

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.

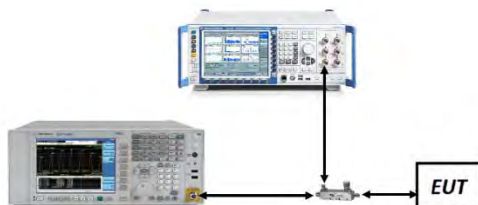


Figure 7-3. Test Instrument & Measurement Setup

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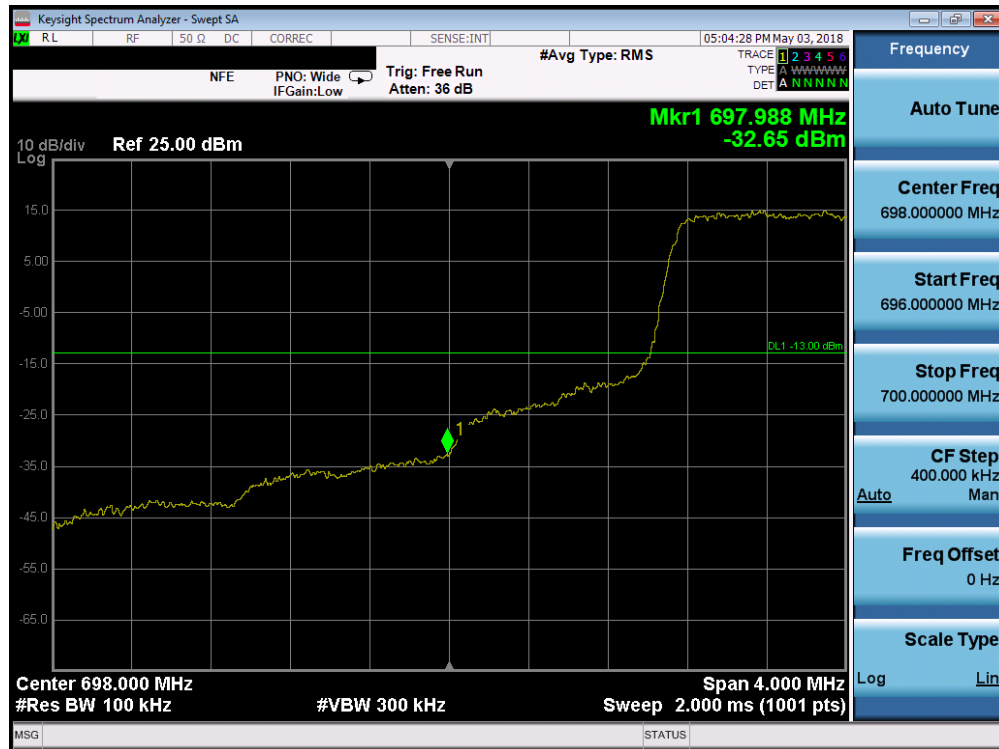
Test Notes

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.

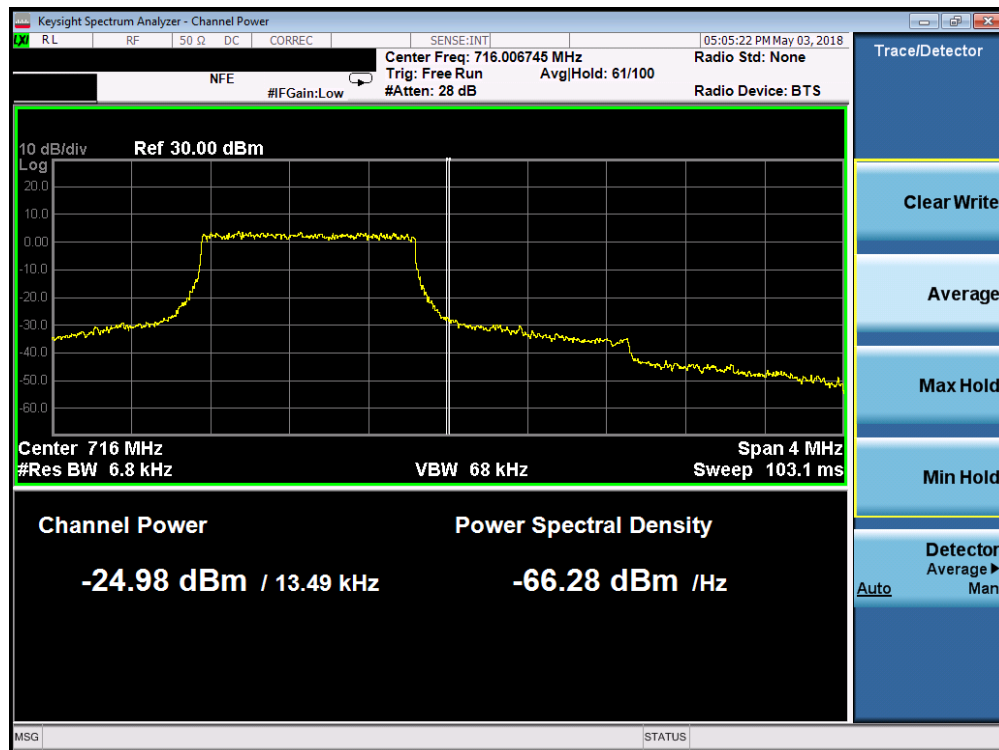
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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Band 12

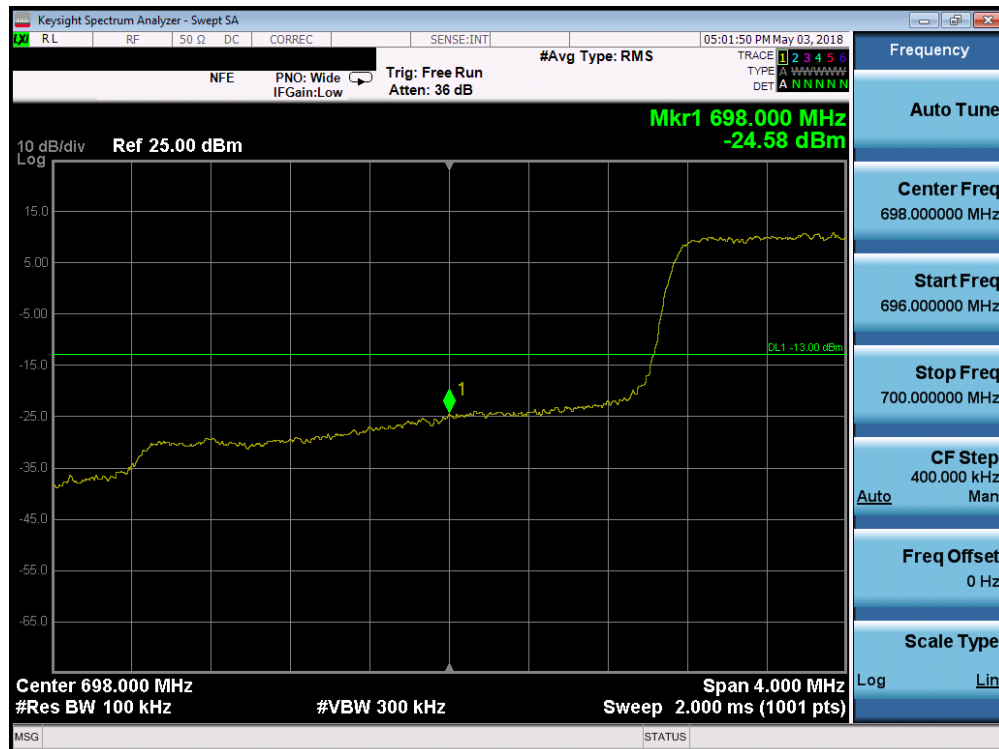


Plot 7-80. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

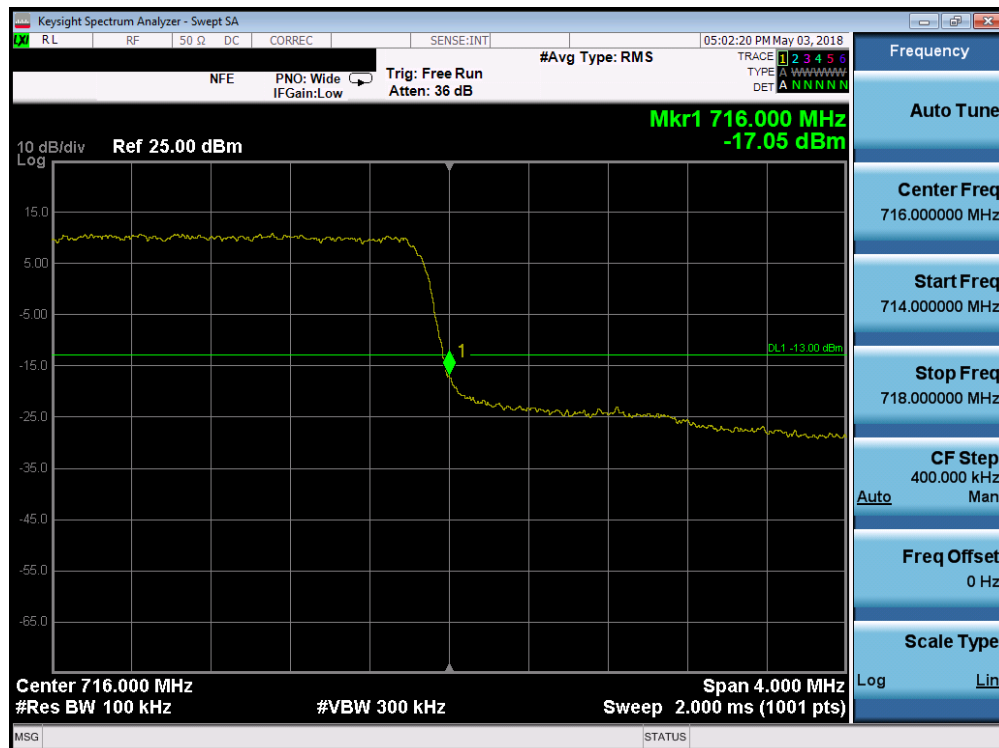


Plot 7-81. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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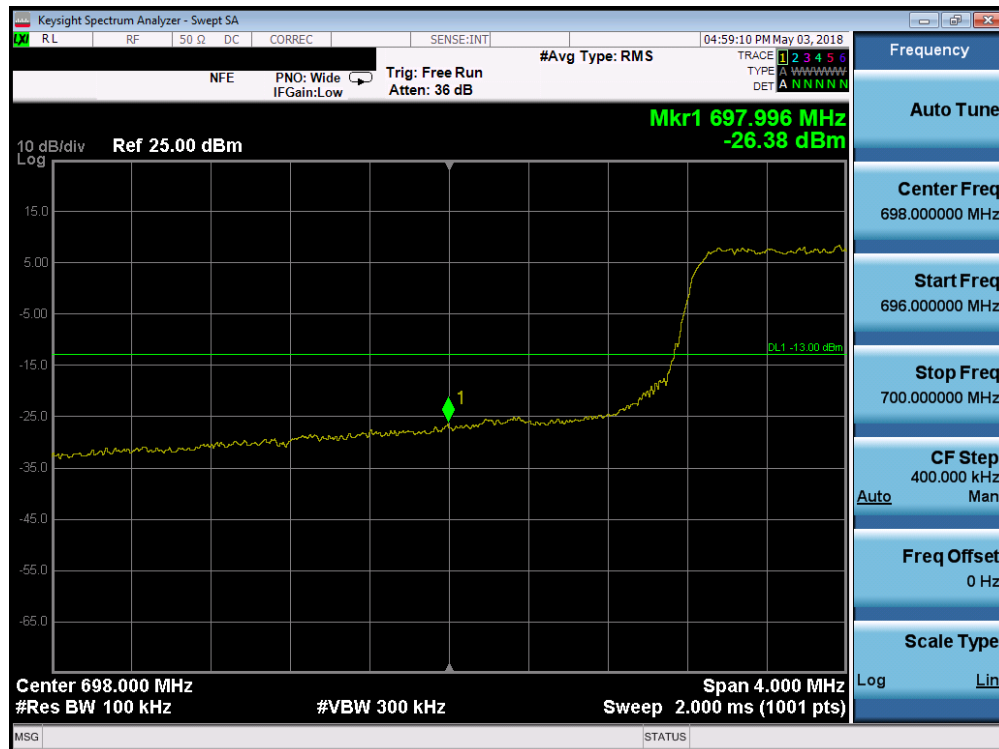


Plot 7-82. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



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

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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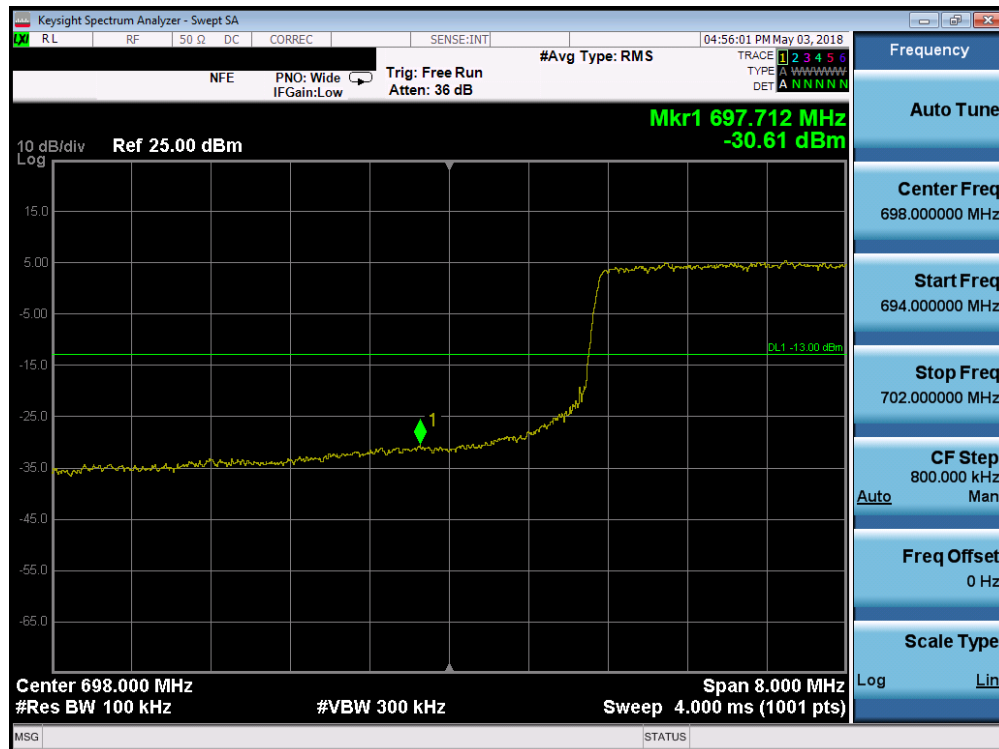


Plot 7-84. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



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

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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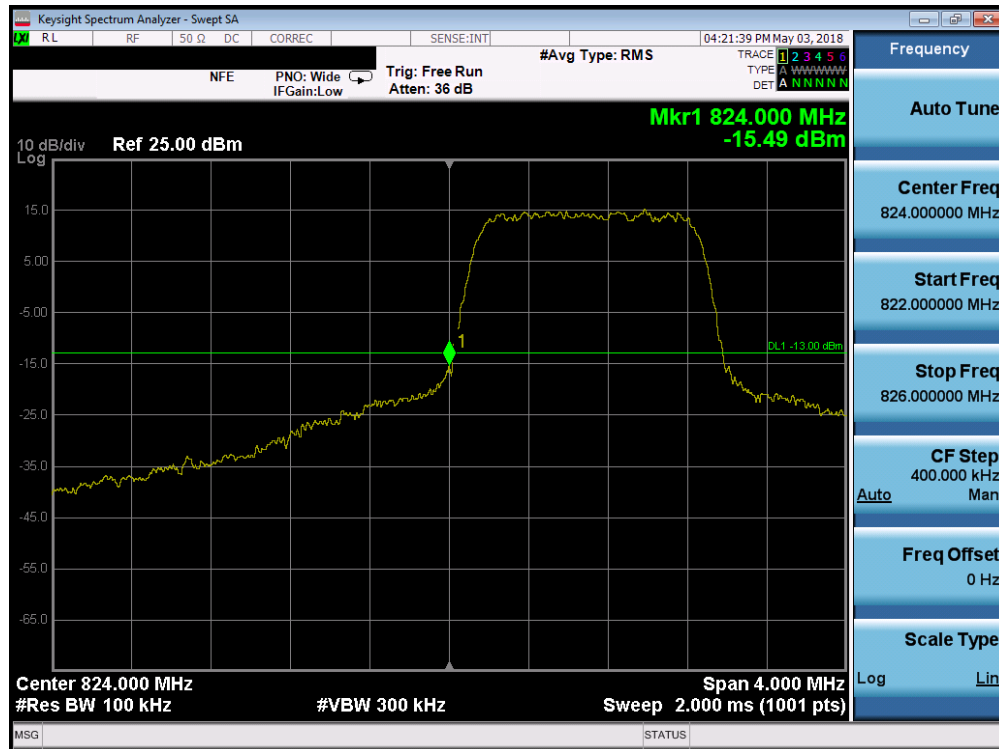
Plot 7-86. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



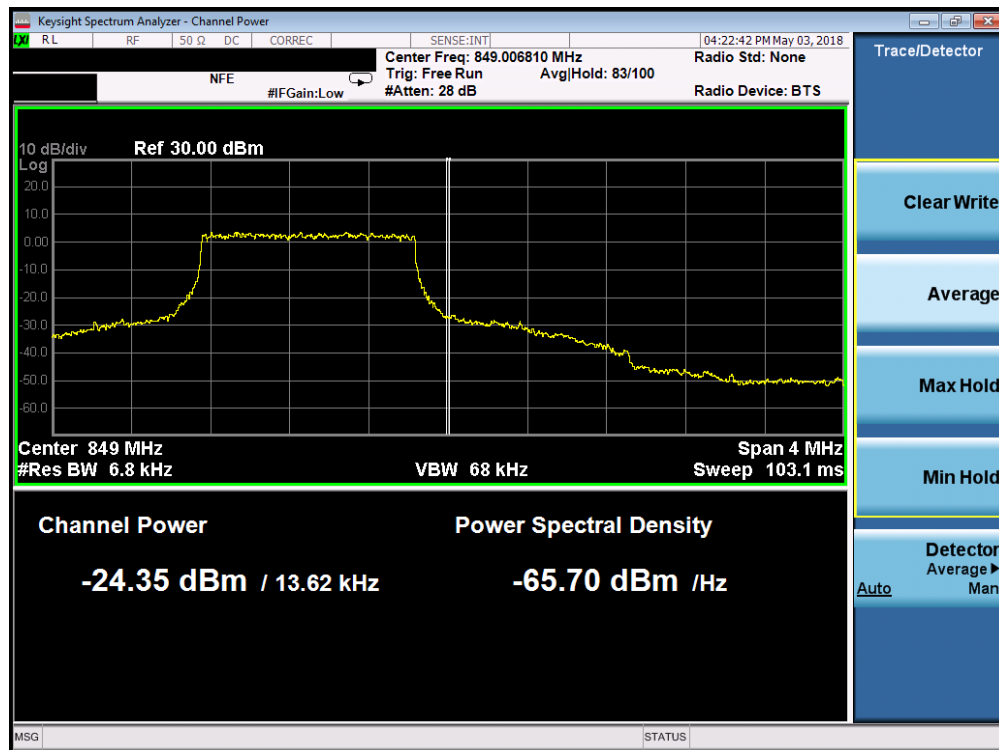
Plot 7-87. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Band 5

