	0.004	-26.74

**Table 6-5. EIRP Data (Band 7)**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset			Page 103 of 126

## 6.7 Radiated Spurious Emissions Measurements

§2.1053 §24.238(a) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

### Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and vertically 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 v02r01 – Section 5.8

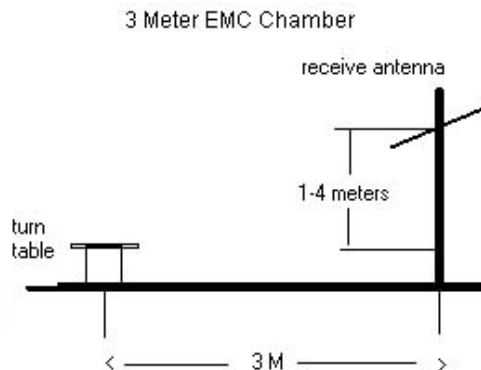
ANSI/TIA-603-C-2004 – Section 2.2.12

### 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

### Test Setup

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





**Figure 6-6. Test Instrument & Measurement Setup**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 104 of 126

**Test Notes**

- 1) The worst case emissions are reported with the EUT positioning, modulations, 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 using CISPR quasi peak detector below 1GHz. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not 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.

<b>FCC ID:</b> ZNFD851		<b>FCC Pt. 24 &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1404070703.ZNF	<b>Test Dates:</b> 4/3 - 4/25/2014	<b>EUT Type:</b> Portable Handset	Page 105 of 126	

OPERATING FREQUENCY: 706.50 MHz  
 CHANNEL: 23755  
 MEASURED OUTPUT POWER: 15.75 dBm = 0.038 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  28.75 dBc



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1413.00	-51.17	5.72	-45.45	H	H	61.2
2119.50	-57.91	6.71	-51.19	H	H	66.9
2826.00	-53.90	7.81	-46.09	H	H	61.8
3532.50	-51.68	7.59	-44.09	H	H	59.8
4239.00	-59.03	8.39	-50.64	H	H	66.4

Table 6-6. Radiated Spurious Data (Band 17 – Low Channel)

OPERATING FREQUENCY: 710.00 MHz  
 CHANNEL: 23790  
 MEASURED OUTPUT POWER: 15.87 dBm = 0.039 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  28.87 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1420.00	-50.88	5.76	-45.12	H	H	61.0
2130.00	-56.31	6.77	-49.54	H	H	65.4
2840.00	-52.48	7.78	-44.70	H	H	60.6
3550.00	-53.22	7.59	-45.63	H	H	61.5
4260.00	-58.28	8.46	-49.82	H	H	65.7



Table 6-7. Radiated Spurious Data (Band 17 – Mid Channel)

FCC ID: ZNFD851			FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 106 of 126	

OPERATING FREQUENCY: 713.50 MHz  
 CHANNEL: 23825  
 MEASURED OUTPUT POWER: 15.99 dBm = 0.040 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  28.99 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1427.00	-50.96	5.80	-45.16	H	H	61.2
2140.50	-54.89	6.83	-48.06	H	H	64.1
2854.00	-52.28	7.76	-44.51	H	H	60.5
3567.50	-54.45	7.60	-46.85	H	H	62.8
4281.00	-58.87	8.53	-50.34	H	H	66.3
4994.50	-53.33	8.78	-44.56	H	H	60.6
5708.00	-56.14	9.10	-47.04	H	H	63.0



Table 6-8. Radiated Spurious Data (Band 17 – High Channel)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 107 of 126	

OPERATING FREQUENCY: 713.50 MHz  
 CHANNEL: 23825  
 MEASURED OUTPUT POWER: 5.56 dBm = 0.004 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  18.56 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1427.00	-44.24	5.80	-38.44	H	H	44.0
2140.50	-42.61	6.83	-35.78	H	H	41.3
2854.00	-45.24	7.76	-37.47	H	H	43.0
3567.50	-44.84	7.60	-37.24	H	H	42.8
4281.00	-57.43	8.53	-48.90	H	H	54.5
4994.50	-46.90	8.78	-38.13	H	H	43.7
5708.00	-55.29	9.10	-46.19	H	H	51.8
6421.50	-55.25	9.78	-45.47	H	H	51.0

