

## 7.4 Band Edge Emissions at Antenna Terminal

### 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

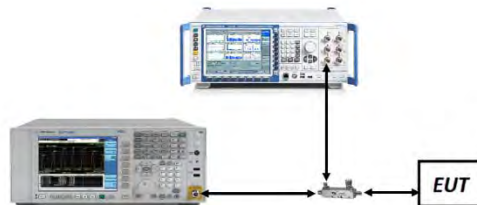
KDB 971168 D01 v03r01 – Section 6.0

### 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**

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 57 of 122                  |

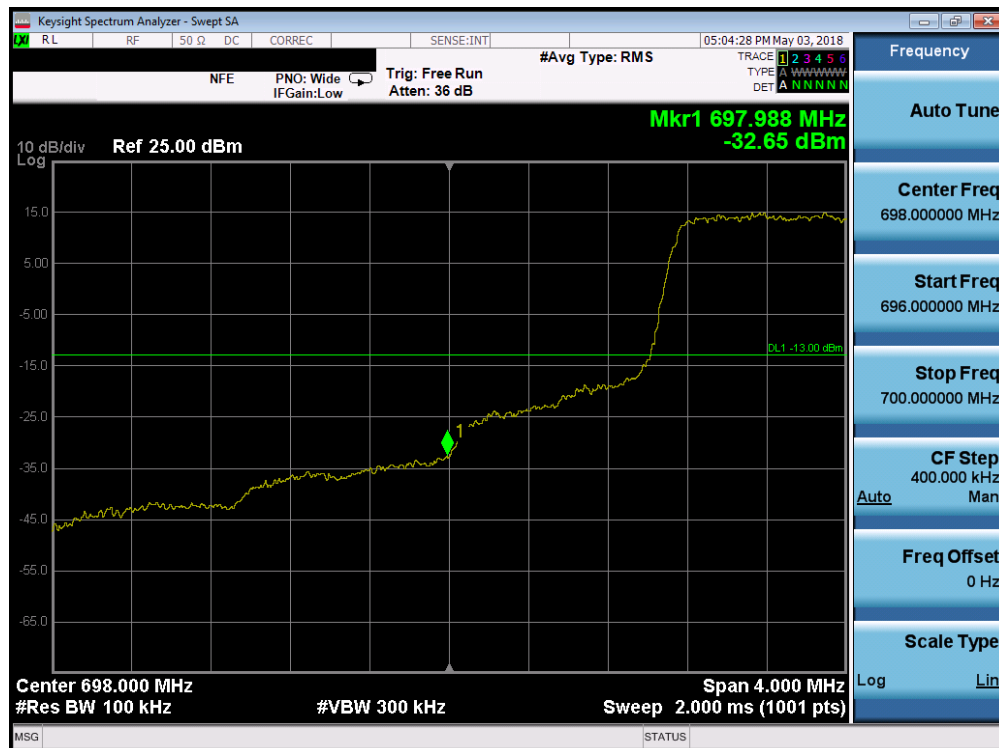
### Test Notes

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

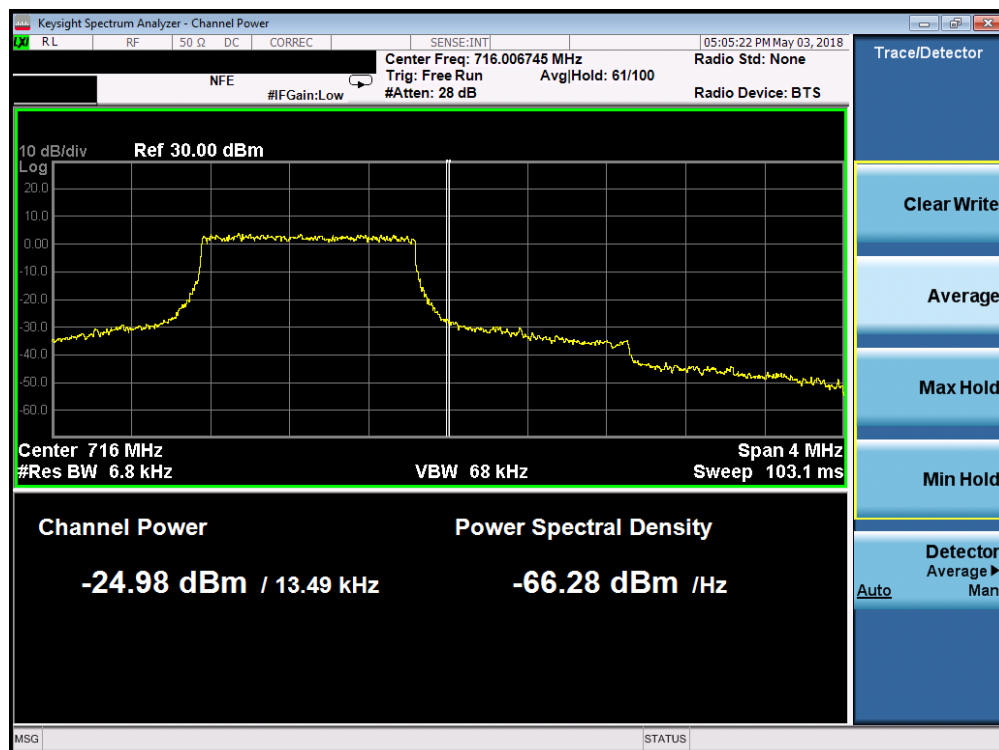
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

|                                                |                                                                                                                                                                                                                         |                                      |                                        |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------|
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| <b>Test Report S/N:</b><br>1M1804200078-03.ZNF | <b>Test Dates:</b><br>4/24 - 5/9/2018                                                                                                                                                                                   | <b>EUT Type:</b><br>Portable Handset | Page 58 of 122                         |

## Band 12

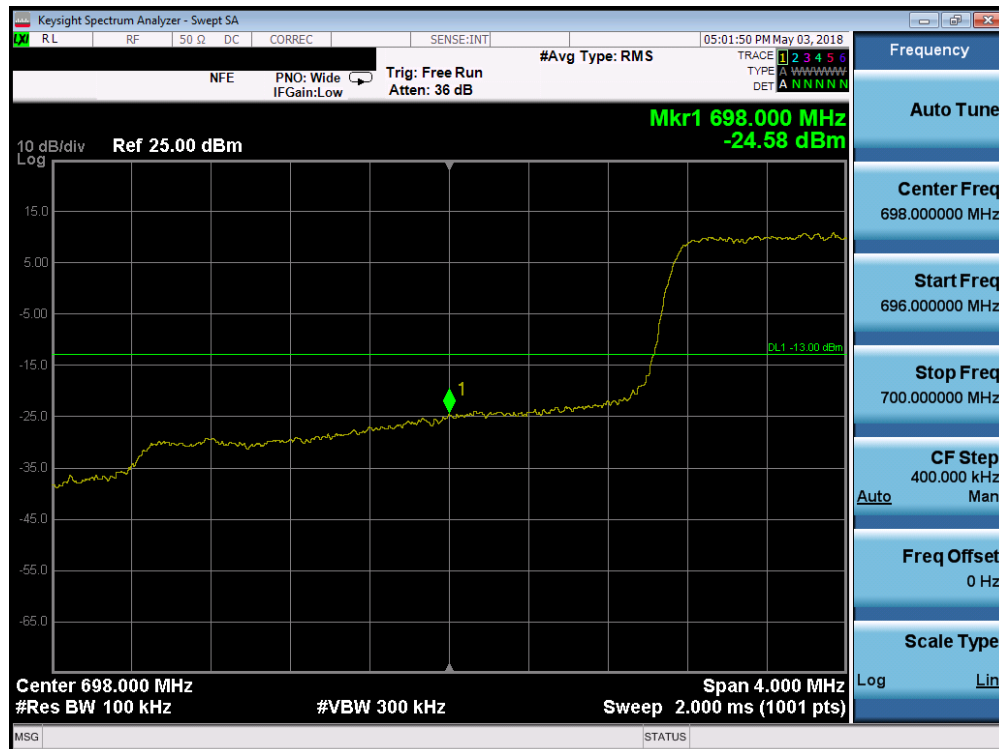


Plot 7-80. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

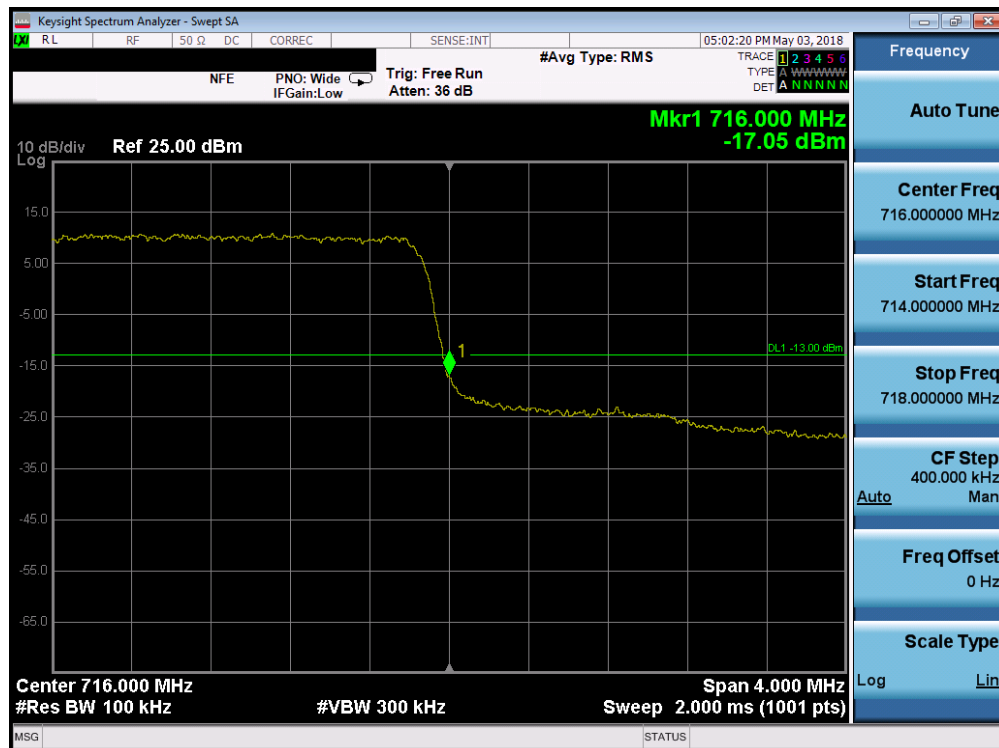


Plot 7-81. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |                |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|----------------|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset | Page 59 of 122 |                                 |

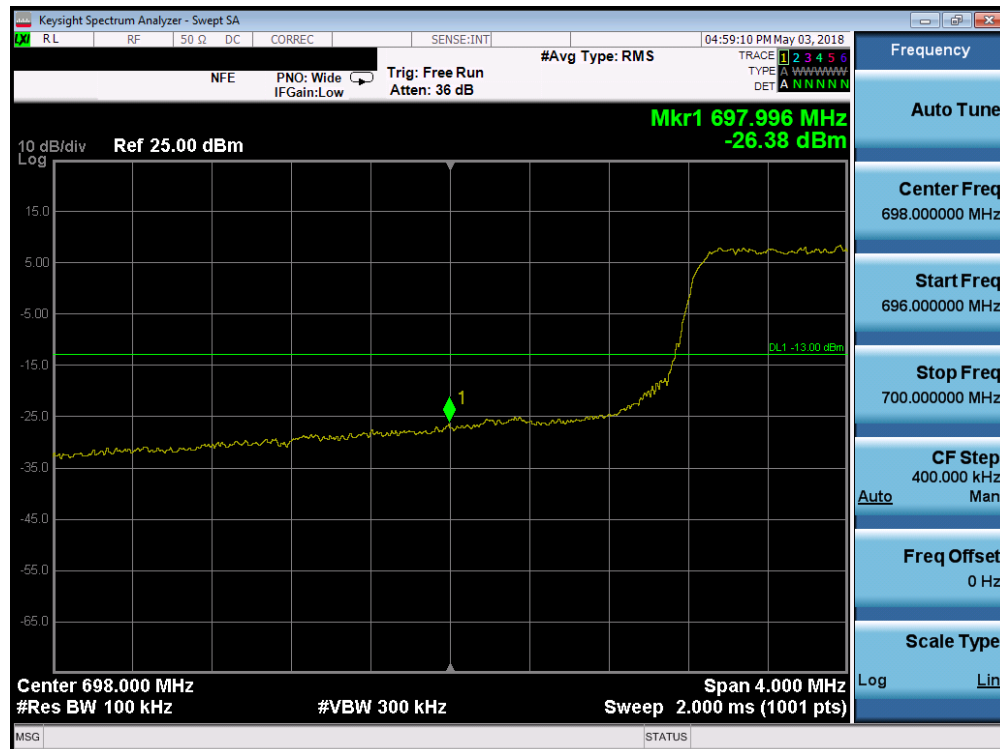


Plot 7-82. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-83. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
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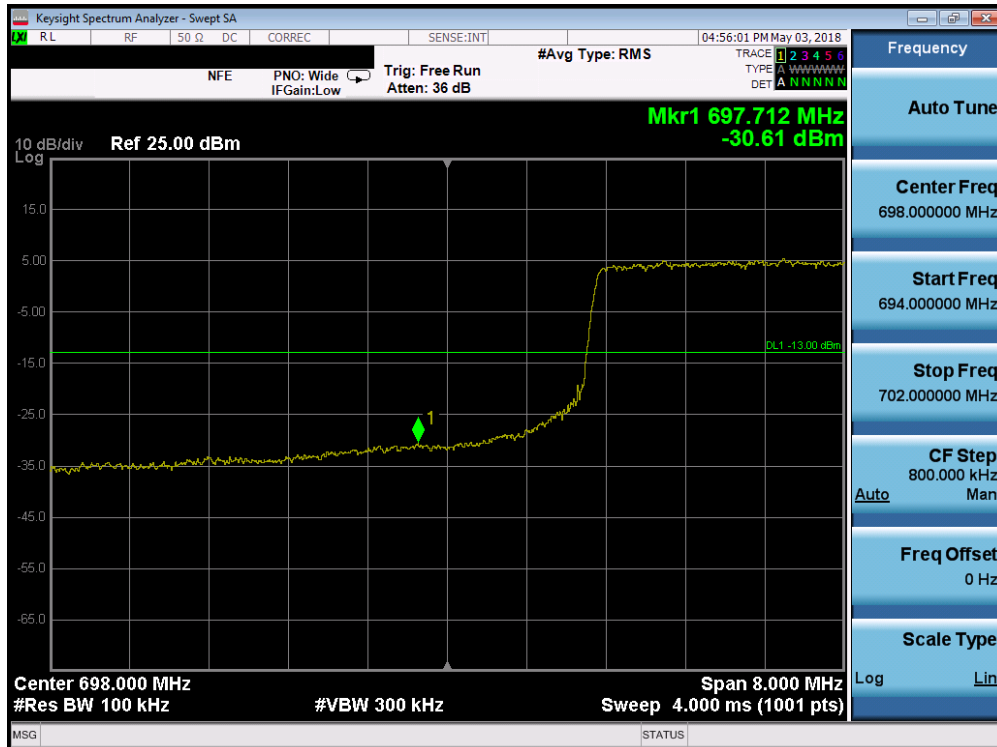


Plot 7-84. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-85. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
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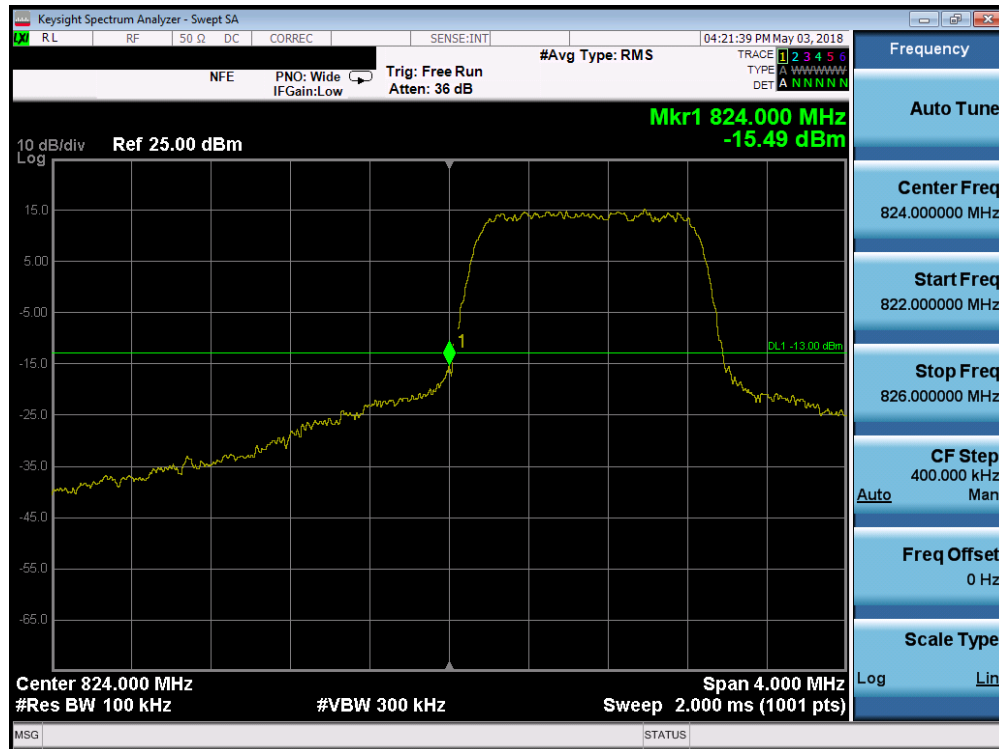
Plot 7-86. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



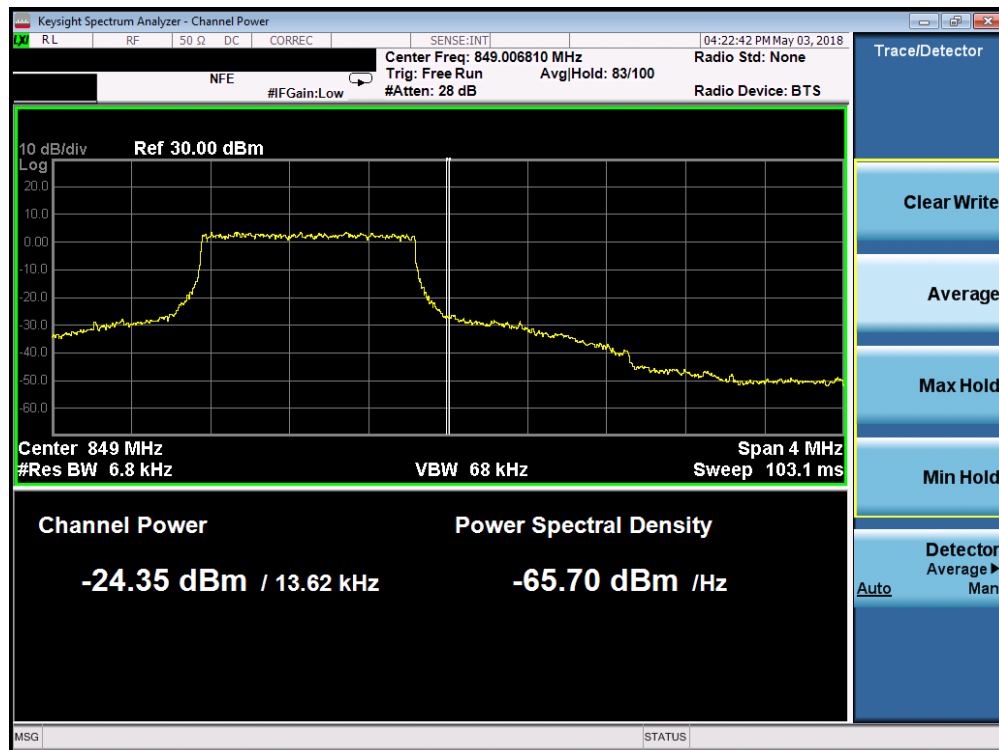
Plot 7-87. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

|                                         |                                               |                               |  |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------|--|---------------------------------|
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## Band 5

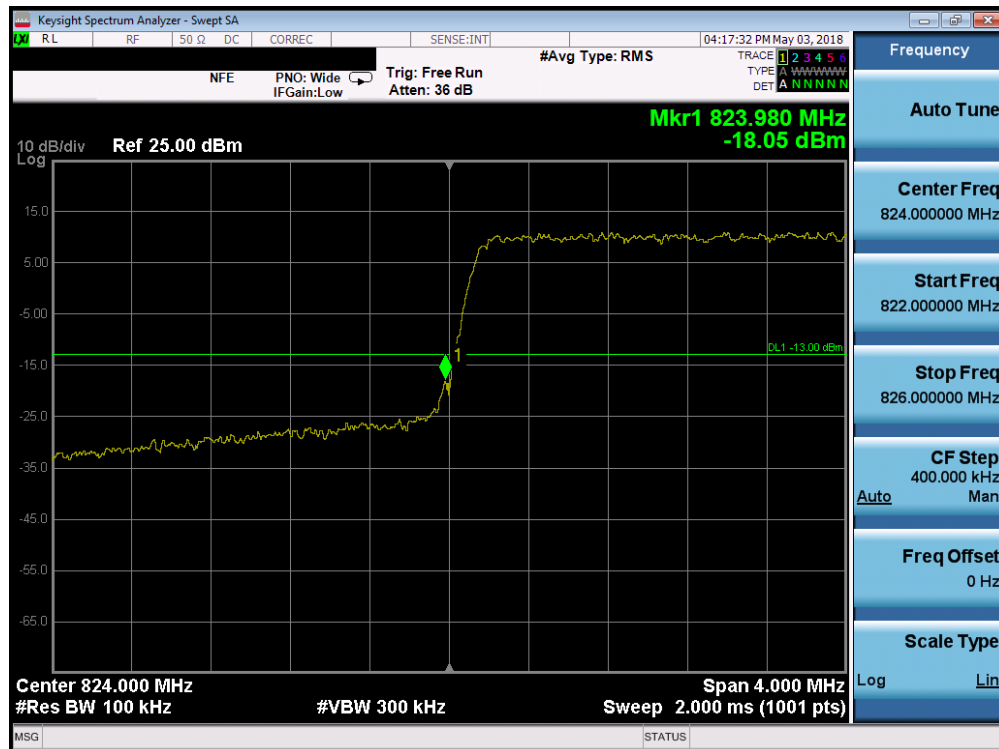


Plot 7-88. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-89. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

|                                         |                                |                               |                                       |  |                                 |
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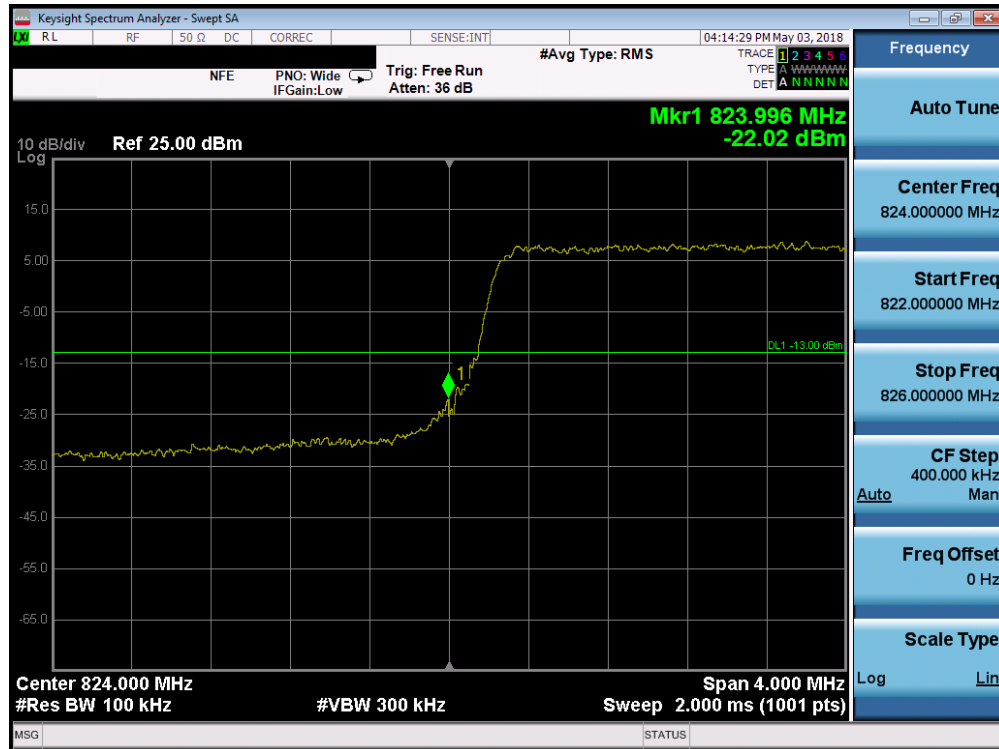
Plot 7-90. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



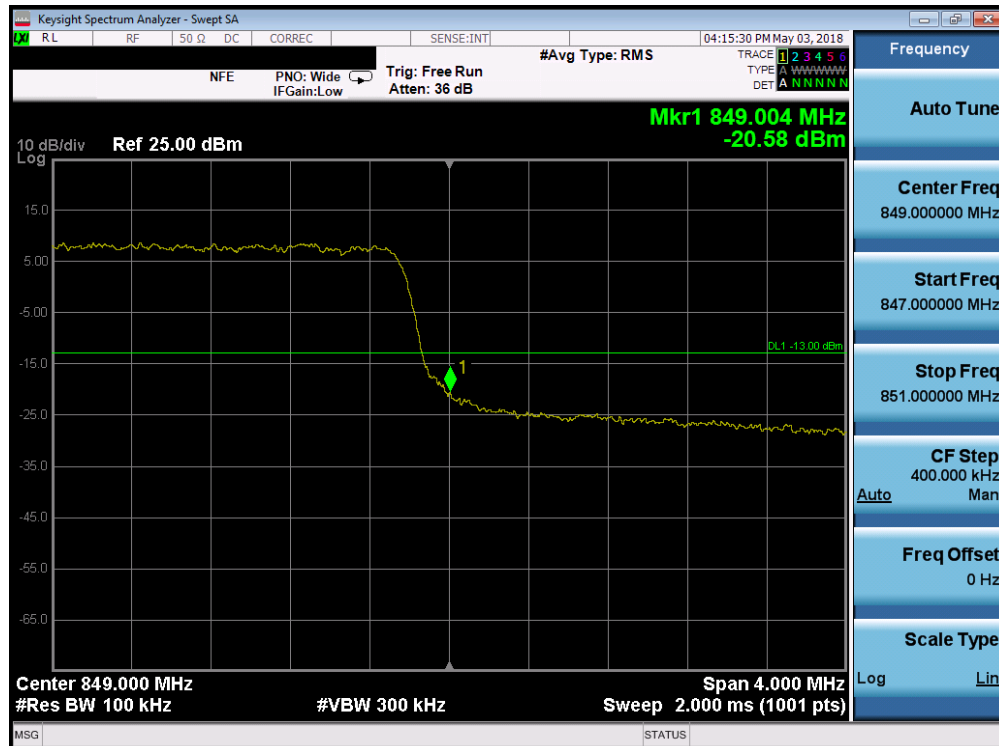
Plot 7-91. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
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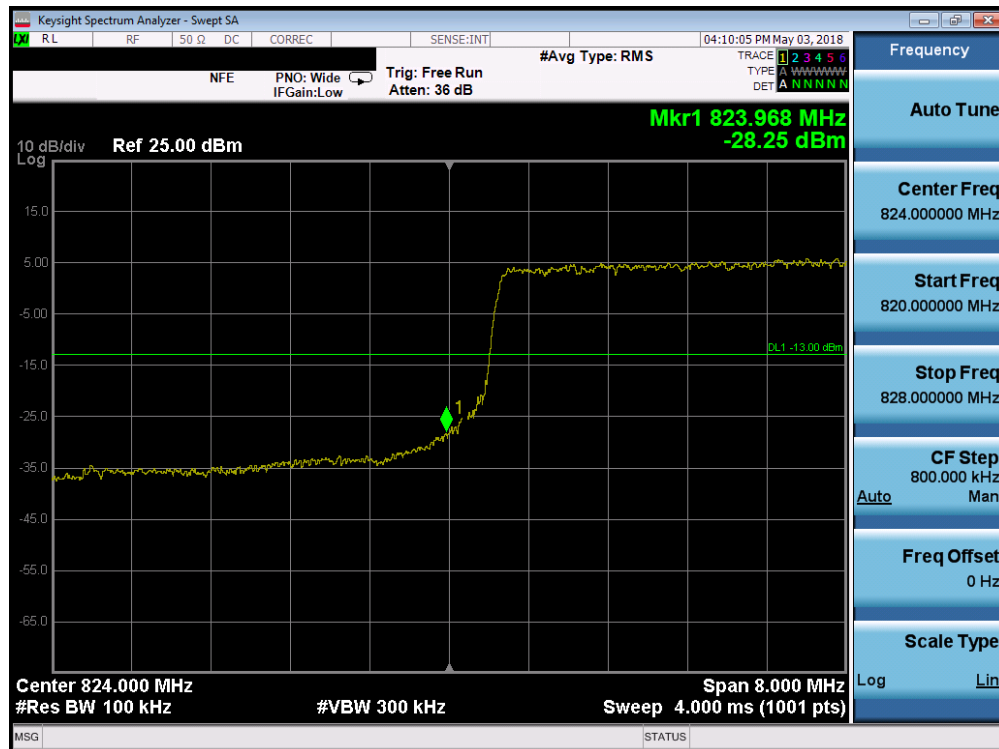