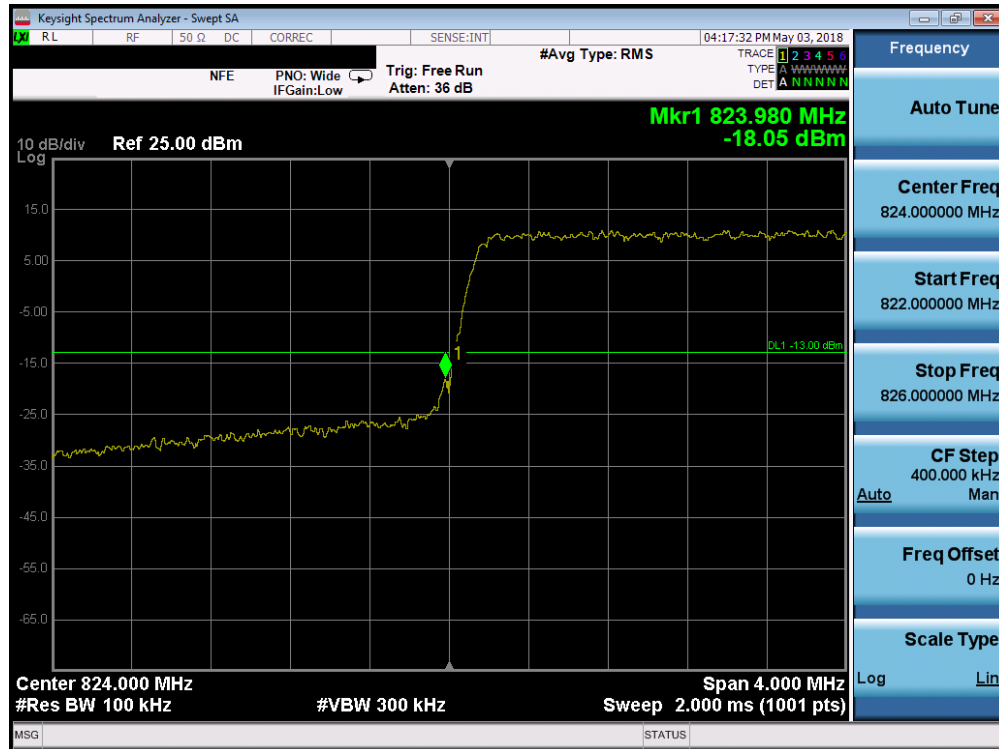


Plot 7-88. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

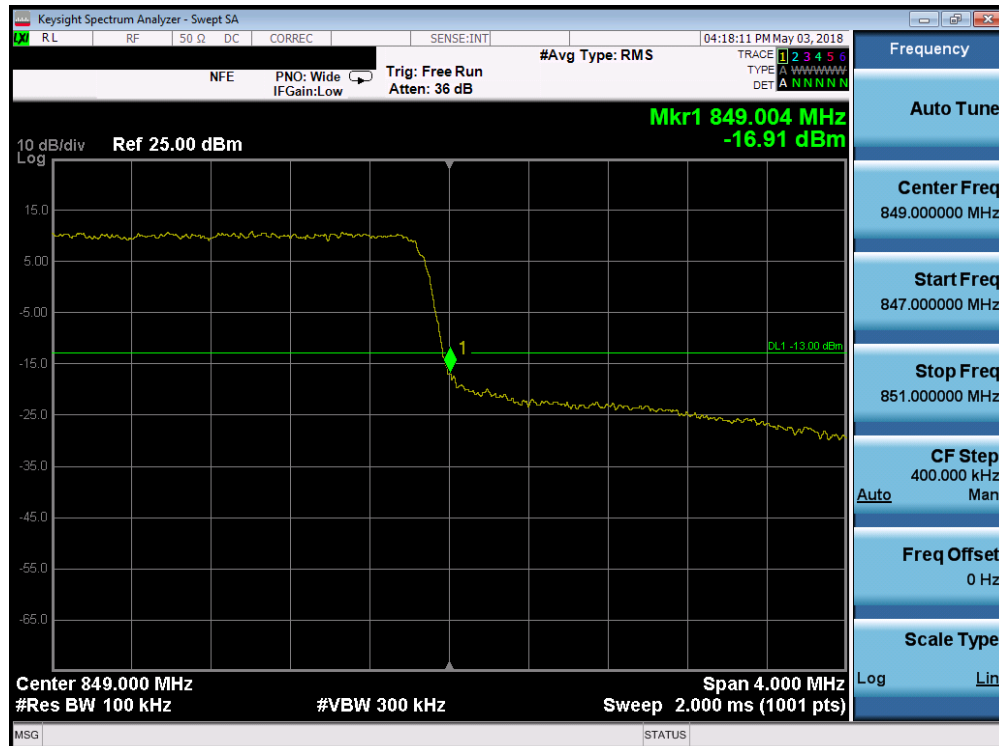


Plot 7-89. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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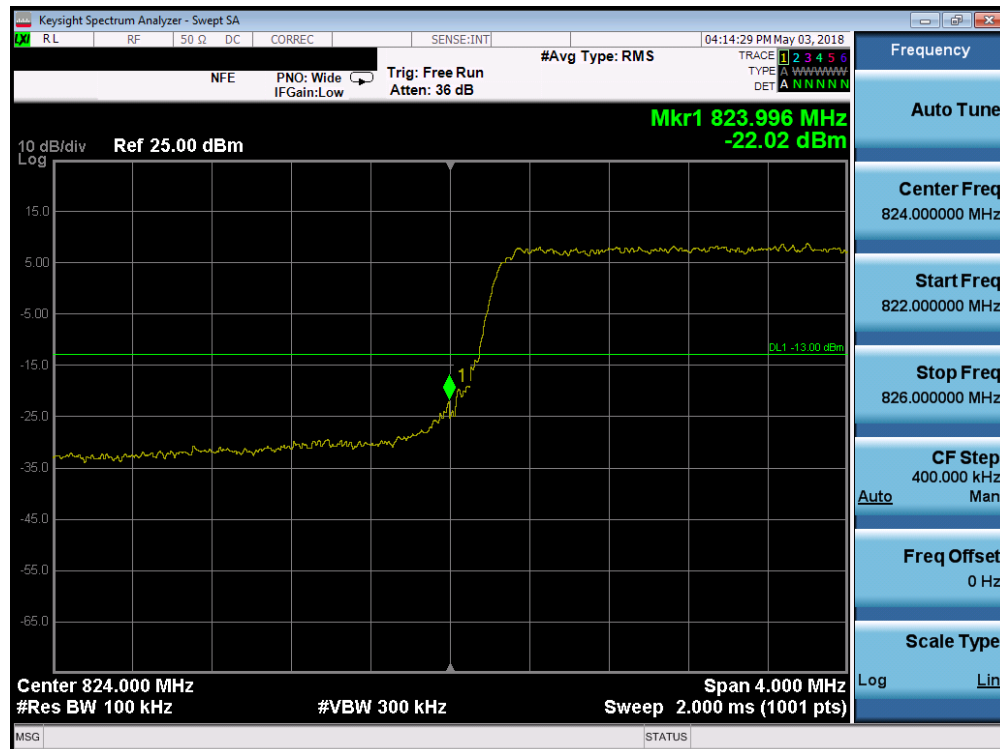


Plot 7-90. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

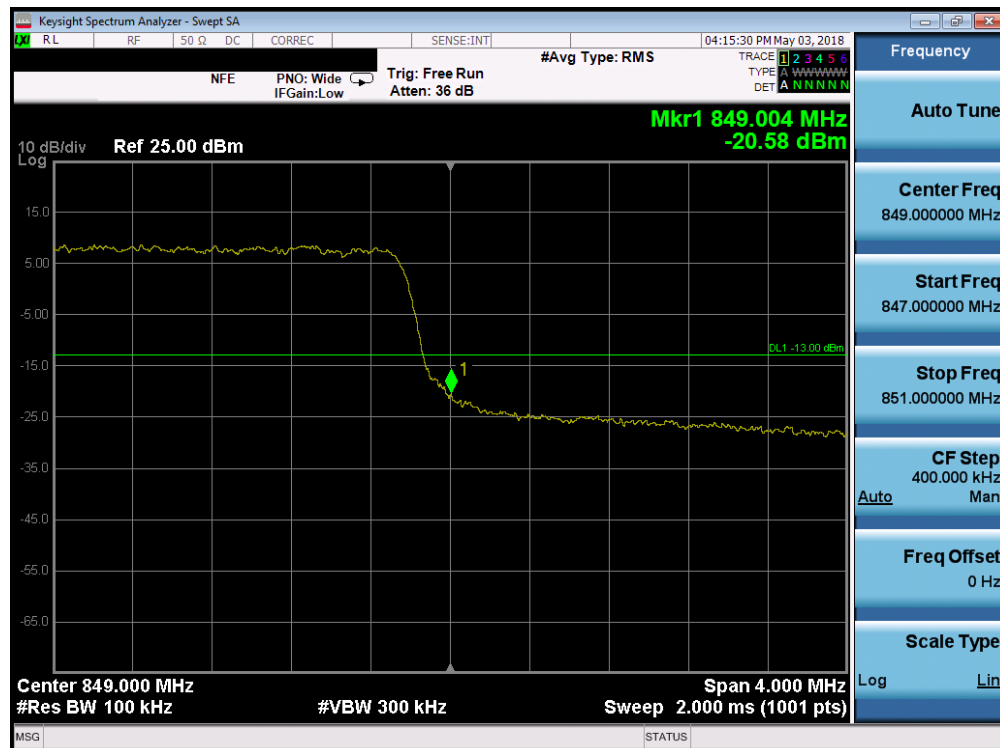


Plot 7-91. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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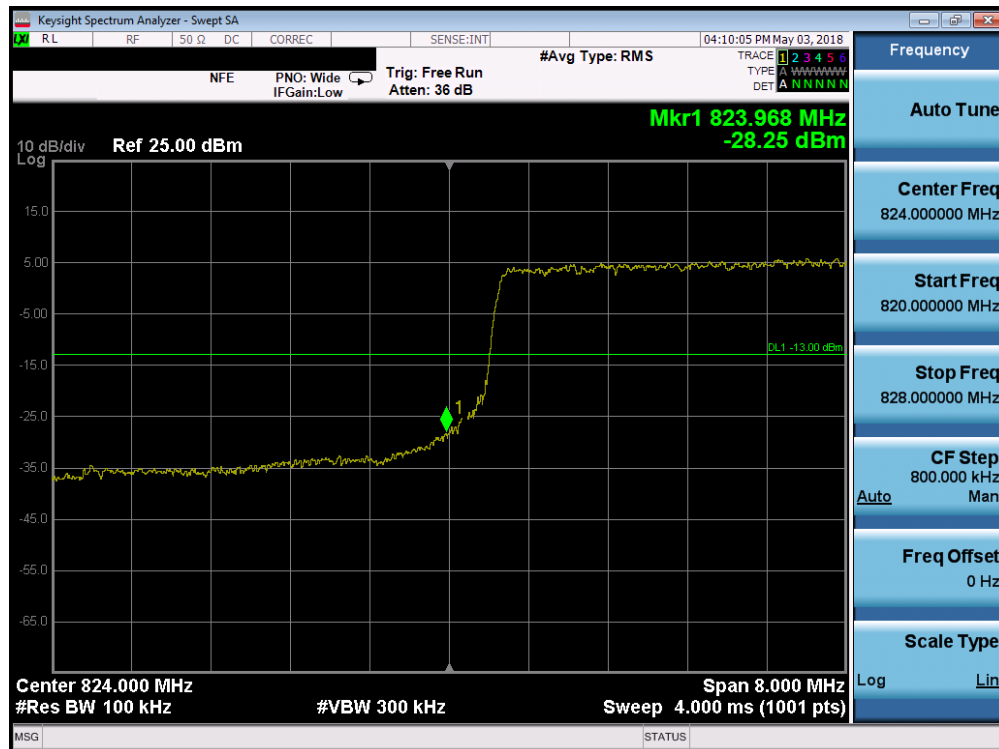


Plot 7-92. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

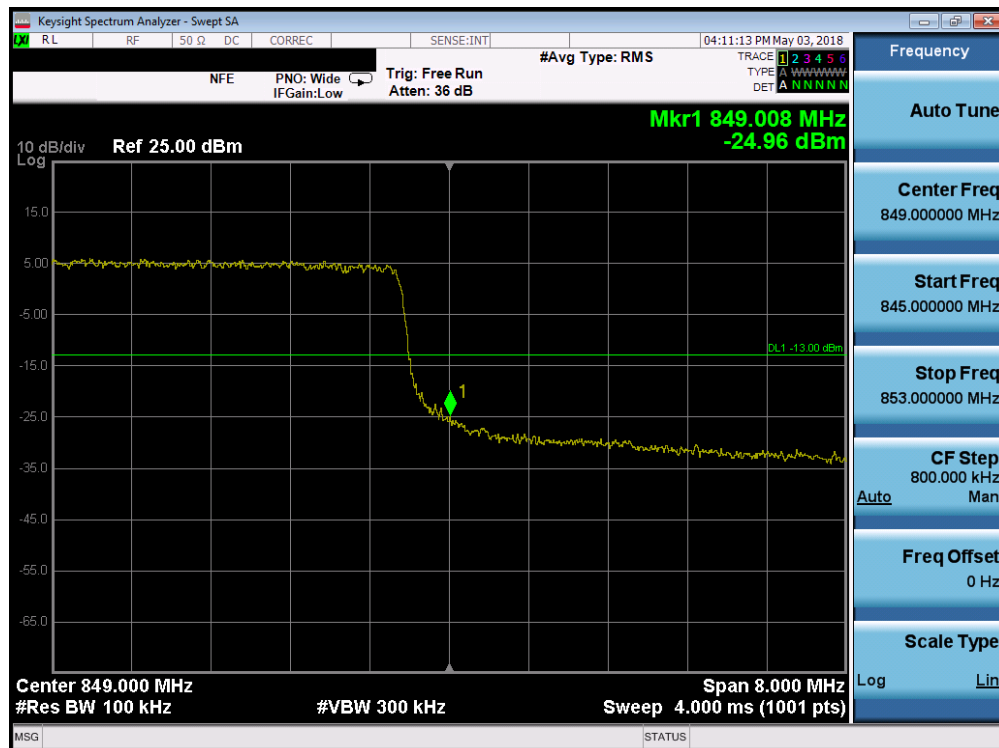


Plot 7-93. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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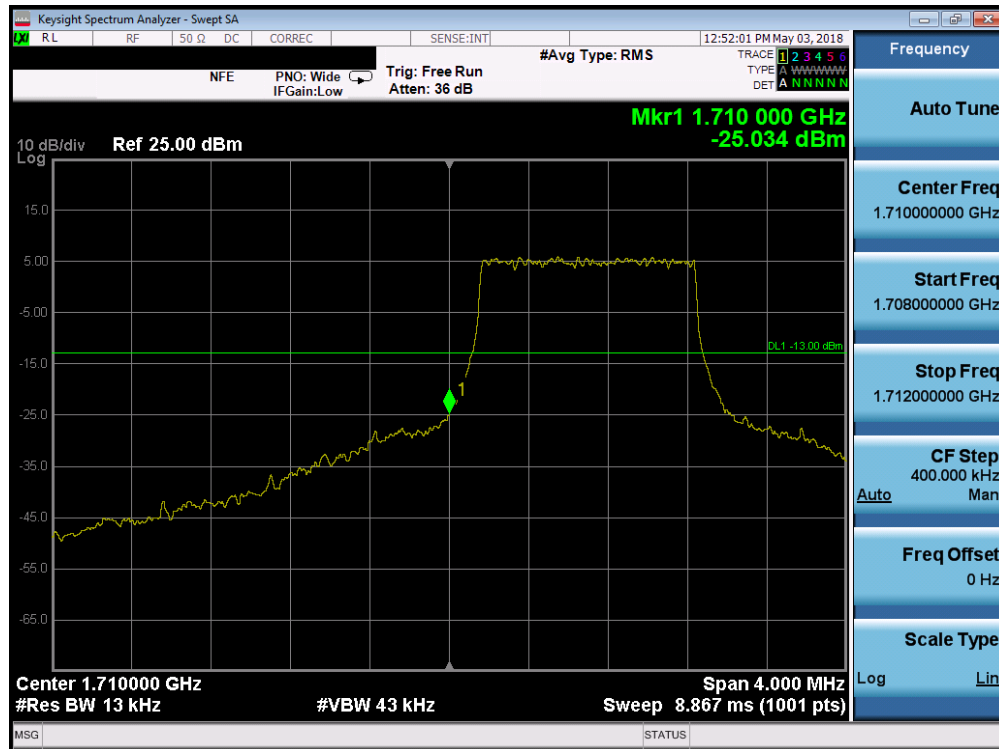
Plot 7-94. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



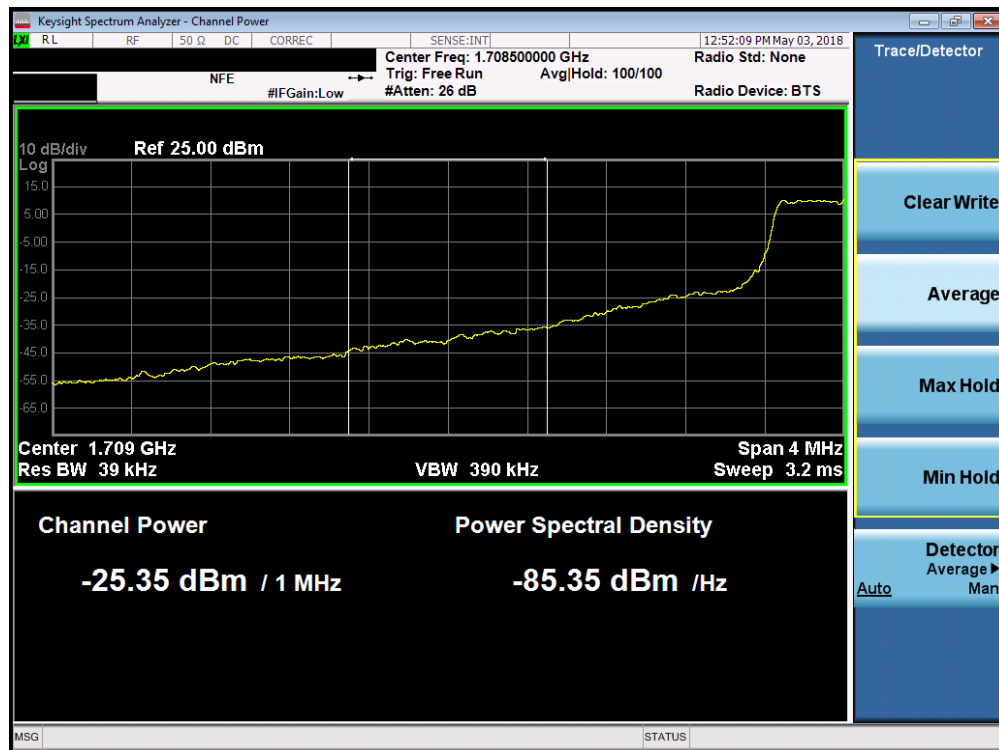
Plot 7-95. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Band 4