Table 6-9. Radiated Spurious Data with WCC (Band 17 – High Channel)

FCC ID: ZNFD851	 FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 108 of 126

OPERATING FREQUENCY: 1715.00 MHz  
 CHANNEL: 20000  
 MEASURED OUTPUT POWER: 25.64 dBm = 0.367 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  38.64 dBc



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3430.00	-46.58	9.69	-36.89	H	H	62.5
5145.00	-34.81	10.67	-24.14	H	H	49.8
6860.00	-43.92	11.74	-32.18	H	H	57.8
8575.00	-45.36	11.05	-34.31	H	H	60.0
10290.00	-46.74	12.29	-34.46	H	H	60.1
12005.00	-49.26	12.51	-36.75	H	H	62.4
13720.00	-32.02	12.07	-19.95	H	H	45.6

Table 6-10. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 MEASURED OUTPUT POWER: 25.94 dBm = 0.392 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  38.94 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3465.00	-47.22	9.71	-37.51	H	H	63.5
5197.50	-37.15	10.59	-26.57	H	H	52.5
6930.00	-49.70	11.75	-37.95	H	H	63.9
8662.50	-45.10	11.06	-34.03	H	H	60.0
10395.00	-49.50	12.37	-37.13	H	H	63.1
12127.50	-49.71	12.83	-36.87	H	H	62.8
13860.00	-32.27	11.85	-20.43	H	H	46.4

Table 6-11. Radiated Spurious Data (Band 4 – Mid Channel)



FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset			Page 109 of 126



OPERATING FREQUENCY: 1750.00 MHz  
 CHANNEL: 20350  
 MEASURED OUTPUT POWER: 25.32 dBm = 0.341 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  38.32 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3500.00	-46.85	9.73	-37.13	H	H	62.4
5250.00	-33.46	10.63	-22.83	H	H	48.2
7000.00	-45.69	11.76	-33.94	H	H	59.3
8750.00	-43.92	11.02	-32.90	H	H	58.2
10500.00	-49.37	12.48	-36.89	H	H	62.2
12250.00	-49.59	13.04	-36.55	H	H	61.9
14000.00	-34.04	11.45	-22.59	H	H	47.9

**Table 6-12. Radiated Spurious Data (Band 4 – High Channel)**

FCC ID: ZNFD851	 FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 110 of 126	

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 MEASURED OUTPUT POWER: 18.51 dBm = 0.071 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  31.51 dBc



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3465.00	-42.26	9.71	-32.55	H	H	51.1
5197.50	-37.38	10.60	-26.78	H	H	45.3
6930.00	-42.37	11.75	-30.62	H	H	49.1
8662.50	-48.01	11.06	-36.95	H	H	55.5
10395.00	-46.46	12.44	-34.02	H	H	52.5
12127.50	-49.04	13.02	-36.03	H	H	54.5
13860.00	-33.81	11.56	-22.24	H	H	40.7

Table 6-13. Radiated Spurious Data with WCC (Band 4 – Mid Channel)

OPERATING FREQUENCY: 1857.50 MHz  
 CHANNEL: 18675  
 MEASURED OUTPUT POWER: 26.64 dBm = 0.462 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  39.64 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3715.00	-42.09	9.42	-32.68	V	H2	59.3
5572.50	-38.65	10.85	-27.79	V	H2	54.4
7430.00	-32.42	10.75	-21.67	V	H2	48.3
9287.50	-39.01	11.59	-27.42	V	H2	54.1
11145.00	-46.63	12.78	-33.84	V	H2	60.5
13002.50	-38.54	13.18	-25.36	V	H2	52.0
14860.00	-38.06	12.47	-25.59	V	H2	52.2