Plot 7-92. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

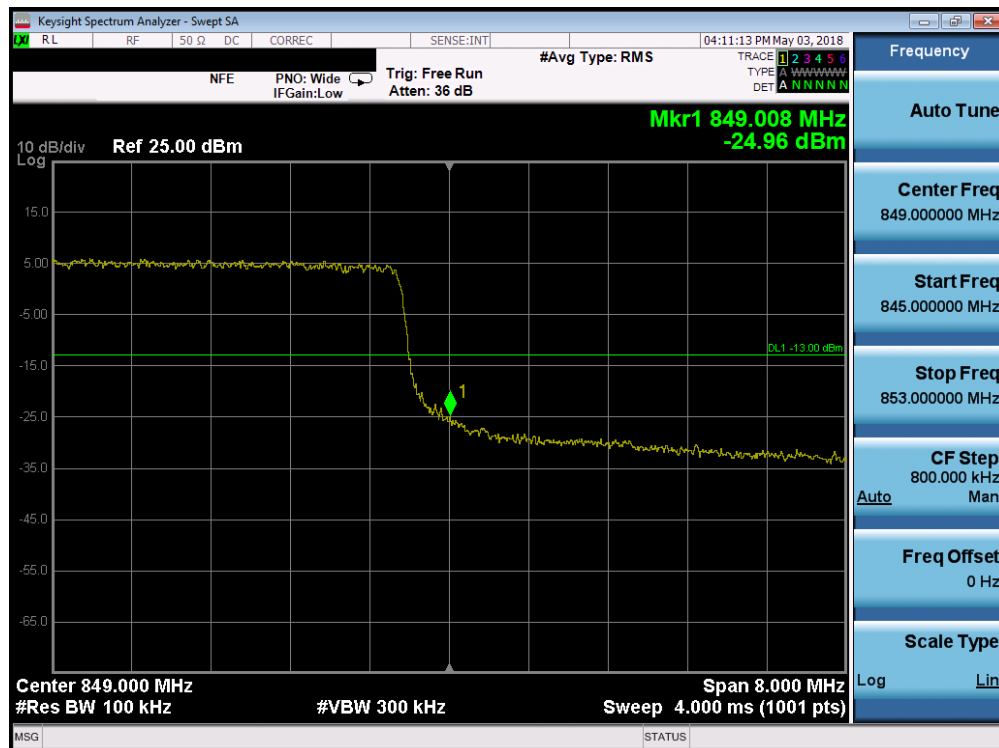


Plot 7-93. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
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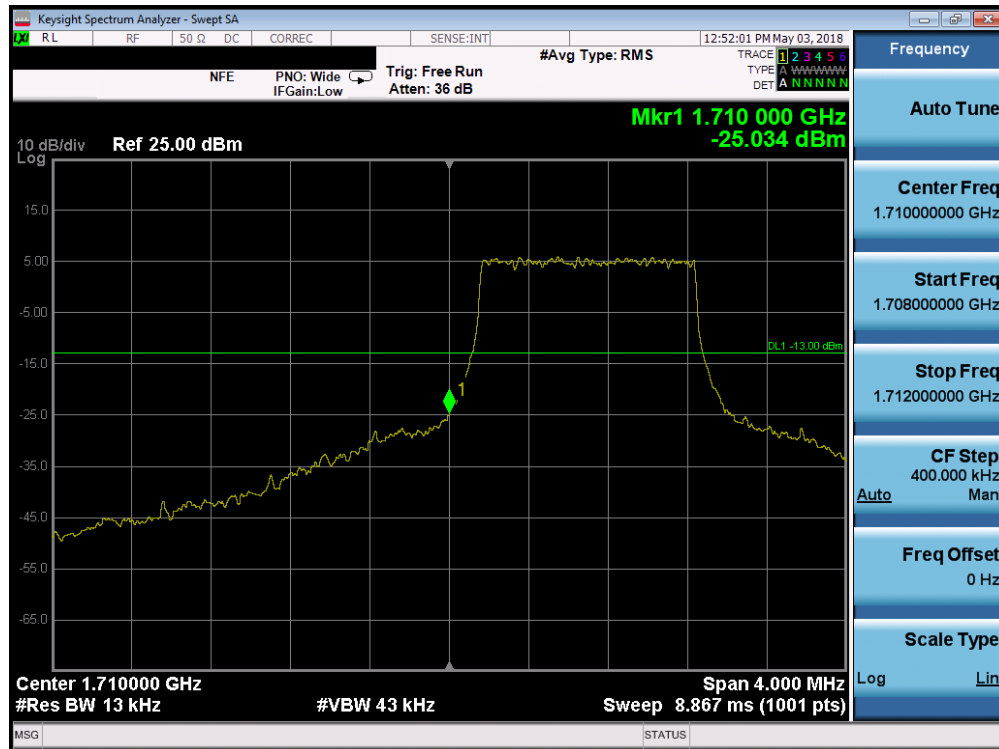
Plot 7-94. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



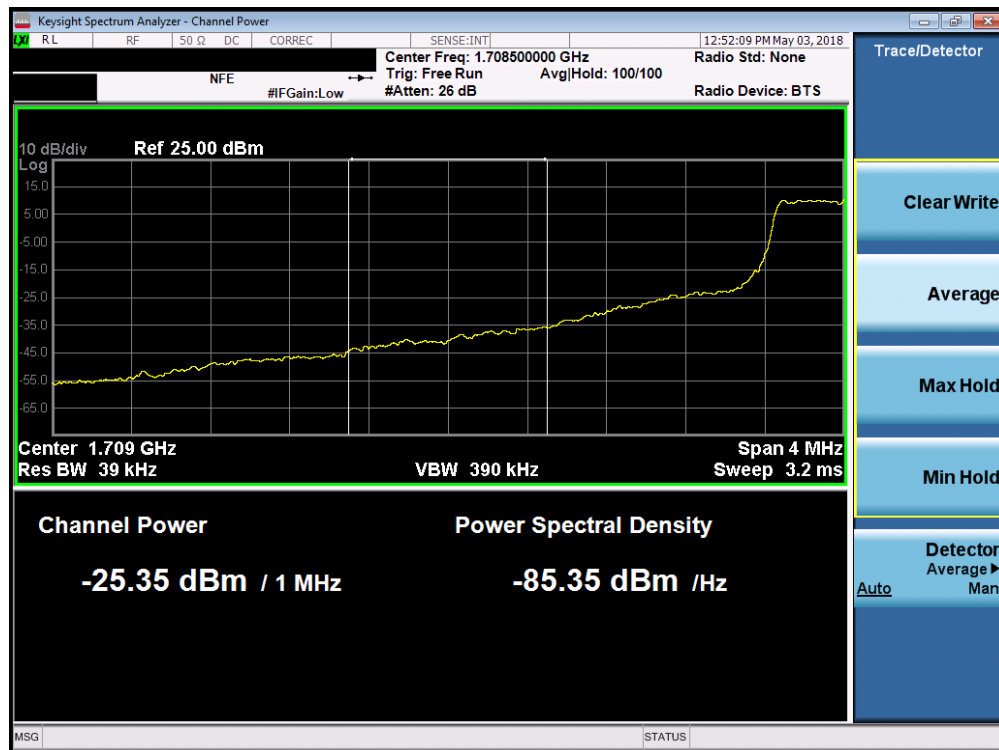
Plot 7-95. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 66 of 122                  |

## Band 4

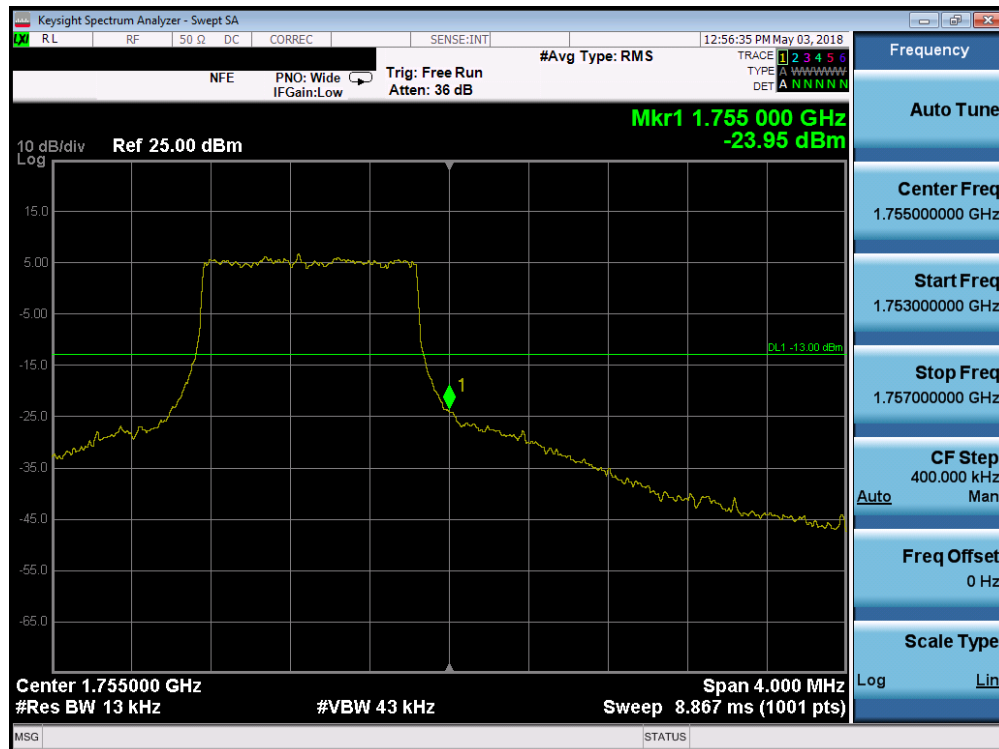


Plot 7-96. Lower Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

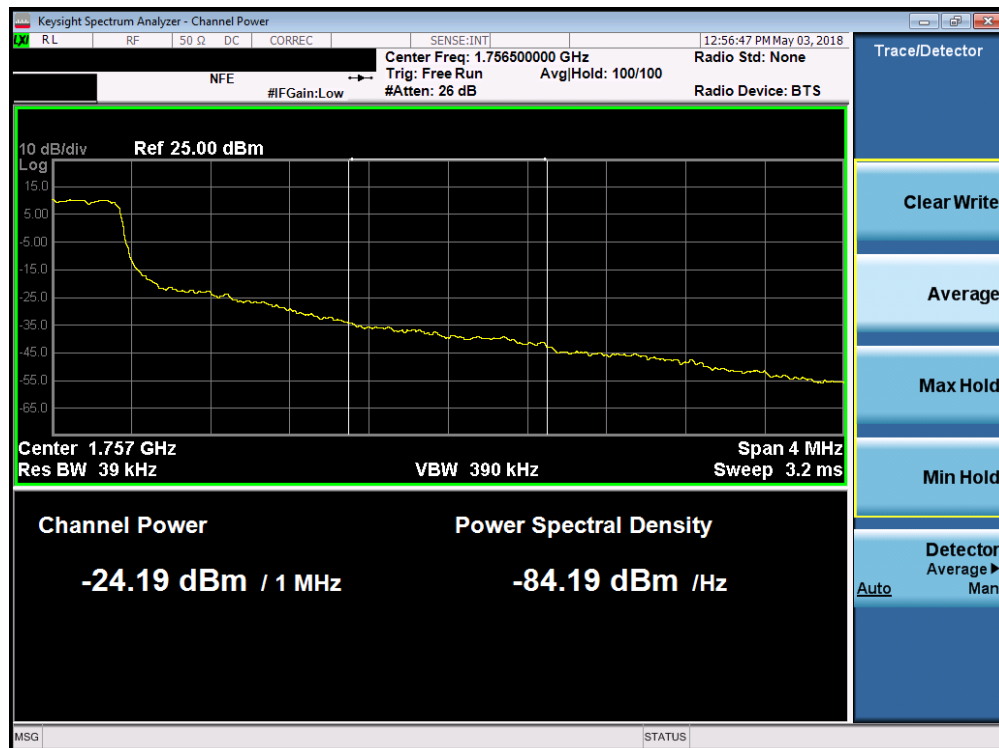


Plot 7-97. Lower Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

|                                         |                                               |                                       |           |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|-----------|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |           | Page 67 of 122                  |

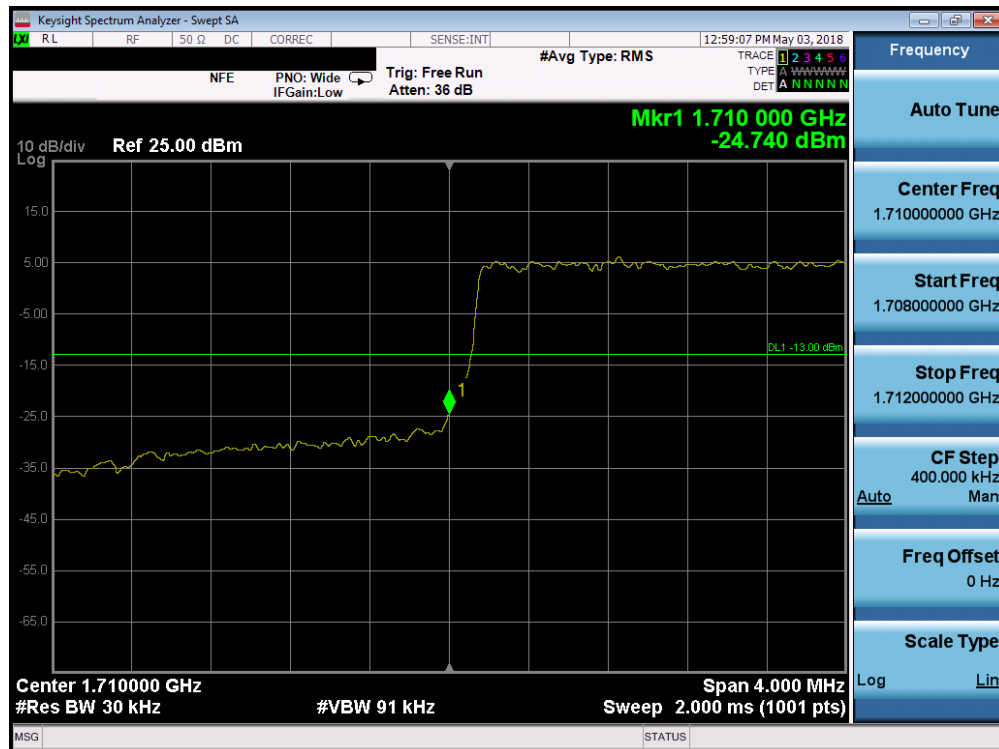


Plot 7-98. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

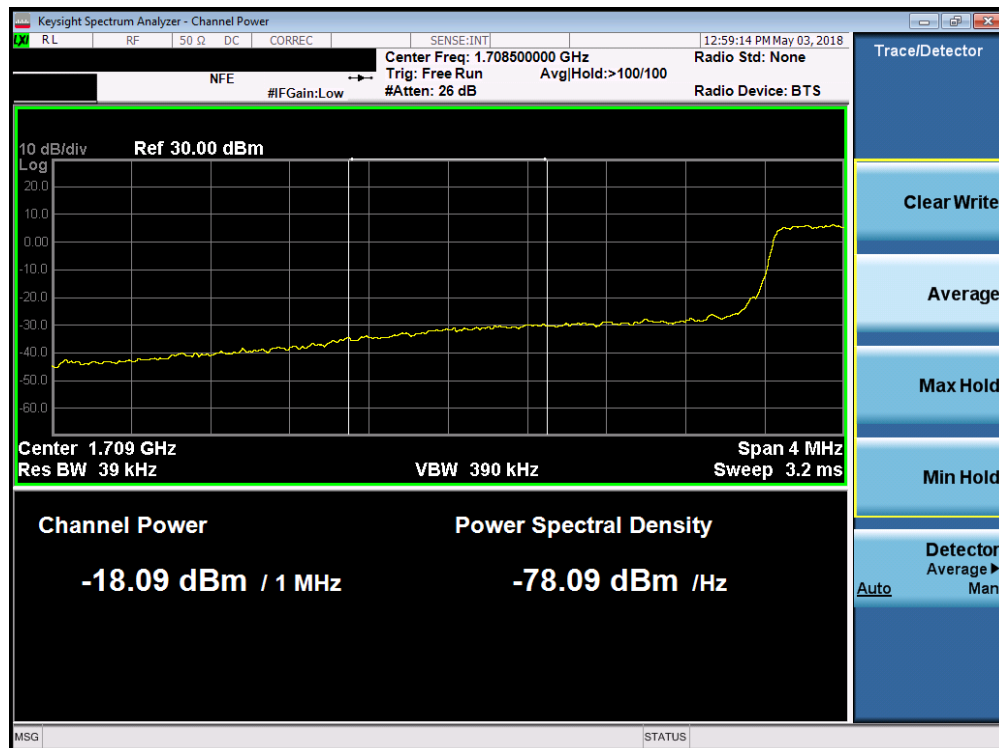


Plot 7-99. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

|                                         |                                                                                                                                  |                               |                                                                                       |                                 |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                   | EUT Type:<br>Portable Handset |                                                                                       | Page 68 of 122                  |

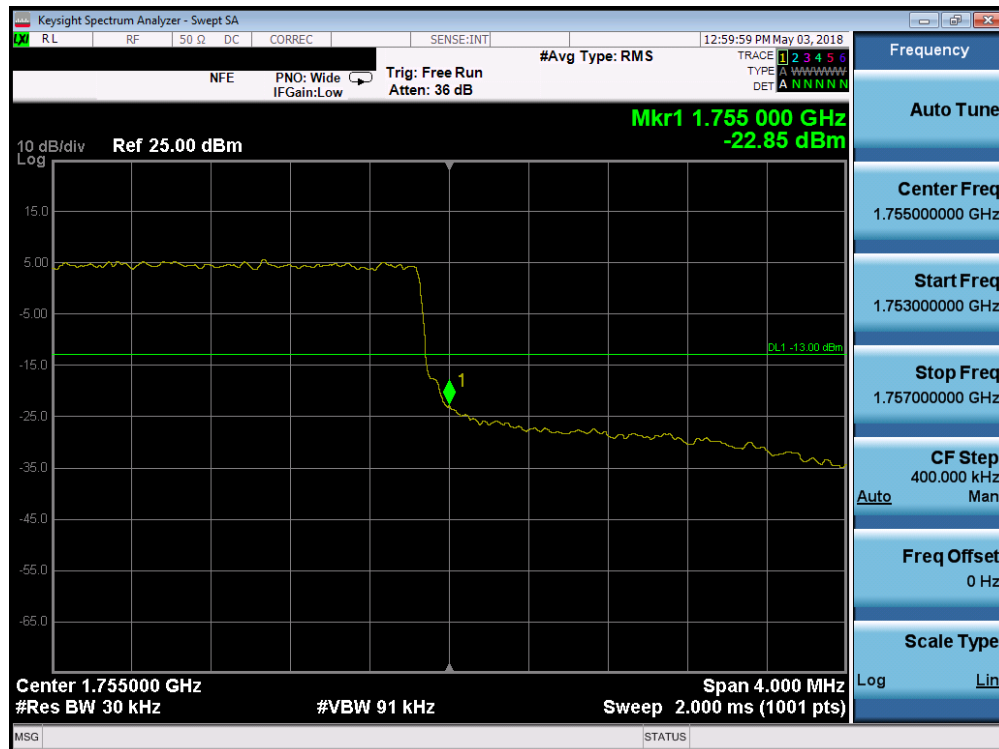


Plot 7-100. Lower Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

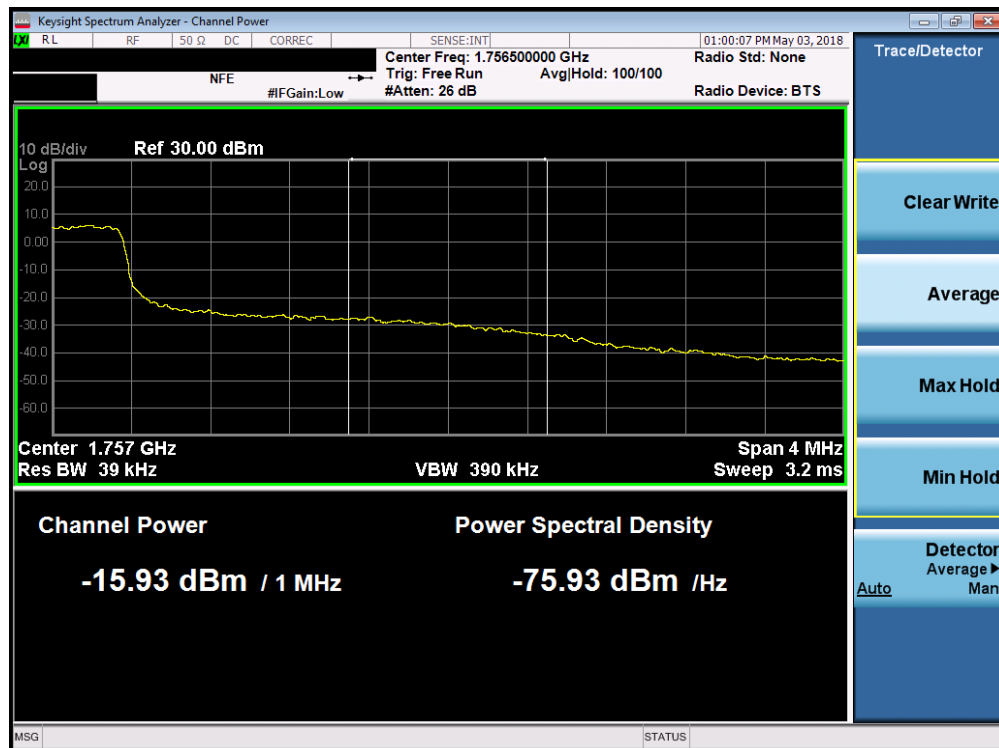


Plot 7-101. Lower Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
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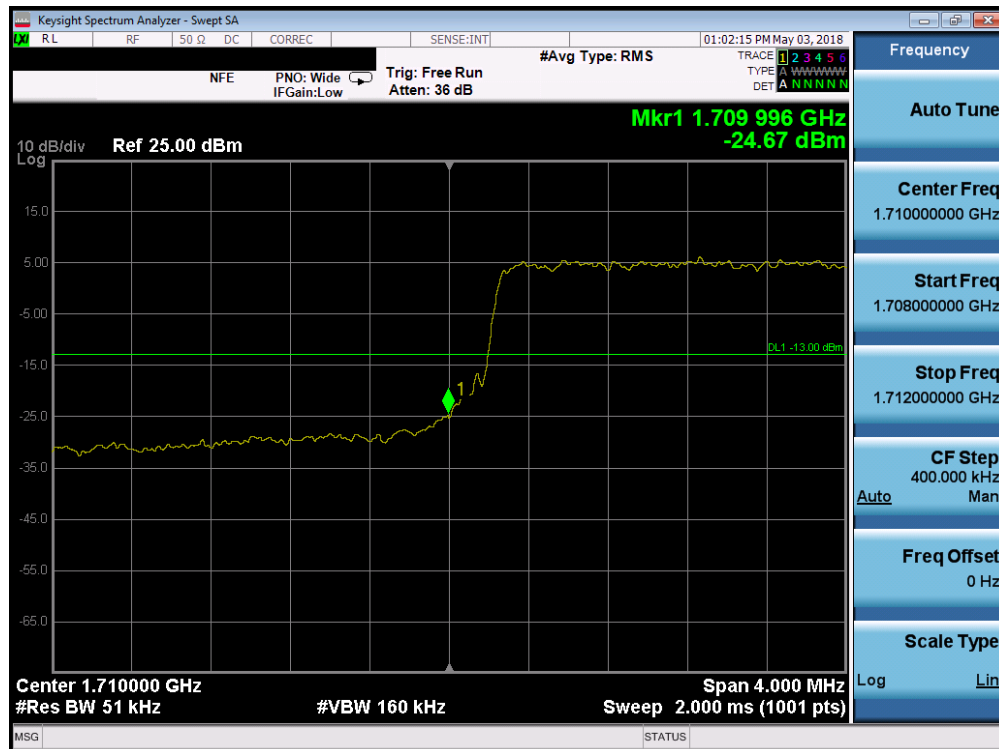


Plot 7-102. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

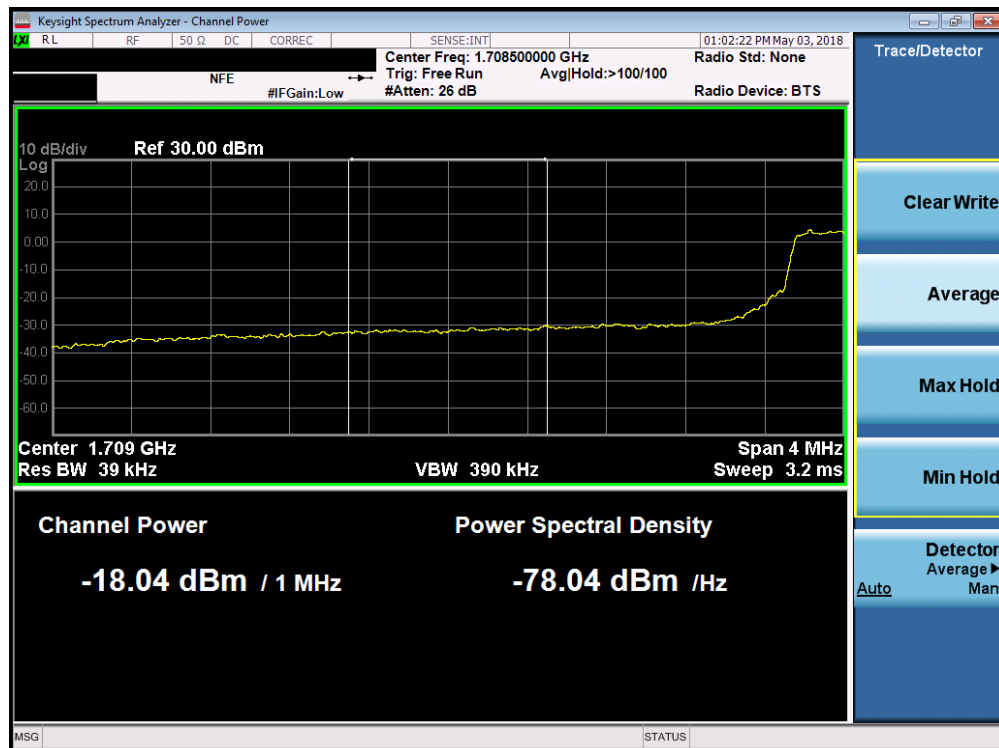


Plot 7-103. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

|                                         |                                               |                                       |           |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|-----------|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |           | Page 70 of 122                  |