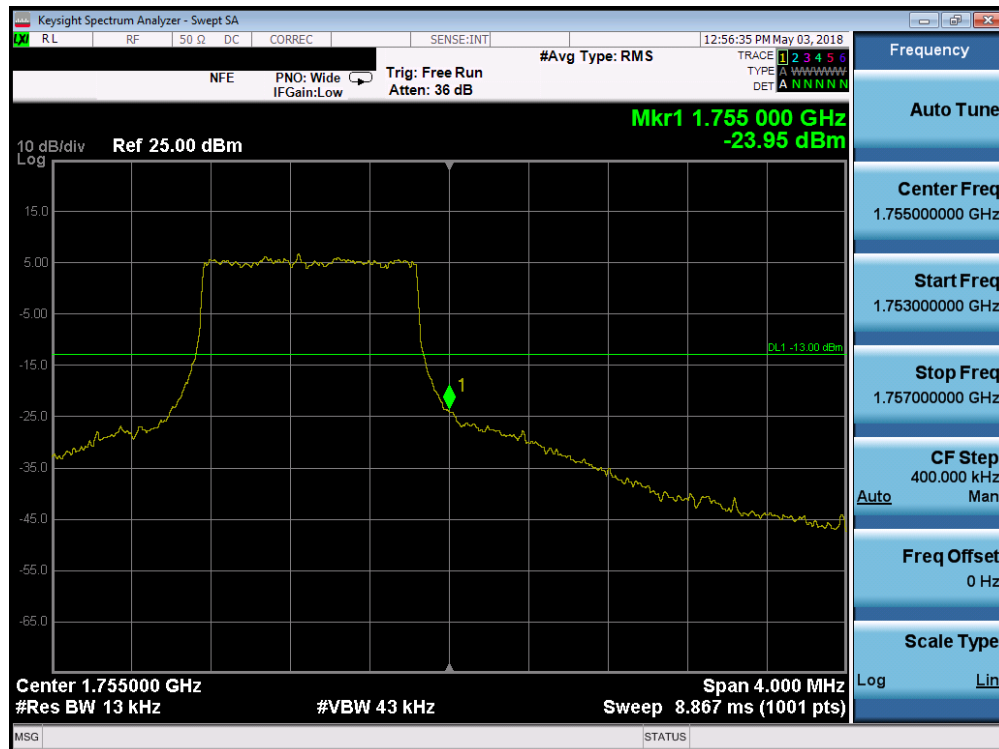


Plot 7-96. Lower Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

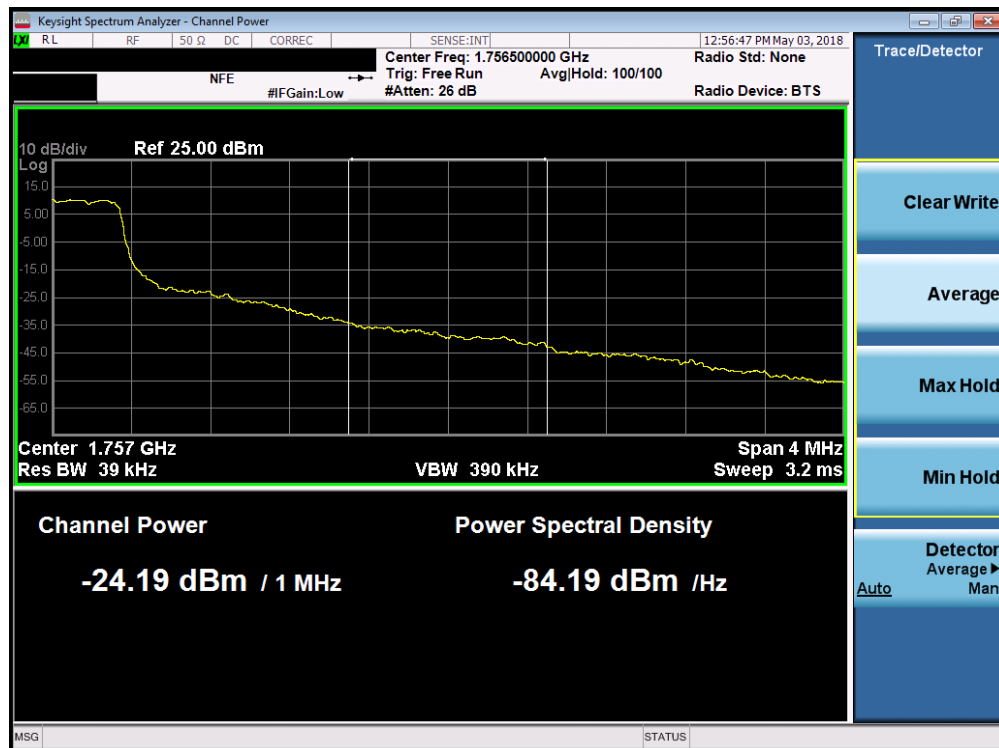


Plot 7-97. Lower Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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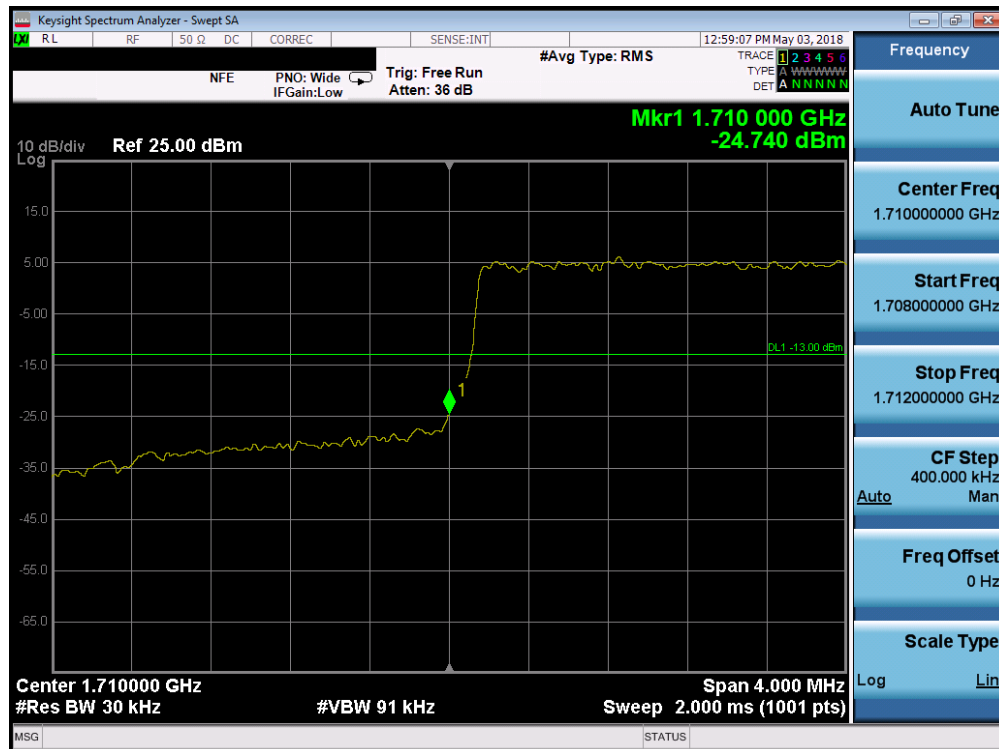


Plot 7-98. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

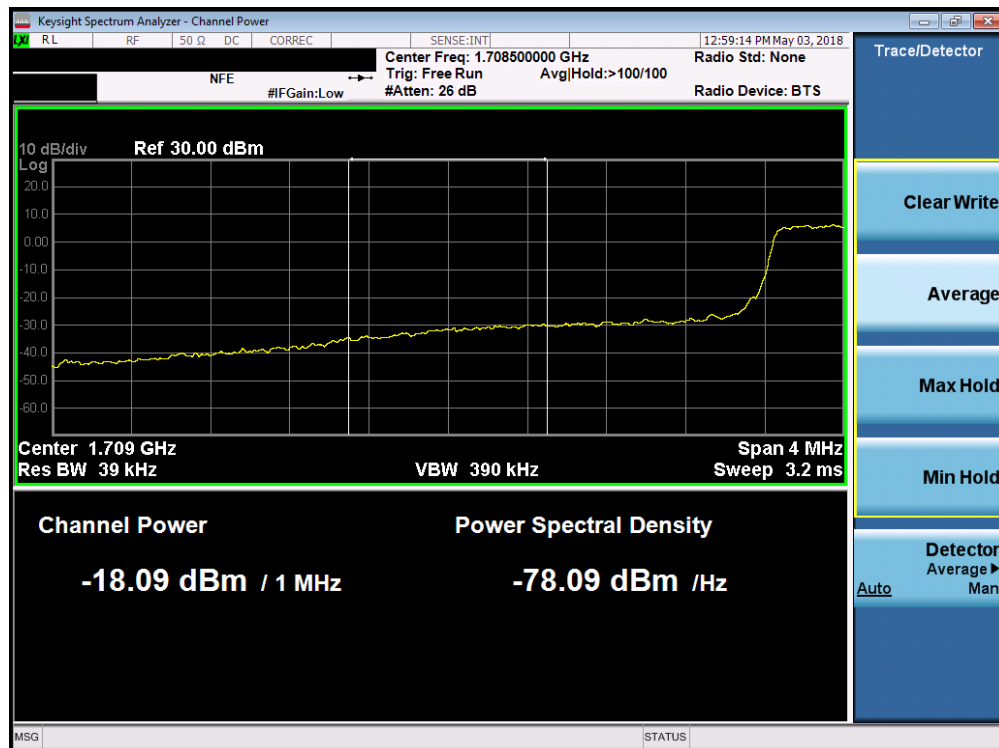


Plot 7-99. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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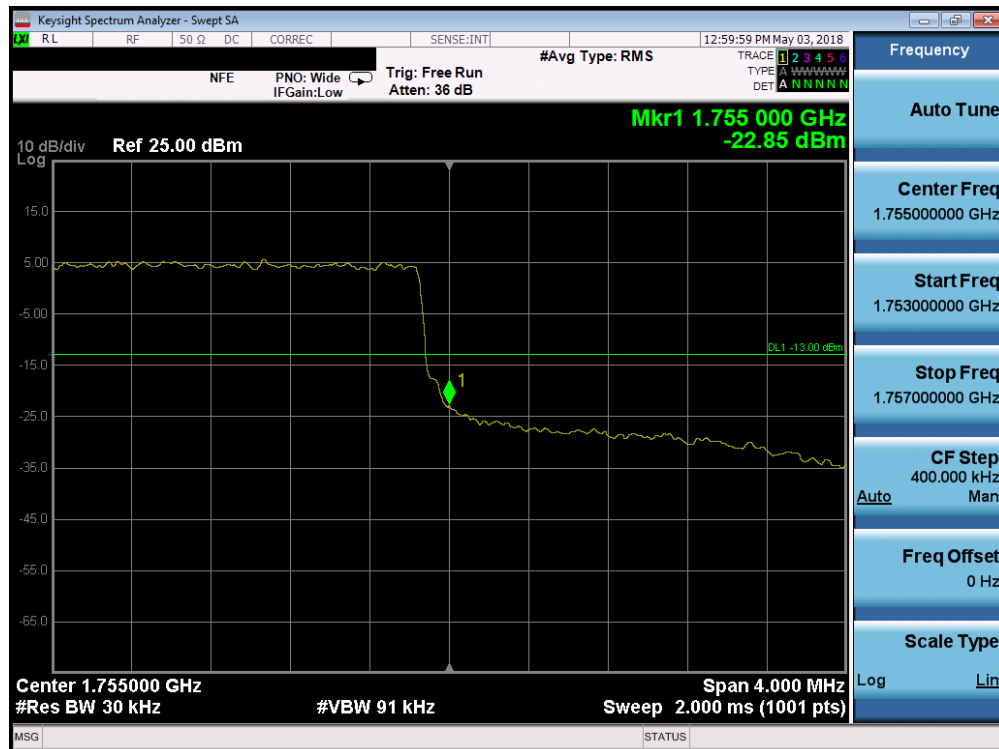


Plot 7-100. Lower Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

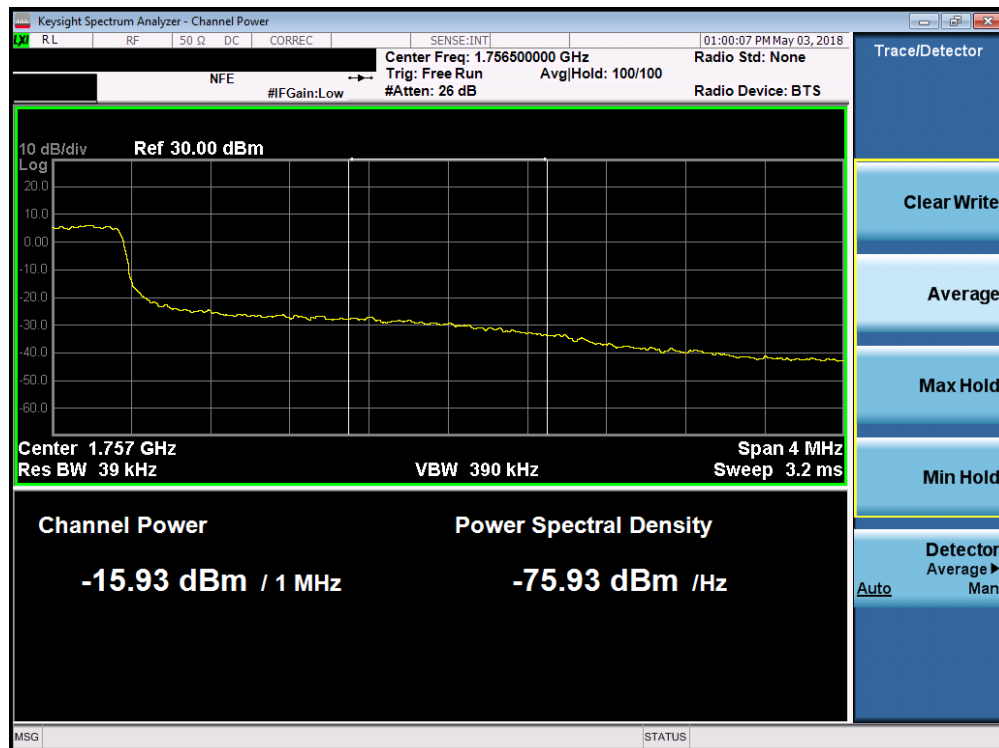


Plot 7-101. Lower Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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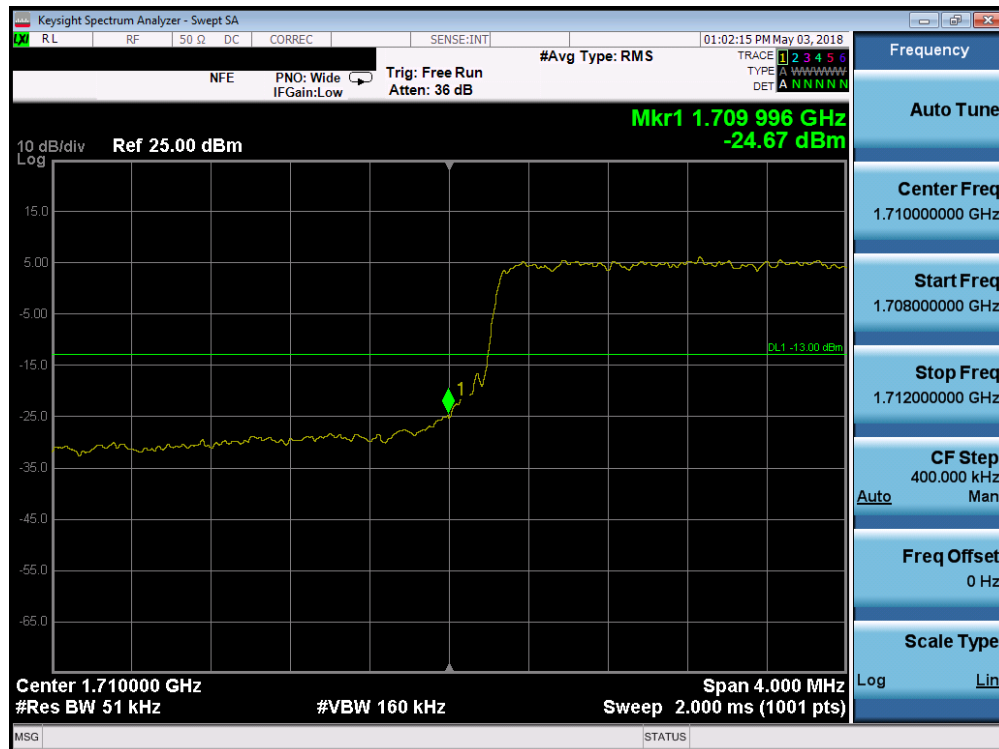


Plot 7-102. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

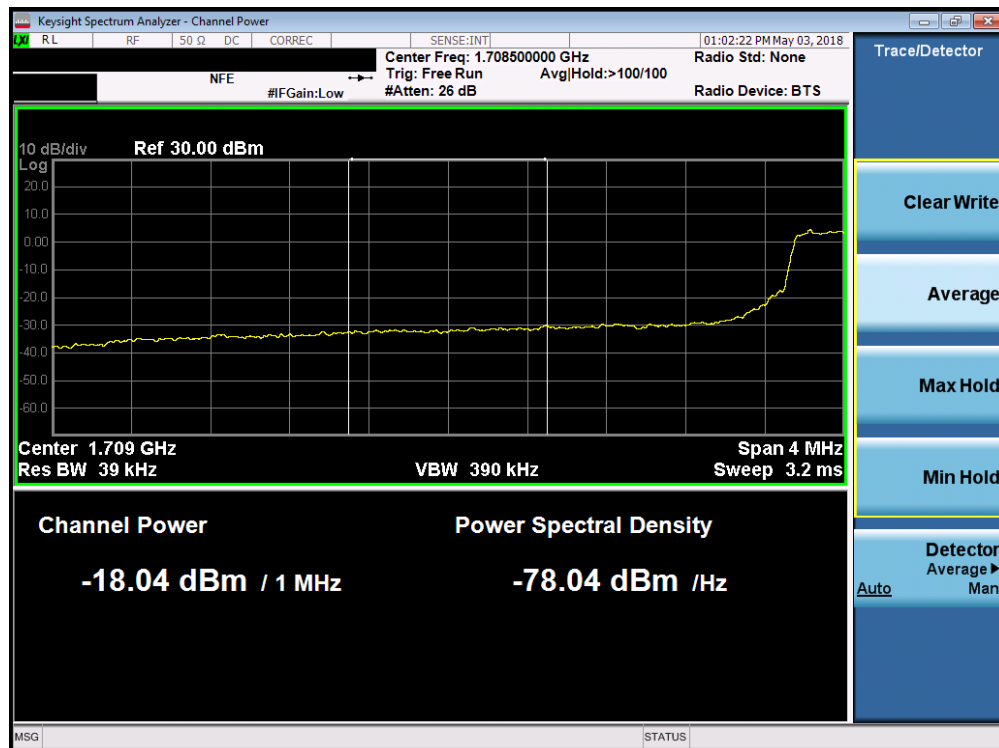


Plot 7-103. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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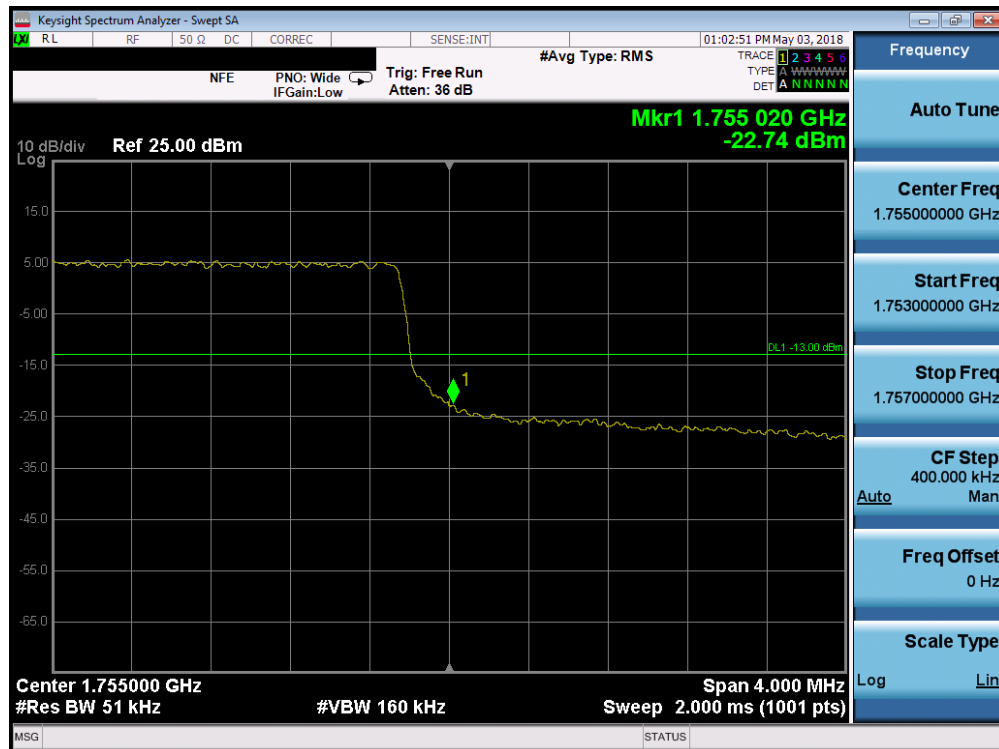