Table 6-14. Radiated Spurious Data (Band 2 – Low Channel)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 111 of 126

OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 25.77 dBm = 0.378 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  38.77 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3760.00	-34.66	9.29	-25.37	V	H2	51.1
5640.00	-39.66	11.05	-28.61	V	H2	54.4
7520.00	-35.04	10.97	-24.06	V	H2	49.8
9400.00	-41.57	11.55	-30.02	V	H2	55.8
11280.00	-47.90	12.72	-35.18	V	H2	60.9
13160.00	-31.70	12.83	-18.87	V	H2	44.6
15040.00	-41.49	13.52	-27.97	V	H2	53.7



**Table 6-15. Radiated Spurious Data (Band 2 – Mid Channel)**

FCC ID: ZNFD851	 <b>FCC Pt. 24 &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>			Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 112 of 126	

OPERATING FREQUENCY: 1902.50 MHz  
 CHANNEL: 19125  
 MEASURED OUTPUT POWER: 24.10 dBm = 0.257 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  37.10 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3805.00	-35.76	9.18	-26.59	V	H2	50.7
5707.50	-34.78	11.26	-23.51	V	H2	47.6
7610.00	-31.87	11.13	-20.74	V	H2	44.8
9512.50	-41.01	11.74	-29.28	V	H2	53.4
11415.00	-48.84	12.76	-36.09	V	H2	60.2
13317.50	-29.05	12.58	-16.46	V	H2	40.6
15220.00	-43.14	14.50	-28.64	V	H2	52.7
17122.50	-40.71	13.48	-27.23	V	H2	51.3

Table 6-16. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 113 of 126	

OPERATING FREQUENCY: 1857.50 MHz  
 CHANNEL: 18675  
 MEASURED OUTPUT POWER: 19.95 dBm = 0.099 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 15  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  32.95 dBc



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3715.00	-39.05	9.42	-29.64	H	H	49.6
5572.50	-43.94	10.98	-32.96	H	H	52.9
7430.00	-40.37	10.97	-29.39	H	H	49.3
9287.50	-47.90	11.58	-36.32	H	H	56.3
11145.00	-50.28	12.73	-37.55	H	H	57.5
13002.50	-28.89	12.71	-16.17	H	H	36.1
14860.00	-42.07	13.99	-28.08	H	H	48.0

Table 6-17. Radiated Spurious Data with WCC (Band 2 – Low Channel)

OPERATING FREQUENCY: 2502.50 MHz  
 CHANNEL: 20775  
 MEASURED OUTPUT POWER: 9.58 dBm = 0.009 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10} (W) =$  34.58 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
5005.00	-41.66	10.94	-30.72	V	H2	40.3
7507.50	-52.64	10.95	-41.69	V	H2	51.3
10010.00	-51.76	12.03	-39.73	V	H2	49.3
12512.50	-44.90	13.45	-31.44	V	H2	41.0
15015.00	-47.63	13.39	-34.23	V	H2	43.8
17517.50	-47.81	11.88	-35.93	V	H2	45.5

Table 6-18. Radiated Spurious Data (Band 7 – Low Channel)

FCC ID: ZNFD851			FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset		Page 114 of 126	

OPERATING FREQUENCY: 2532.30 MHz  
 CHANNEL: 21073  
 MEASURED OUTPUT POWER: 9.02 dBm = 0.008 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W) =$  34.02 dBc



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
5064.60	-42.25	10.80	-31.45	V	H2	40.5
7596.90	-52.14	11.13	-41.01	V	H2	50.0
10129.20	-44.36	12.14	-32.23	V	H2	41.2
12661.50	-51.06	13.72	-37.34	V	H2	46.4
15193.80	-49.15	14.43	-34.72	V	H2	43.7
17726.10	-45.92	9.90	-36.02	V	H2	45.0