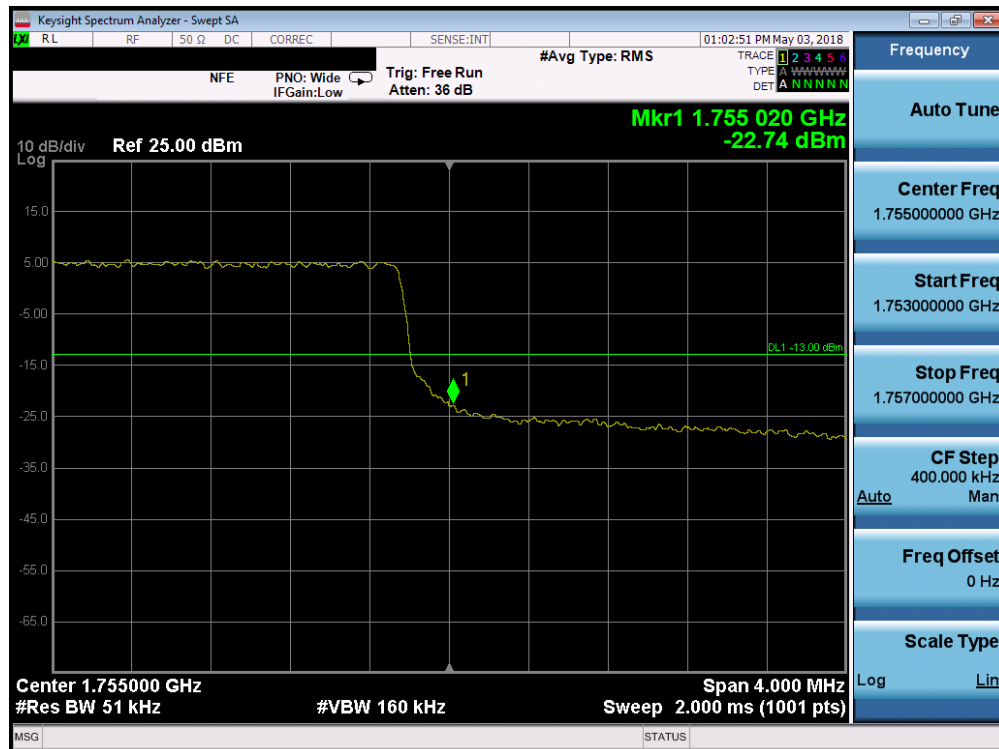


Plot 7-104. Lower Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

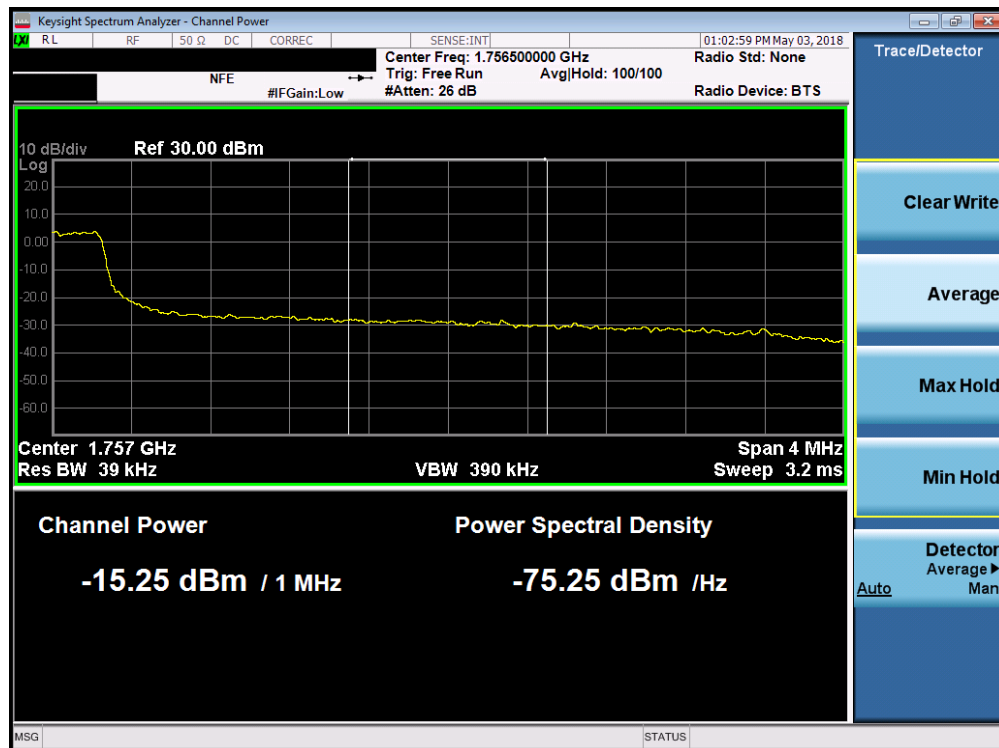


Plot 7-105. Lower Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
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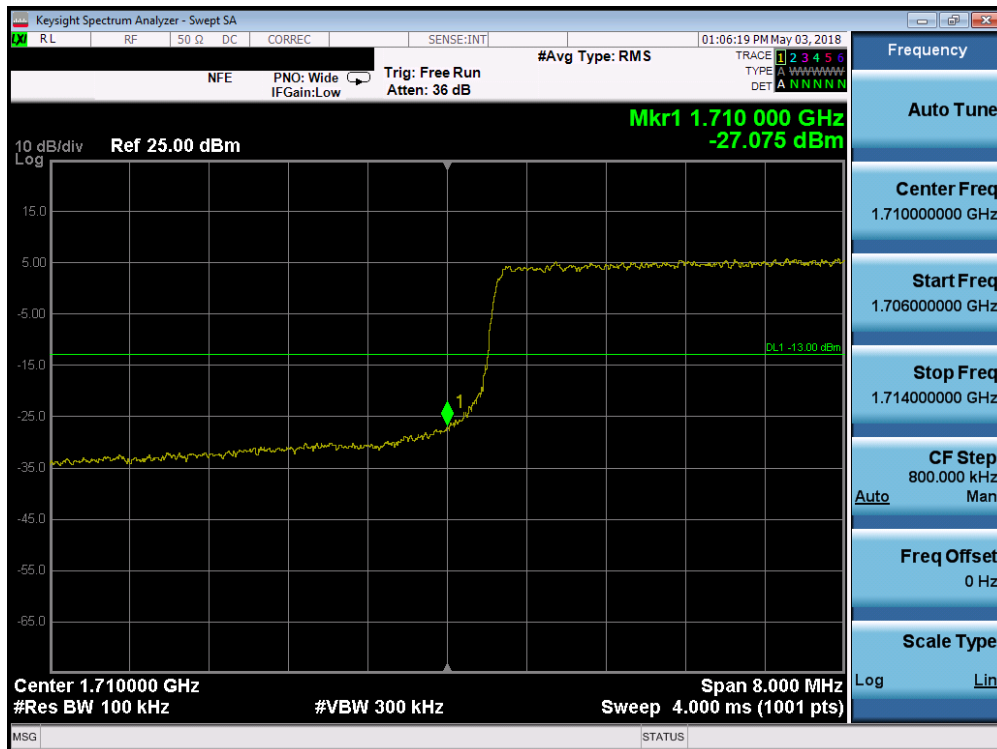
Plot 7-106. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



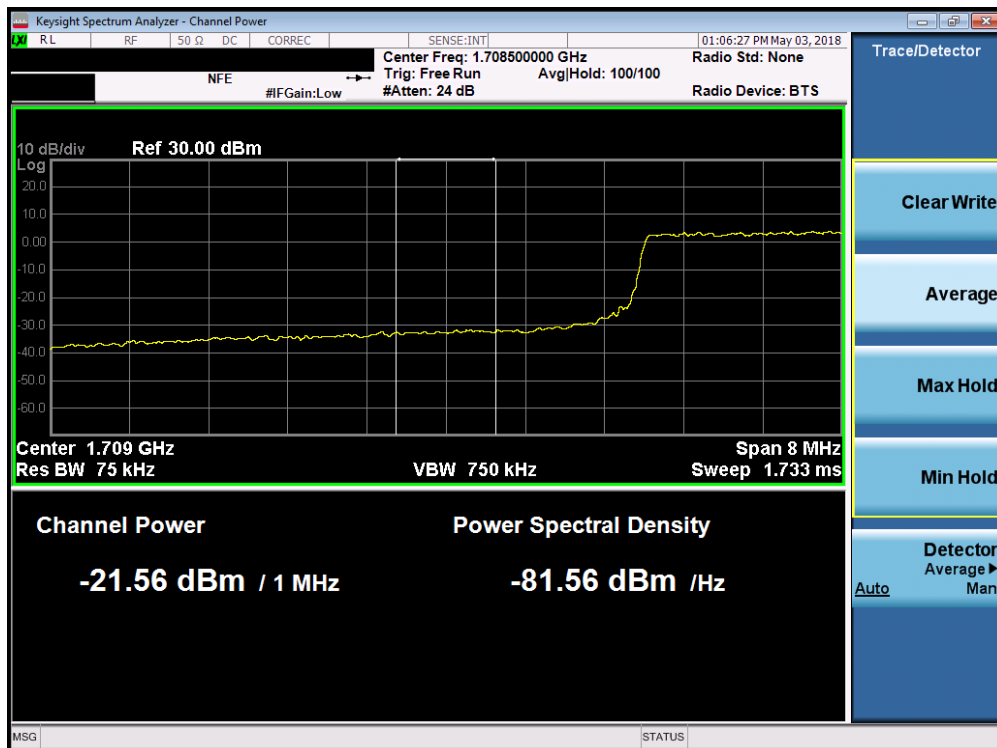
Plot 7-107. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

|                                         |                                                                                                                                  |                               |                                                                                       |                                 |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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Plot 7-108. Lower Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

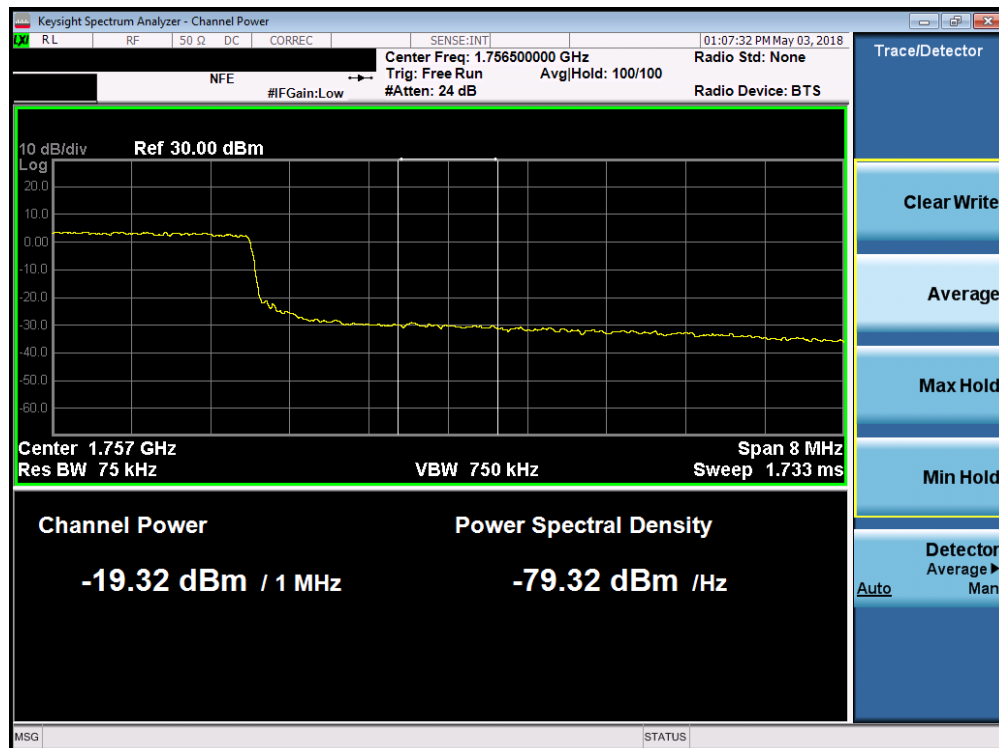


Plot 7-109. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 73 of 122                  |

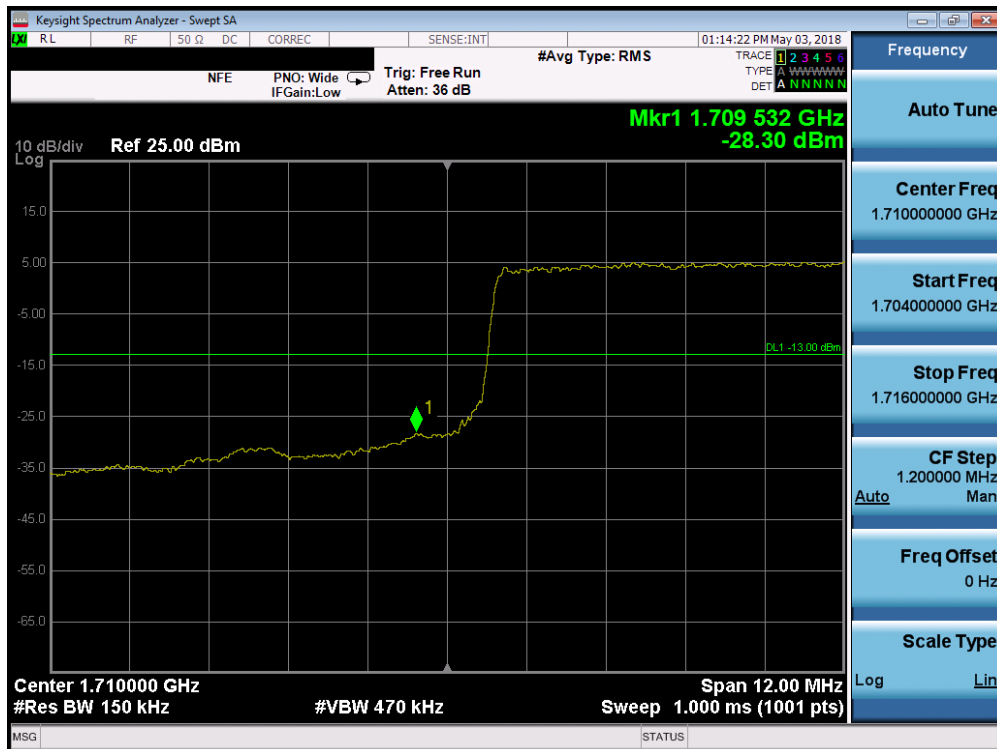


Plot 7-110. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

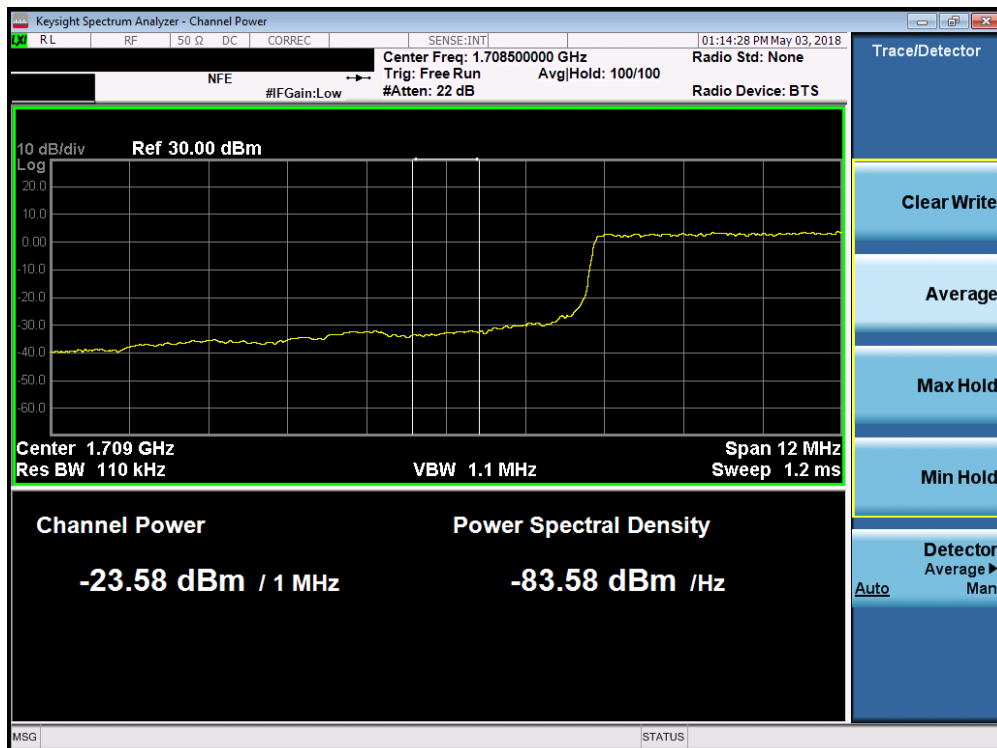


Plot 7-111. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
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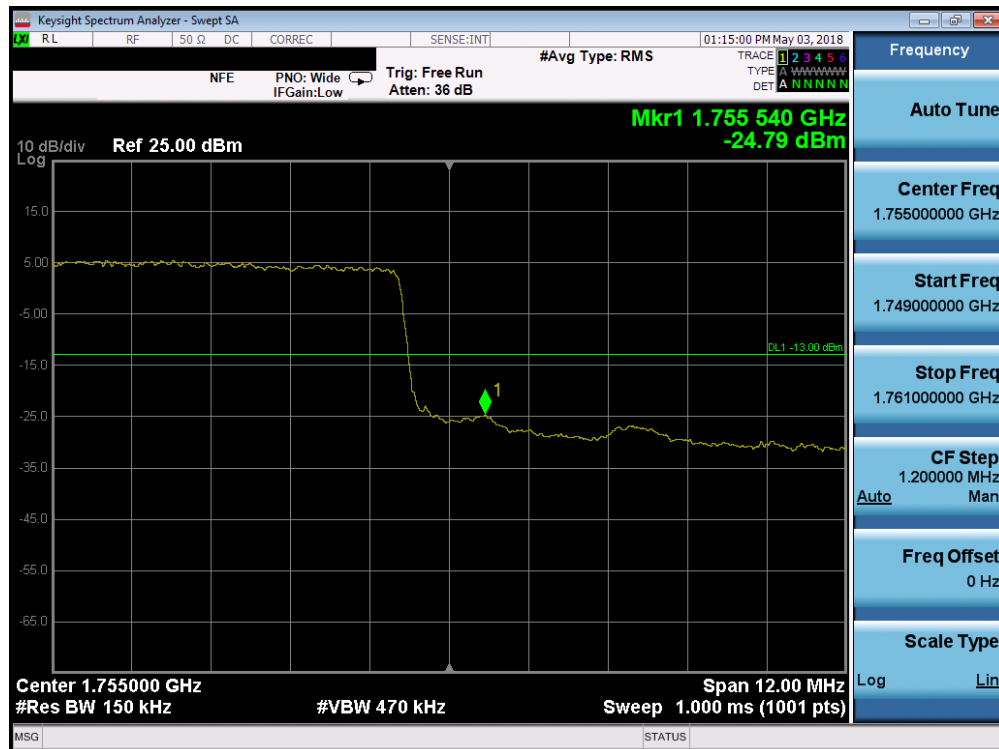


Plot 7-112. Lower Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

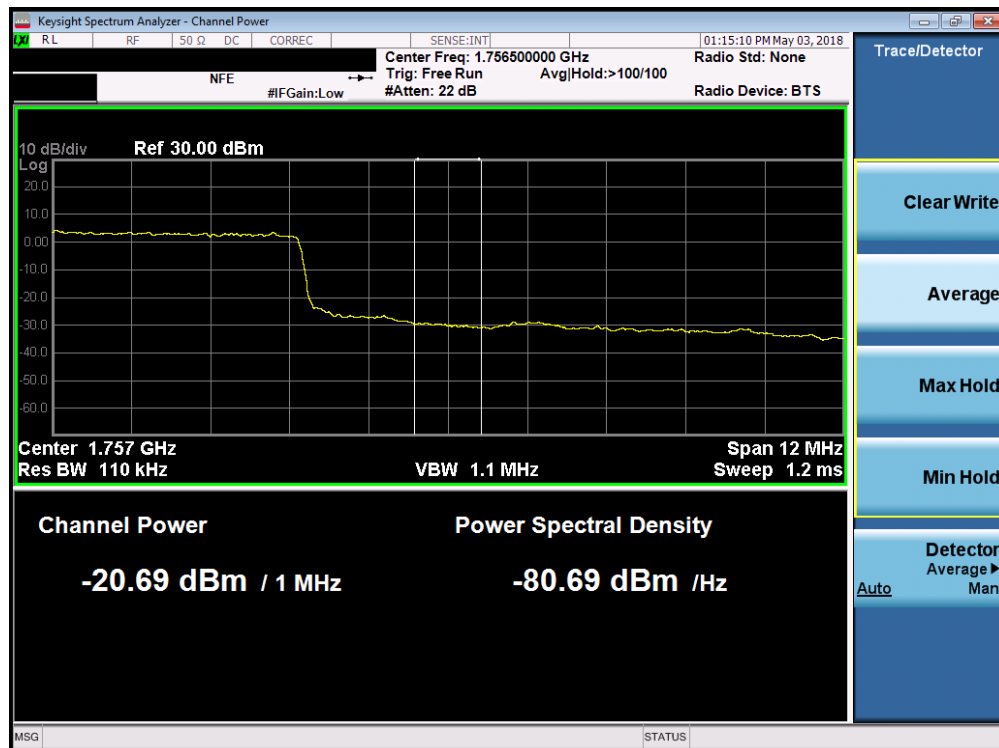


Plot 7-113. Lower Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 75 of 122                  |

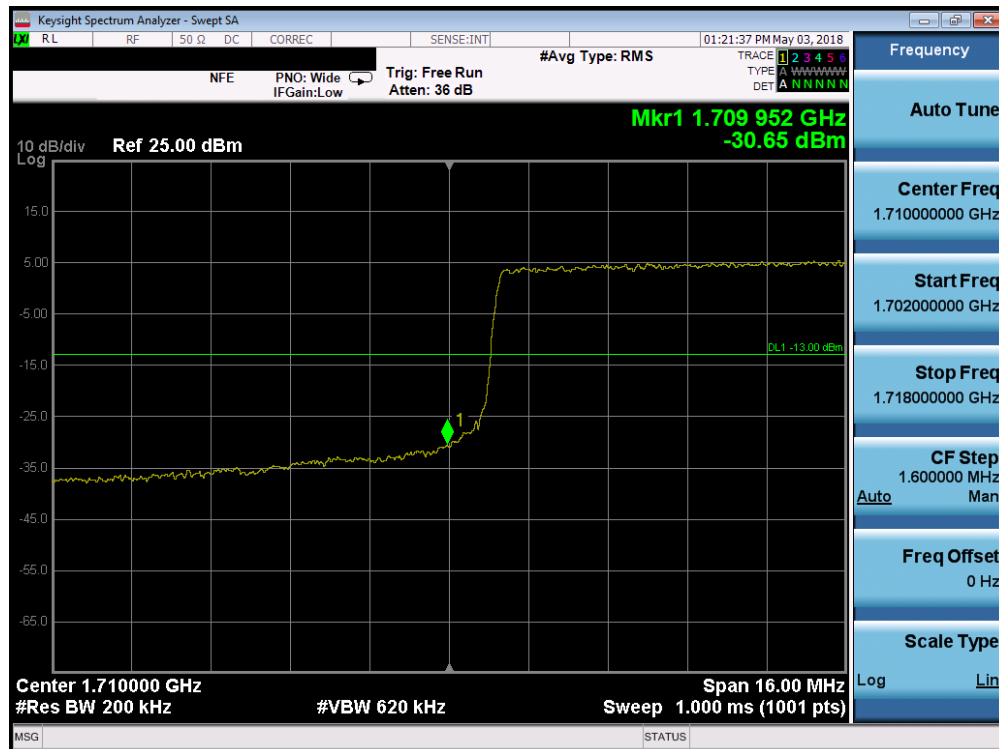


Plot 7-114. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

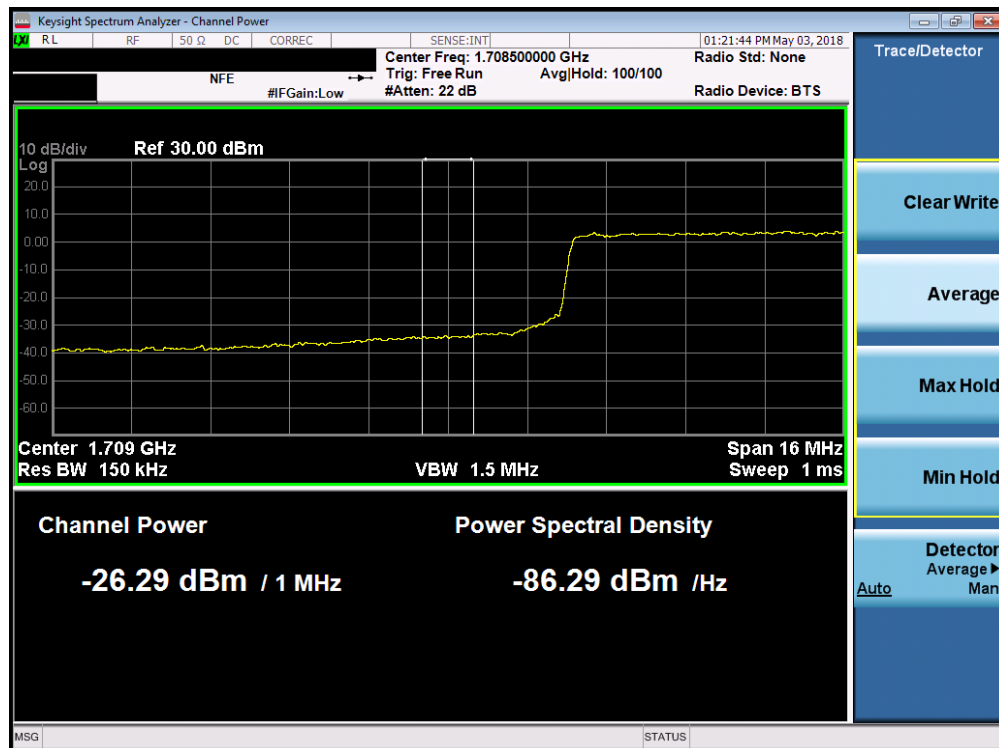


Plot 7-115. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 76 of 122                  |



Plot 7-116. Lower Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

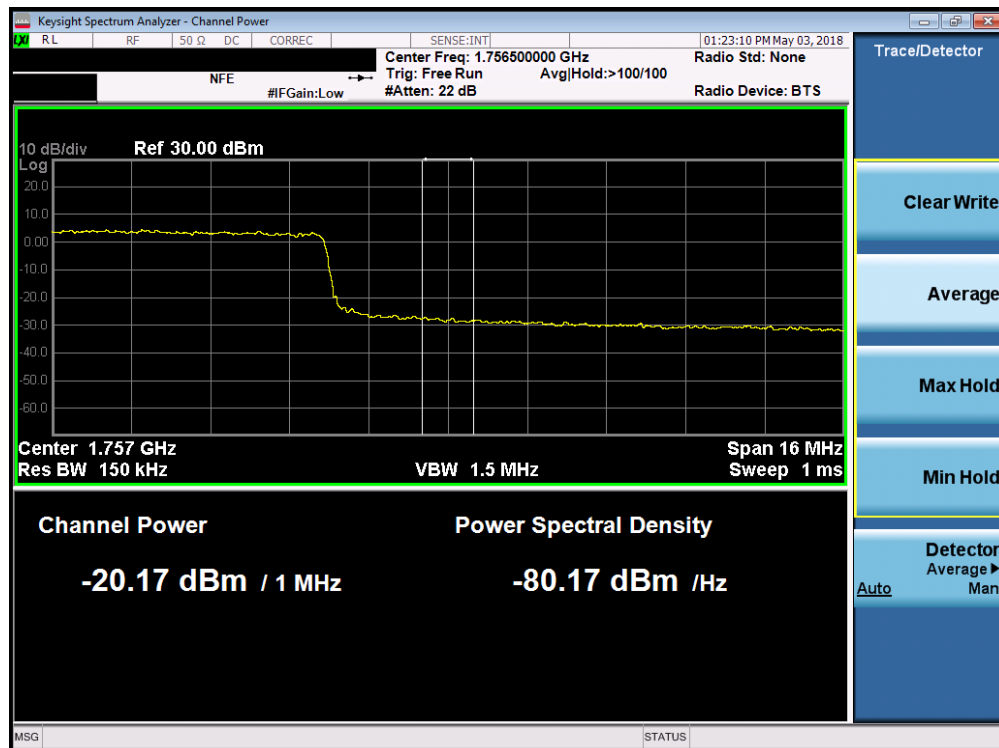


Plot 7-117. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

|                                         |                                               |                                       |           |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|-----------|---------------------------------|
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| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |           | Page 77 of 122                  |