Plot 7-104. Lower Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

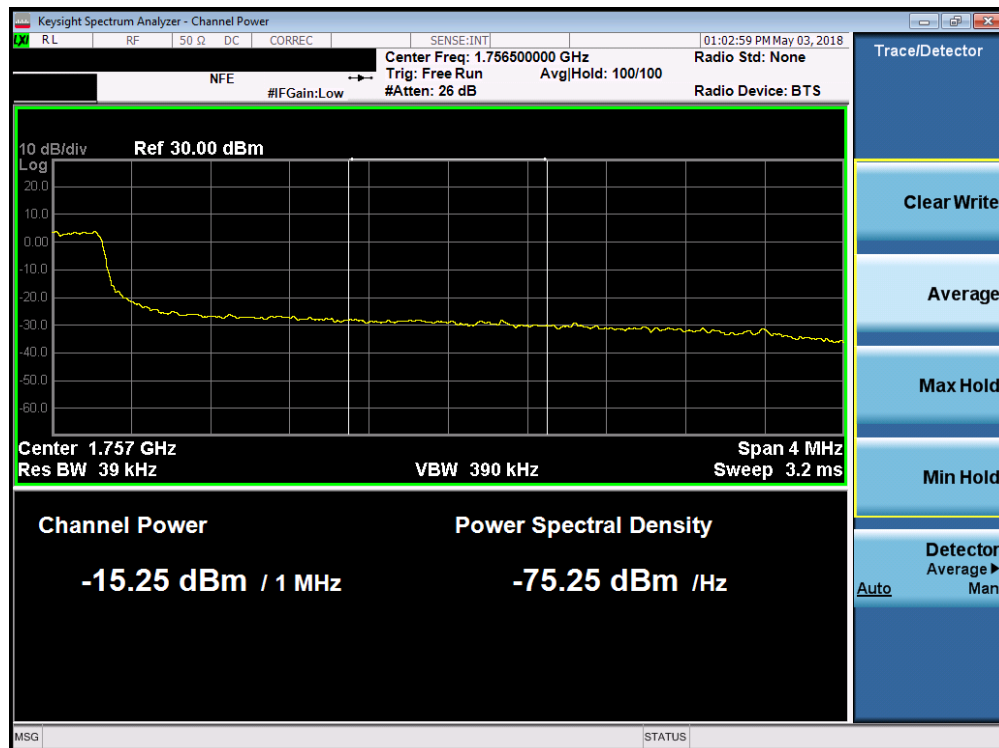


Plot 7-105. Lower Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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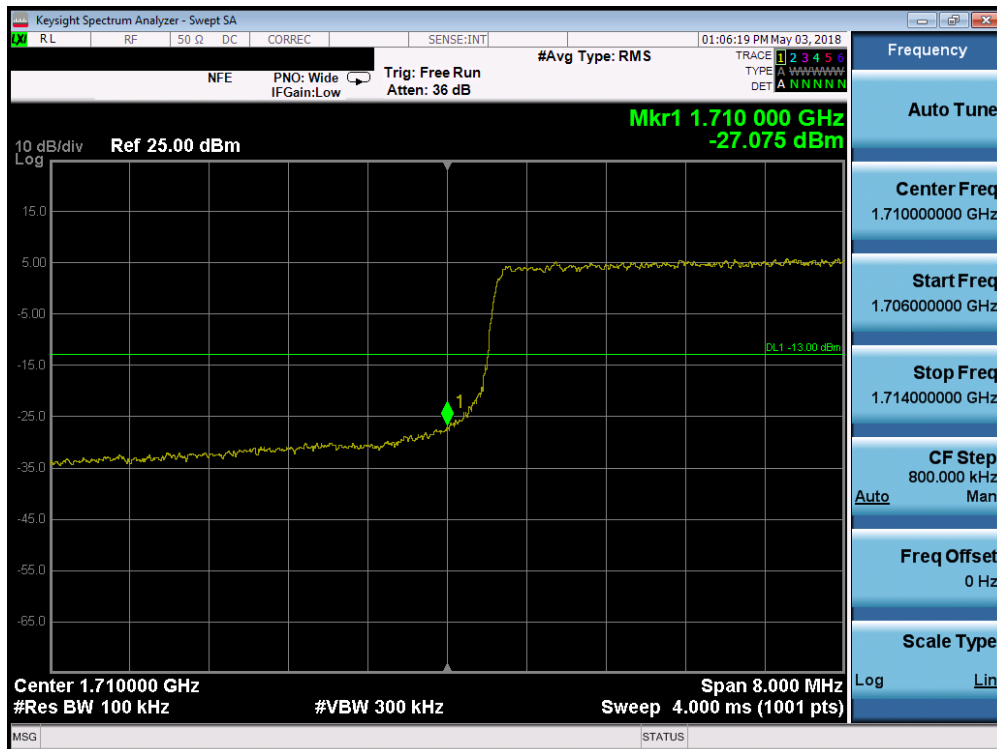


Plot 7-106. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

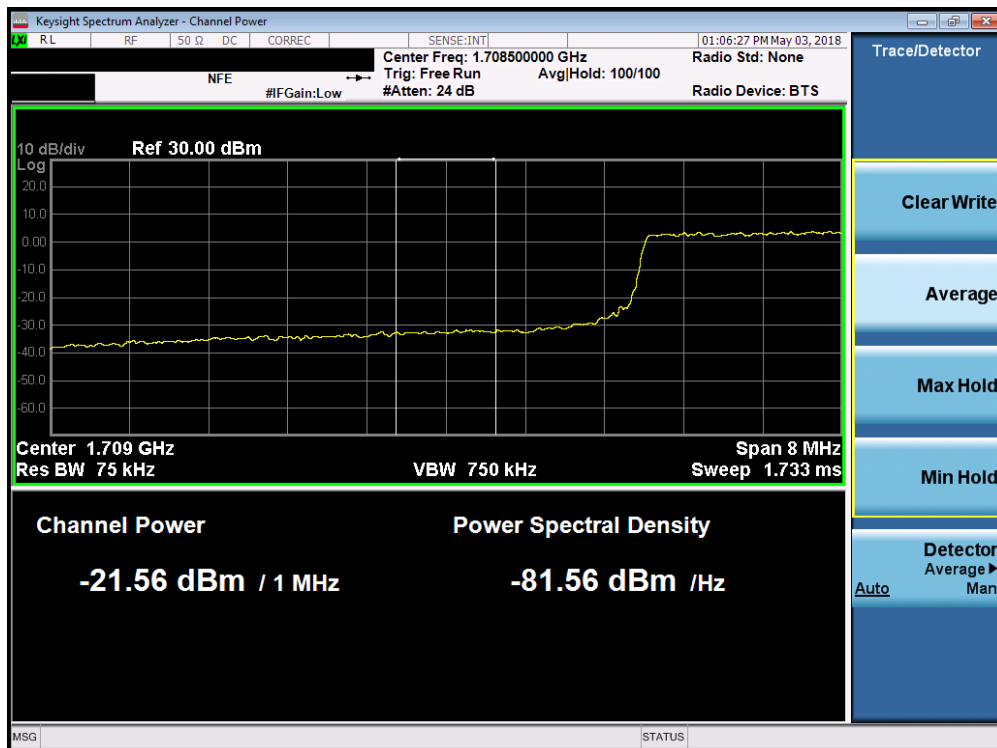


Plot 7-107. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Plot 7-108. Lower Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

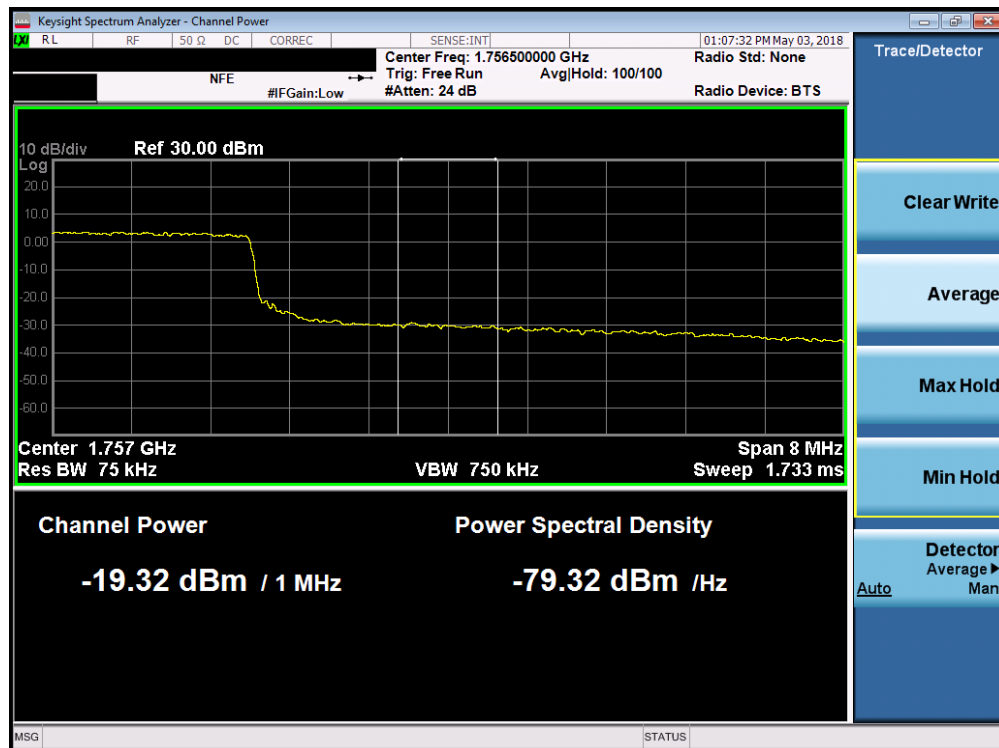


Plot 7-109. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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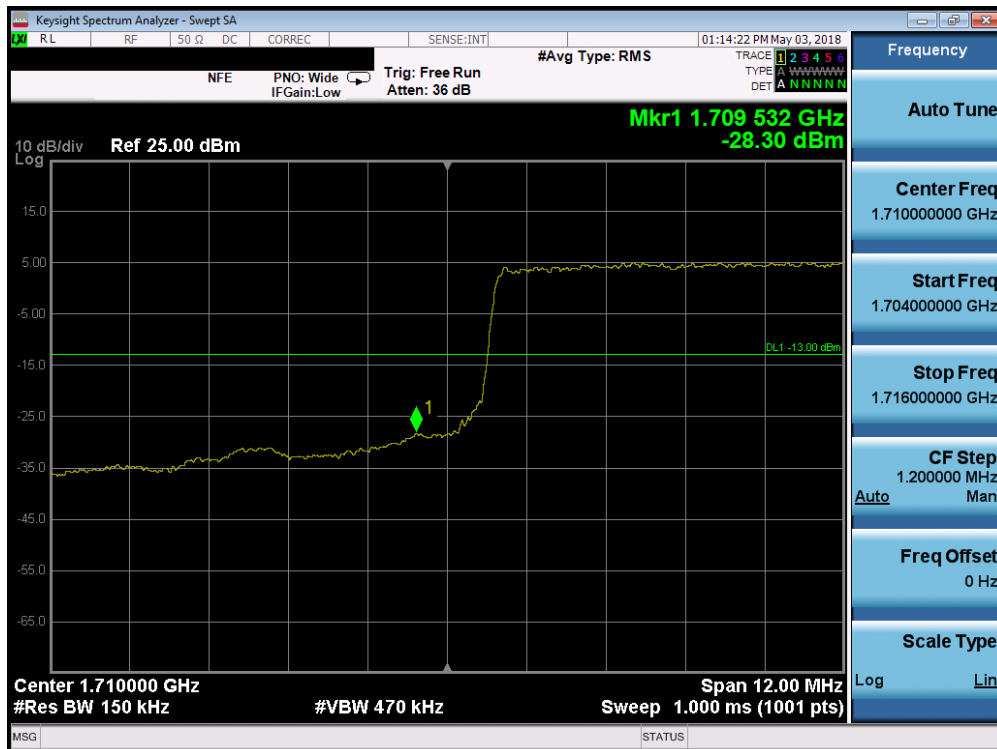


Plot 7-110. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

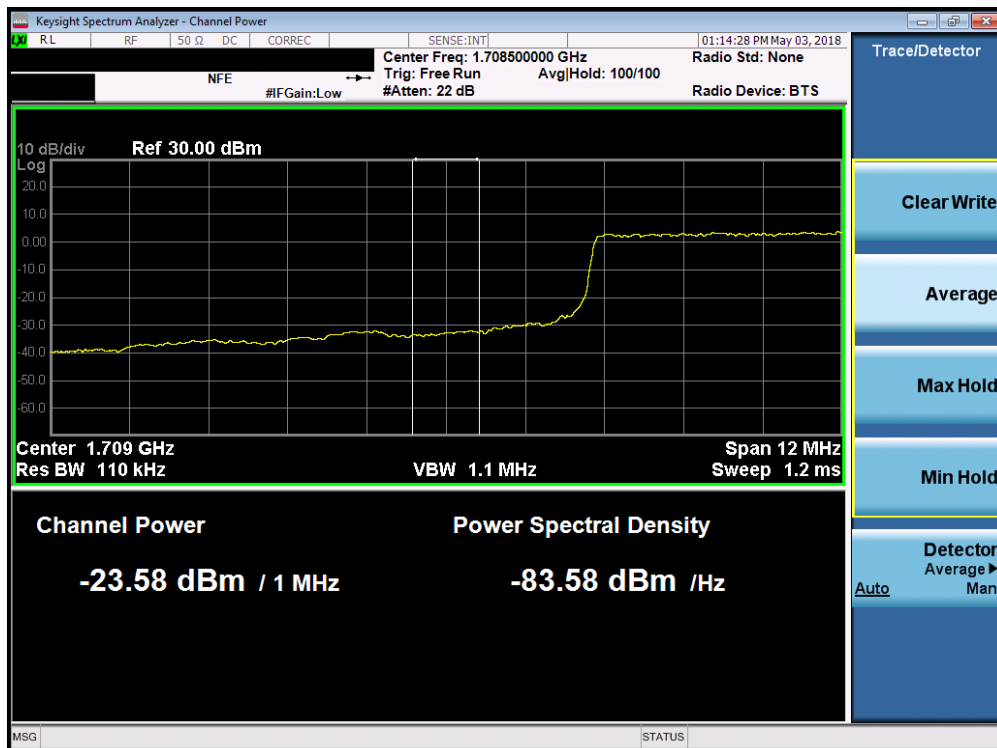


Plot 7-111. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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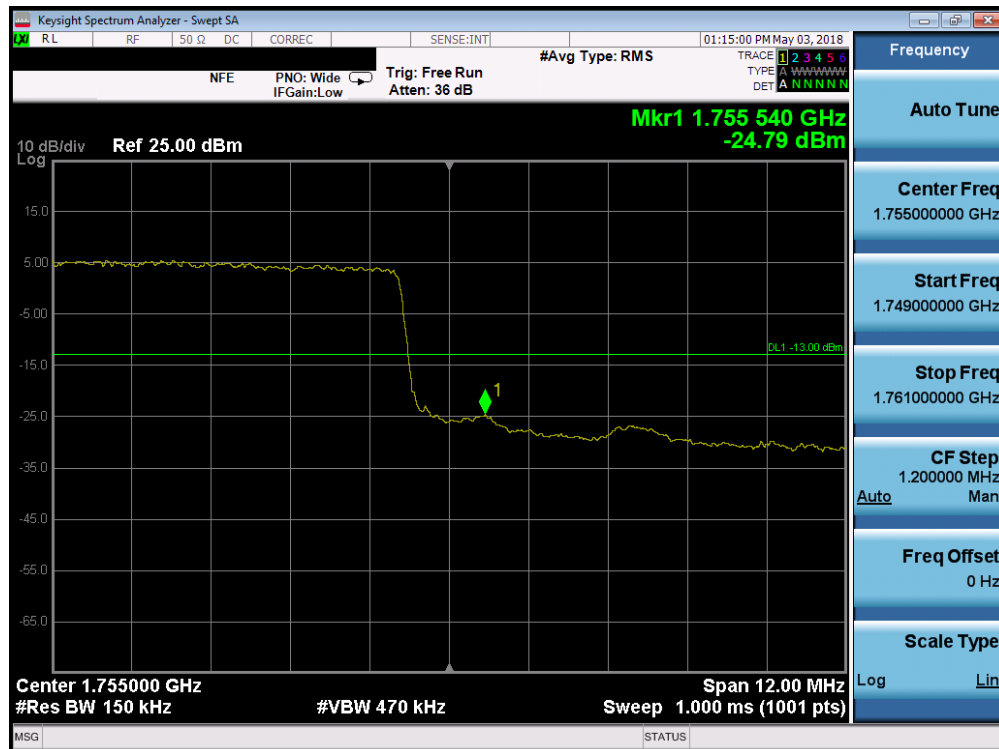


Plot 7-112. Lower Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

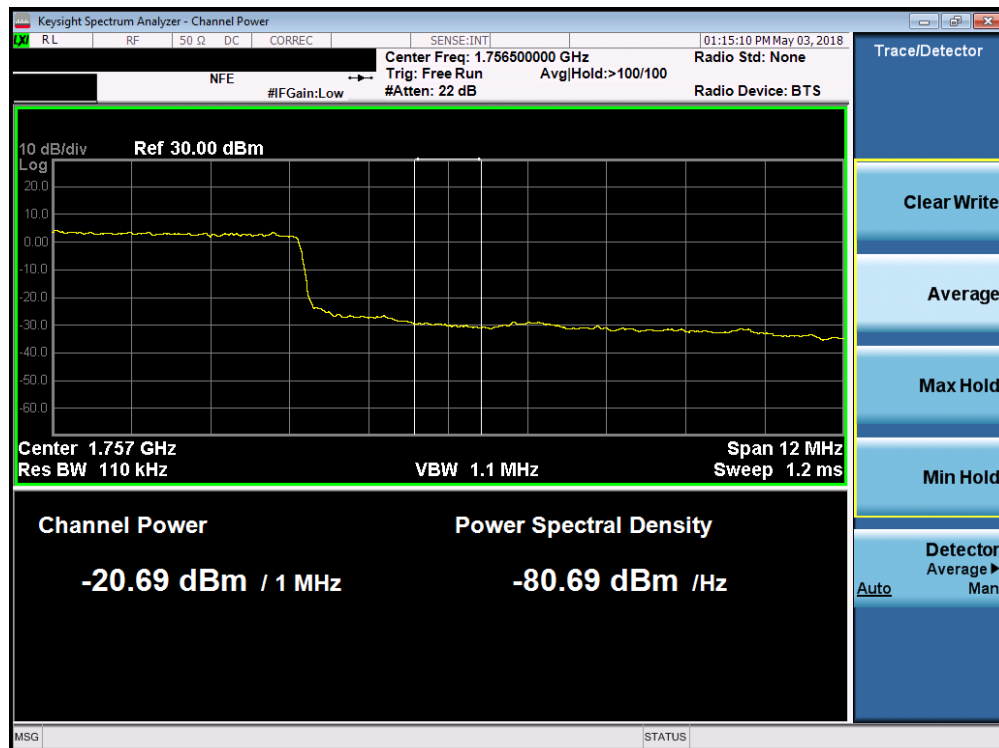


Plot 7-113. Lower Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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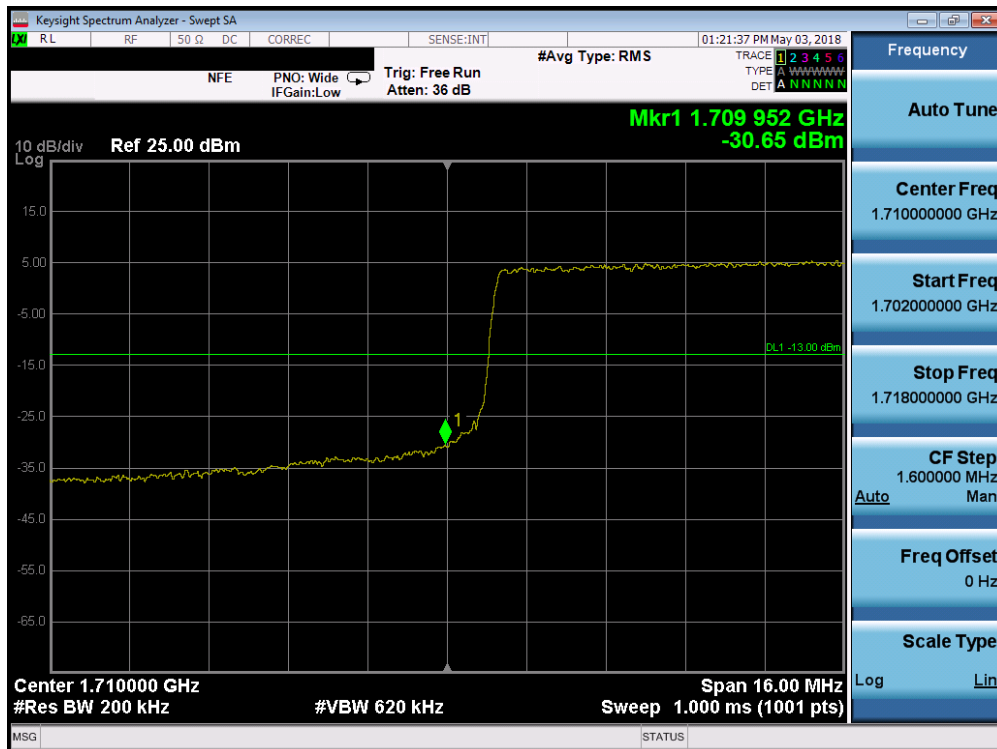