Table 6-19. Radiated Spurious Data (Band 7 – Mid Channel)

OPERATING FREQUENCY: 2567.50 MHz  
 CHANNEL: 21425  
 MEASURED OUTPUT POWER: 7.94 dBm = 0.006 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W) =$  32.94 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
5135.00	-41.28	10.94	-30.34	V	H2	38.3
7702.50	-39.43	10.95	-28.48	V	H2	36.4
10270.00	-41.37	12.03	-29.33	V	H2	37.3
12837.50	-47.70	13.45	-34.24	V	H2	42.2
15405.00	-48.99	13.39	-35.59	V	H2	43.5
17972.50	-47.14	11.88	-35.26	V	H2	43.2



Table 6-20. Radiated Spurious Data (Band 7 – High Channel)

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 115 of 126	

OPERATING FREQUENCY: 2502.50 MHz  
 CHANNEL: 20775  
 MEASURED OUTPUT POWER: 6.27 dBm = 0.004 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10} (W) =$  31.27 dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
5005.00	-45.43	10.94	-34.49	H	H	40.8
7507.50	-46.26	10.95	-35.31	H	H	41.6
10010.00	-41.35	12.03	-29.32	H	H	35.6
12512.50	-56.53	13.45	-43.07	H	H	49.3
15015.00	-48.44	13.39	-35.04	H	H	41.3
17517.50	-47.99	11.88	-36.11	H	H	42.4

**Table 6-21. Radiated Spurious Data with WCC (Band 7 – Low Channel)**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 116 of 126	

## 6.8 Frequency Stability / Temperature Variation

\$2.1055 \$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 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: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 117 of 126	



**Band 17 Frequency Stability Measurements**  
§2.1055 §27.54



OPERATING FREQUENCY: 710,000,000 Hz  
 CHANNEL: 23090  
 REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	710,000,003	3	0.0000004
100 %		- 30	709,999,991	-9	-0.0000013
100 %		- 20	709,999,994	-6	-0.0000008
100 %		- 10	709,999,996	-4	-0.0000006
100 %		0	710,000,008	8	0.0000011
100 %		+ 10	710,000,018	18	0.0000025
100 %		+ 20	709,999,987	-13	-0.0000018
100 %		+ 30	710,000,018	18	0.0000025
100 %		+ 40	710,000,015	15	0.0000021
100 %		+ 50	710,000,010	10	0.0000014
115 %	4.37	+ 20	709,999,993	-7	-0.0000010
BATT. ENDPOINT	3.40	+ 20	710,000,017	17	0.0000024