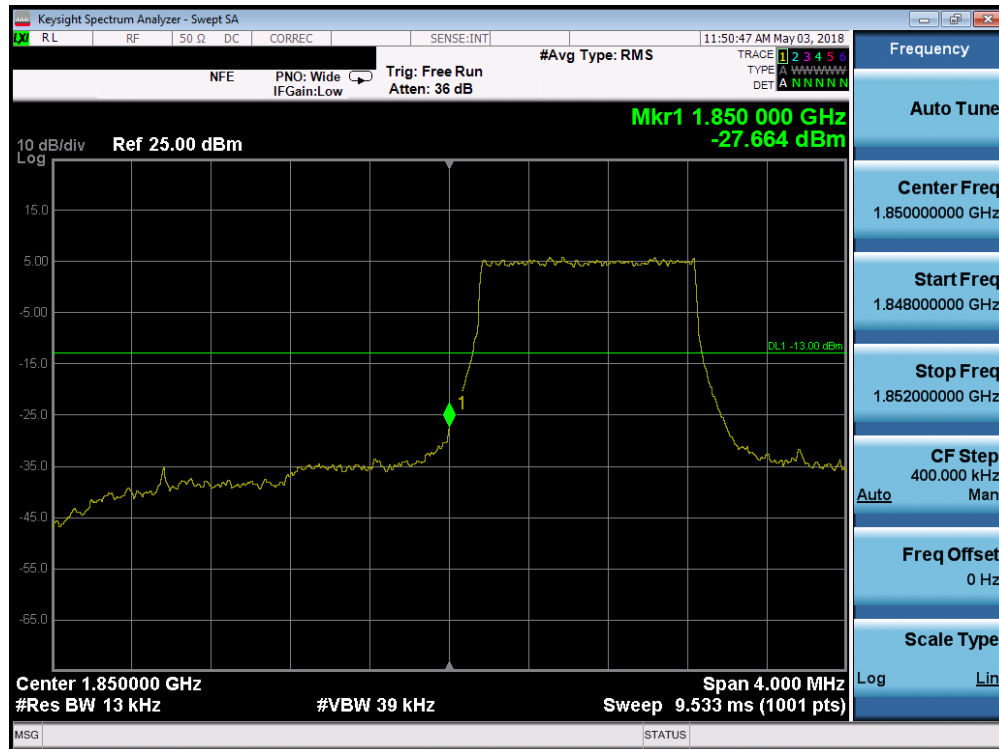
Plot 7-118. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



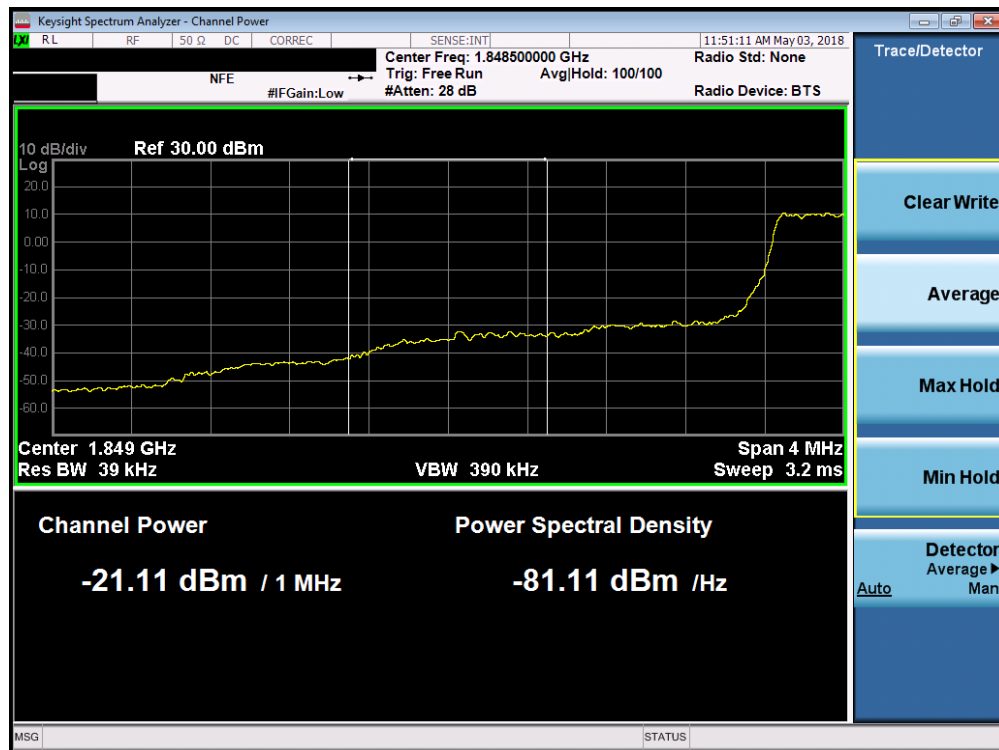
Plot 7-119. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
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## Band 2

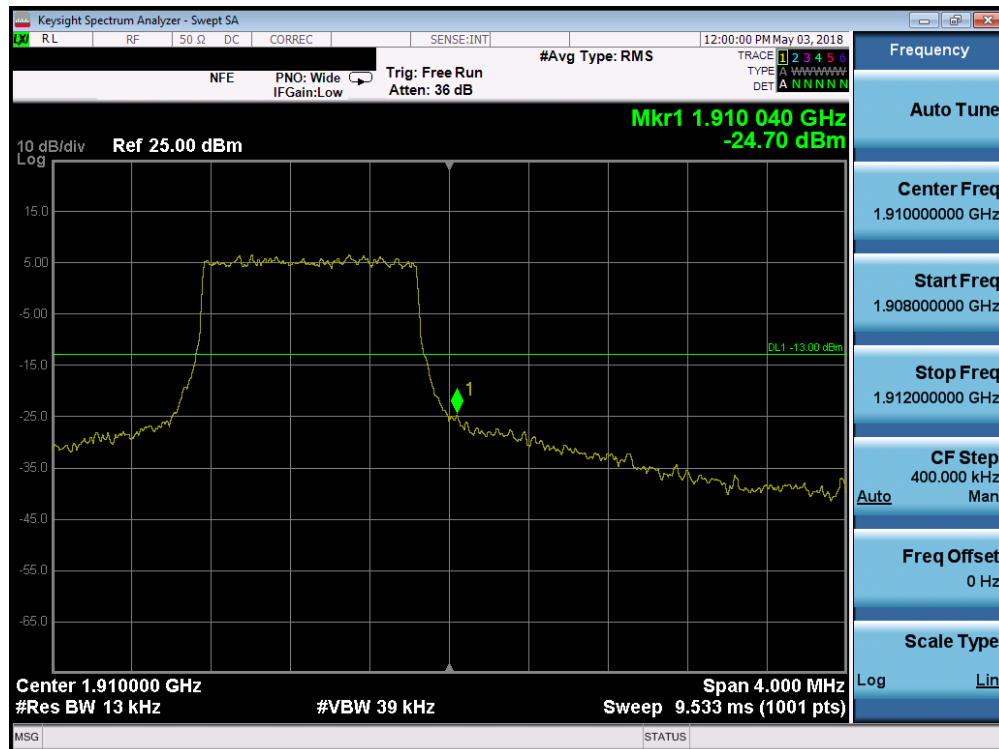


Plot 7-120. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-121. Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 79 of 122                  |



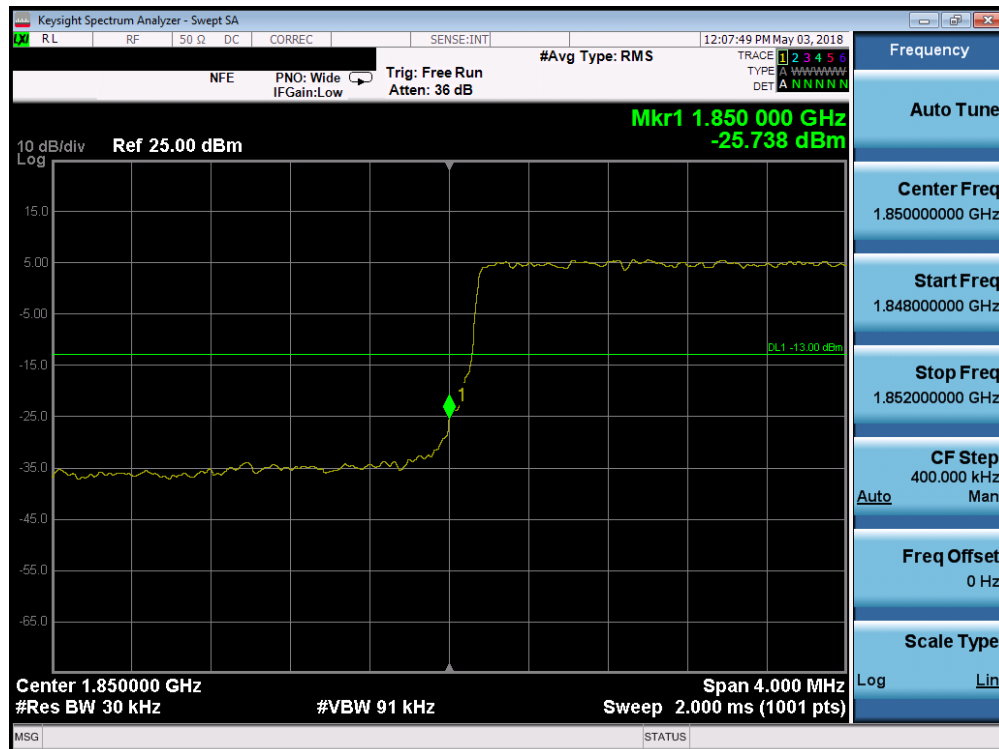
Plot 7-122. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



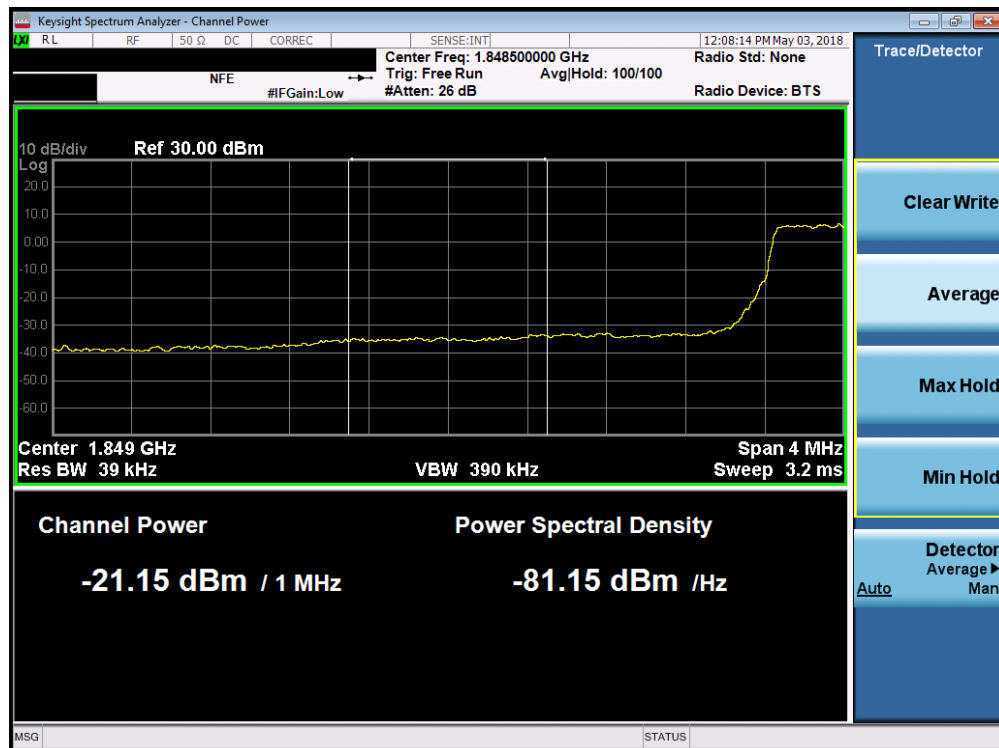
Plot 7-123. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

|                                         |                                               |                                       |           |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|-----------|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | MEASUREMENT REPORT<br>(CERTIFICATION) | <b>LG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |           | Page 80 of 122                  |



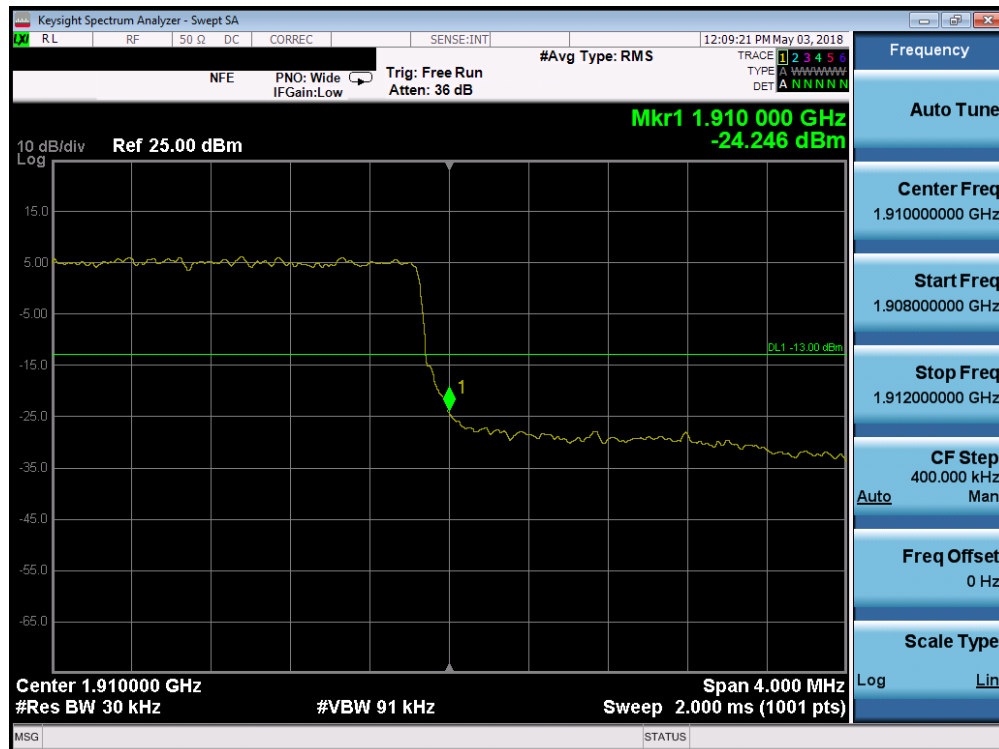


Plot 7-124. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

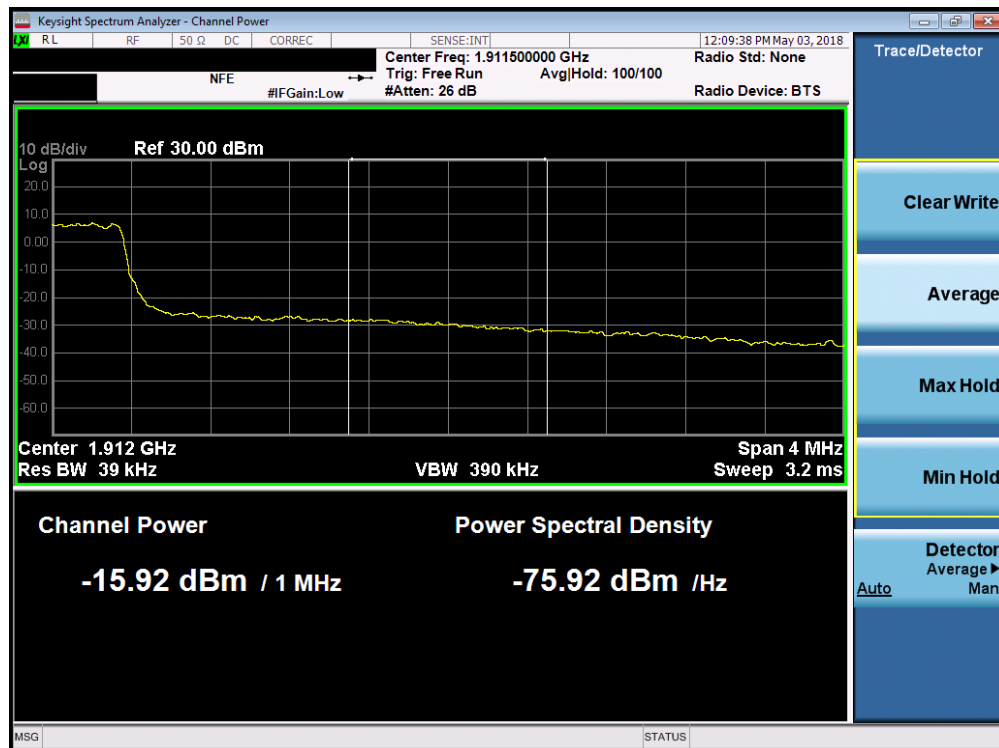


Plot 7-125. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 81 of 122                  |

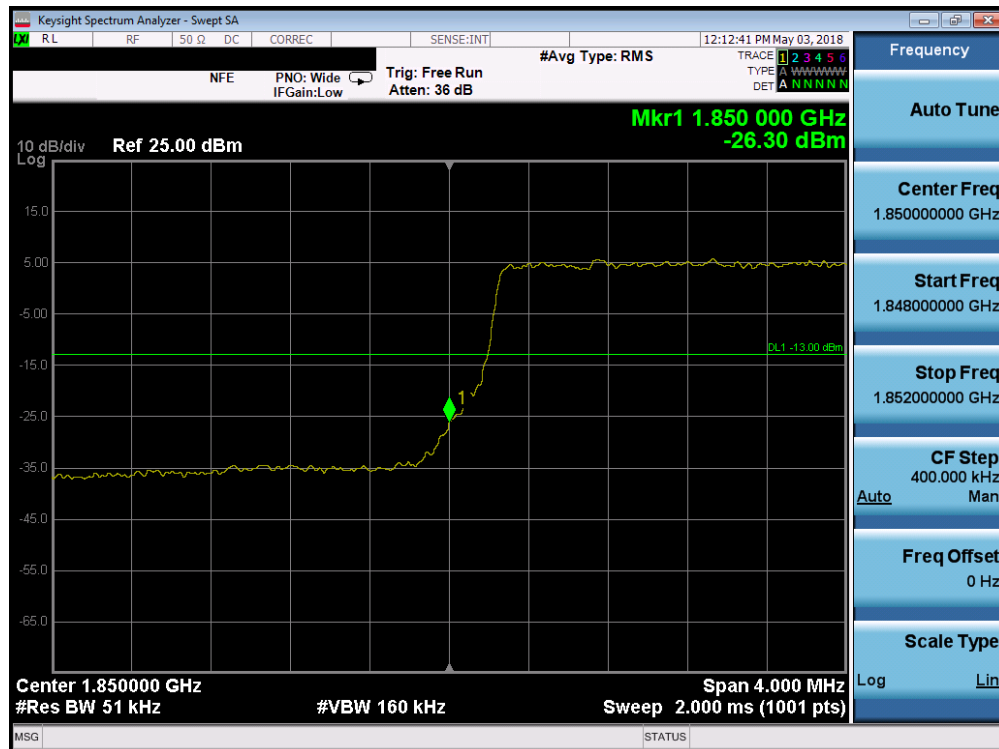


Plot 7-126. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

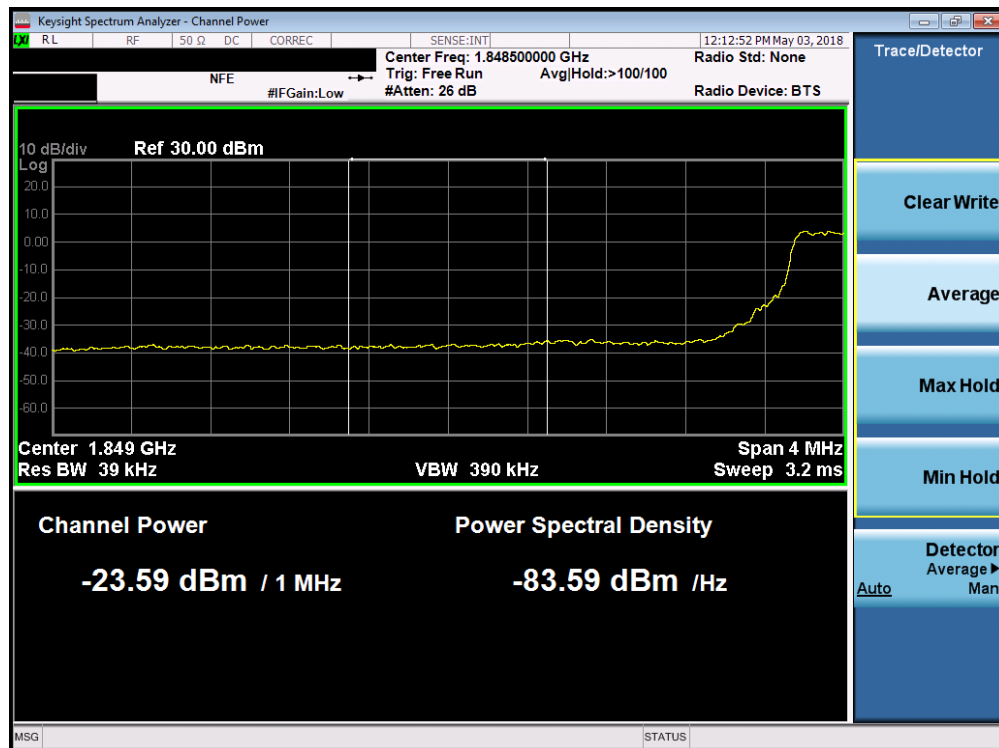


Plot 7-127. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

|                                         |                                               |                                       |           |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|-----------|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | MEASUREMENT REPORT<br>(CERTIFICATION) | <b>LG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |           | Page 82 of 122                  |

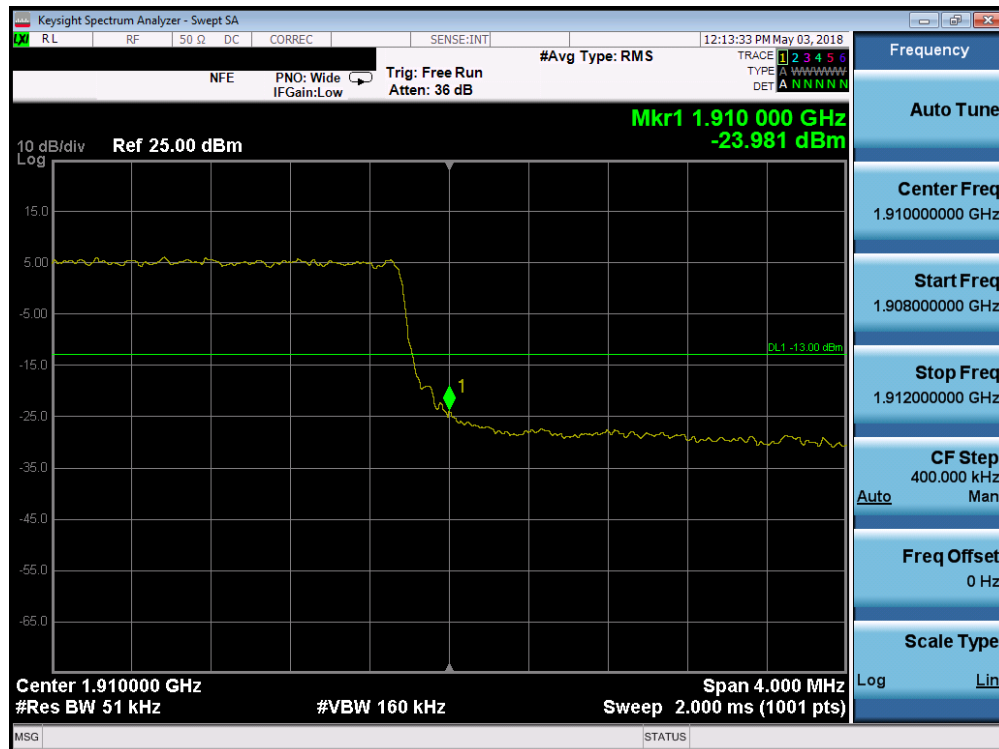


Plot 7-128. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

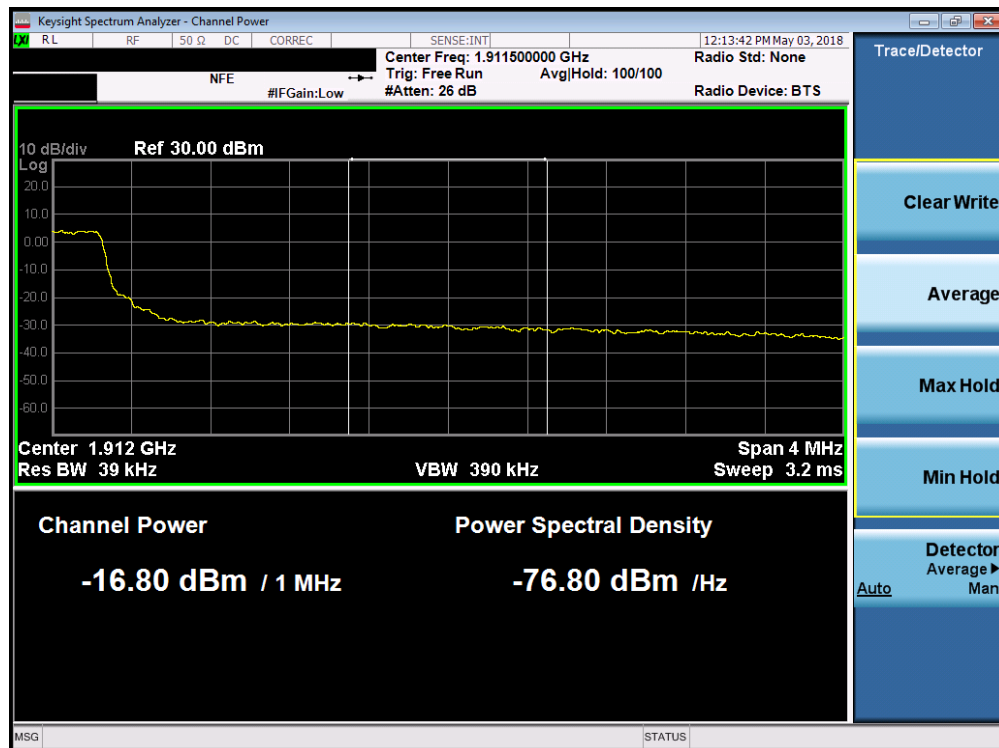


Plot 7-129. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 83 of 122                  |