Plot 7-114. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

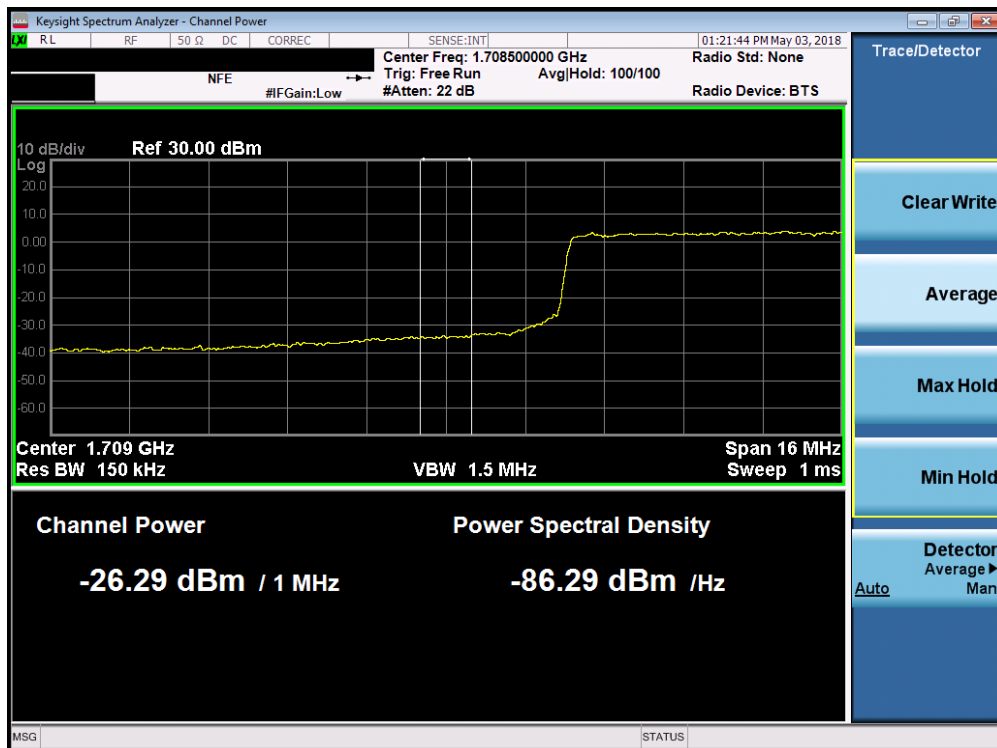


Plot 7-115. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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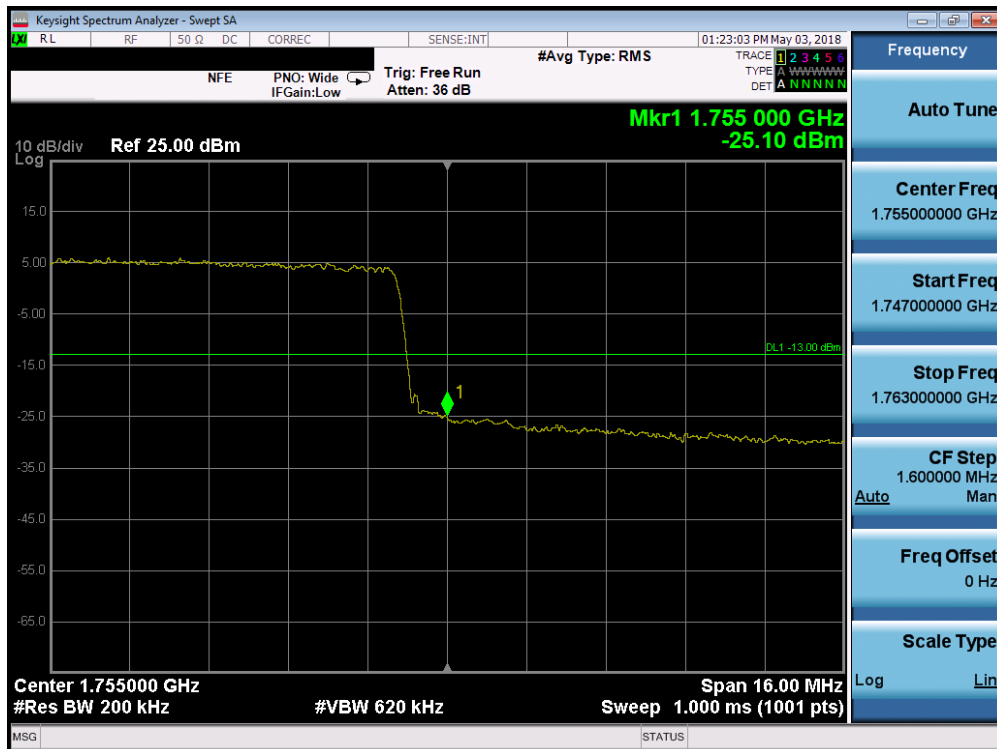


Plot 7-116. Lower Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

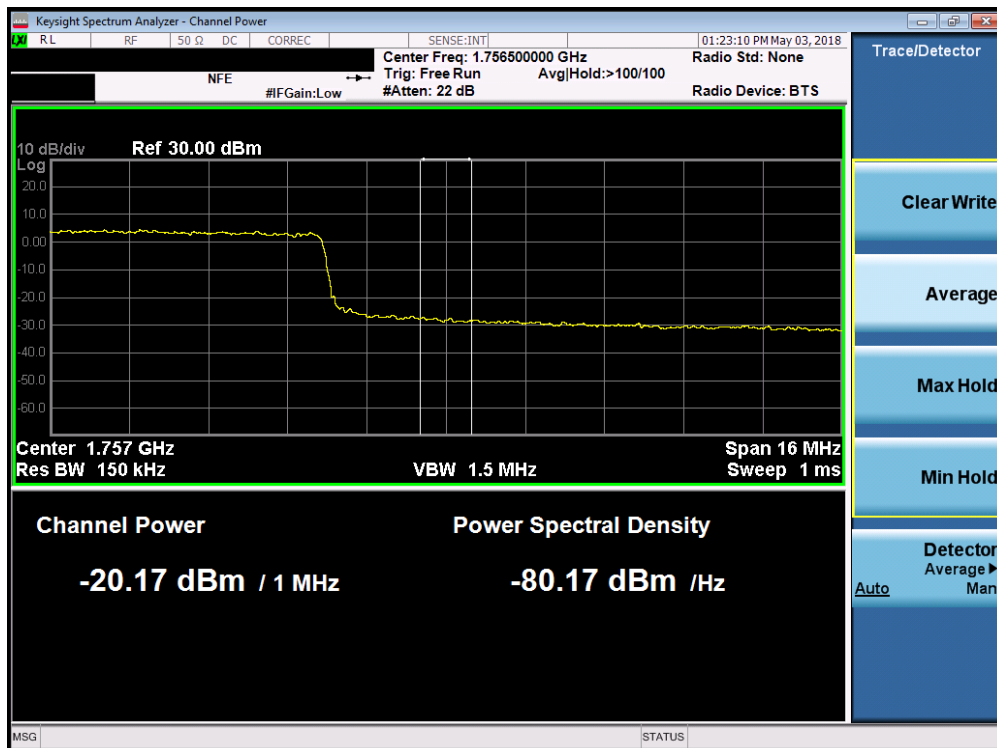


Plot 7-117. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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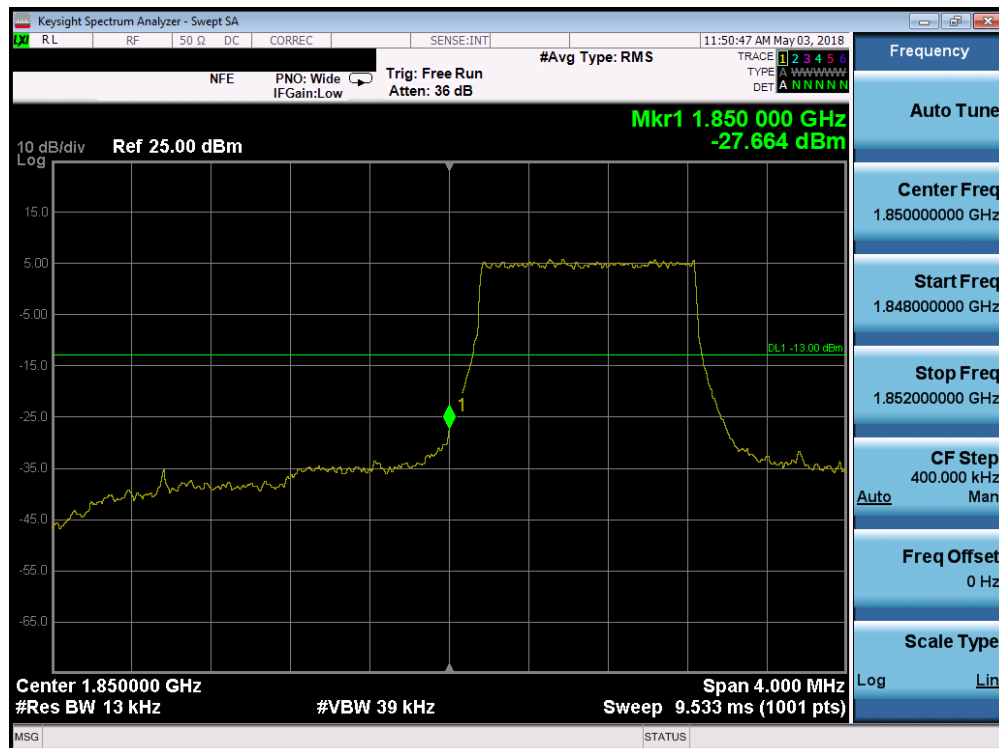
Plot 7-118. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



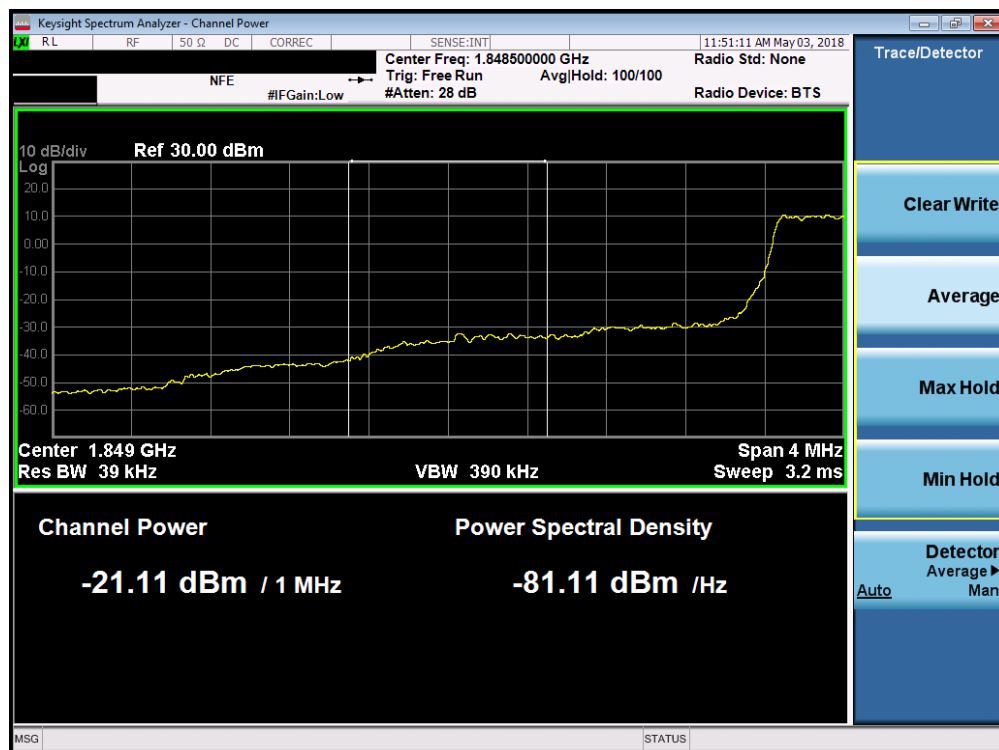
Plot 7-119. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: Portable Handset		Page 78 of 122

Band 2

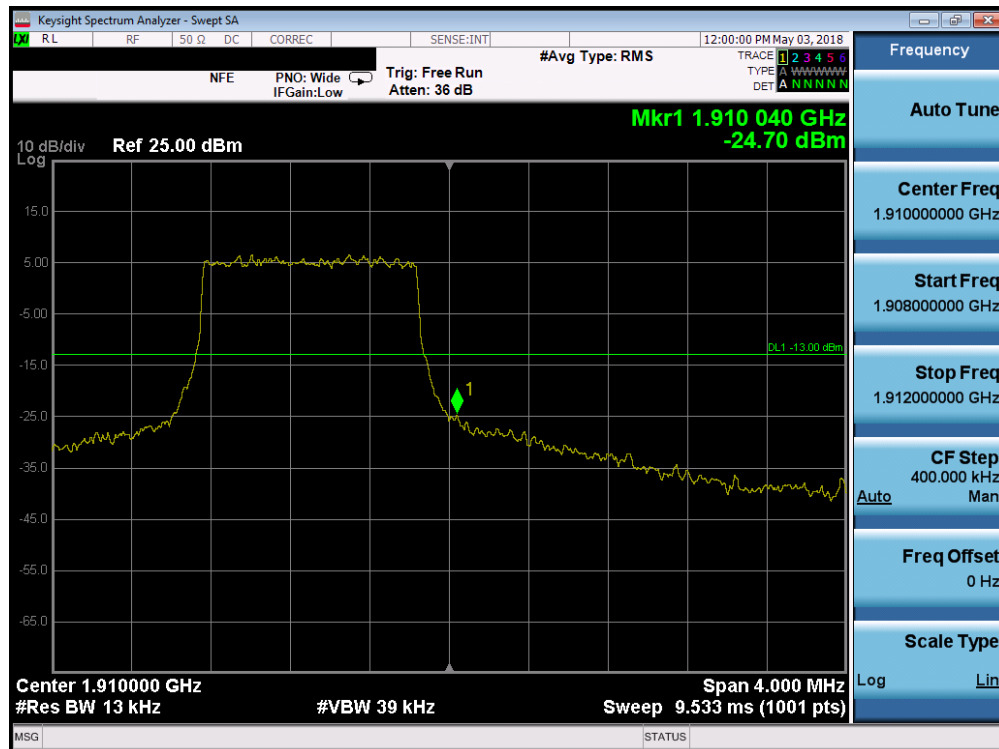


Plot 7-120. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



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

FCC ID: ZNFX410CS	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: Portable Handset		Page 79 of 122

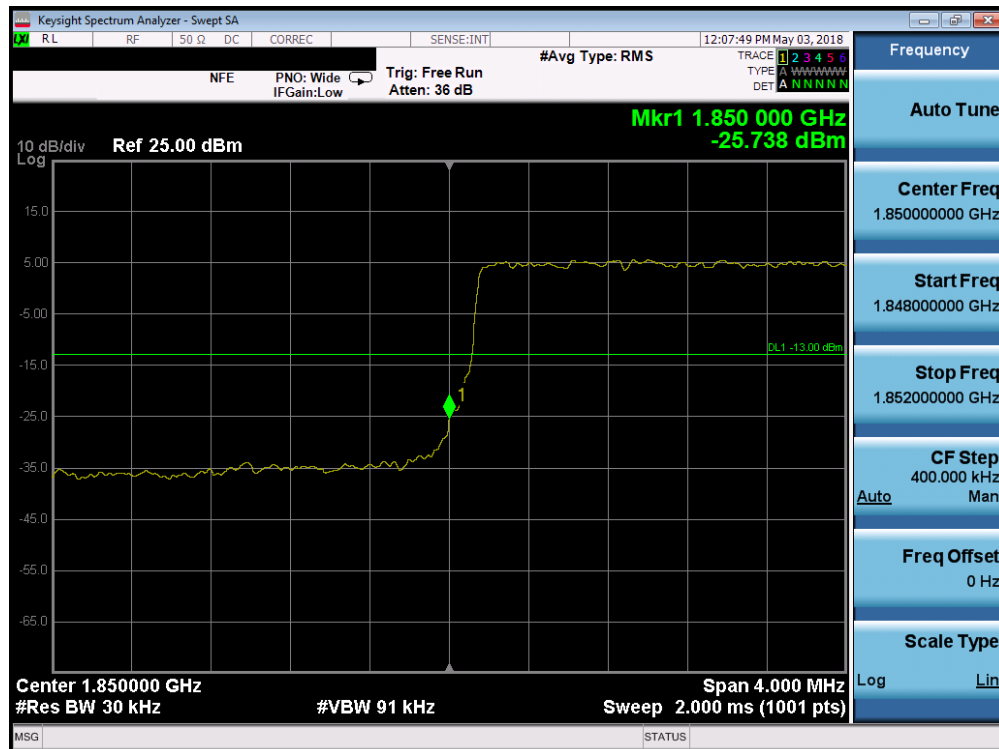


Plot 7-122. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

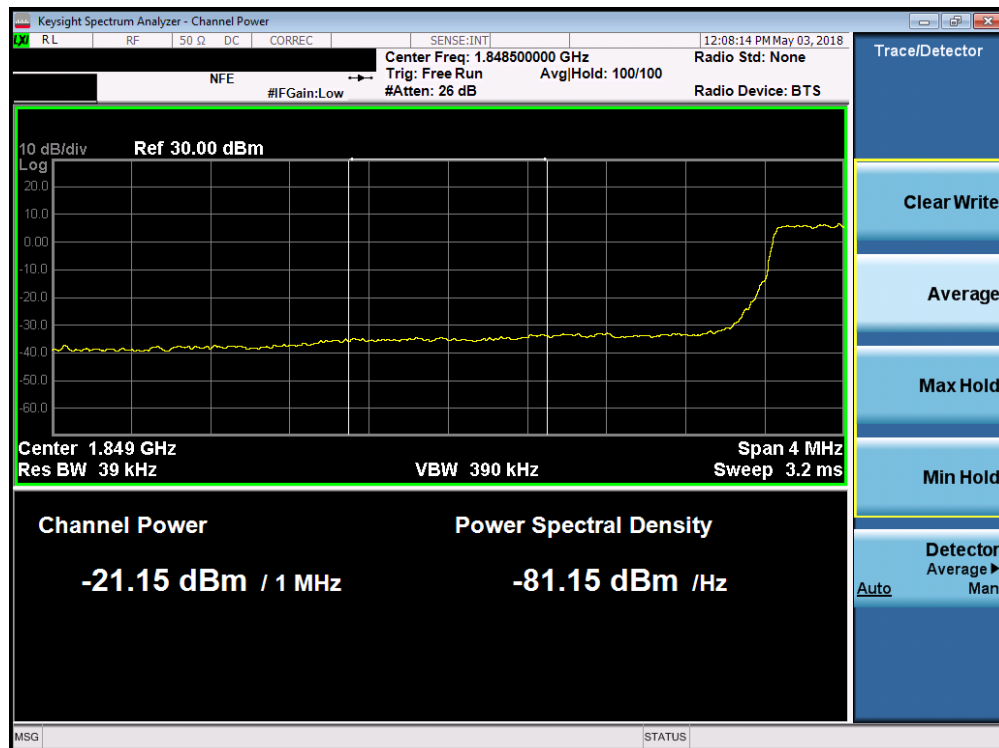


Plot 7-123. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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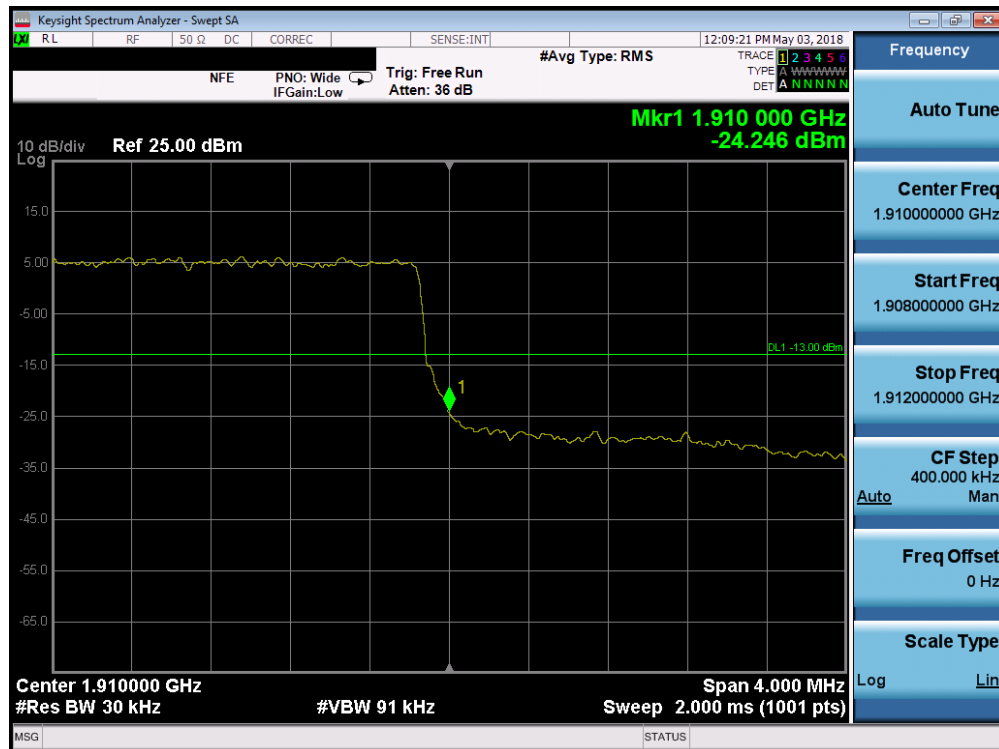