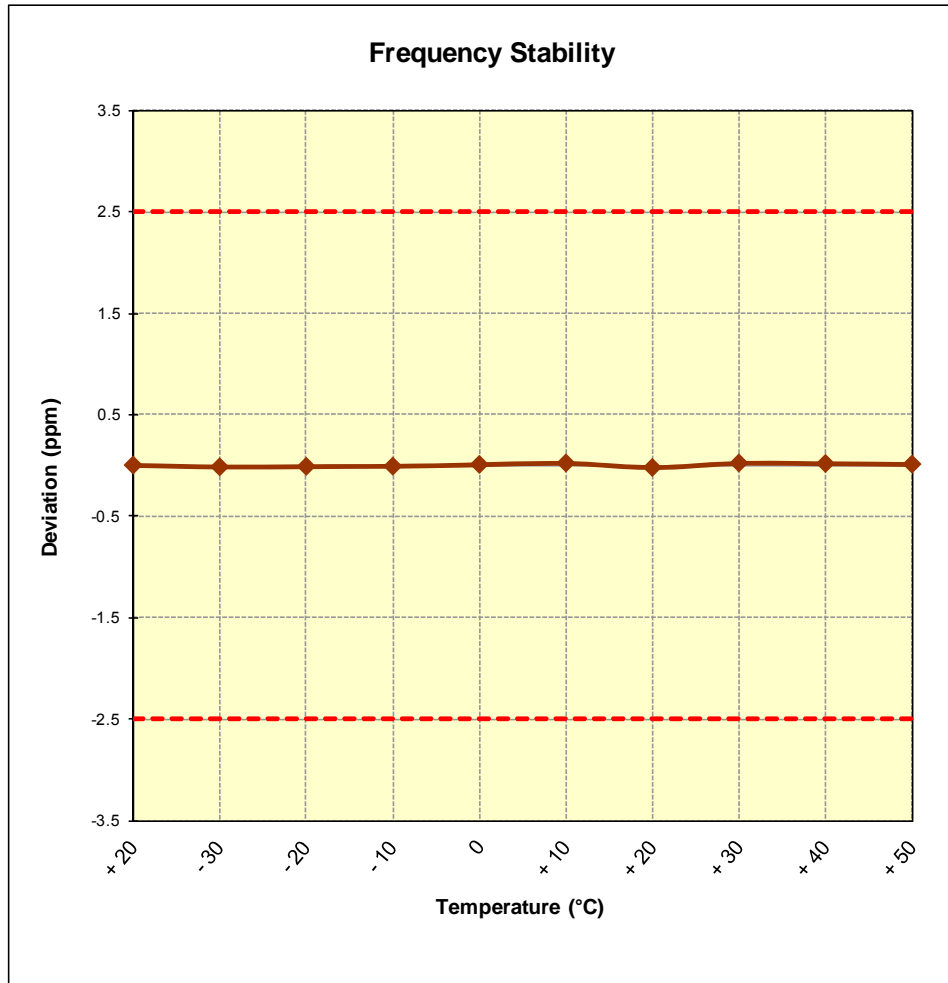
**Table 6-22. Frequency Stability Data (Band 17)**

**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: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 118 of 126	

**Band 17 Frequency Stability Measurements**  
**§2.1055 §27.54**



**Figure 6-7. Frequency Stability Graph (Band 17)**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 119 of 126	

## 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)	1,732,499,982	-18	-0.0000010
100 %		- 30	1,732,499,996	-4	-0.0000002
100 %		- 20	1,732,499,986	-14	-0.0000008
100 %		- 10	1,732,500,010	10	0.0000006
100 %		0	1,732,500,006	6	0.0000003
100 %		+ 10	1,732,500,008	8	0.0000005
100 %		+ 20	1,732,500,017	17	0.0000010
100 %		+ 30	1,732,500,007	7	0.0000004
100 %		+ 40	1,732,500,012	12	0.0000007
100 %		+ 50	1,732,500,002	2	0.0000001
115 %	4.37	+ 20	1,732,499,996	-4	-0.0000002
BATT. ENDPOINT	3.40	+ 20	1,732,500,007	7	0.0000004