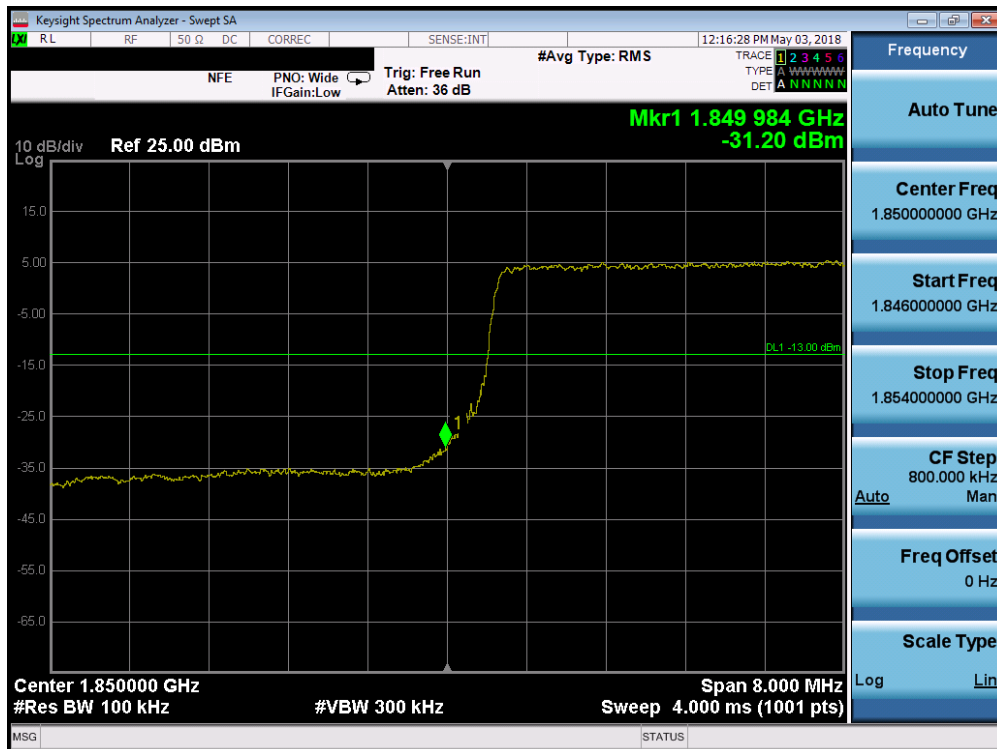


Plot 7-130. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

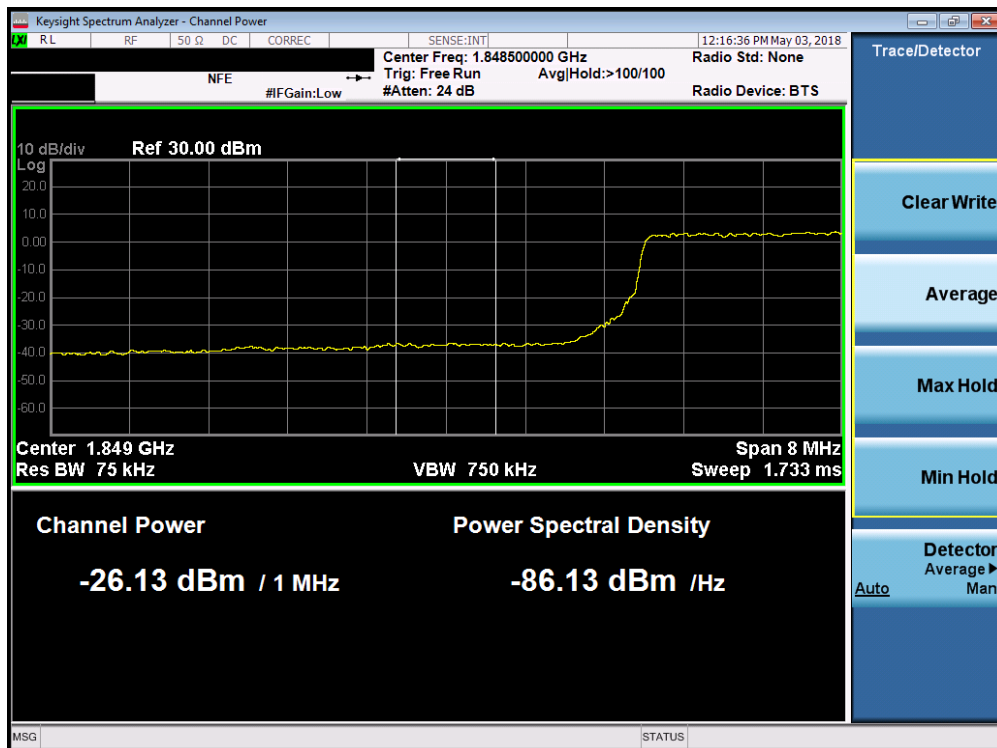


Plot 7-131. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 84 of 122                  |

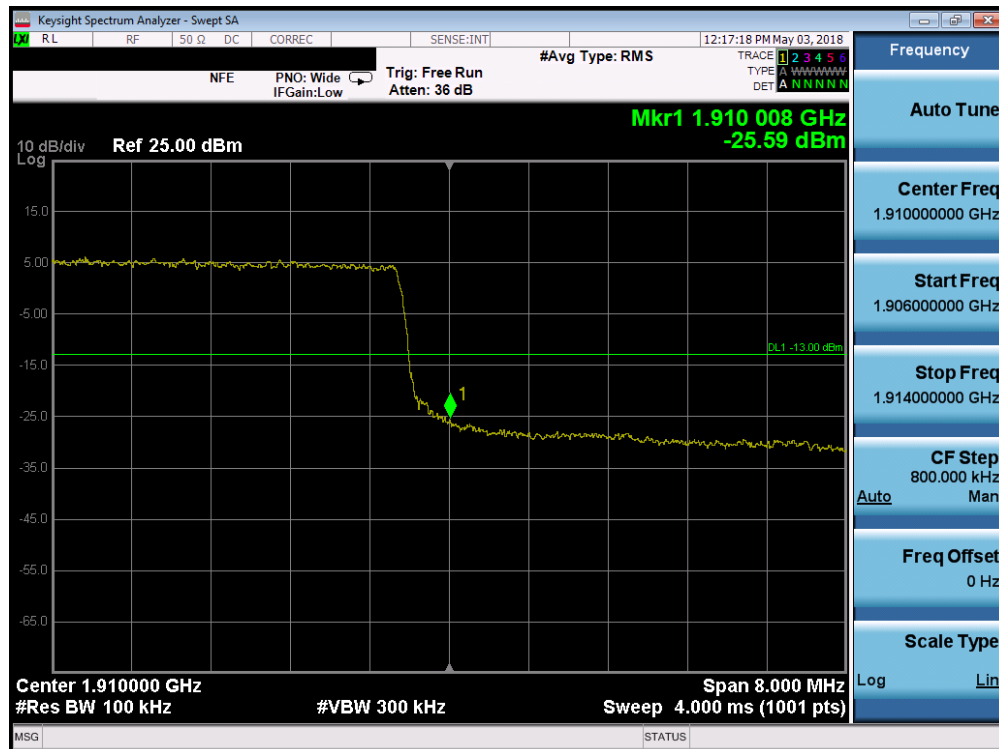


Plot 7-132. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

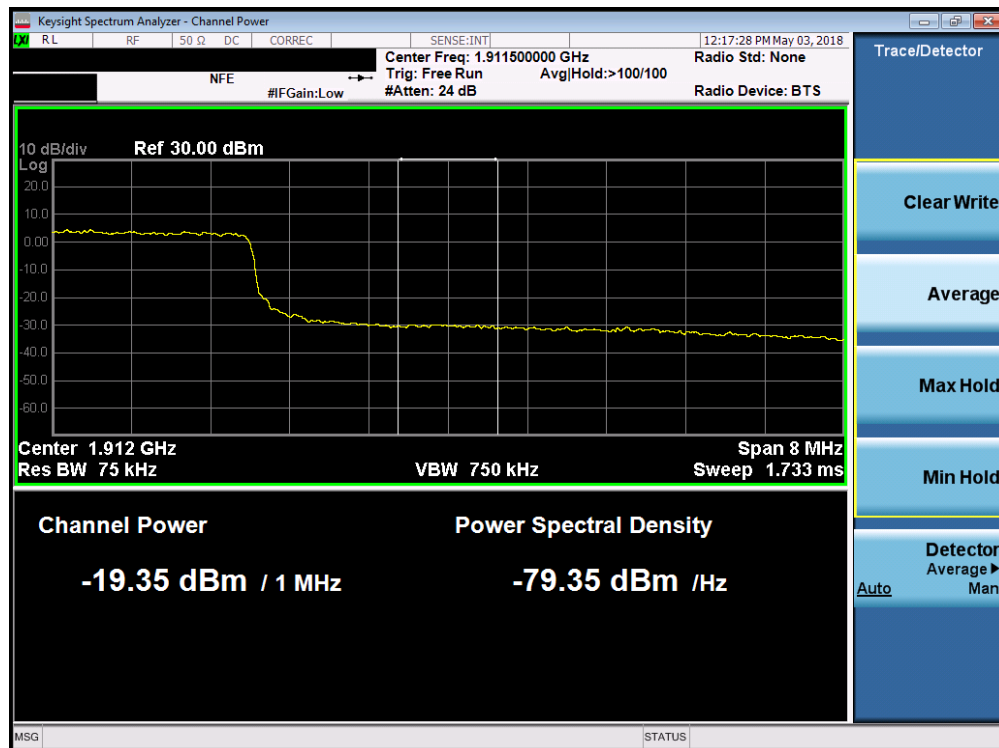


Plot 7-133. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 85 of 122                  |

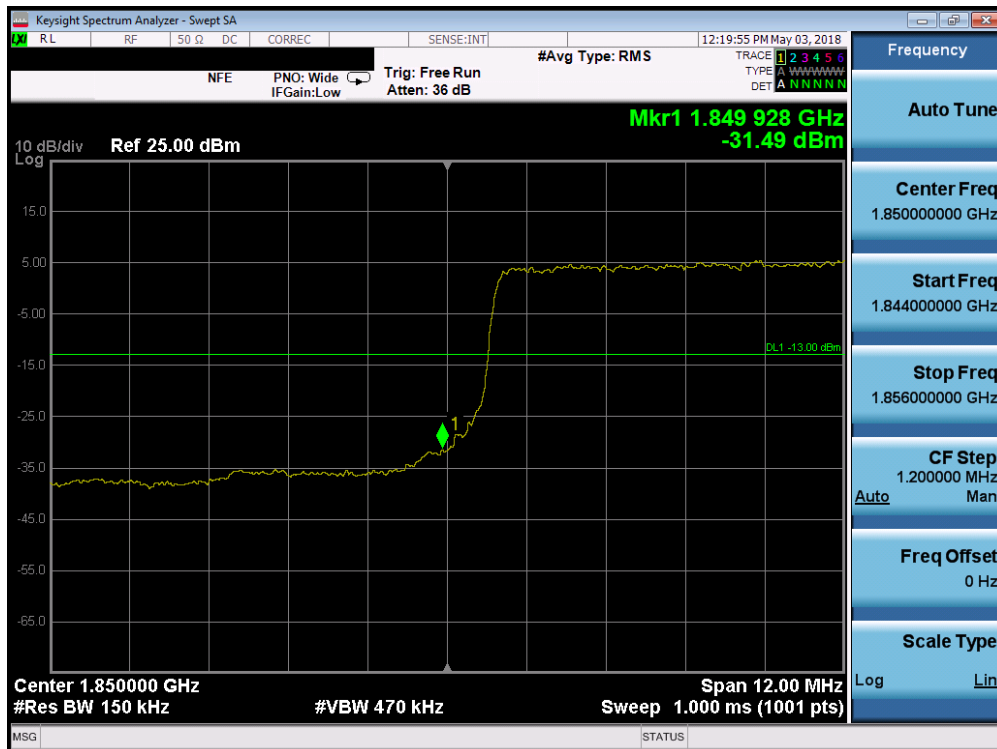


Plot 7-134. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

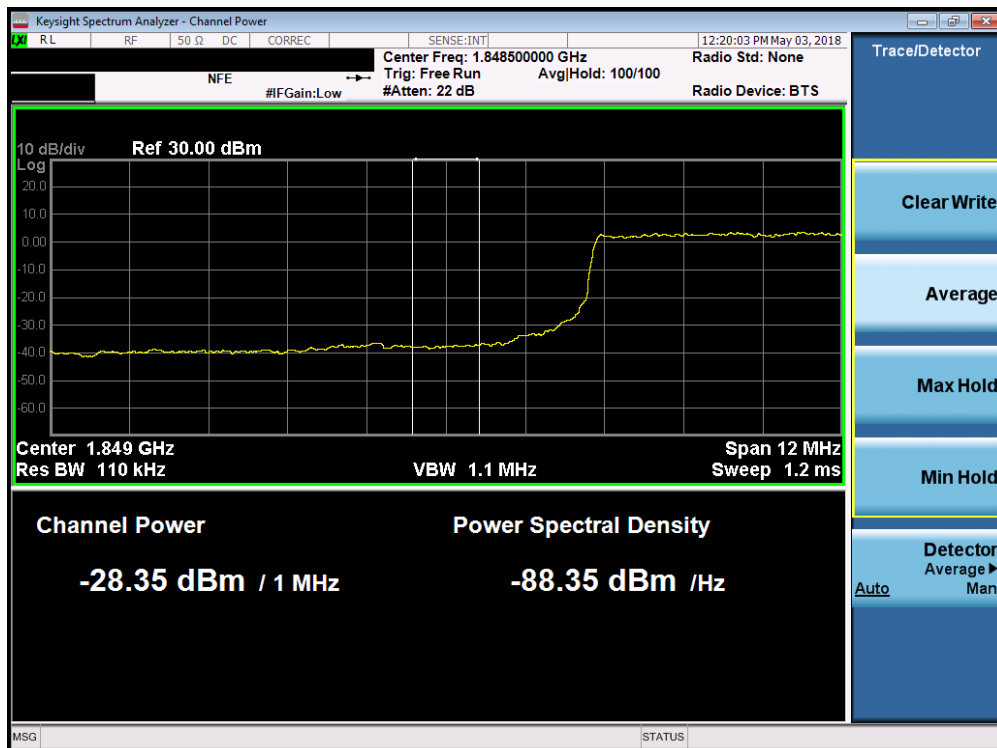


Plot 7-135. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 86 of 122                  |

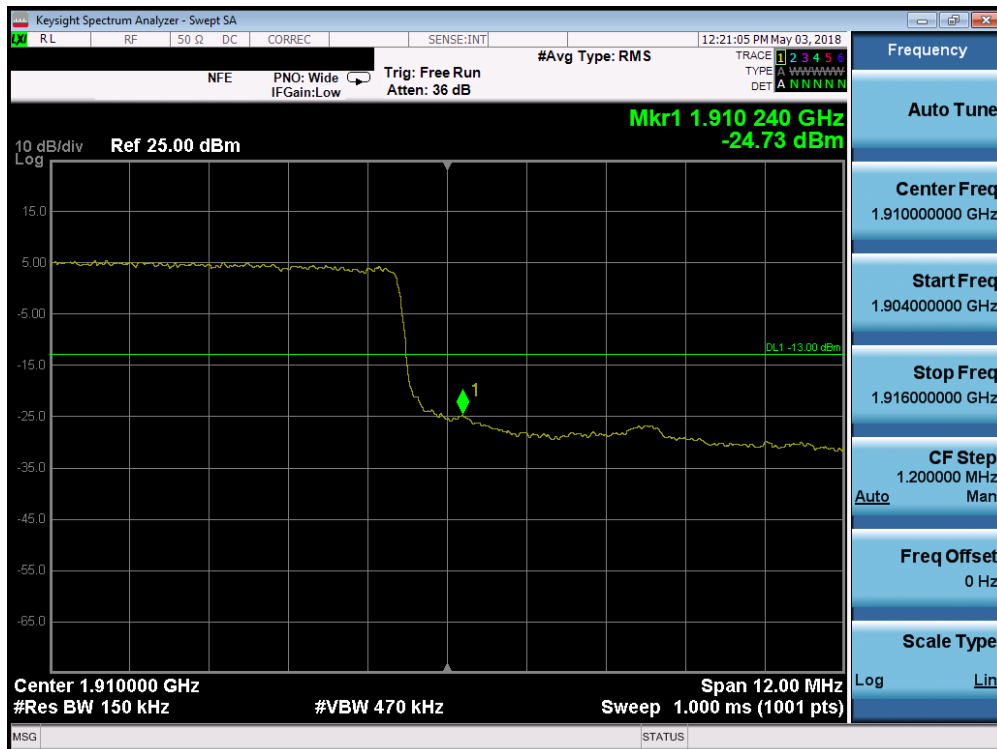


Plot 7-136. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

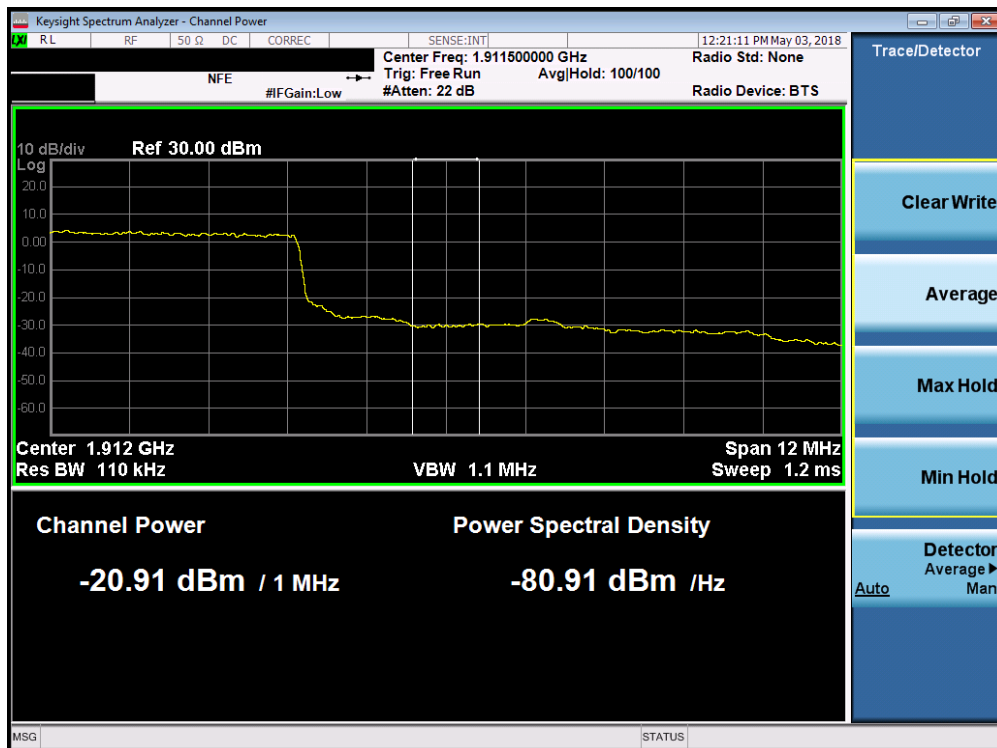


Plot 7-137. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 87 of 122                  |



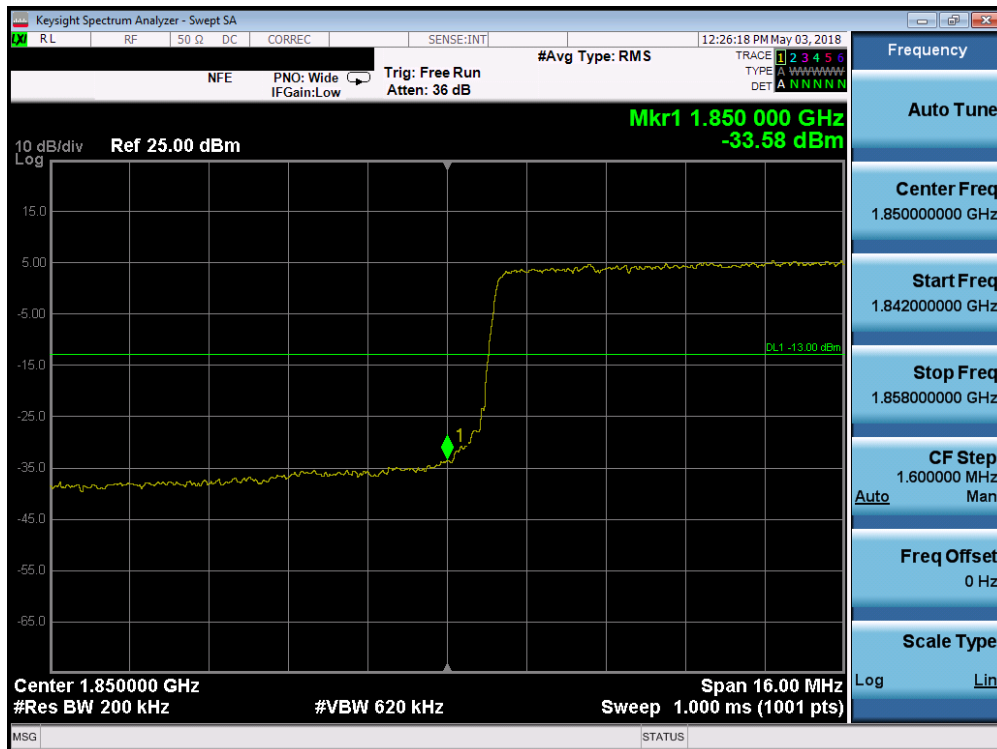
Plot 7-138. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



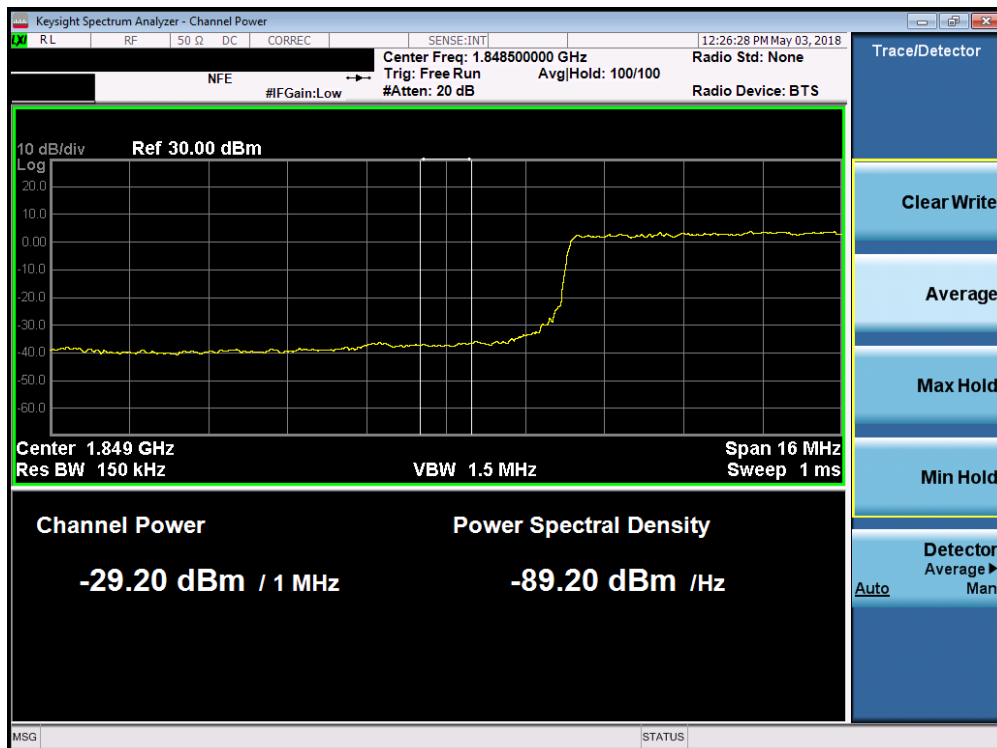
Plot 7-139. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 88 of 122                  |





Plot 7-140. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

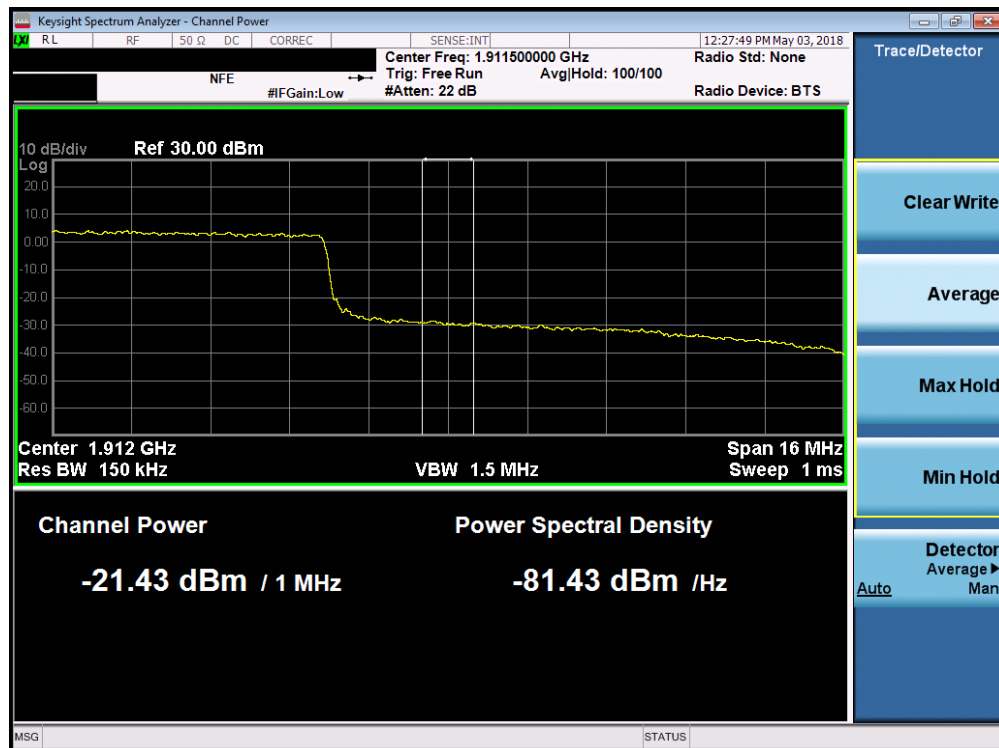


Plot 7-141. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

|                                         |                                               |                               |  |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset |  | Page 89 of 122                  |



Plot 7-142. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-143. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 90 of 122                  |

## 7.5 Peak-Average Ratio

### 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

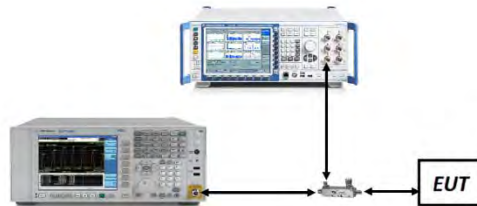
KDB 971168 D01 v03r01 – Section 5.7.1

### 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.



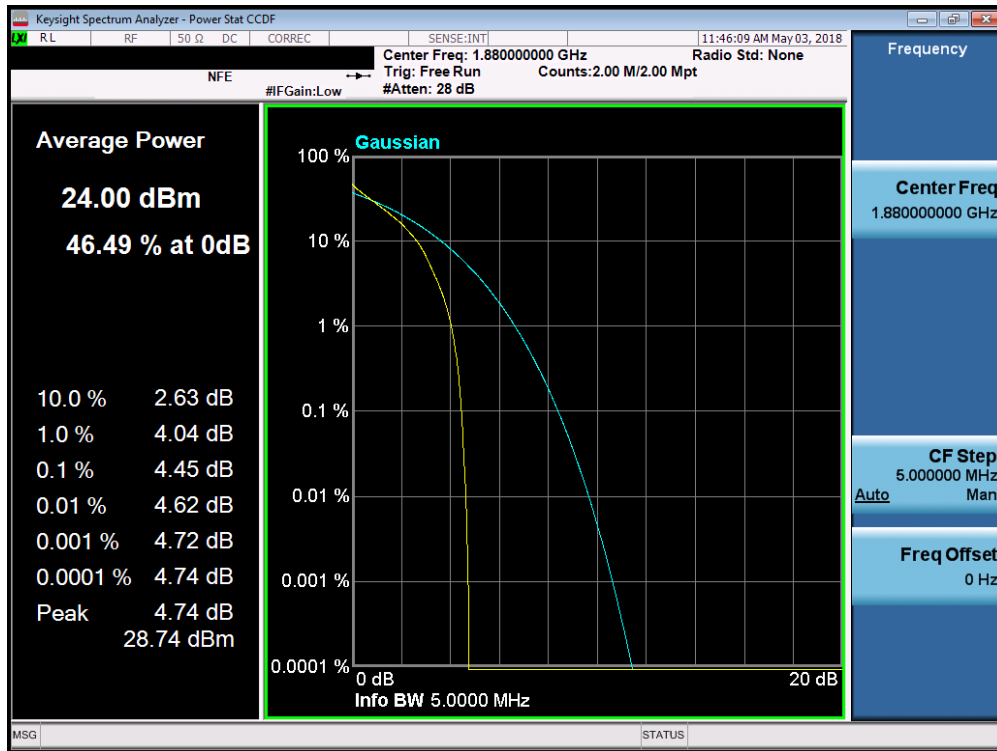
**Figure 7-4. Test Instrument & Measurement Setup**

### Test Notes

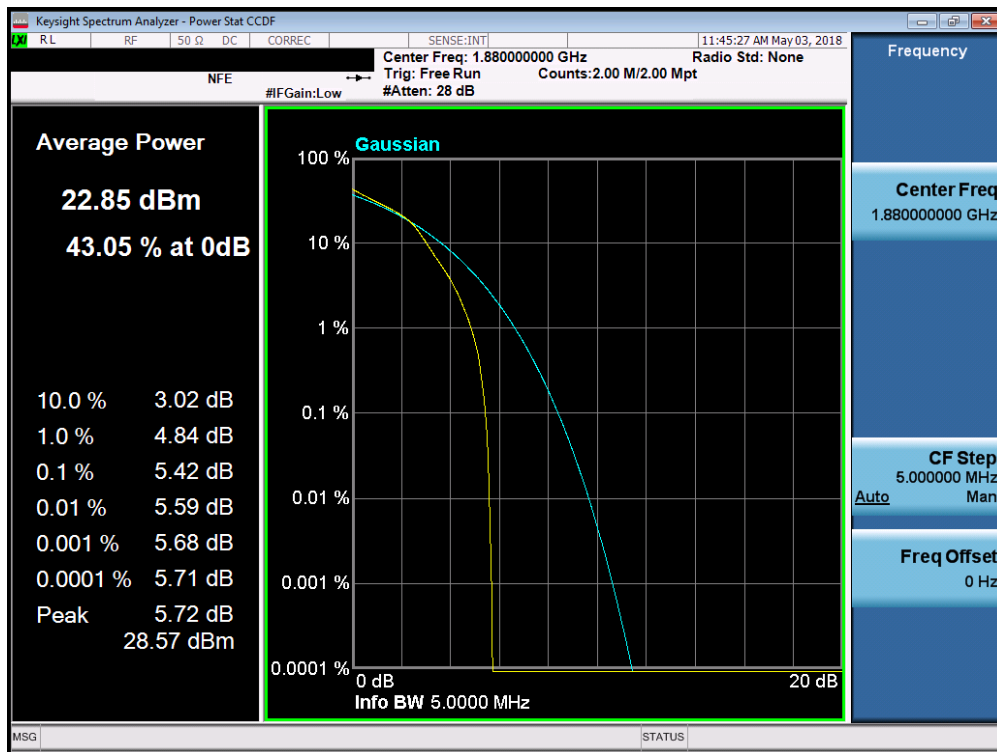
None.