Plot 7-124. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

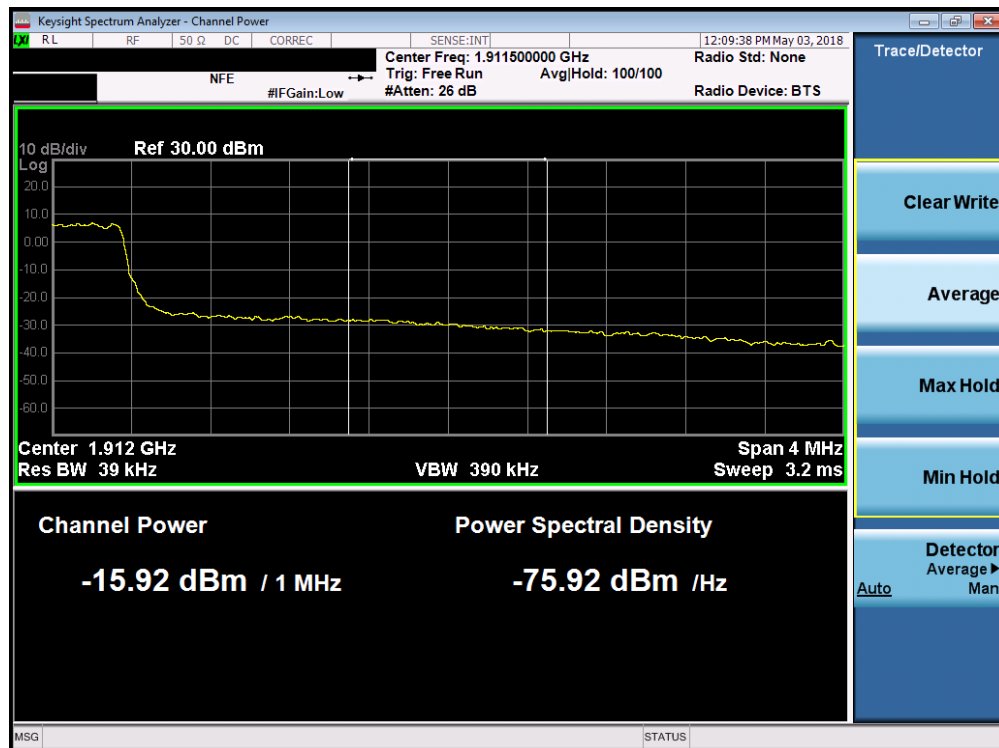


Plot 7-125. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: Portable Handset		Page 81 of 122

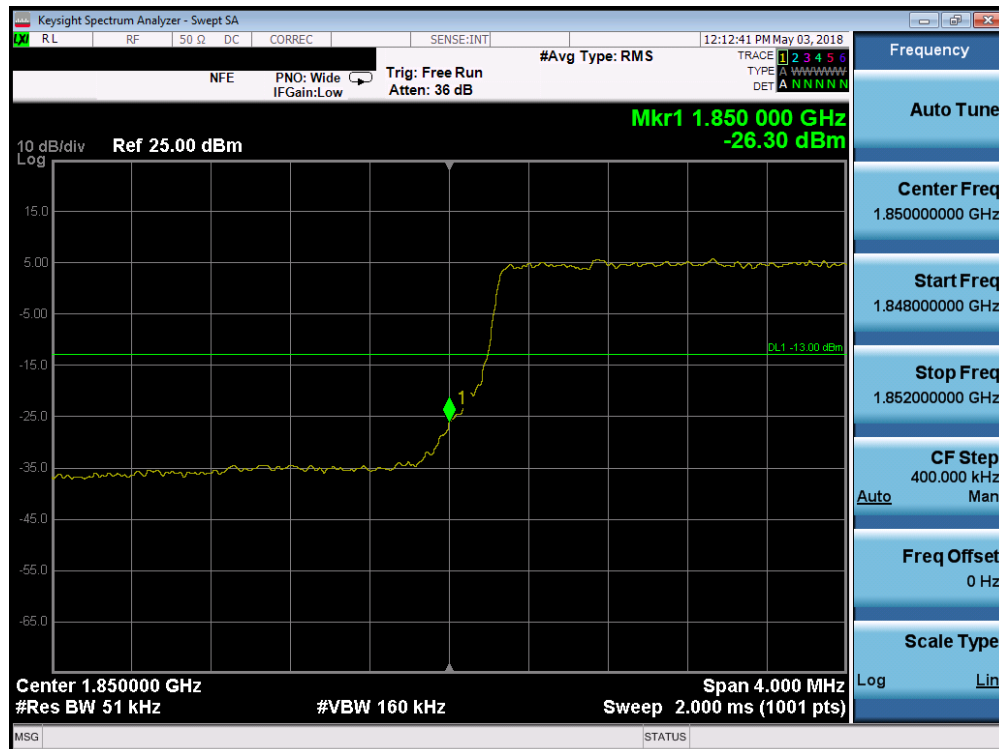


Plot 7-126. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

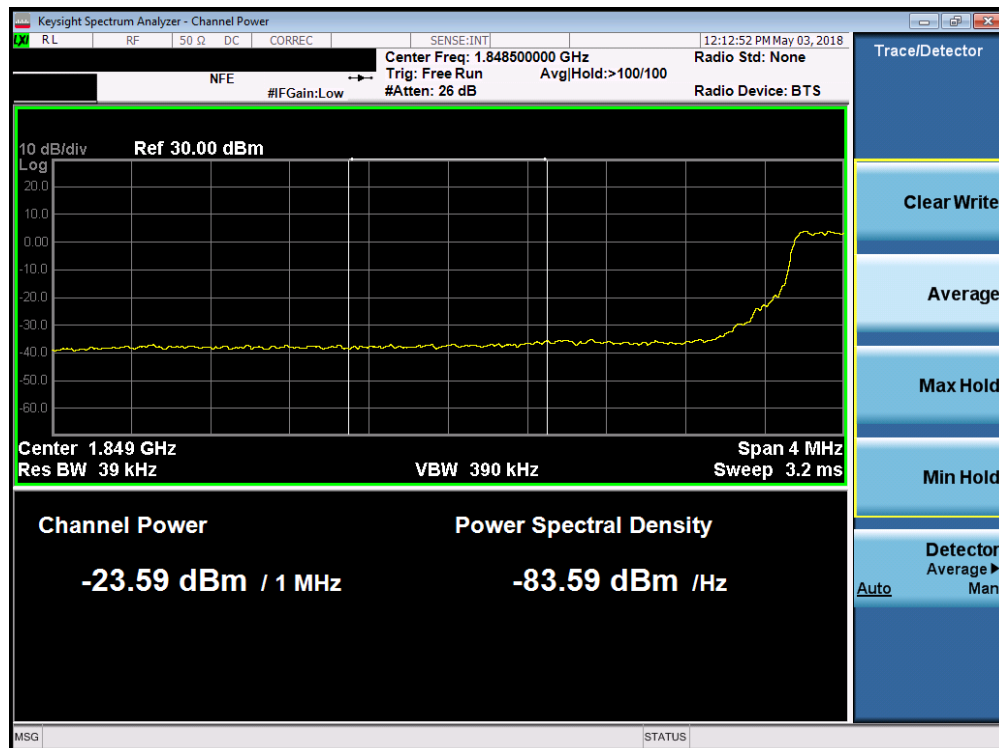


Plot 7-127. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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

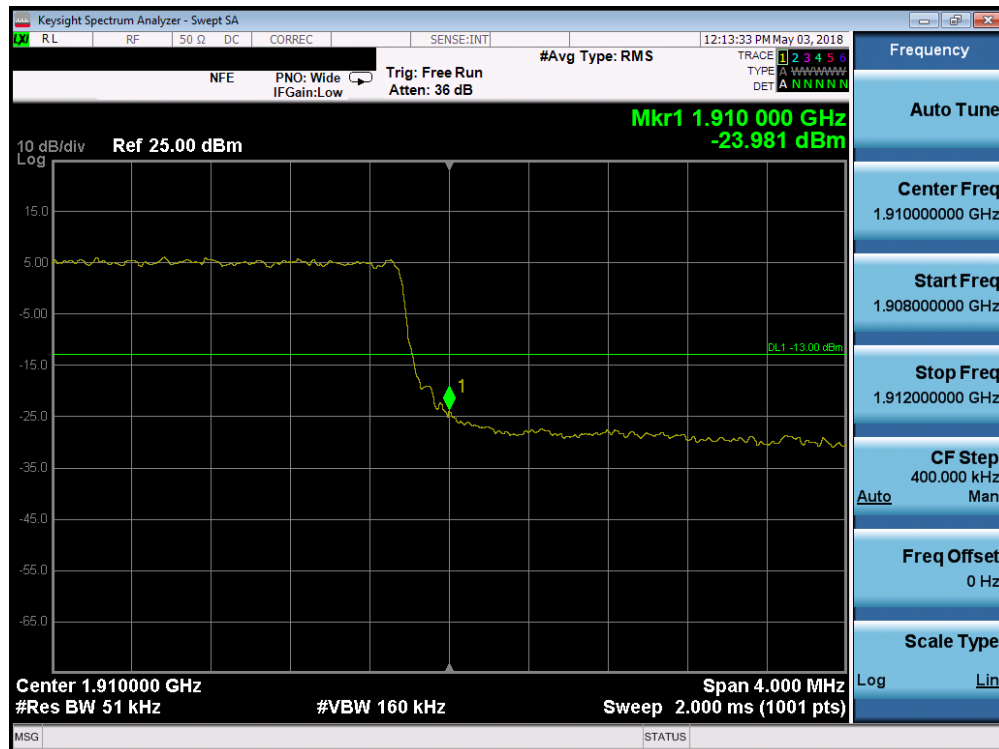


Plot 7-128. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

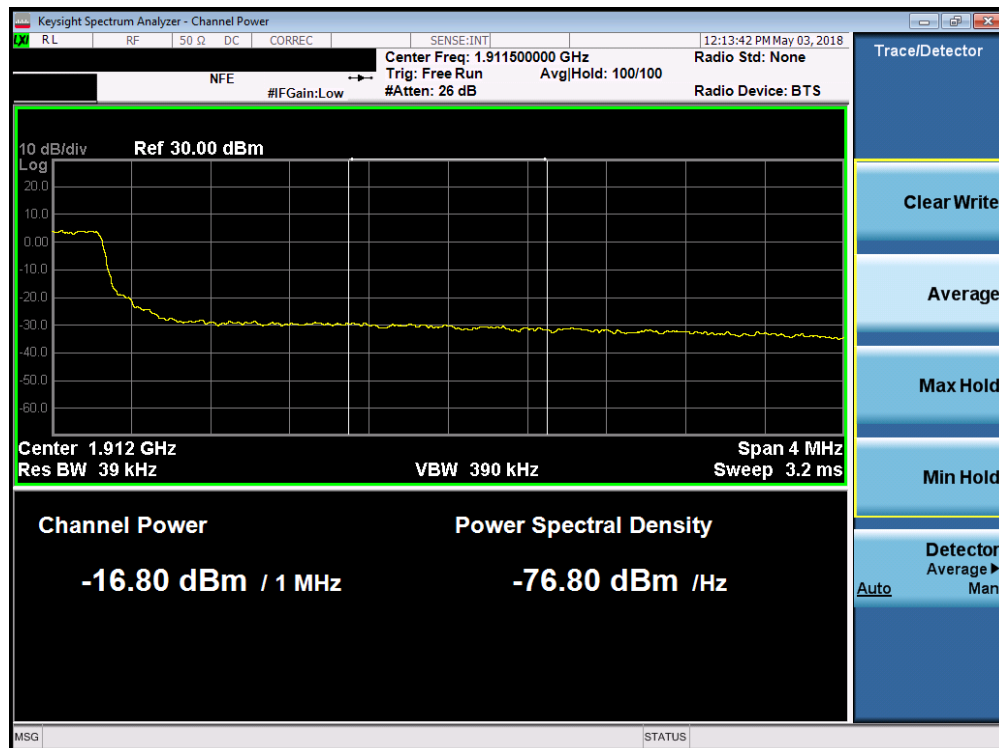


Plot 7-129. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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

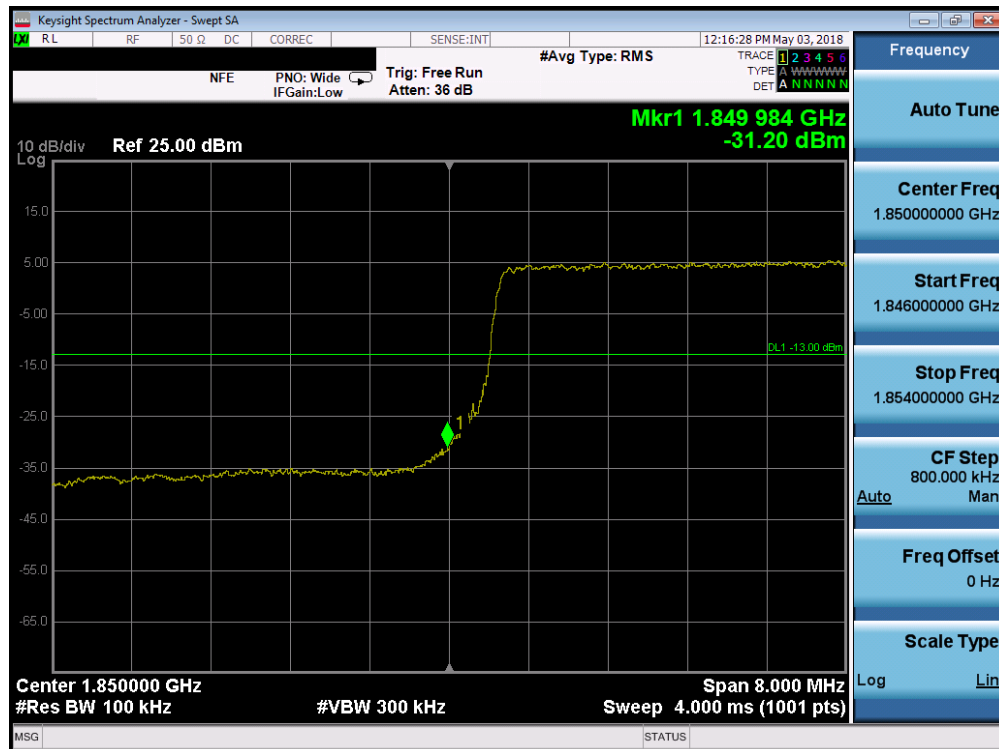


Plot 7-130. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

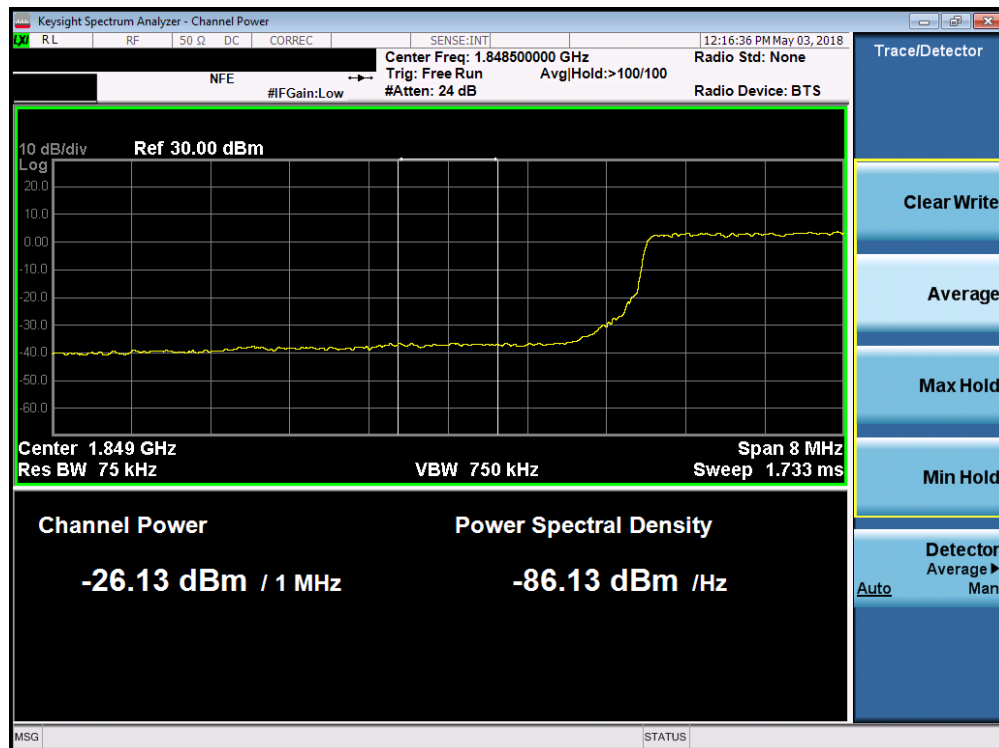


Plot 7-131. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: Portable Handset		Page 84 of 122

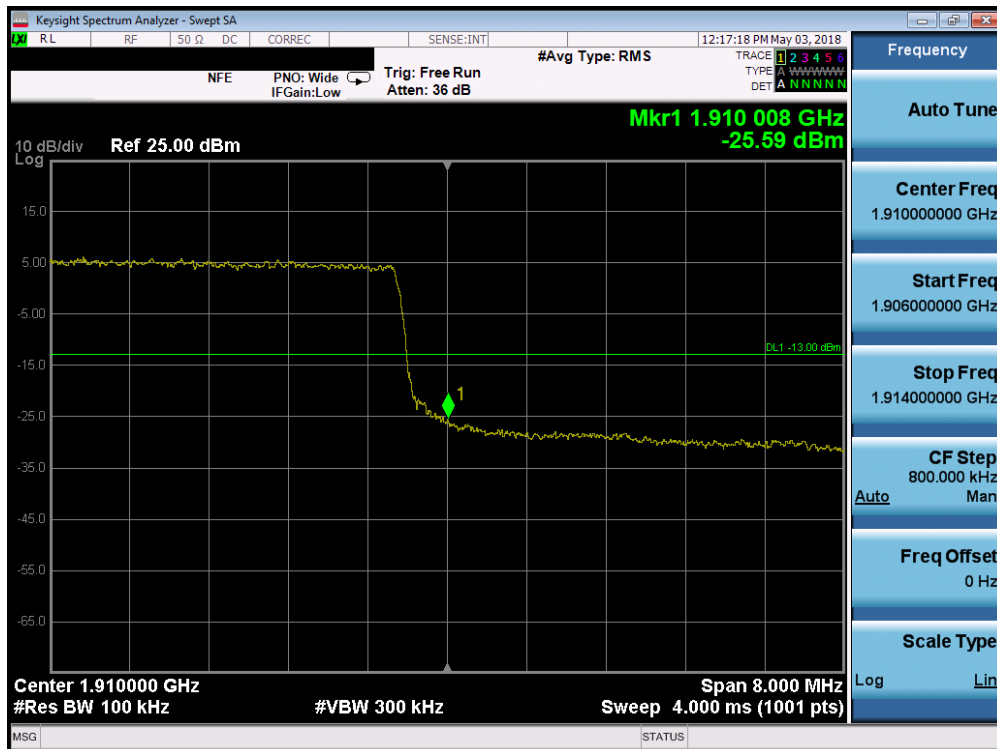


Plot 7-132. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

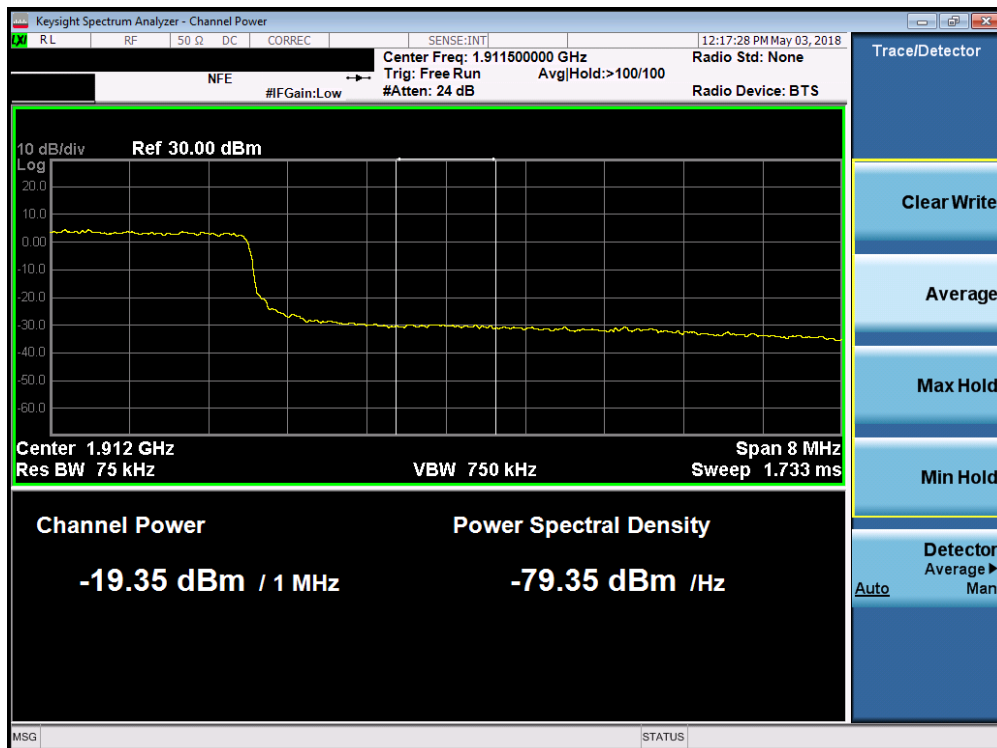


Plot 7-133. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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