**Table 6-23. Frequency Stability Data (Band 4)**

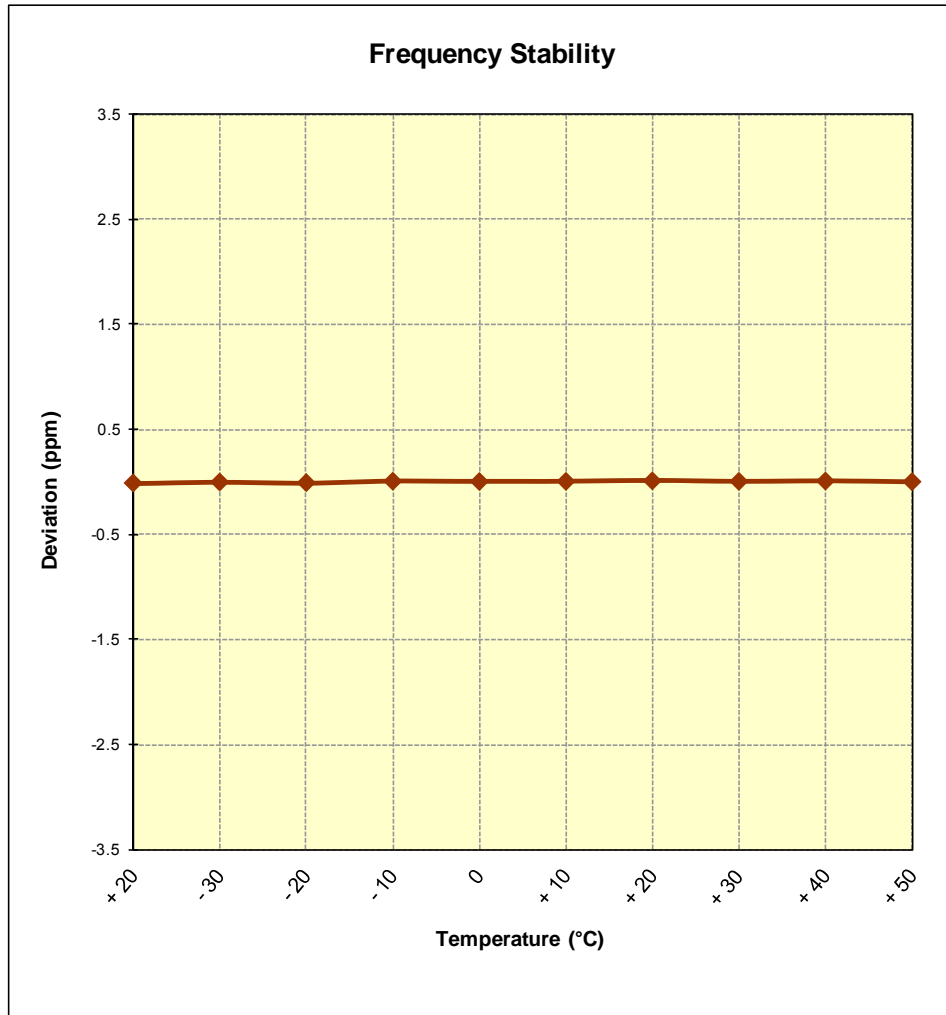
**Note:**

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: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 120 of 126	

**Band 4 Frequency Stability Measurements**

§2.1055 §§27.54



**Figure 6-8. Frequency Stability Graph (Band 4)**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 121 of 126	

## 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)	1,880,000,014	14	0.0000007
100 %		- 30	1,879,999,989	-11	-0.0000006
100 %		- 20	1,880,000,013	13	0.0000007
100 %		- 10	1,880,000,010	10	0.0000005
100 %		0	1,879,999,995	-5	-0.0000003
100 %		+ 10	1,880,000,002	2	0.0000001
100 %		+ 20	1,880,000,012	12	0.0000006
100 %		+ 30	1,880,000,012	12	0.0000006
100 %		+ 40	1,880,000,004	4	0.0000002
100 %		+ 50	1,880,000,018	18	0.0000010
115 %	4.37	+ 20	1,880,000,012	12	0.0000006
BATT. ENDPOINT	3.40	+ 20	1,880,000,013	13	0.0000007