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 91 of 122                  |

## Band 2

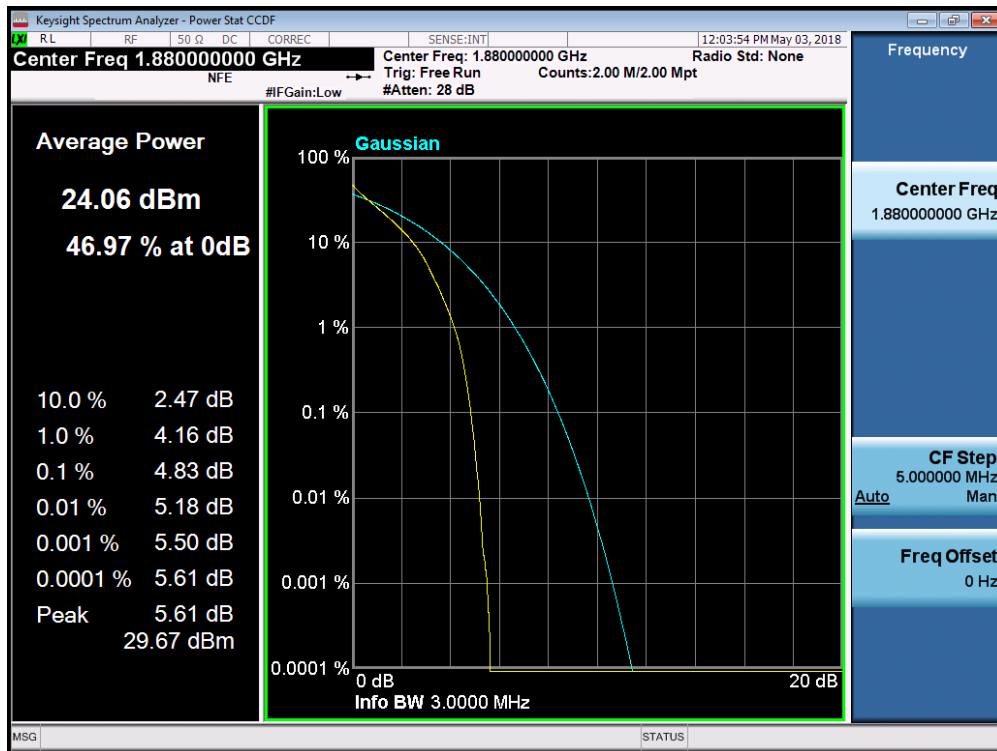


Plot 7-144. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

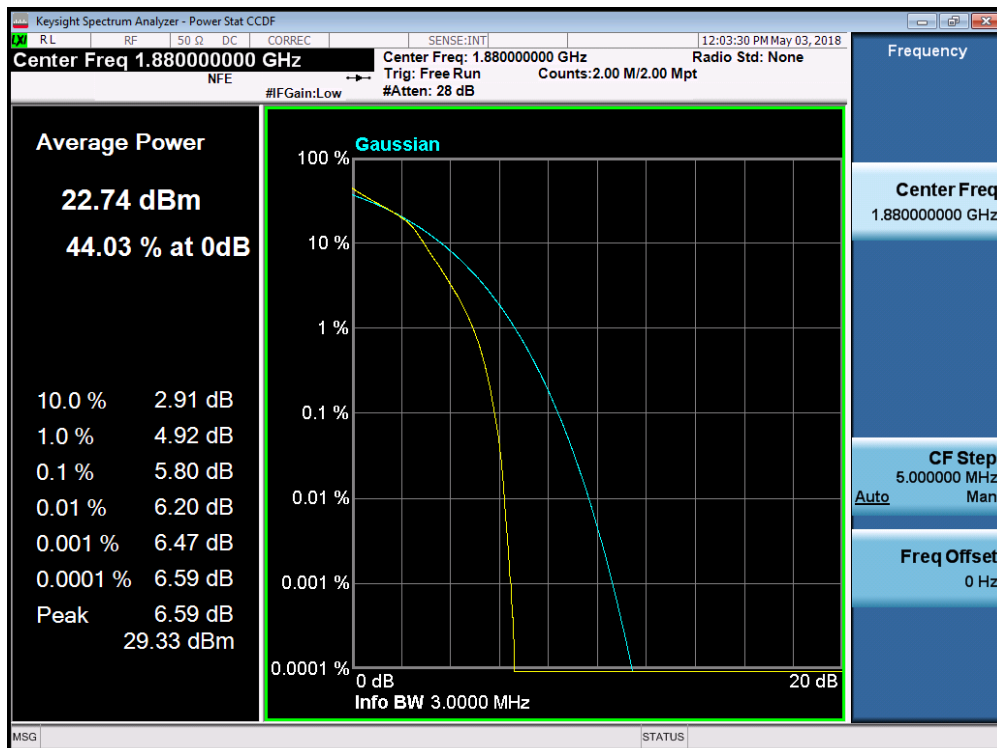


Plot 7-145. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

|                                         |                                              |                               |                                        |
|-----------------------------------------|----------------------------------------------|-------------------------------|----------------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               | <b>Approved by:</b><br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset | Page 92 of 122                         |

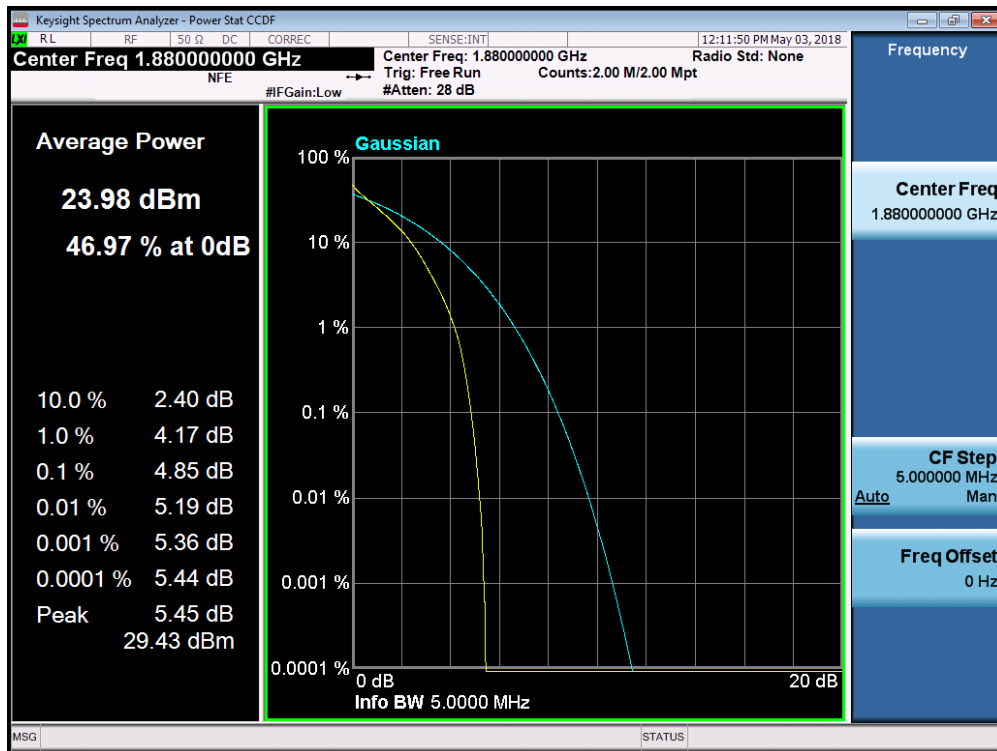


Plot 7-146. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

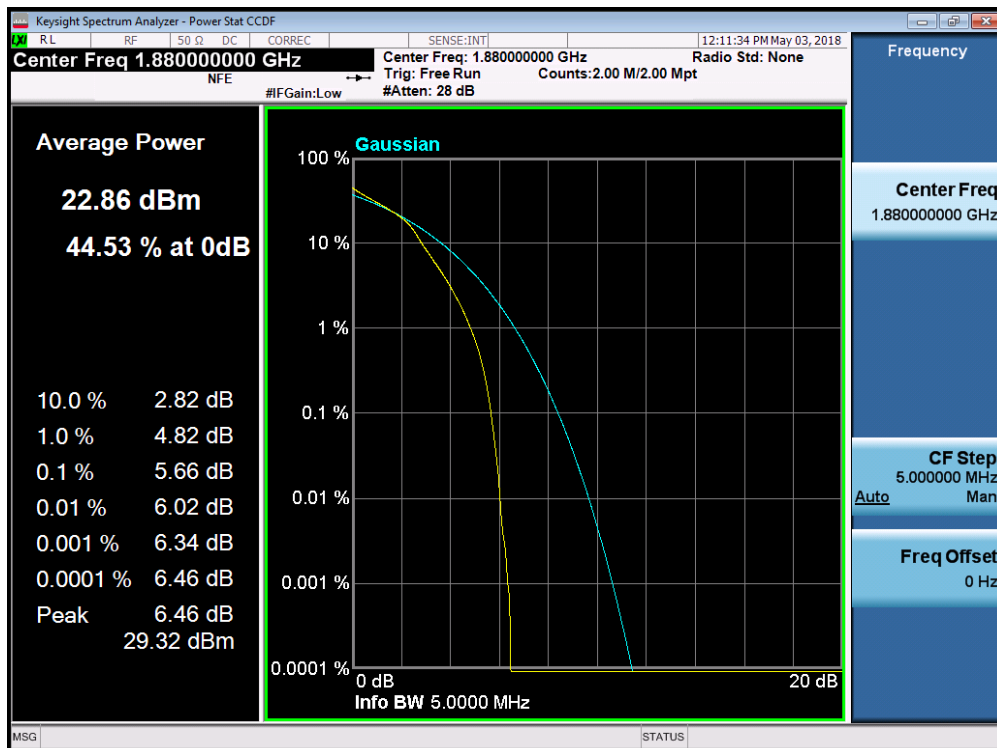


Plot 7-147. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 93 of 122                  |

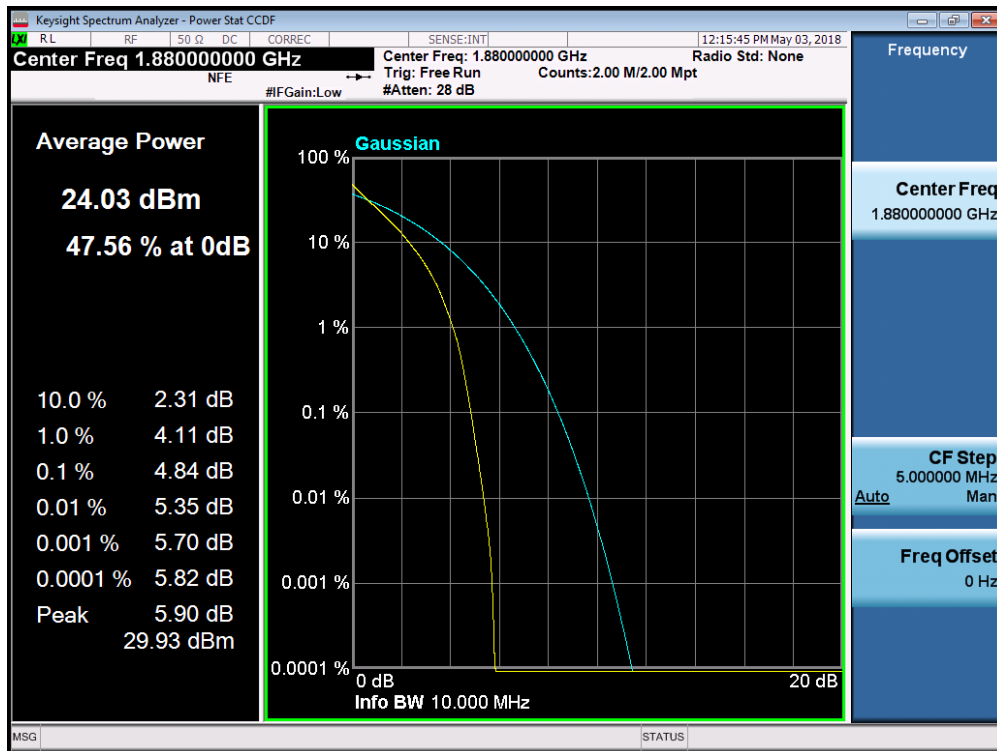


Plot 7-148. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

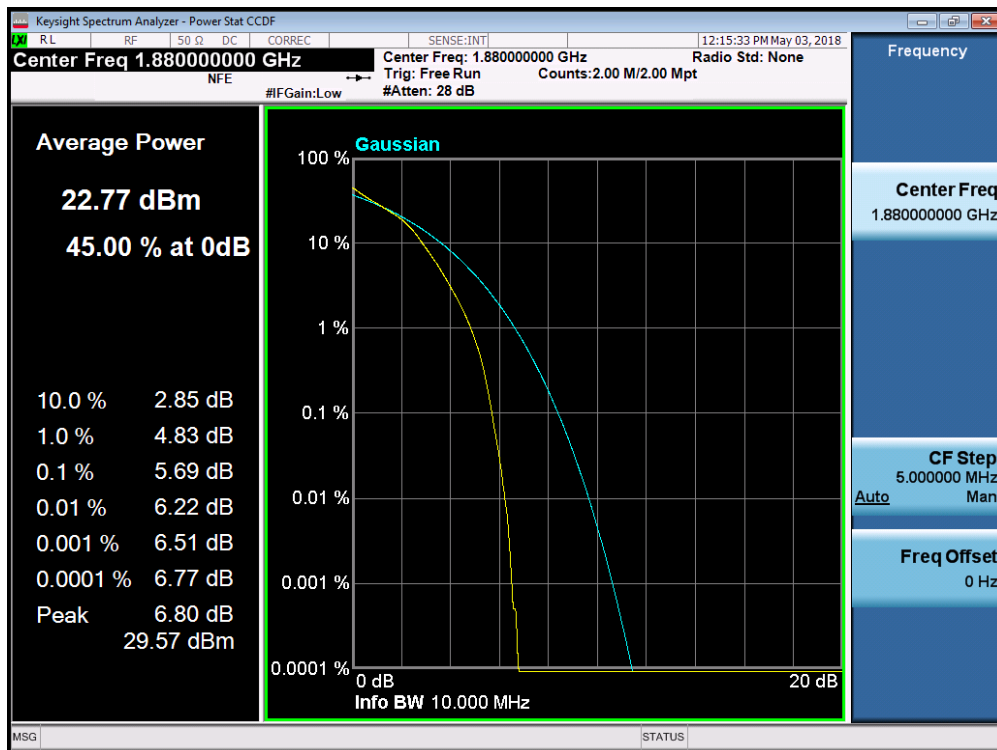


Plot 7-149. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 94 of 122                  |



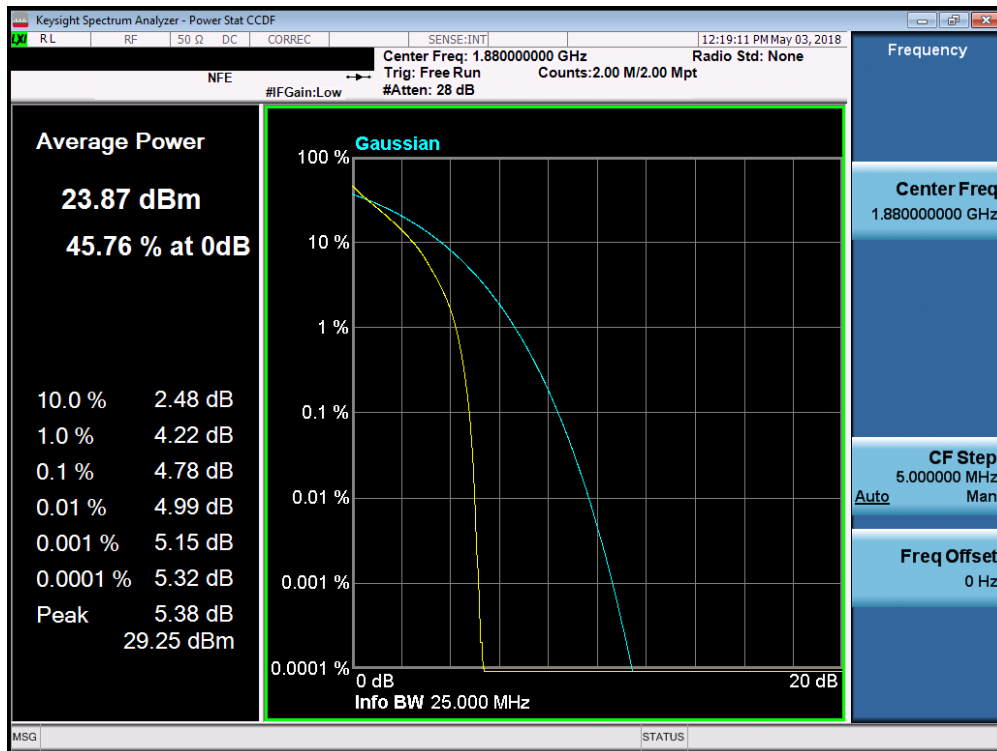
Plot 7-150. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



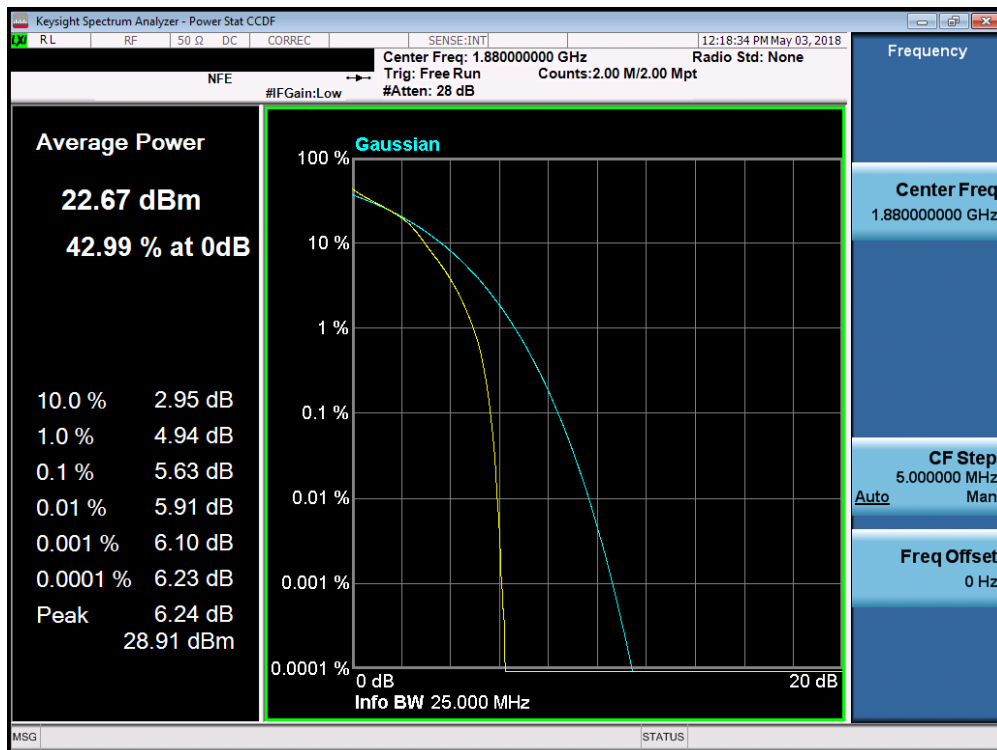
Plot 7-151. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

|                                         |                                               |                               |  |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset |  | Page 95 of 122                  |





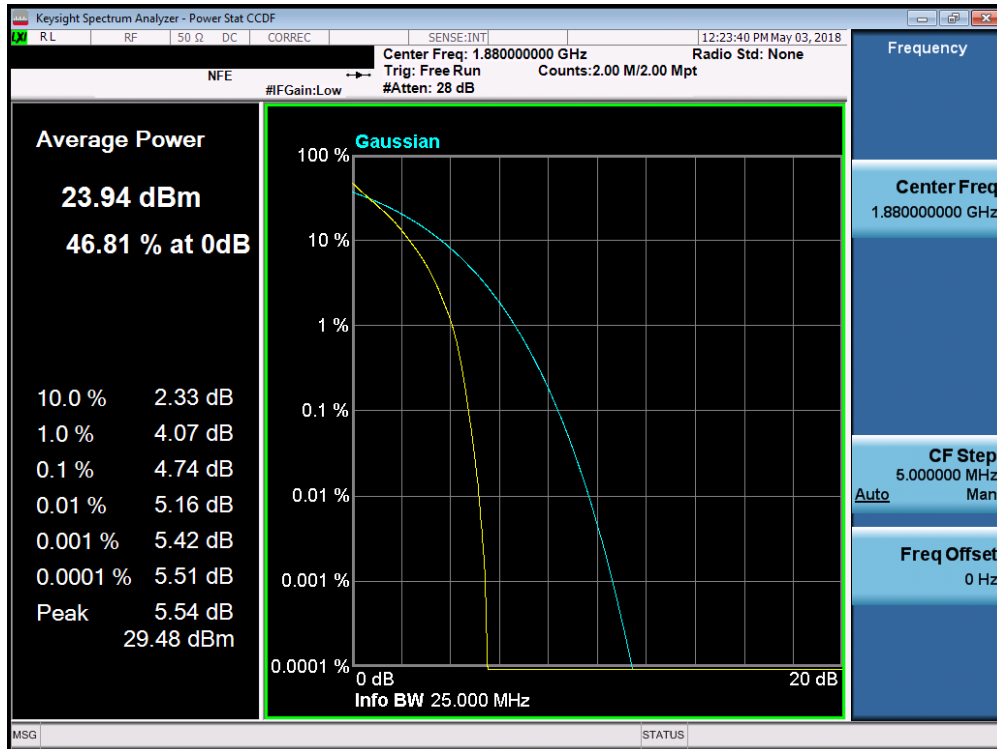
Plot 7-152. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



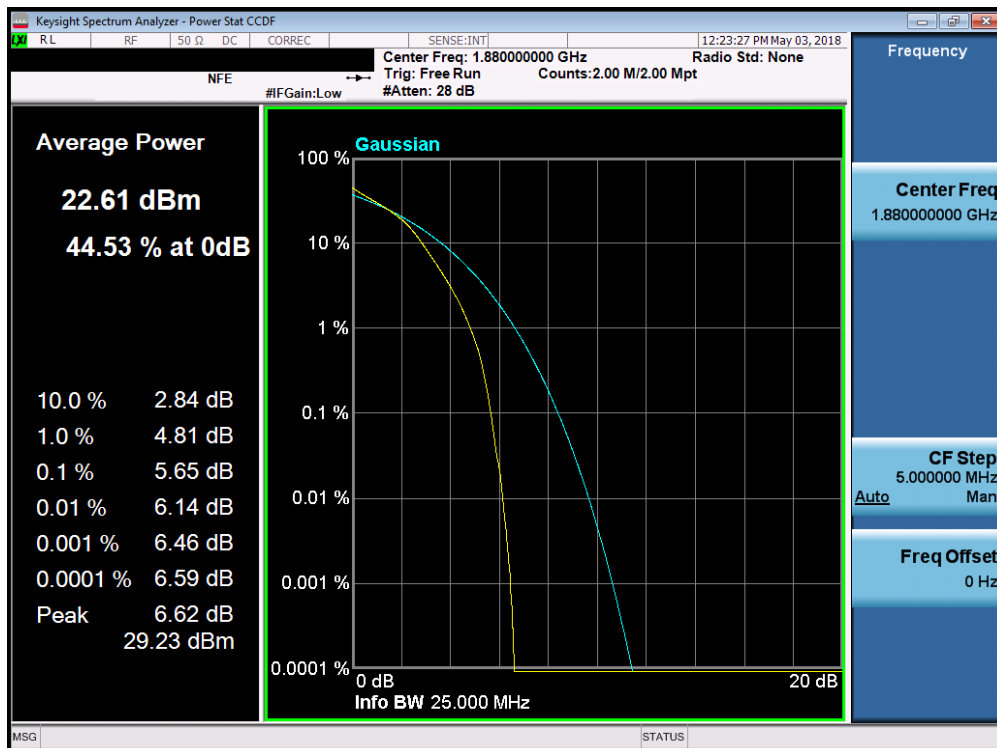
Plot 7-153. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 96 of 122                  |





Plot 7-154. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-155. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

|                                         |                                              |                               |  |                                 |
|-----------------------------------------|----------------------------------------------|-------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018               | EUT Type:<br>Portable Handset |  | Page 97 of 122                  |

## 7.6 Radiated Power (ERP/EIRP)

### 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 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

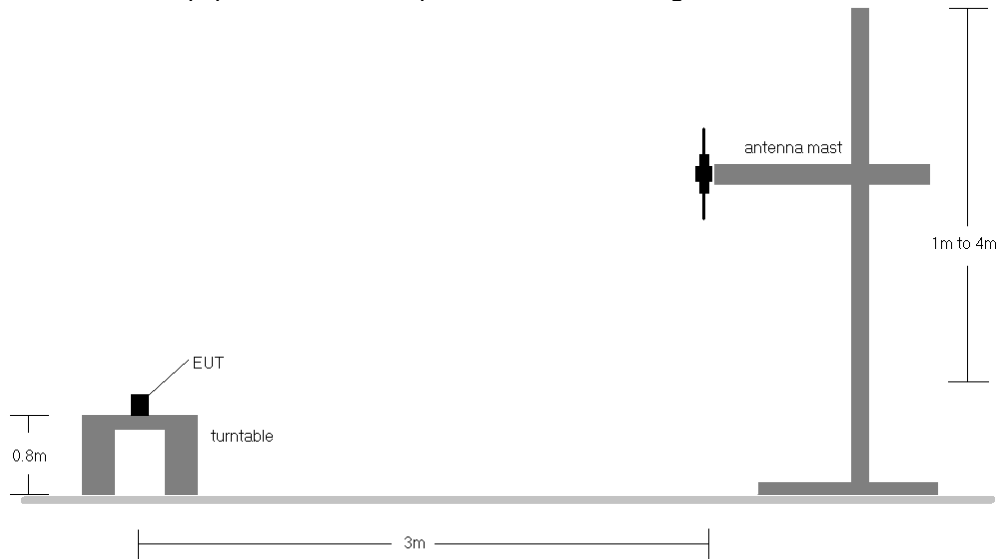
### Test Settings

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  $\geq 3 \times$  RBW
4. Span = 1.5 times the OBW
5. No. of sweep points  $\geq 2 \times$  span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