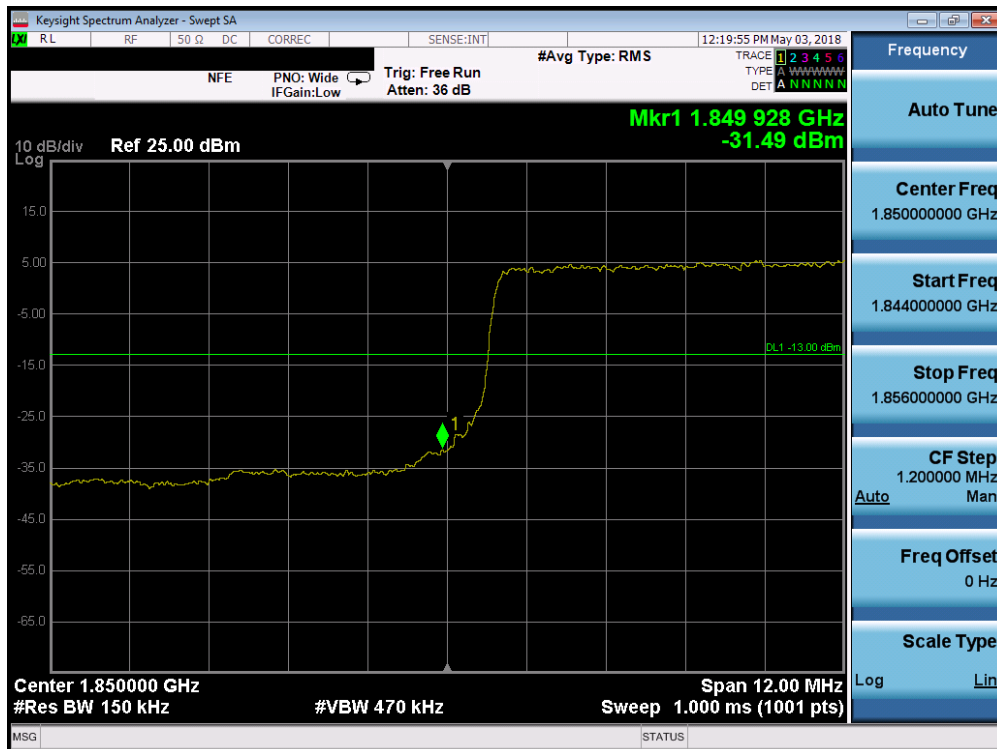


Plot 7-134. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

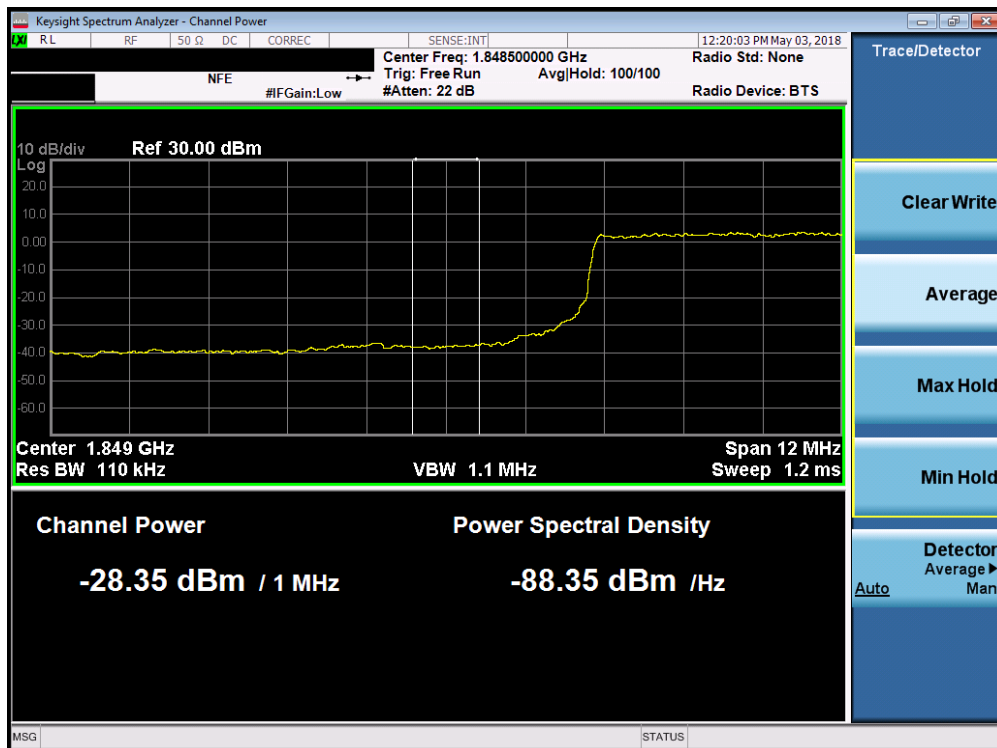


Plot 7-135. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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

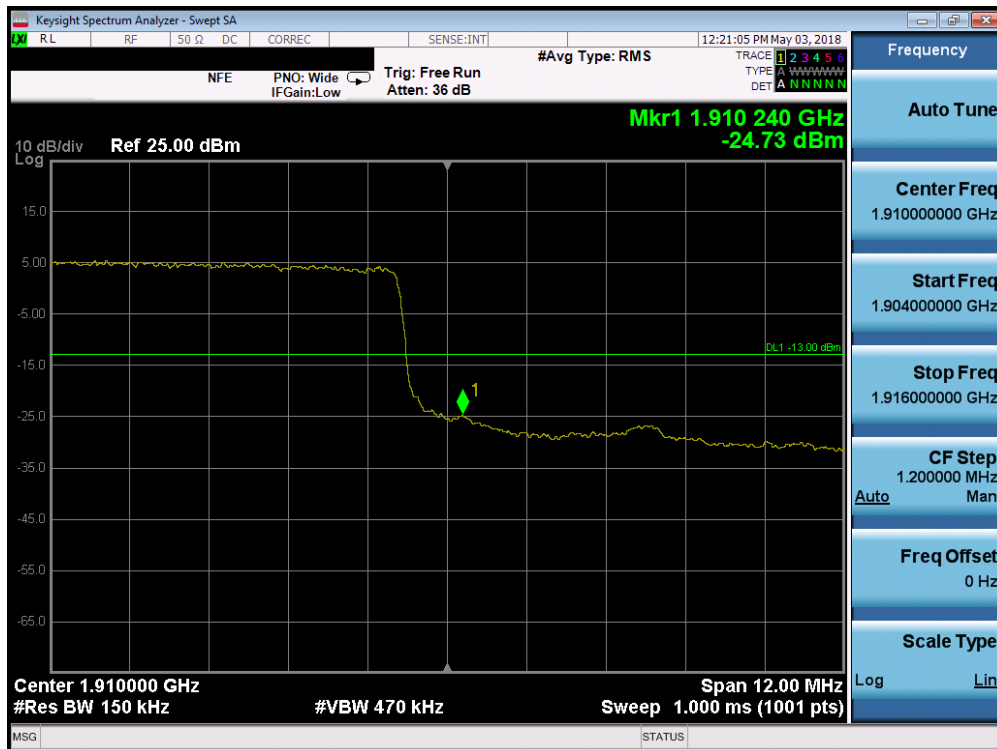


Plot 7-136. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

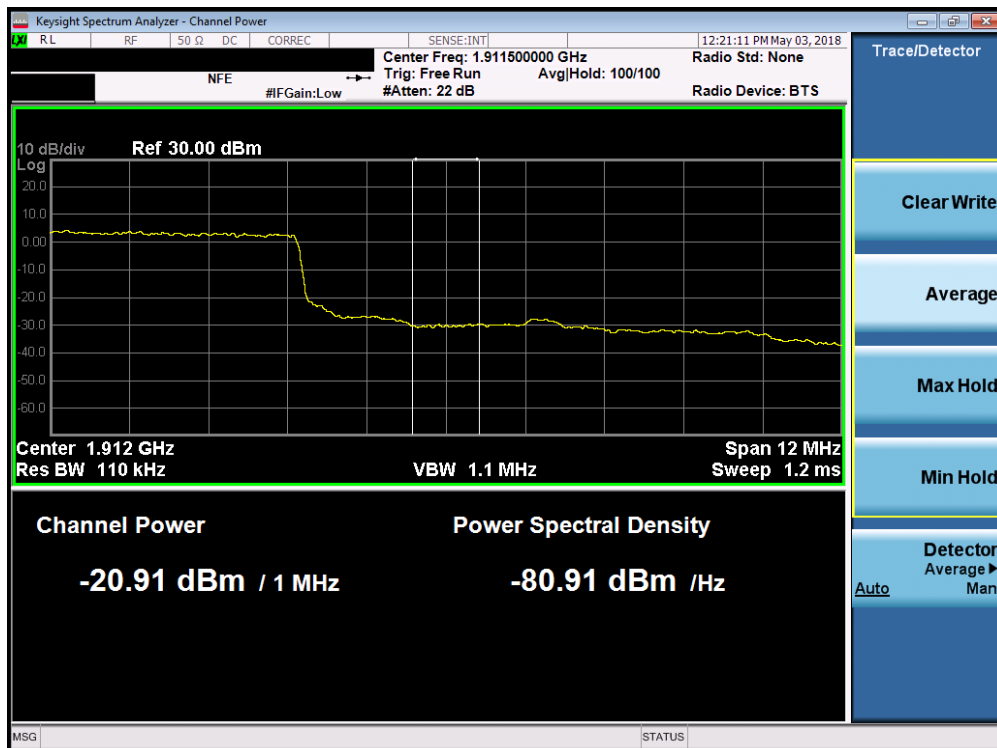


Plot 7-137. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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

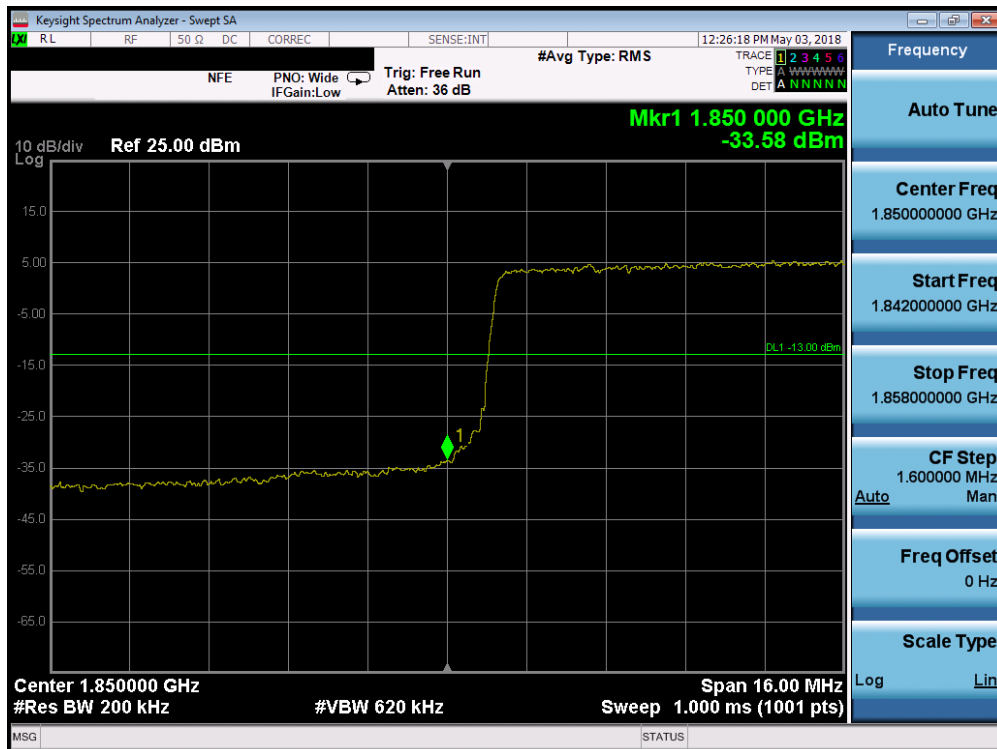


Plot 7-138. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

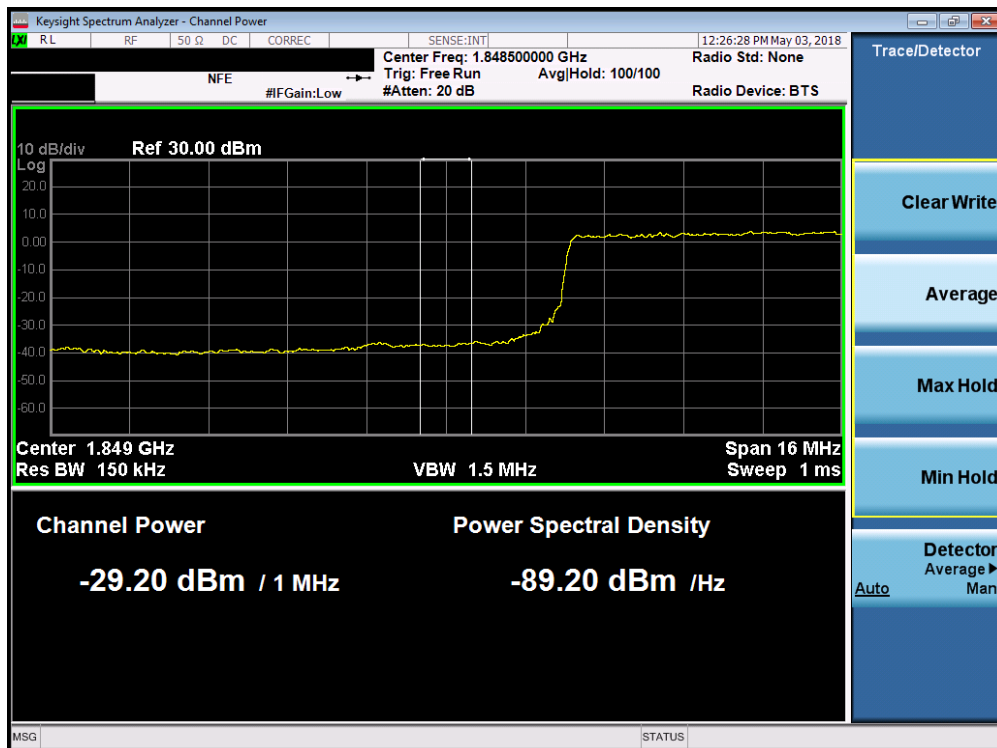


Plot 7-139. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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



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

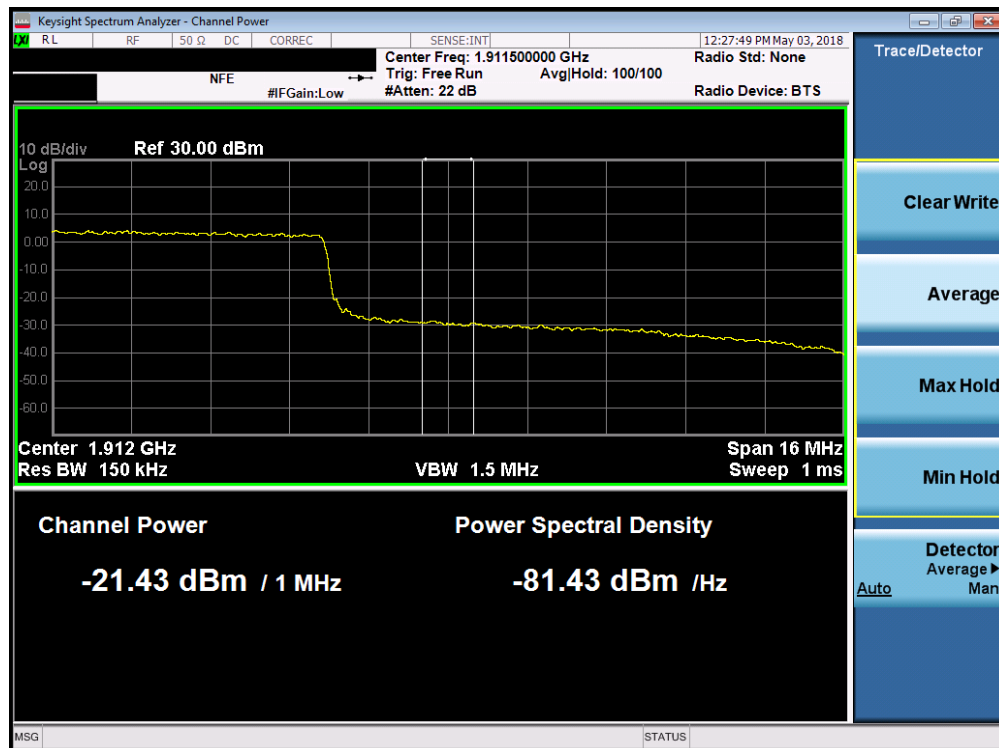


Plot 7-141. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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.