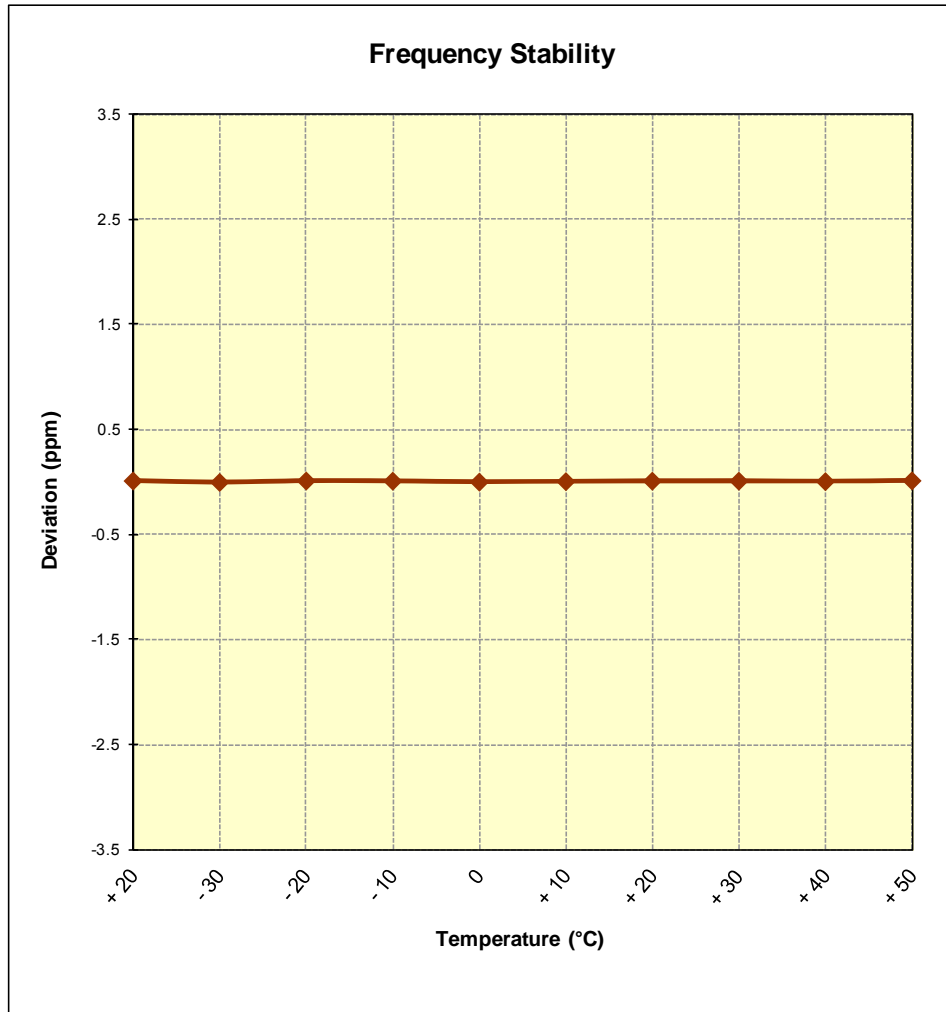
Table 6-24. Frequency Stability Data (Band 2)

**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: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 122 of 126	

**Band 2 Frequency Stability Measurements**  
§2.1055 §24.235



**Figure 6-9. Frequency Stability Graph (Band 2)**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 123 of 126	

## Band 7 Frequency Stability Measurements

§2.1055 §27.54



OPERATING FREQUENCY: 2,535,000,000 Hz  
 CHANNEL: 2655  
 REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	2,534,999,998	-2	-0.0000001
100 %		- 30	2,535,000,013	13	0.0000005
100 %		- 20	2,534,999,986	-14	-0.0000006
100 %		- 10	2,534,999,983	-17	-0.0000007
100 %		0	2,535,000,004	4	0.0000002
100 %		+ 10	2,534,999,981	-19	-0.0000007
100 %		+ 20	2,534,999,997	-3	-0.0000001
100 %		+ 30	2,535,000,015	15	0.0000006
100 %		+ 40	2,535,000,002	2	0.0000001
100 %		+ 50	2,535,000,007	7	0.0000003
115 %	4.37	+ 20	2,534,999,982	-18	-0.0000007
BATT. ENDPOINT	3.40	+ 20	2,535,000,020	20	0.0000008