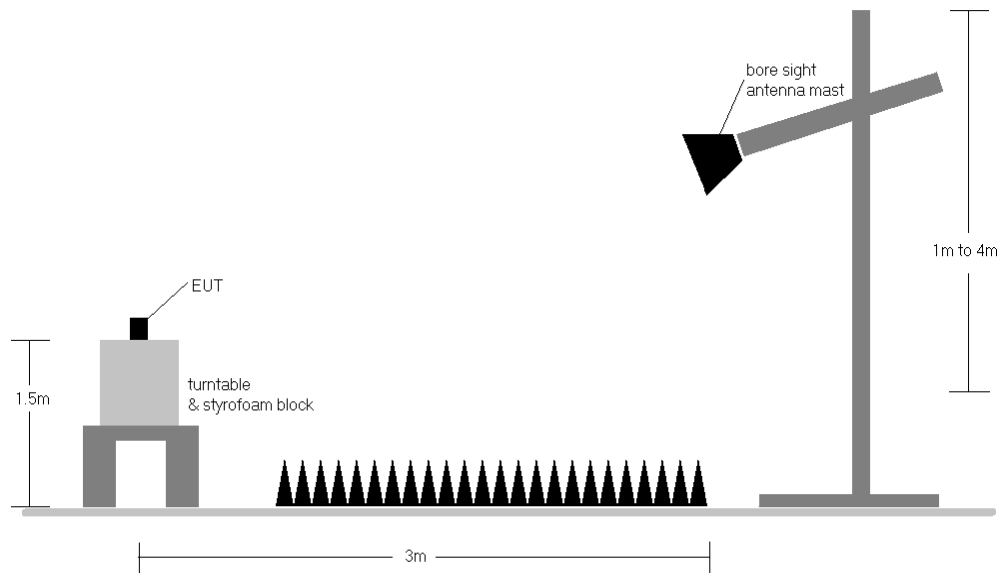
|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 98 of 122                  |

## Test Setup

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



**Figure 7-5. Radiated Test Setup <1GHz**



**Figure 7-6. Radiated Test Setup >1GHz**

## Test Notes

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

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 99 of 122                  |

| 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] |
|-----------------|-------------------------|--------|-----------------|---------------------|----------------------------|----------------|------------------------|-----------------|--------------|--------------|-----------------|-------------|--------------|--------------|------------------|-------------|
| 699.70          | 1.4                     | QPSK   | V               | 150                 | 5                          | 1 / 5          | 21.30                  | 1.10            | 20.25        | 0.106        | 34.77           | -14.52      | 22.40        | 0.174        | 36.99            | -14.59      |
| 707.50          | 1.4                     | QPSK   | V               | 150                 | 5                          | 1 / 5          | 21.71                  | 1.13            | 20.69        | 0.117        | 34.77           | -14.08      | 22.84        | 0.192        | 36.99            | -14.15      |
| 715.30          | 1.4                     | QPSK   | V               | 150                 | 5                          | 1 / 5          | 21.91                  | 1.16            | <b>20.92</b> | 0.124        | 34.77           | -13.85      | <b>23.07</b> | 0.203        | 36.99            | -13.92      |
| 707.50          | 1.4                     | 16-QAM | V               | 150                 | 5                          | 1 / 5          | 20.72                  | 1.13            | <b>19.70</b> | 0.093        | 34.77           | -15.07      | <b>21.85</b> | 0.153        | 36.99            | -15.14      |
| 700.50          | 3                       | QPSK   | V               | 150                 | 8                          | 1 / 14         | 21.36                  | 1.10            | 20.31        | 0.107        | 34.77           | -14.46      | 22.46        | 0.176        | 36.99            | -14.53      |
| 707.50          | 3                       | QPSK   | V               | 150                 | 8                          | 1 / 14         | 21.83                  | 1.13            | 20.81        | 0.121        | 34.77           | -13.96      | 22.96        | 0.198        | 36.99            | -14.03      |
| 714.50          | 3                       | QPSK   | V               | 150                 | 8                          | 1 / 0          | 21.95                  | 1.16            | <b>20.96</b> | <b>0.125</b> | 34.77           | -13.81      | <b>23.11</b> | <b>0.205</b> | 36.99            | -13.88      |
| 707.50          | 3                       | 16-QAM | V               | 150                 | 8                          | 1 / 14         | 20.19                  | 1.13            | <b>19.17</b> | 0.083        | 34.77           | -15.60      | <b>21.32</b> | 0.136        | 36.99            | -15.67      |
| 701.50          | 5                       | QPSK   | V               | 150                 | 7                          | 1 / 0          | 21.37                  | 1.11            | 20.33        | 0.108        | 34.77           | -14.45      | 22.48        | 0.177        | 36.99            | -14.51      |
| 707.50          | 5                       | QPSK   | V               | 150                 | 7                          | 1 / 24         | 21.42                  | 1.13            | 20.40        | 0.110        | 34.77           | -14.37      | 22.55        | 0.180        | 36.99            | -14.44      |
| 713.50          | 5                       | QPSK   | V               | 150                 | 7                          | 1 / 0          | 21.87                  | 1.15            | <b>20.87</b> | 0.122        | 34.77           | -13.90      | <b>23.02</b> | 0.201        | 36.99            | -13.97      |
| 707.50          | 5                       | 16-QAM | V               | 150                 | 7                          | 1 / 24         | 20.20                  | 1.13            | <b>19.18</b> | 0.083        | 34.77           | -15.59      | <b>21.33</b> | 0.136        | 36.99            | -15.66      |
| 704.00          | 10                      | QPSK   | V               | 150                 | 5                          | 1 / 49         | 21.30                  | 1.12            | 20.27        | 0.106        | 34.77           | -14.50      | 22.42        | 0.174        | 36.99            | -14.57      |
| 707.50          | 10                      | QPSK   | V               | 150                 | 5                          | 1 / 49         | 21.48                  | 1.13            | 20.46        | 0.111        | 34.77           | -14.31      | 22.61        | 0.182        | 36.99            | -14.38      |
| 711.00          | 10                      | QPSK   | V               | 150                 | 5                          | 1 / 49         | 21.77                  | 1.14            | <b>20.76</b> | 0.119        | 34.77           | -14.01      | <b>22.91</b> | 0.196        | 36.99            | -14.08      |
| 707.50          | 10                      | 16-QAM | V               | 150                 | 5                          | 1 / 49         | 20.48                  | 1.13            | <b>19.46</b> | 0.088        | 34.77           | -15.31      | <b>21.61</b> | 0.145        | 36.99            | -15.38      |
| 714.50          | 3                       | QPSK   | H               | 150                 | 120                        | 1 / 0          | 20.79                  | 1.16            | 19.80        | 0.095        | 34.77           | -14.97      | 21.95        | 0.157        | 36.99            | -15.04      |

Table 7-3. ERP Data (Band 12)

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod.   | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | RB Size/Offset | Substitute Level [dBm] | Ant. Gain [dBi] | ERP [dBm]    | ERP [Watts]  | ERP Limit [dBm] | Margin [dB] | EIRP [dBm]   | EIRP [Watts] | EIRP Limit [dBm] | Margin [dB] |
|-----------------|-------------------------|--------|-----------------|---------------------|----------------------------|----------------|------------------------|-----------------|--------------|--------------|-----------------|-------------|--------------|--------------|------------------|-------------|
| 824.70          | 1.4                     | QPSK   | H               | 150                 | 3                          | 1 / 0          | 19.90                  | 1.50            | 19.25        | 0.084        | 38.45           | -19.20      | 21.40        | 0.138        | 40.61            | -19.21      |
| 836.50          | 1.4                     | QPSK   | H               | 150                 | 3                          | 1 / 0          | 20.70                  | 1.50            | 20.05        | 0.101        | 38.45           | -18.40      | 22.20        | 0.166        | 40.61            | -18.41      |
| 848.30          | 1.4                     | QPSK   | H               | 150                 | 3                          | 1 / 0          | 21.35                  | 1.50            | <b>20.70</b> | 0.117        | 38.45           | -17.75      | <b>22.85</b> | 0.193        | 40.61            | -17.76      |
| 848.30          | 1.4                     | 16-QAM | H               | 150                 | 3                          | 1 / 0          | 20.16                  | 1.50            | <b>19.51</b> | 0.089        | 38.45           | -18.94      | <b>21.66</b> | 0.147        | 40.61            | -18.95      |
| 825.50          | 3                       | QPSK   | H               | 150                 | 3                          | 1 / 0          | 19.83                  | 1.50            | 19.18        | 0.083        | 38.45           | -19.27      | 21.33        | 0.136        | 40.61            | -19.28      |
| 836.50          | 3                       | QPSK   | H               | 150                 | 3                          | 1 / 0          | 20.40                  | 1.50            | 19.75        | 0.094        | 38.45           | -18.70      | 21.90        | 0.155        | 40.61            | -18.71      |
| 847.50          | 3                       | QPSK   | H               | 150                 | 3                          | 1 / 0          | 21.40                  | 1.50            | <b>20.75</b> | <b>0.119</b> | 38.45           | -17.70      | <b>22.90</b> | <b>0.195</b> | 40.61            | -17.71      |
| 847.50          | 3                       | 16-QAM | H               | 150                 | 3                          | 1 / 0          | 20.25                  | 1.50            | <b>19.60</b> | 0.091        | 38.45           | -18.85      | <b>21.75</b> | 0.150        | 40.61            | -18.86      |
| 826.50          | 5                       | QPSK   | H               | 150                 | 359                        | 1 / 0          | 19.94                  | 1.50            | 19.29        | 0.085        | 38.45           | -19.16      | 21.44        | 0.139        | 40.61            | -19.17      |
| 836.50          | 5                       | QPSK   | H               | 150                 | 3                          | 1 / 0          | 20.44                  | 1.50            | 19.79        | 0.095        | 38.45           | -18.66      | 21.94        | 0.156        | 40.61            | -18.67      |
| 846.50          | 5                       | QPSK   | H               | 150                 | 359                        | 1 / 0          | 20.89                  | 1.50            | <b>20.24</b> | 0.106        | 38.45           | -18.21      | <b>22.39</b> | 0.173        | 40.61            | -18.22      |
| 846.50          | 5                       | 16-QAM | H               | 150                 | 359                        | 1 / 0          | 19.50                  | 1.50            | <b>18.85</b> | 0.077        | 38.45           | -19.60      | <b>21.00</b> | 0.126        | 40.61            | -19.61      |
| 829.00          | 10                      | QPSK   | H               | 150                 | 5                          | 1 / 0          | 20.23                  | 1.50            | 19.58        | 0.091        | 38.45           | -18.87      | 21.73        | 0.149        | 40.61            | -18.88      |
| 836.50          | 10                      | QPSK   | H               | 150                 | 343                        | 1 / 0          | 20.68                  | 1.50            | 20.03        | 0.101        | 38.45           | -18.42      | 22.18        | 0.165        | 40.61            | -18.43      |
| 844.00          | 10                      | QPSK   | H               | 150                 | 0                          | 1 / 0          | 20.98                  | 1.50            | <b>20.33</b> | 0.108        | 38.45           | -18.12      | <b>22.48</b> | 0.177        | 40.61            | -18.13      |
| 844.00          | 10                      | 16-QAM | H               | 150                 | 0                          | 1 / 0          | 19.72                  | 1.50            | <b>19.07</b> | 0.081        | 38.45           | -19.38      | <b>21.22</b> | 0.132        | 40.61            | -19.39      |
| 847.50          | 3                       | QPSK   | V               | 150                 | 358                        | 1 / 0          | 20.50                  | 1.50            | 19.85        | 0.097        | 38.45           | -18.60      | 22.00        | 0.158        | 40.61            | -18.61      |

Table 7-4. ERP Data (Band 5)

|                                         |                                                                                                                                                                                                                     |                               |                                 |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT (CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                      | EUT Type:<br>Portable Handset | Page 100 of 122                 |

| 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               | 118                 | 222                        | 1 / 0          | 14.96                  | 8.23            | <b>23.19</b> | 0.208        | 30.00            | -6.81       |
| 1732.50         | 1.4                     | QPSK   | H               | 116                 | 43                         | 1 / 0          | 13.97                  | 8.06            | 22.03        | 0.160        | 30.00            | -7.97       |
| 1754.30         | 1.4                     | QPSK   | H               | 120                 | 38                         | 1 / 0          | 13.20                  | 7.90            | 21.10        | 0.129        | 30.00            | -8.90       |
| 1710.70         | 1.4                     | 16-QAM | H               | 118                 | 222                        | 1 / 0          | 13.67                  | 8.23            | <b>21.90</b> | 0.155        | 30.00            | -8.10       |
| 1711.50         | 3                       | QPSK   | H               | 118                 | 220                        | 1 / 0          | 15.03                  | 8.22            | <b>23.25</b> | 0.211        | 30.00            | -6.75       |
| 1732.50         | 3                       | QPSK   | H               | 124                 | 26                         | 1 / 0          | 14.67                  | 8.06            | 22.73        | 0.188        | 30.00            | -7.27       |
| 1753.50         | 3                       | QPSK   | H               | 122                 | 31                         | 1 / 0          | 13.50                  | 7.90            | 21.40        | 0.138        | 30.00            | -8.60       |
| 1711.50         | 3                       | 16-QAM | H               | 118                 | 220                        | 1 / 0          | 14.06                  | 8.22            | <b>22.28</b> | 0.169        | 30.00            | -7.72       |
| 1712.50         | 5                       | QPSK   | H               | 122                 | 222                        | 1 / 0          | 14.68                  | 8.21            | 22.89        | 0.195        | 30.00            | -7.11       |
| 1732.50         | 5                       | QPSK   | H               | 124                 | 5                          | 1 / 0          | 14.84                  | 8.06            | 22.90        | 0.195        | 30.00            | -7.10       |
| 1752.50         | 5                       | QPSK   | H               | 127                 | 33                         | 1 / 0          | 15.21                  | 7.91            | <b>23.12</b> | 0.205        | 30.00            | -6.88       |
| 1752.50         | 5                       | 16-QAM | H               | 127                 | 33                         | 1 / 0          | 13.75                  | 7.91            | <b>21.66</b> | 0.147        | 30.00            | -8.34       |
| 1715.00         | 10                      | QPSK   | H               | 117                 | 224                        | 1 / 0          | 15.25                  | 8.19            | 23.44        | 0.221        | 30.00            | -6.56       |
| 1732.50         | 10                      | QPSK   | H               | 117                 | 222                        | 1 / 0          | 14.39                  | 8.06            | 22.45        | 0.176        | 30.00            | -7.55       |
| 1750.00         | 10                      | QPSK   | H               | 118                 | 37                         | 1 / 0          | 15.84                  | 7.93            | <b>23.77</b> | <b>0.238</b> | 30.00            | -6.23       |
| 1750.00         | 10                      | 16-QAM | H               | 118                 | 37                         | 1 / 0          | 14.46                  | 7.93            | <b>22.39</b> | 0.173        | 30.00            | -7.61       |
| 1717.50         | 15                      | QPSK   | H               | 124                 | 15                         | 1 / 0          | 14.58                  | 8.17            | 22.76        | 0.189        | 30.00            | -7.24       |
| 1732.50         | 15                      | QPSK   | H               | 125                 | 5                          | 1 / 0          | 14.91                  | 8.06            | 22.97        | 0.198        | 30.00            | -7.03       |
| 1747.50         | 15                      | QPSK   | H               | 126                 | 5                          | 1 / 0          | 15.59                  | 7.95            | <b>23.54</b> | 0.226        | 30.00            | -6.46       |
| 1747.50         | 15                      | 16-QAM | H               | 126                 | 5                          | 1 / 0          | 14.30                  | 7.95            | <b>22.25</b> | 0.168        | 30.00            | -7.75       |
| 1720.00         | 20                      | QPSK   | H               | 128                 | 5                          | 1 / 0          | 13.82                  | 8.15            | <b>21.98</b> | 0.158        | 30.00            | -8.02       |
| 1732.50         | 20                      | QPSK   | H               | 128                 | 6                          | 1 / 0          | 12.70                  | 8.06            | 20.76        | 0.119        | 30.00            | -9.24       |
| 1745.00         | 20                      | QPSK   | H               | 129                 | 5                          | 1 / 0          | 14.00                  | 7.97            | 21.97        | 0.157        | 30.00            | -8.03       |
| 1745.00         | 20                      | 16-QAM | H               | 129                 | 5                          | 1 / 0          | 13.12                  | 7.97            | <b>21.09</b> | 0.128        | 30.00            | -8.91       |
| 1750.00         | 10                      | QPSK   | V               | 110                 | 305                        | 1 / 0          | 9.91                   | 7.93            | 17.84        | 0.061        | 30.00            | -12.16      |

Table 7-5. EIRP Data (Band 4)

|                                         |                                                                                                                                  |                               |                                                                                       |                                 |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                   | EUT Type:<br>Portable Handset |                                                                                       | Page 101 of 122                 |

| 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   | H               | 113                 | 7                          | 1 / 0          | 13.59                  | 7.71            | 21.31        | 0.135        | 33.01            | -11.70      |
| 1880.00         | 1.4                     | QPSK   | H               | 113                 | 5                          | 1 / 0          | 14.61                  | 7.80            | <b>22.41</b> | 0.174        | 33.01            | -10.60      |
| 1909.30         | 1.4                     | QPSK   | H               | 115                 | 4                          | 1 / 0          | 13.85                  | 7.88            | 21.74        | 0.149        | 33.01            | -11.27      |
| 1880.00         | 1.4                     | 16-QAM | H               | 113                 | 5                          | 1 / 0          | 13.52                  | 7.80            | <b>21.32</b> | 0.136        | 33.01            | -11.69      |
| 1851.50         | 3                       | QPSK   | H               | 118                 | 230                        | 1 / 0          | 14.44                  | 7.72            | <b>22.16</b> | 0.164        | 33.01            | -10.85      |
| 1880.00         | 3                       | QPSK   | H               | 112                 | 200                        | 1 / 0          | 13.75                  | 7.80            | 21.55        | 0.143        | 33.01            | -11.46      |
| 1908.50         | 3                       | QPSK   | H               | 115                 | 5                          | 1 / 0          | 13.73                  | 7.88            | 21.61        | 0.145        | 33.01            | -11.40      |
| 1851.50         | 3                       | 16-QAM | H               | 118                 | 230                        | 1 / 0          | 13.30                  | 7.72            | <b>21.02</b> | 0.126        | 33.01            | -11.99      |
| 1852.50         | 5                       | QPSK   | H               | 112                 | 188                        | 1 / 0          | 13.58                  | 7.72            | 21.30        | 0.135        | 33.01            | -11.71      |
| 1880.00         | 5                       | QPSK   | H               | 114                 | 193                        | 1 / 0          | 15.27                  | 7.80            | <b>23.07</b> | <b>0.203</b> | 33.01            | -9.94       |
| 1907.50         | 5                       | QPSK   | H               | 146                 | 190                        | 1 / 0          | 13.04                  | 7.88            | 20.92        | 0.124        | 33.01            | -12.09      |
| 1880.00         | 5                       | 16-QAM | H               | 114                 | 193                        | 1 / 0          | 14.05                  | 7.80            | <b>21.85</b> | 0.153        | 33.01            | -11.16      |
| 1855.00         | 10                      | QPSK   | H               | 117                 | 192                        | 1 / 0          | 13.56                  | 7.73            | 21.29        | 0.135        | 33.01            | -11.72      |
| 1880.00         | 10                      | QPSK   | H               | 111                 | 186                        | 1 / 0          | 14.88                  | 7.80            | <b>22.68</b> | 0.186        | 33.01            | -10.33      |
| 1905.00         | 10                      | QPSK   | H               | 117                 | 194                        | 1 / 0          | 12.89                  | 7.87            | 20.77        | 0.119        | 33.01            | -12.24      |
| 1880.00         | 10                      | 16-QAM | H               | 111                 | 186                        | 1 / 0          | 13.89                  | 7.80            | <b>21.69</b> | 0.148        | 33.01            | -11.32      |
| 1857.50         | 15                      | QPSK   | H               | 115                 | 5                          | 1 / 0          | 13.43                  | 7.73            | 21.17        | 0.131        | 33.01            | -11.84      |
| 1880.00         | 15                      | QPSK   | H               | 112                 | 3                          | 1 / 0          | 14.29                  | 7.80            | 22.09        | 0.162        | 33.01            | -10.92      |
| 1902.50         | 15                      | QPSK   | H               | 116                 | 5                          | 1 / 0          | 14.60                  | 7.87            | <b>22.47</b> | 0.177        | 33.01            | -10.54      |
| 1902.50         | 15                      | 16-QAM | H               | 116                 | 5                          | 1 / 0          | 13.79                  | 7.87            | <b>21.66</b> | 0.147        | 33.01            | -11.35      |
| 1860.00         | 20                      | QPSK   | H               | 116                 | 5                          | 1 / 0          | 13.42                  | 7.74            | 21.17        | 0.131        | 33.01            | -11.85      |
| 1880.00         | 20                      | QPSK   | H               | 115                 | 5                          | 1 / 0          | 14.20                  | 7.80            | 22.00        | 0.159        | 33.01            | -11.01      |
| 1900.00         | 20                      | QPSK   | H               | 114                 | 5                          | 1 / 0          | 14.64                  | 7.86            | <b>22.50</b> | 0.178        | 33.01            | -10.51      |
| 1900.00         | 20                      | 16-QAM | H               | 114                 | 5                          | 1 / 0          | 13.54                  | 7.86            | <b>21.40</b> | 0.138        | 33.01            | -11.61      |
| 1880.00         | 5                       | QPSK   | V               | 142                 | 184                        | 1 / 0          | 10.84                  | 7.88            | 18.73        | 0.075        | 33.01            | -14.28      |

Table 7-6. EIRP Data (Band 2)

|                                         |                                                                                                                                  |                               |                                                                                       |                                 |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                   | EUT Type:<br>Portable Handset |                                                                                       | Page 102 of 122                 |

## 7.7 Radiated Spurious Emissions Measurements

### 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 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

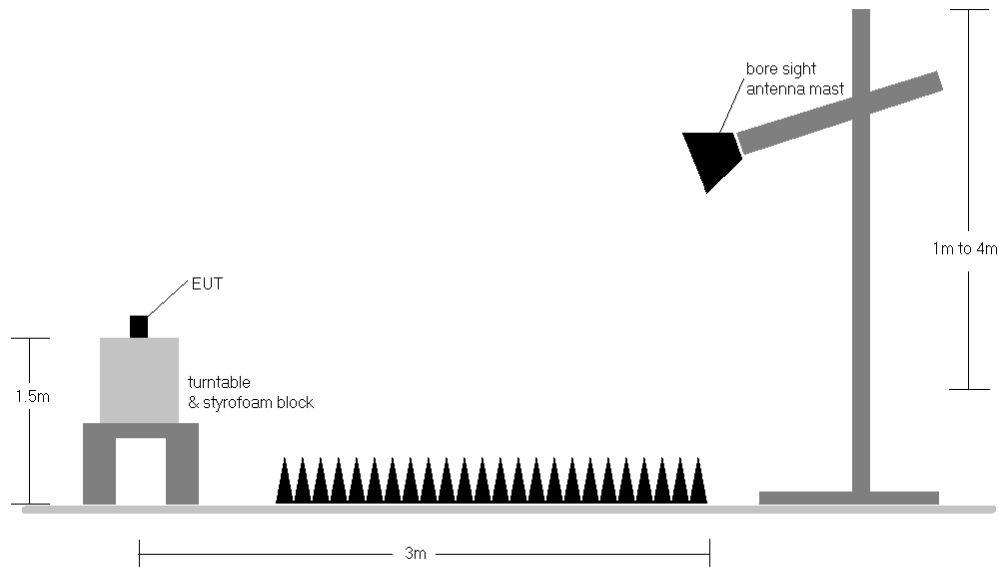
### Test Settings

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: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 103 of 122                 |

## Test Setup

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



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

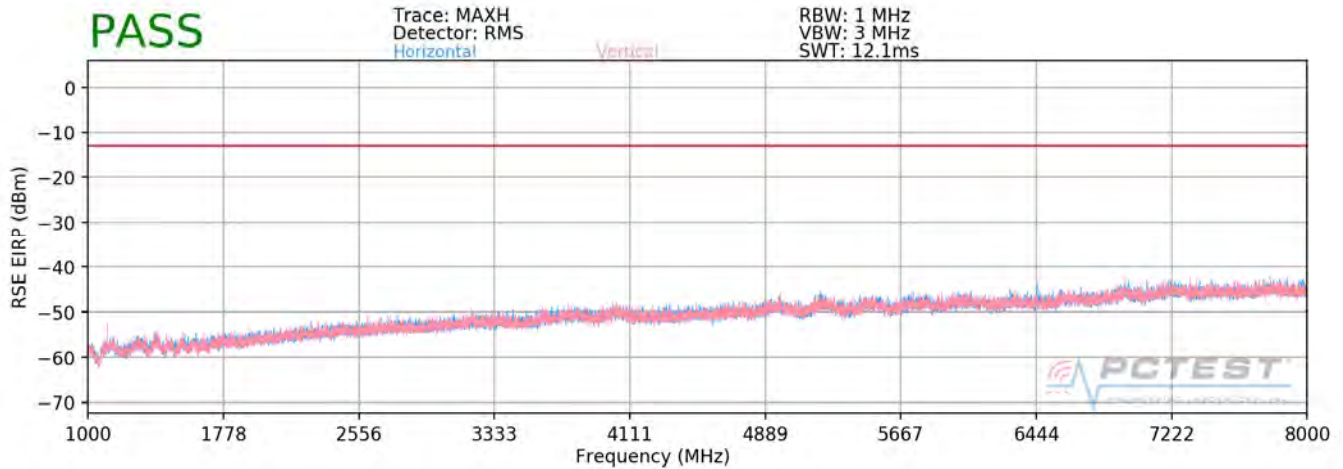
## Test Notes

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

|                                         |                                                                                     |                                       |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                      | EUT Type:<br>Portable Handset         |                                                                                       | Page 104 of 122                 |



## Band 12



**Plot 7-156. Radiated Spurious Plot above 1GHz (Band 12)**

OPERATING FREQUENCY: 700.50 MHz  
CHANNEL: 23025  
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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 1401.00         | V               | 150                 | 271                        | -66.96                           | 3.78                          | -63.18                        | -50.2       |
| 2101.50         | V               | 150                 | 271                        | -62.91                           | 4.80                          | -58.11                        | -45.1       |
| 2802.00         | V               | -                   | -                          | -66.70                           | 5.64                          | -61.06                        | -48.1       |
| 3502.50         | V               | -                   | -                          | -66.47                           | 6.60                          | -59.87                        | -46.9       |
| 4203.00         | V               | -                   | -                          | -66.97                           | 7.70                          | -59.27                        | -46.3       |

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

|                                         |                                               |                                       |  |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |  | Page 105 of 122                 |

OPERATING FREQUENCY: 707.50 MHz  
 CHANNEL: 23095  
 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 1415.00         | V               | 150                 | 275                        | -66.96                           | 3.90                          | -63.05                        | -50.1       |
| 2122.50         | V               | 150                 | 271                        | -62.03                           | 4.78                          | -57.25                        | -44.2       |
| 2830.00         | V               | -                   | -                          | -66.35                           | 5.73                          | -60.62                        | -47.6       |
| 3537.50         | V               | -                   | -                          | -66.04                           | 6.54                          | -59.50                        | -46.5       |
| 4245.00         | V               | -                   | -                          | -65.86                           | 7.75                          | -58.11                        | -45.1       |

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

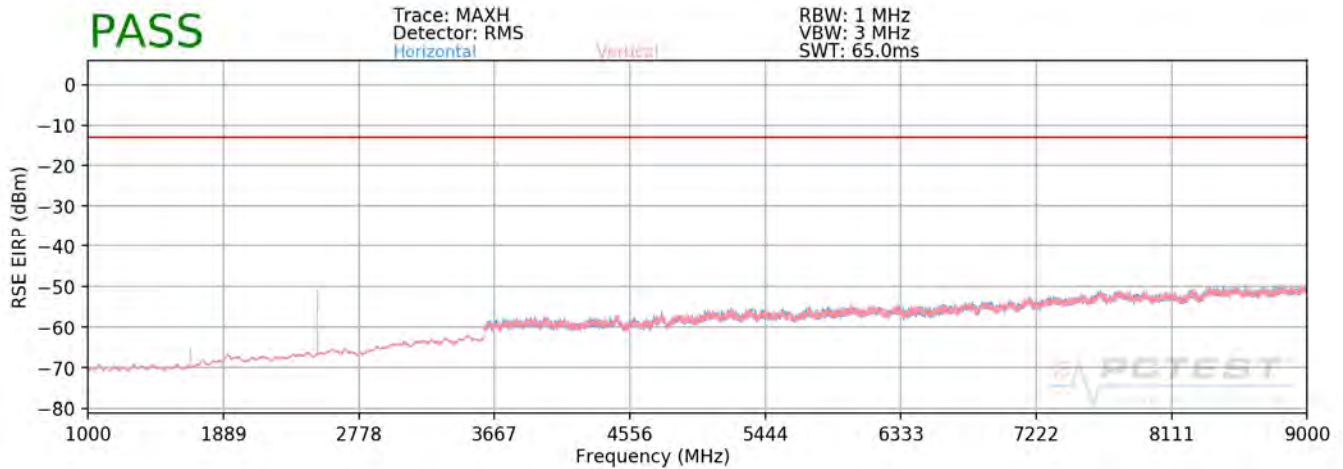
OPERATING FREQUENCY: 714.50 MHz  
 CHANNEL: 23165  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

| 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 1429.00         | V               | 150                 | 265                        | -66.46                           | 4.03                          | -62.43                        | -49.4       |
| 2143.50         | V               | 150                 | 261                        | -62.11                           | 4.77                          | -57.35                        | -44.3       |
| 2858.00         | V               | -                   | -                          | -66.22                           | 5.79                          | -60.43                        | -47.4       |
| 3572.50         | V               | -                   | -                          | -65.93                           | 6.58                          | -59.35                        | -46.3       |
| 4287.00         | V               | -                   | -                          | -66.78                           | 7.81                          | -58.97                        | -46.0       |