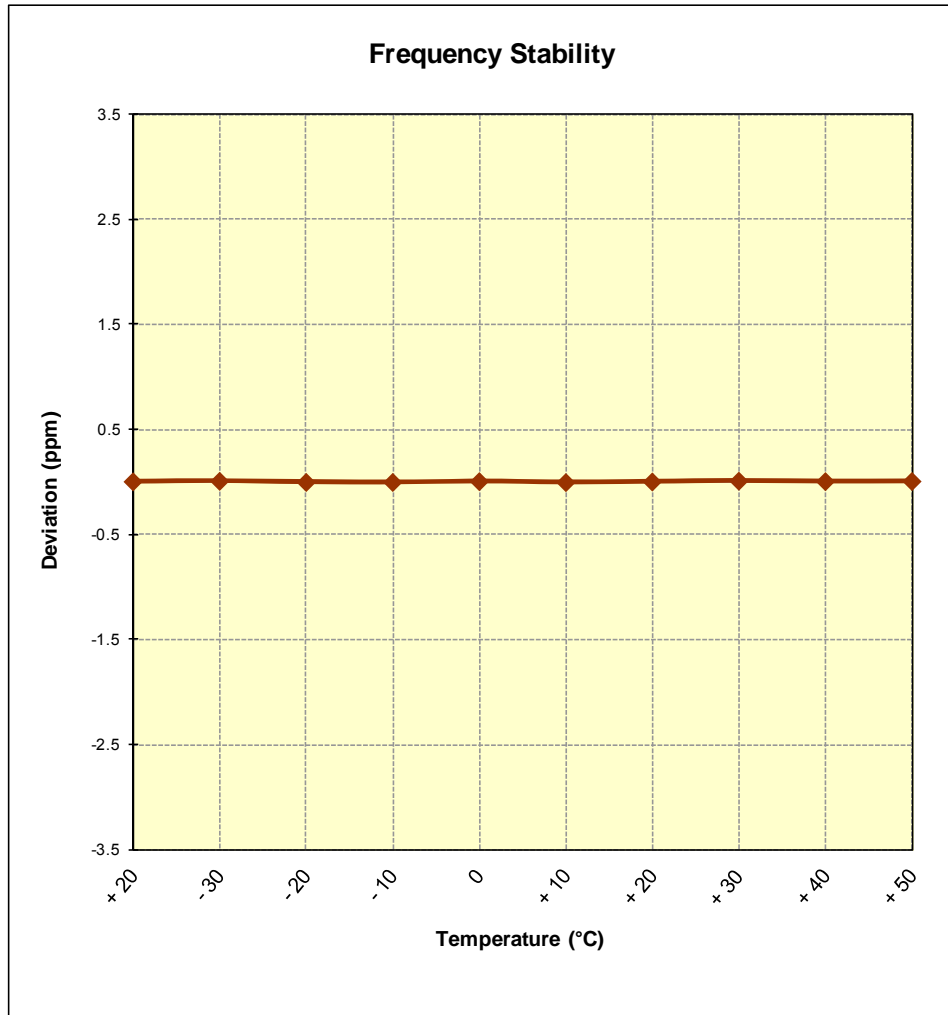
Table 6-25. Frequency Stability Data (Band 7)

**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: ZNFD851	 <b>FCC Pt. 24 &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b> 		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 124 of 126

**Band 7 Frequency Stability Measurements**  
§2.1055 §27.54





**Figure 6-10. Frequency Stability Graph (Band 7)**

FCC ID: ZNFD851		FCC Pt. 24 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1404070703.ZNF	Test Dates: 4/3 - 4/25/2014	EUT Type: Portable Handset	Page 125 of 126	



## 7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFD851** complies with all the requirements of Parts 2, 24, 27 of the FCC rules for LTE operation only.

<b>FCC ID:</b> ZNFD851		<b>FCC Pt. 24 &amp; 27 LTE MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1404070703.ZNF	<b>Test Dates:</b> 4/3 - 4/25/2014	<b>EUT Type:</b> Portable Handset		Page 126 of 126