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

|                                         |                                                                                                                                                                                                                     |                               |                                 |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT (CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                      | EUT Type:<br>Portable Handset | Page 106 of 122                 |

## Band 5



**Plot 7-157. Radiated Spurious Plot above 1GHz (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               | 171                 | 123                        | -68.80                           | 8.95                          | -59.86                        | -46.9       |
| 2476.50         | H               | 111                 | 349                        | -57.57                           | 9.66                          | -47.91                        | -34.9       |
| 3302.00         | H               | -                   | -                          | -75.38                           | 9.58                          | -65.80                        | -52.8       |

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

|                                         |                                           |                               |                                 |
|-----------------------------------------|-------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT (CERTIFICATION)</b> |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018            | EUT Type:<br>Portable Handset | Page 107 of 122                 |

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               | 165                 | 188                        | -68.99                           | 8.95                          | -60.04                        | -47.0       |
| 2509.50         | H               | 138                 | 356                        | -62.07                           | 9.75                          | -52.32                        | -39.3       |
| 3346.00         | H               | -                   | -                          | -74.42                           | 9.60                          | -64.81                        | -51.8       |

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

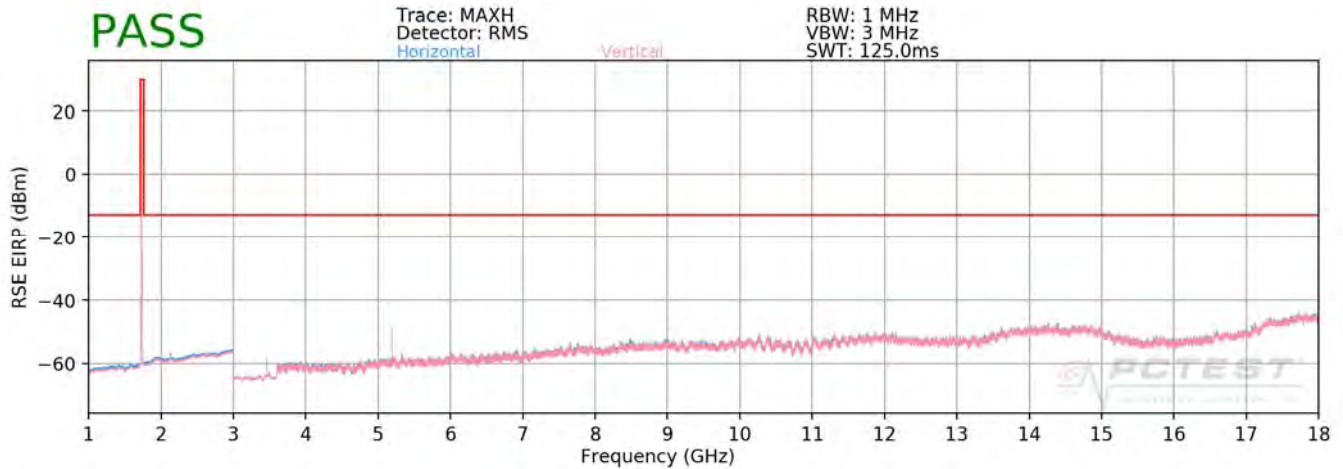
OPERATING FREQUENCY: 847.50 MHz  
 CHANNEL: 20635  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

| 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               | 164                 | 200                        | -69.88                           | 8.95                          | -60.93                        | -47.9       |
| 2542.50         | H               | 129                 | 344                        | -60.51                           | 9.74                          | -50.76                        | -37.8       |
| 3390.00         | H               | -                   | -                          | -75.44                           | 9.76                          | -65.68                        | -52.7       |

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

|                                         |                                                                                                                                                                                                                     |                               |                                 |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT (CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                      | EUT Type:<br>Portable Handset | Page 108 of 122                 |

## Band 4



**Plot 7-158. Radiated Spurious Plot above 1GHz (Band 4)**

OPERATING FREQUENCY: 1715.00 MHz  
CHANNEL: 20000  
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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 3430.00         | H               | 178                 | 16                         | -68.21                           | 9.83                          | -58.37                        | -45.4       |
| 5145.00         | H               | -                   | -                          | -72.08                           | 10.69                         | -61.39                        | -48.4       |
| 6860.00         | H               | 109                 | 357                        | -68.59                           | 11.65                         | -56.94                        | -43.9       |
| 8575.00         | H               | -                   | -                          | -66.69                           | 11.12                         | -55.57                        | -42.6       |

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

|                                         |                                               |                                       |  |                                 |
|-----------------------------------------|-----------------------------------------------|---------------------------------------|--|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                | EUT Type:<br>Portable Handset         |  | Page 109 of 122                 |

OPERATING FREQUENCY: 1732.50 MHz  
 CHANNEL: 20175  
 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 3465.00         | H               | 111                 | 44                         | -68.02                           | 9.88                          | -58.14                        | -45.1       |
| 5197.50         | H               | 110                 | 314                        | -65.47                           | 10.76                         | -54.72                        | -41.7       |
| 6930.00         | H               | 111                 | 357                        | -69.03                           | 11.74                         | -57.29                        | -44.3       |
| 8662.50         | H               | -                   | -                          | -66.35                           | 11.02                         | -55.33                        | -42.3       |

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

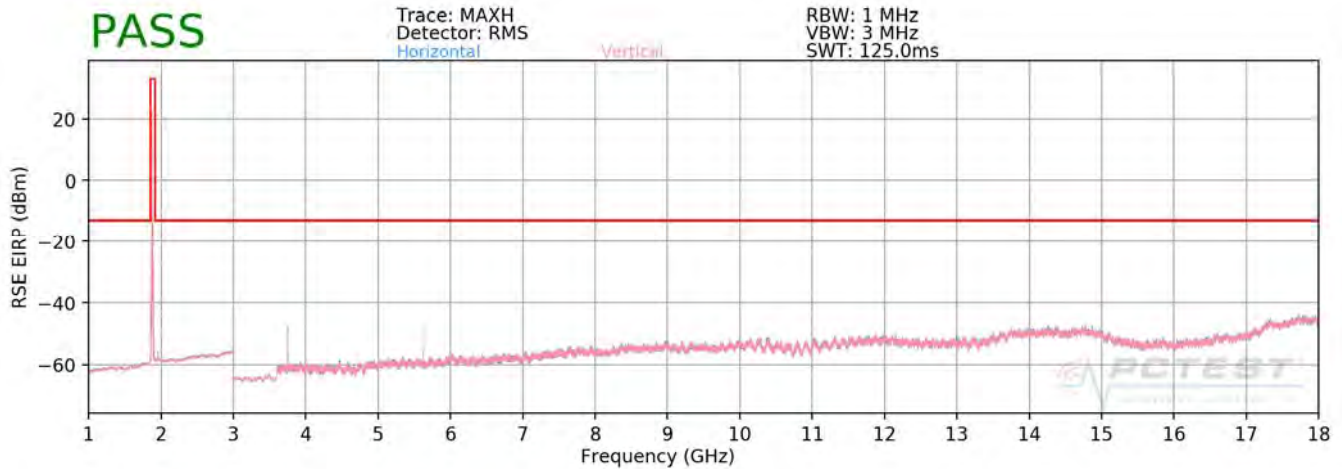
OPERATING FREQUENCY: 1750.00 MHz  
 CHANNEL: 20350  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 10.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

| 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 3500.00         | H               | 110                 | 35                         | -65.15                           | 9.93                          | -55.22                        | -42.2       |
| 5250.00         | H               | -                   | -                          | -71.13                           | 10.72                         | -60.41                        | -47.4       |
| 7000.00         | H               | 381                 | 1                          | -69.59                           | 11.87                         | -57.73                        | -44.7       |
| 8750.00         | H               | -                   | -                          | -66.58                           | 10.97                         | -55.60                        | -42.6       |

Table 7-15. Radiated Spurious Data (Band 4 – High Channel)

|                                         |                                                                                     |                               |                                       |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  |                               | MEASUREMENT REPORT<br>(CERTIFICATION) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                      | EUT Type:<br>Portable Handset | Page 110 of 122                       |                                                                                       |                                 |

## Band 2



**Plot 7-159. Radiated Spurious Plot above 1GHz (Band 2)**

OPERATING FREQUENCY: 1855.00 MHz

CHANNEL: 18650

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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 3710.00         | H               | 119                 | 31                         | -56.58                           | 9.55                          | -47.03                        | -34.0       |
| 5565.00         | H               | 110                 | 21                         | -72.12                           | 10.96                         | -61.16                        | -48.2       |
| 7420.00         | H               | -                   | -                          | -70.27                           | 10.97                         | -59.30                        | -46.3       |

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

|                                         |                                           |                               |                                 |
|-----------------------------------------|-------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       | <b>MEASUREMENT REPORT (CERTIFICATION)</b> |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018            | EUT Type:<br>Portable Handset | Page 111 of 122                 |

OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 3760.00         | H               | 110                 | 41                         | -57.23                           | 9.37                          | -47.87                        | -34.9       |
| 5640.00         | H               | 111                 | 29                         | -69.49                           | 11.17                         | -58.32                        | -45.3       |
| 7520.00         | H               | -                   | -                          | -69.35                           | 11.11                         | -58.24                        | -45.2       |

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

OPERATING FREQUENCY: 1905.00 MHz  
 CHANNEL: 19150  
 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 3810.00         | H               | 113                 | 17                         | -52.56                           | 9.29                          | -43.27                        | -30.3       |
| 5715.00         | H               | 113                 | 164                        | -69.44                           | 11.35                         | -58.10                        | -45.1       |
| 7620.00         | H               | -                   | -                          | -69.34                           | 11.29                         | -58.05                        | -45.0       |

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

|                                         |                                                                                                                                                                                                                     |                               |                                 |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT (CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                      | EUT Type:<br>Portable Handset | Page 112 of 122                 |



## 7.8 Frequency Stability / Temperature Variation

### 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, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24, 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-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

|                                                |                                                                                                                                   |                                      |                                                                                                                              |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| FCC ID: ZNFX410CS                              |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |                                      |  <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1804200078-03.ZNF | <b>Test Dates:</b><br>4/24 - 5/9/2018                                                                                             | <b>EUT Type:</b><br>Portable Handset | Page 113 of 122                                                                                                              |

## Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz  
 CHANNEL: 23790  
 REFERENCE VOLTAGE: 4.30 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 4.30        | + 20 (Ref) | 707,500,293    | 293             | 0.0000414     |
| 100 %          |             | - 30       | 707,500,120    | 120             | 0.0000170     |
| 100 %          |             | - 20       | 707,499,921    | -79             | -0.0000112    |
| 100 %          |             | - 10       | 707,500,005    | 5               | 0.0000007     |
| 100 %          |             | 0          | 707,500,007    | 7               | 0.0000010     |
| 100 %          |             | + 10       | 707,499,938    | -62             | -0.0000088    |
| 100 %          |             | + 20       | 707,500,244    | 244             | 0.0000345     |
| 100 %          |             | + 30       | 707,500,165    | 165             | 0.0000233     |
| 100 %          |             | + 40       | 707,499,712    | -288            | -0.0000407    |
| 100 %          |             | + 50       | 707,500,227    | 227             | 0.0000321     |
| BATT. ENDPOINT | 3.40        | + 20       | 707,500,149    | 149             | 0.0000211     |

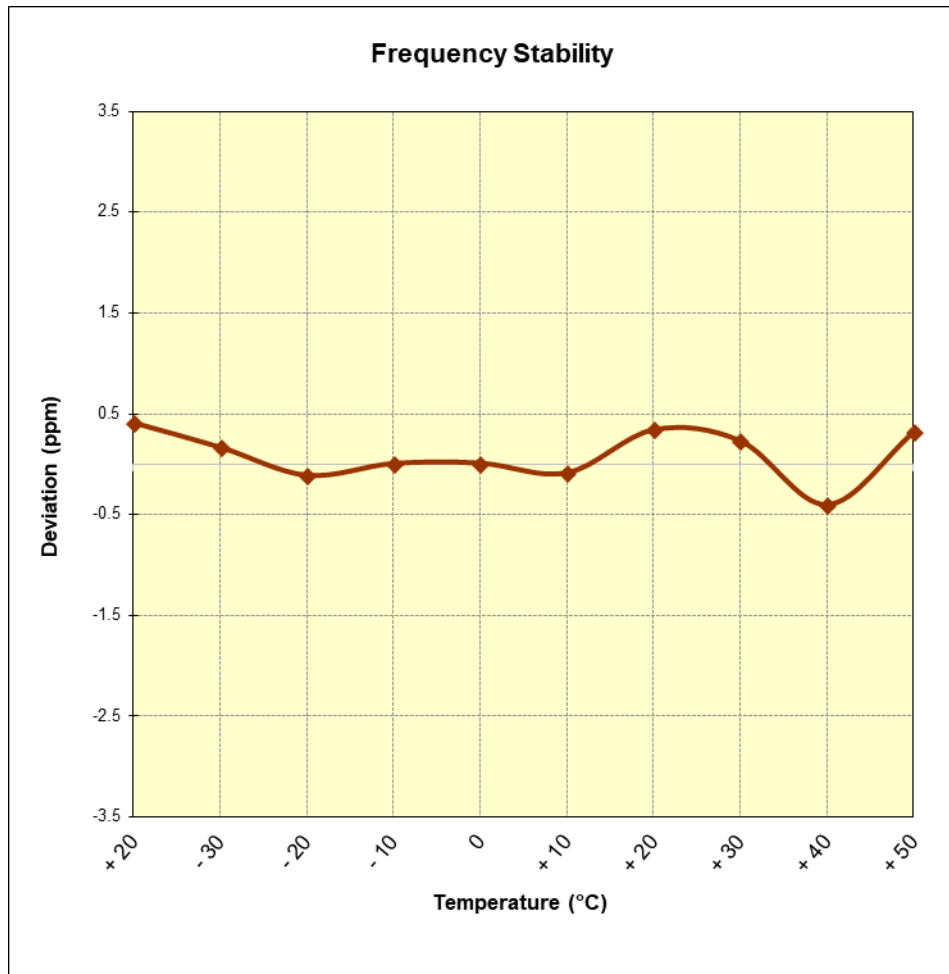
**Table 7-19. Frequency Stability Data (Band 12)**

### Note:

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

|                                         |                                                                                                                                  |                               |                                                                                       |                                 |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT</b><br>(CERTIFICATION) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                   | EUT Type:<br>Portable Handset |                                                                                       | Page 114 of 122                 |

## Band 12 Frequency Stability Measurements



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

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 115 of 122                 |

## Band 5 Frequency Stability Measurements

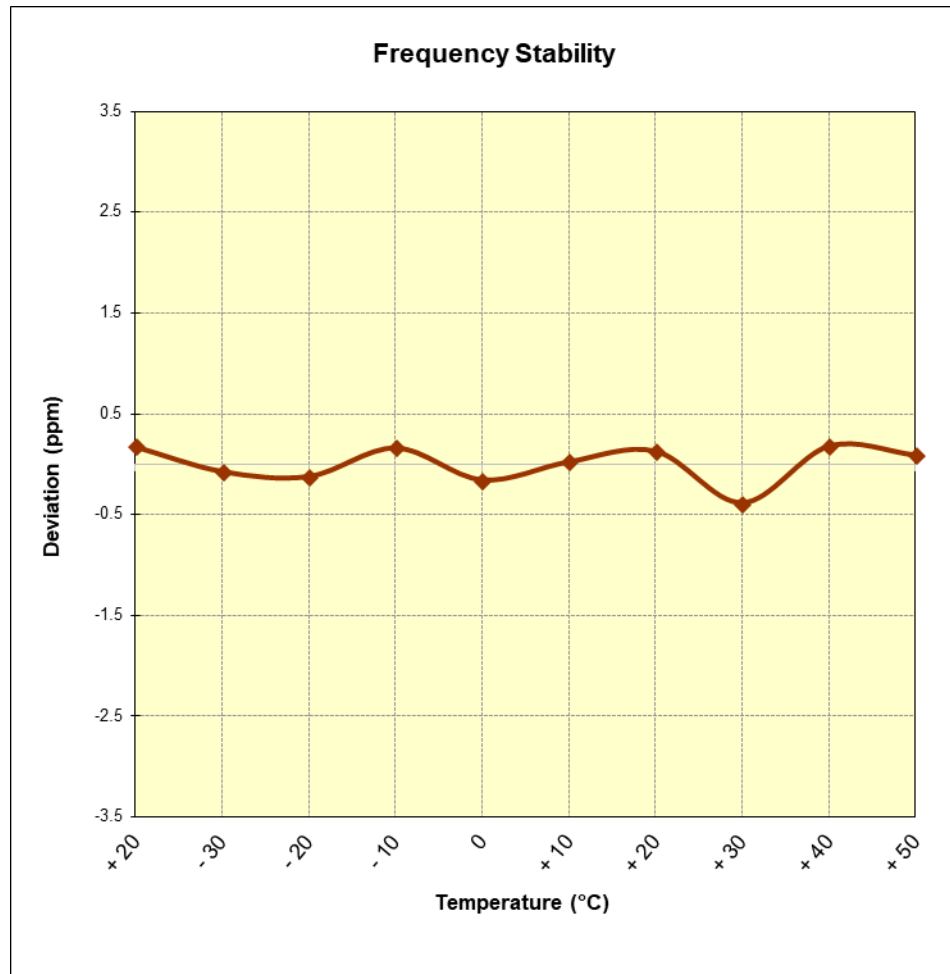
OPERATING FREQUENCY: 836,500,000 Hz  
 CHANNEL: 20525  
 REFERENCE VOLTAGE: 4.30 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 4.30        | + 20 (Ref) | 836,500,148    | 148             | 0.0000177     |
| 100 %          |             | - 30       | 836,499,939    | -61             | -0.0000073    |
| 100 %          |             | - 20       | 836,499,898    | -102            | -0.0000122    |
| 100 %          |             | - 10       | 836,500,138    | 138             | 0.0000165     |
| 100 %          |             | 0          | 836,499,869    | -131            | -0.0000157    |
| 100 %          |             | + 10       | 836,500,022    | 22              | 0.0000026     |
| 100 %          |             | + 20       | 836,500,111    | 111             | 0.0000133     |
| 100 %          |             | + 30       | 836,499,676    | -324            | -0.0000387    |
| 100 %          |             | + 40       | 836,500,154    | 154             | 0.0000184     |
| 100 %          |             | + 50       | 836,500,079    | 79              | 0.0000094     |
| BATT. ENDPOINT | 3.40        | + 20       | 836,500,001    | 1               | 0.0000001     |

Table 7-20. Frequency Stability Data (Band 5)

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 116 of 122                 |

## Band 5 Frequency Stability Measurements



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

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 117 of 122                 |

## Band 4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,732,500,000 Hz  
 CHANNEL: 20175  
 REFERENCE VOLTAGE: 4.30 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 4.30        | + 20 (Ref) | 1,732,500,054  | 54              | 0.0000031     |
| 100 %          |             | - 30       | 1,732,499,835  | -165            | -0.0000095    |
| 100 %          |             | - 20       | 1,732,499,988  | -12             | -0.0000007    |
| 100 %          |             | - 10       | 1,732,500,001  | 1               | 0.0000001     |
| 100 %          |             | 0          | 1,732,500,320  | 320             | 0.0000185     |
| 100 %          |             | + 10       | 1,732,499,894  | -106            | -0.0000061    |
| 100 %          |             | + 20       | 1,732,499,855  | -145            | -0.0000084    |
| 100 %          |             | + 30       | 1,732,500,120  | 120             | 0.0000069     |
| 100 %          |             | + 40       | 1,732,500,425  | 425             | 0.0000245     |
| 100 %          |             | + 50       | 1,732,499,943  | -57             | -0.0000033    |
| BATT. ENDPOINT | 3.40        | + 20       | 1,732,500,280  | 280             | 0.0000162     |

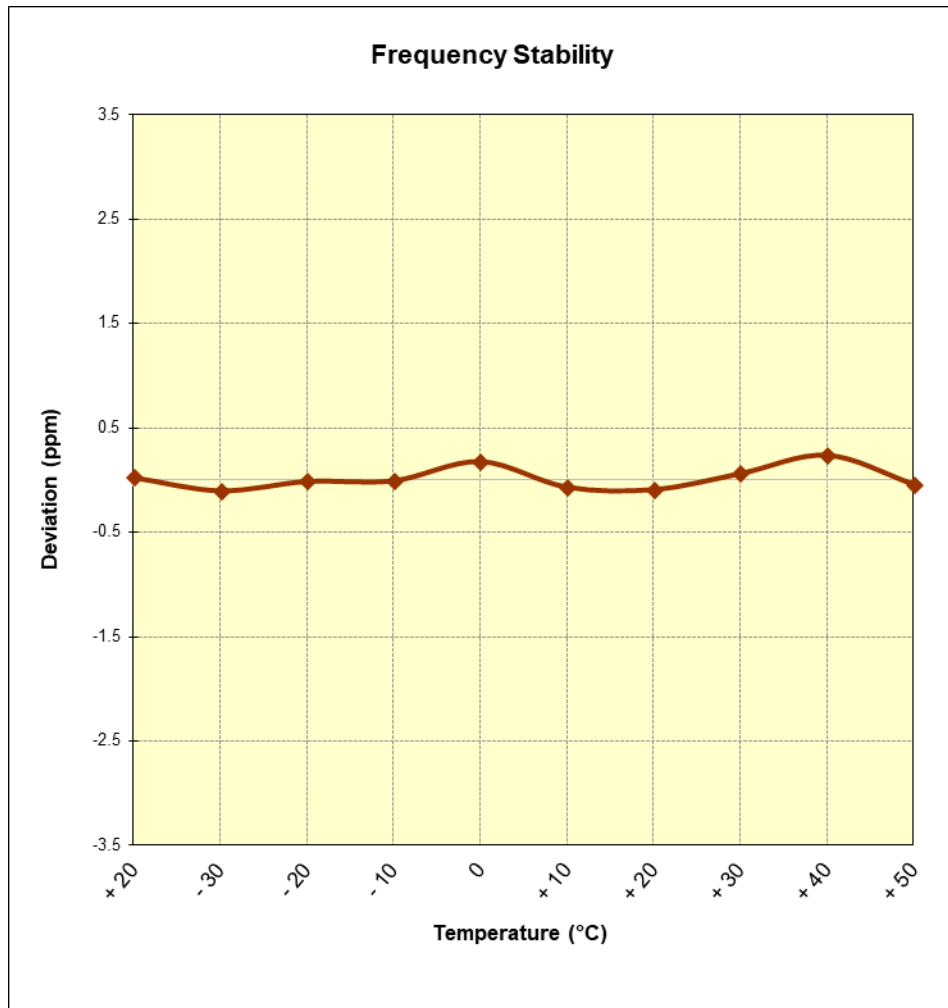
**Table 7-21. Frequency Stability Data (Band 4)**

### 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: ZNFX410CS                       |  <b>MEASUREMENT REPORT (CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                      | EUT Type:<br>Portable Handset | Page 118 of 122                 |

## Band 4 Frequency Stability Measurements



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

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 119 of 122                 |

## Band 2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 4.30 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

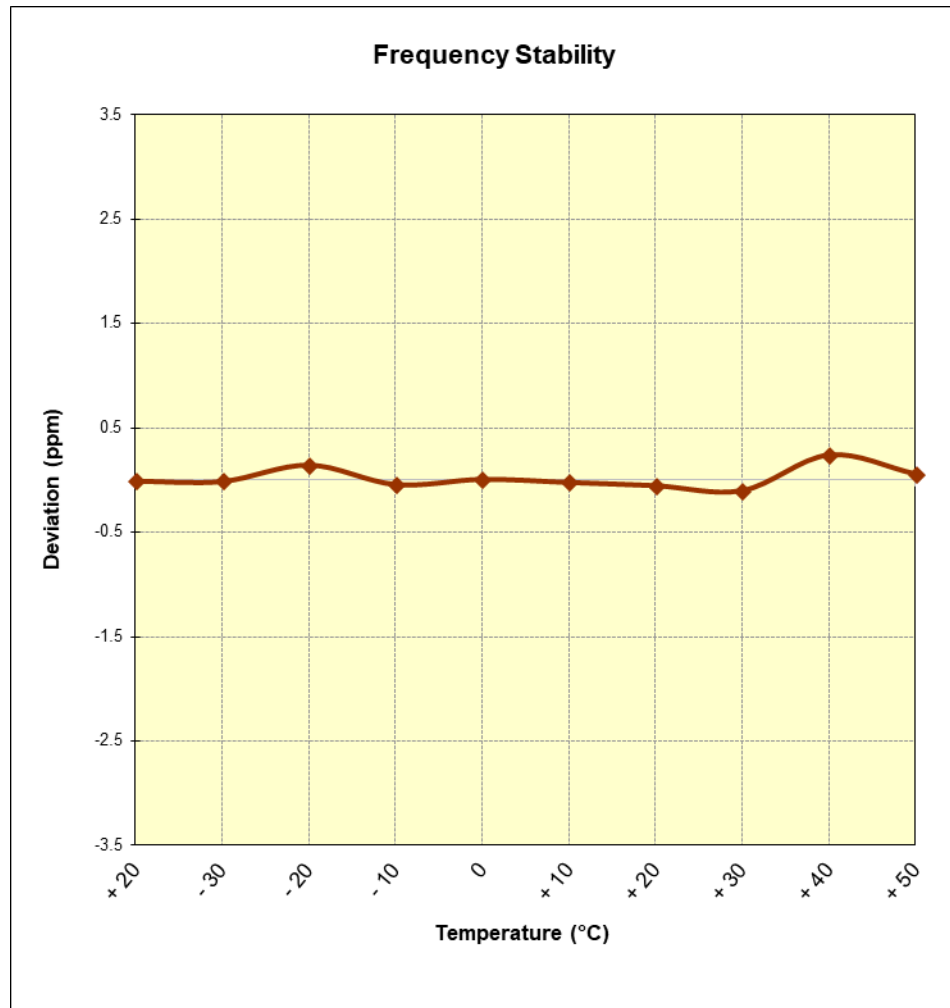
| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 4.30        | + 20 (Ref) | 1,879,999,994  | -6              | -0.0000003    |
| 100 %          |             | - 30       | 1,879,999,987  | -13             | -0.0000007    |
| 100 %          |             | - 20       | 1,880,000,284  | 284             | 0.0000151     |
| 100 %          |             | - 10       | 1,879,999,933  | -67             | -0.0000036    |
| 100 %          |             | 0          | 1,880,000,026  | 26              | 0.0000014     |
| 100 %          |             | + 10       | 1,879,999,970  | -30             | -0.0000016    |
| 100 %          |             | + 20       | 1,879,999,912  | -88             | -0.0000047    |
| 100 %          |             | + 30       | 1,879,999,824  | -176            | -0.0000094    |
| 100 %          |             | + 40       | 1,880,000,467  | 467             | 0.0000248     |
| 100 %          |             | + 50       | 1,880,000,123  | 123             | 0.0000065     |
| BATT. ENDPOINT | 3.40        | + 20       | 1,880,000,353  | 353             | 0.0000188     |

Table 7-22. Frequency Stability Data (Band 2)

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 120 of 122                 |



## Band 2 Frequency Stability Measurements



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

|                                         |                                                                                                                                                                                                                         |                               |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                                                                                                          | EUT Type:<br>Portable Handset | Page 121 of 123                 |

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFX410CS** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

|                                         |                                                                                                                                   |                               |                                                                                       |                                 |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFX410CS                       |  <b>MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1804200078-03.ZNF | Test Dates:<br>4/24 - 5/9/2018                                                                                                    | EUT Type:<br>Portable Handset | Page 122 of 122                                                                       |                                 |