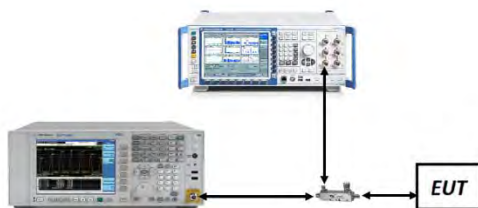


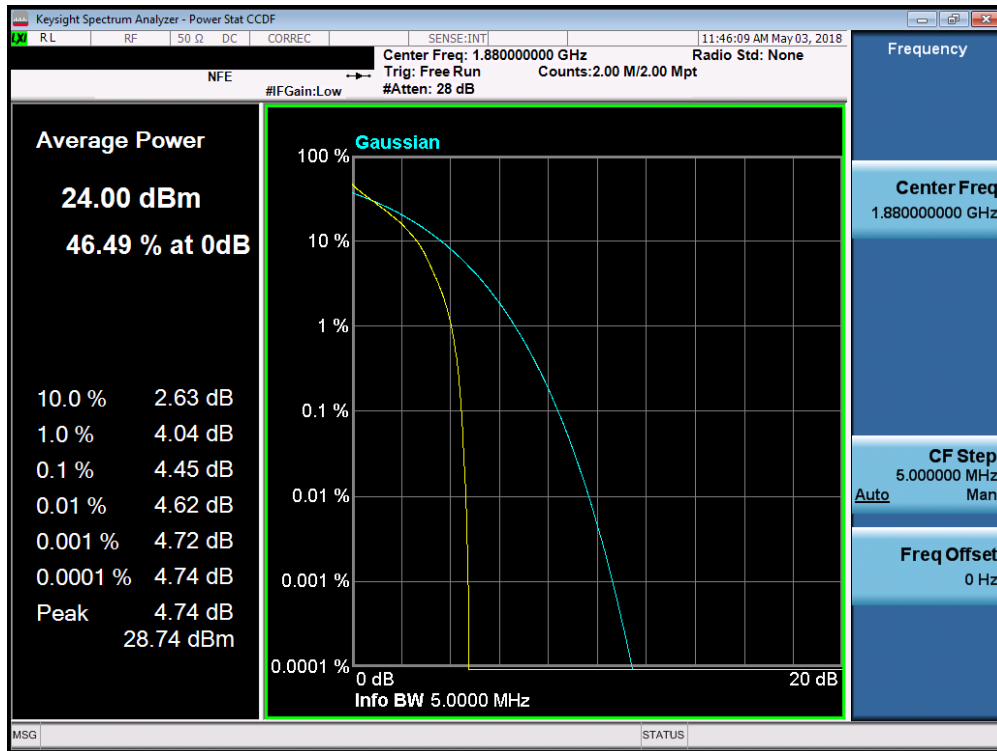
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

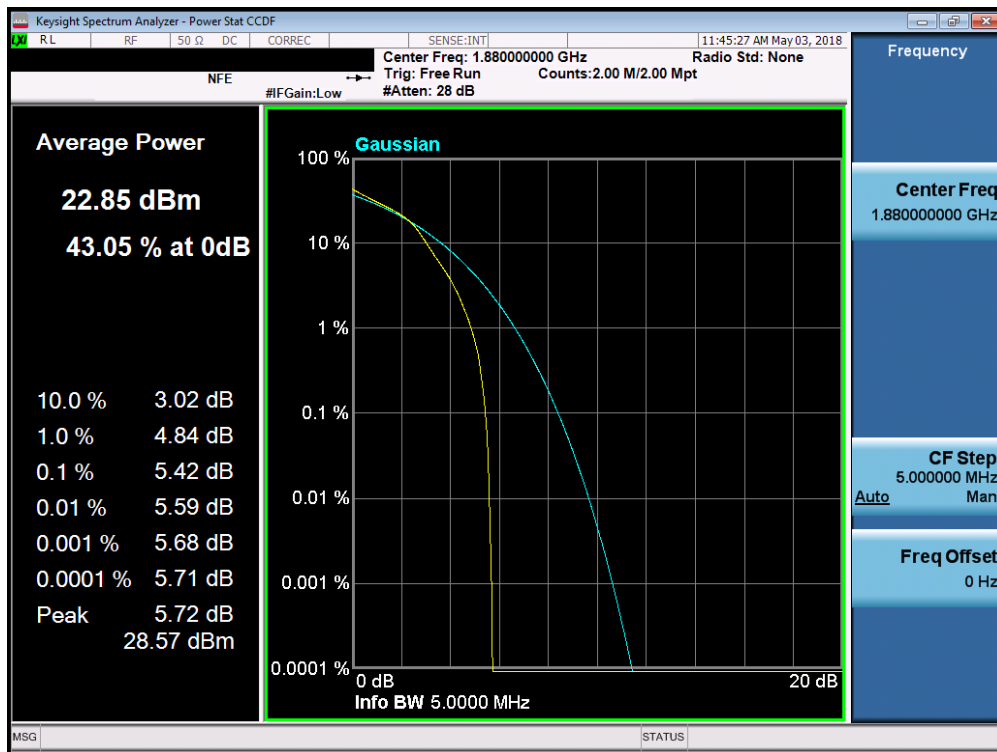
None.

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

Band 2

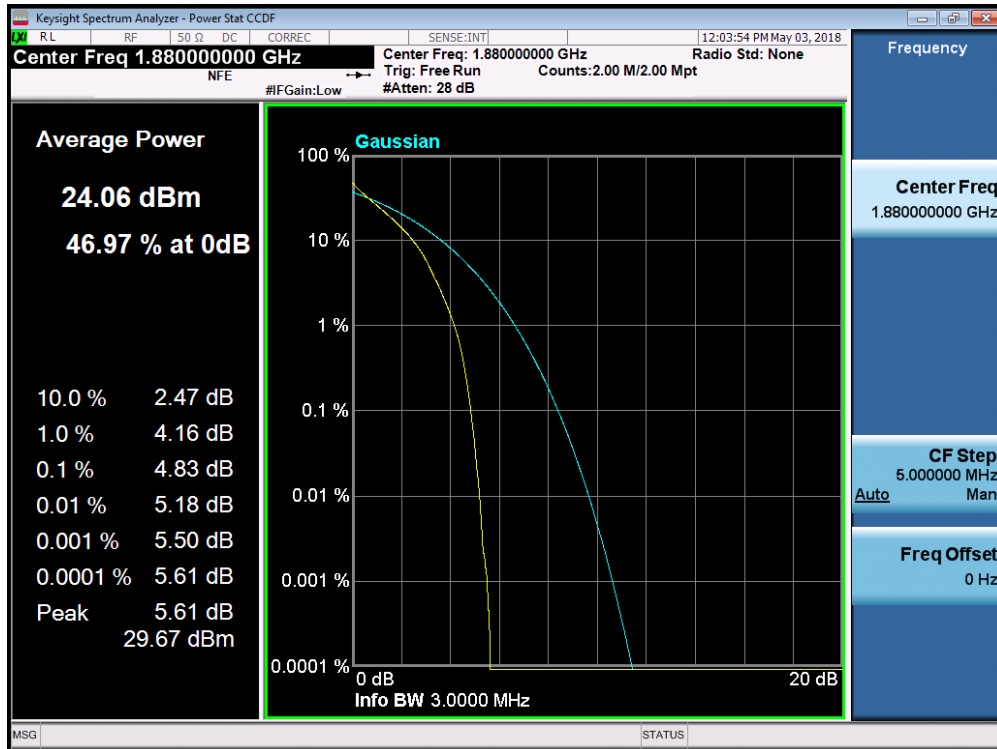


Plot 7-144. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

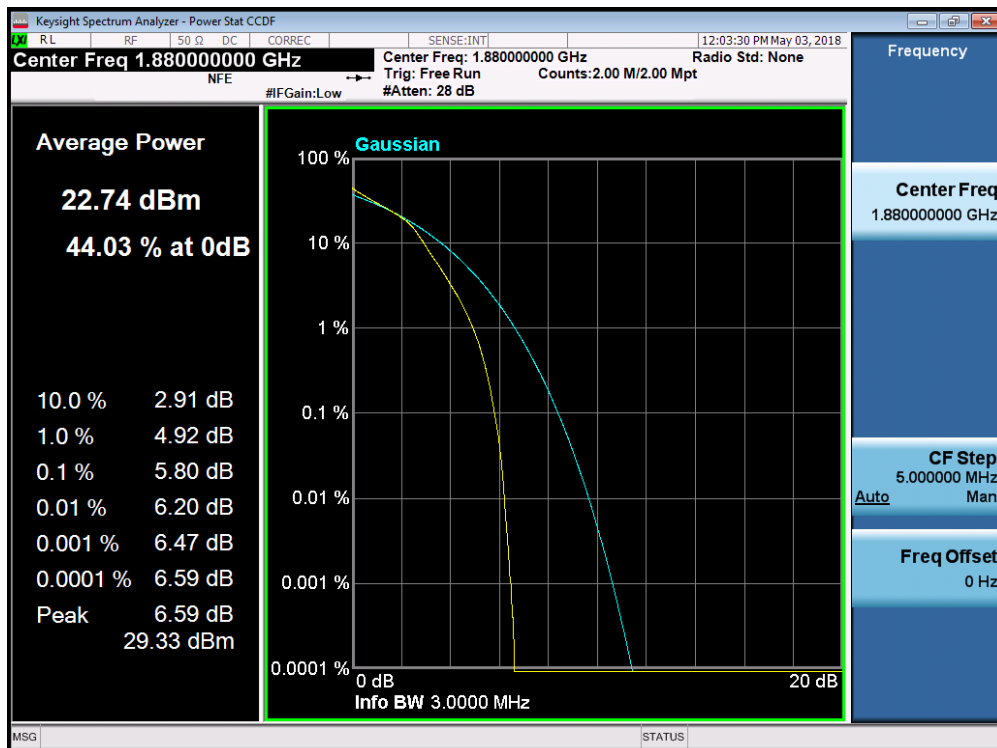


Plot 7-145. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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

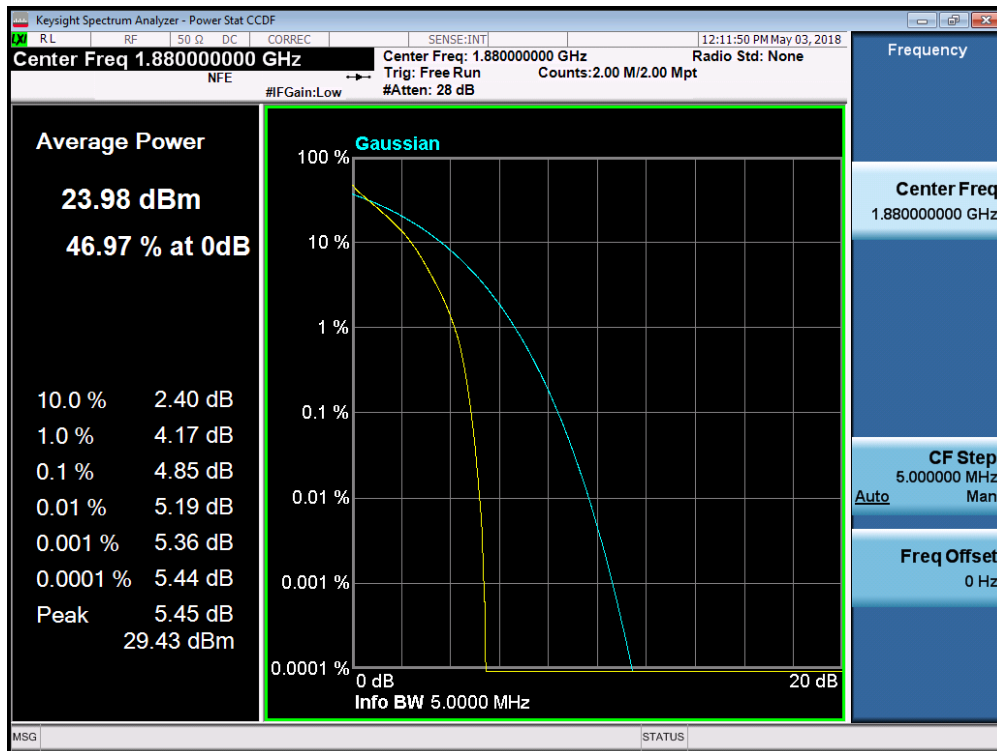


Plot 7-146. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

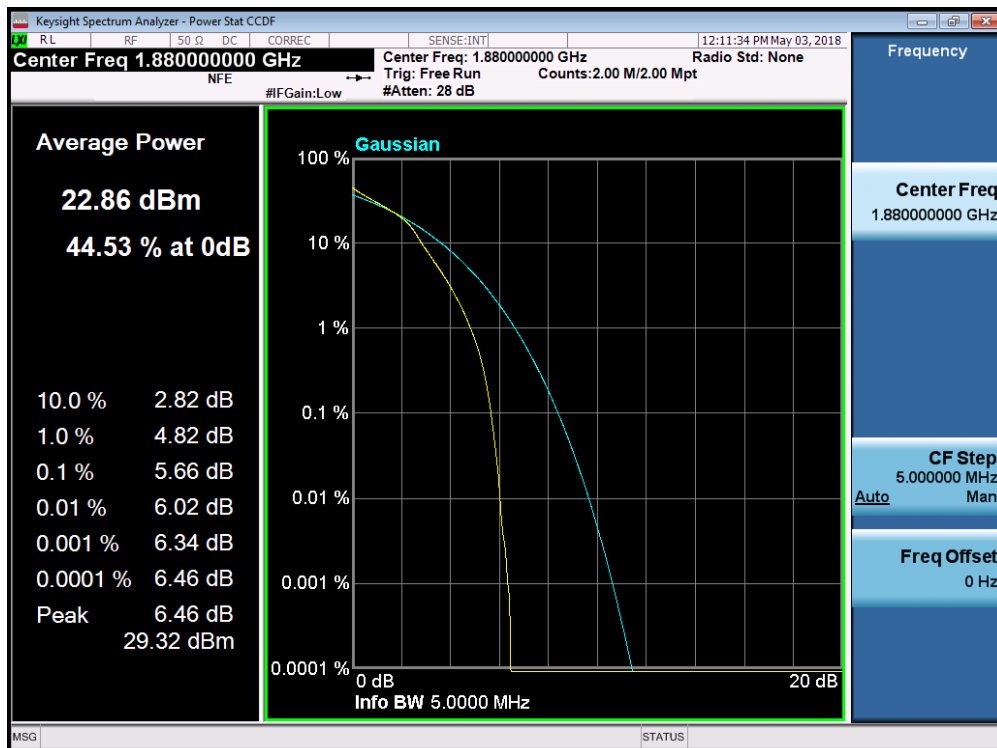


Plot 7-147. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

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

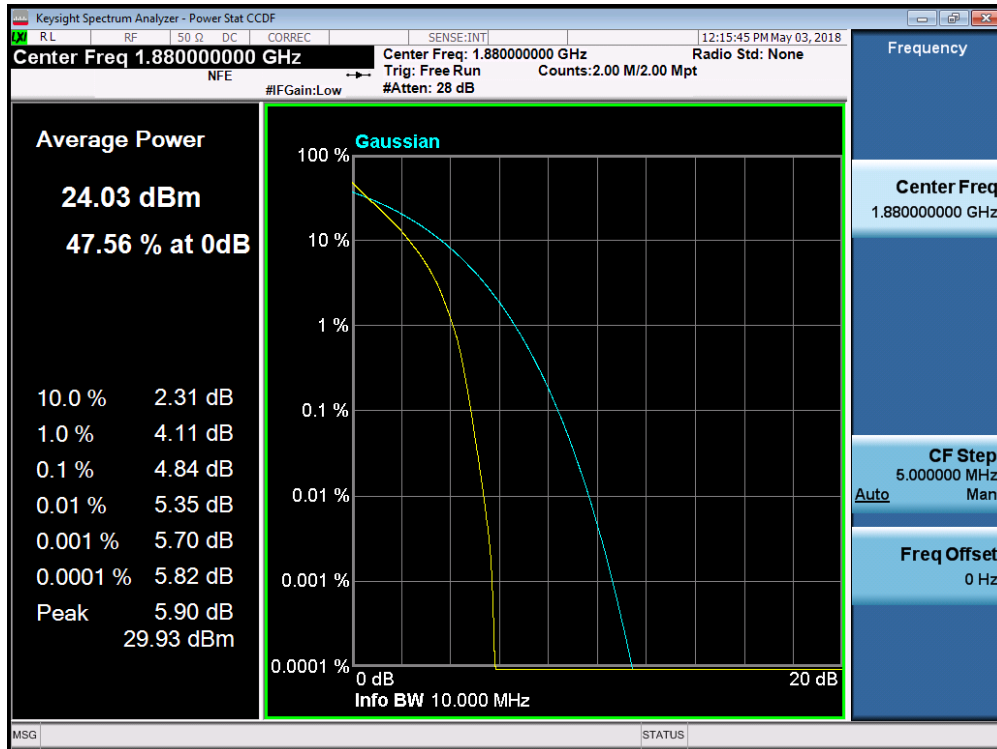


Plot 7-148. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

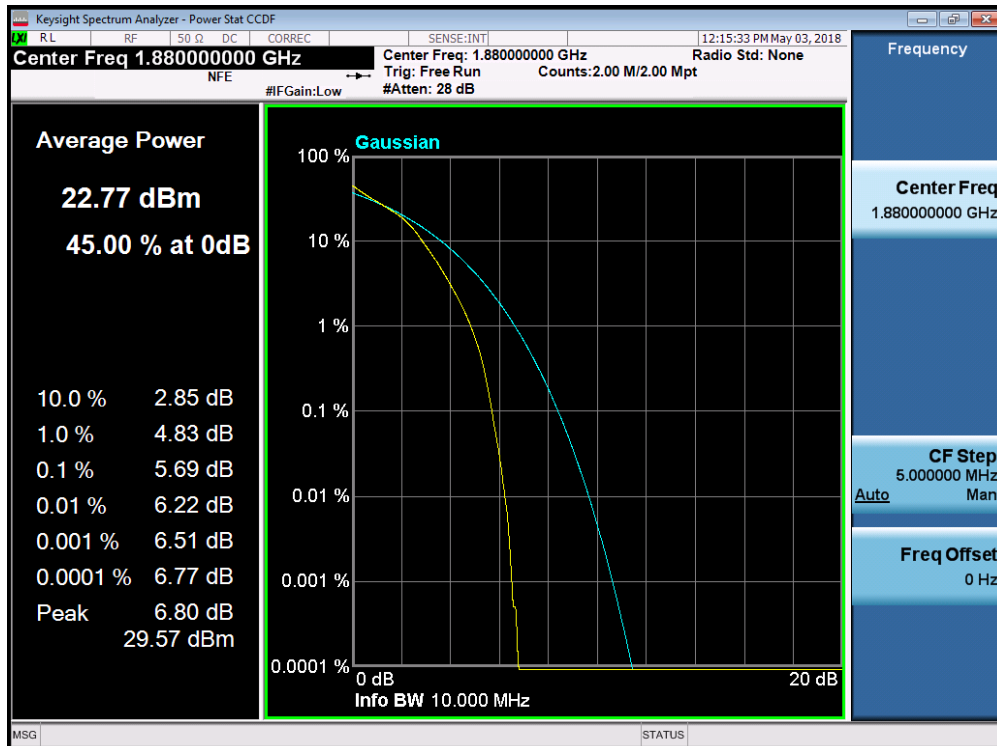


Plot 7-149. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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

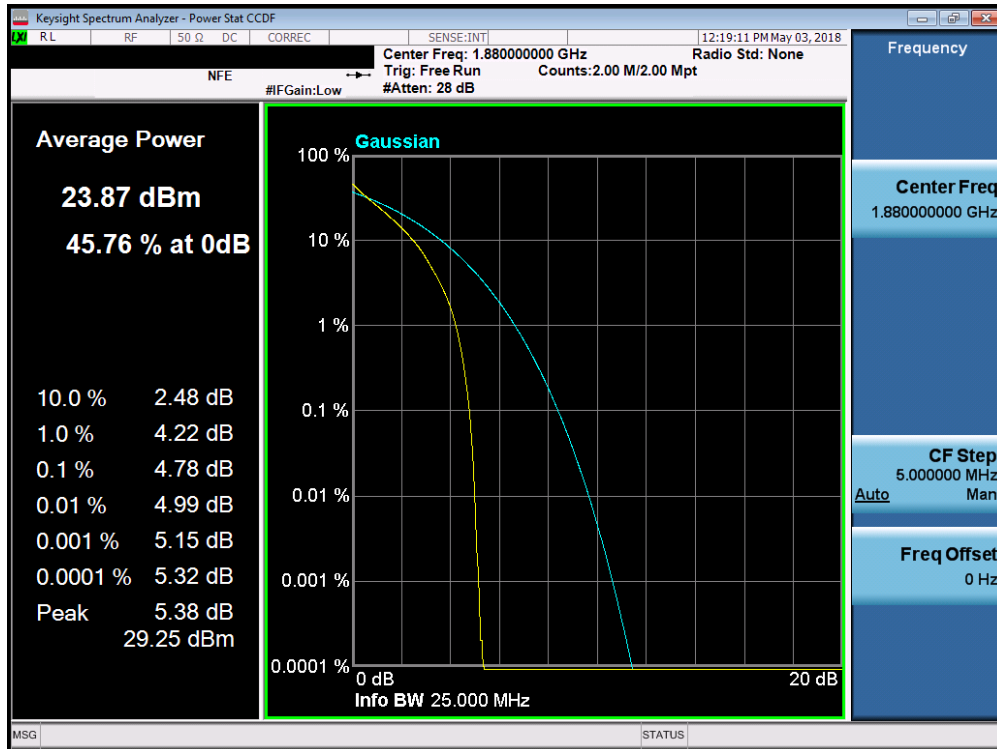


Plot 7-150. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

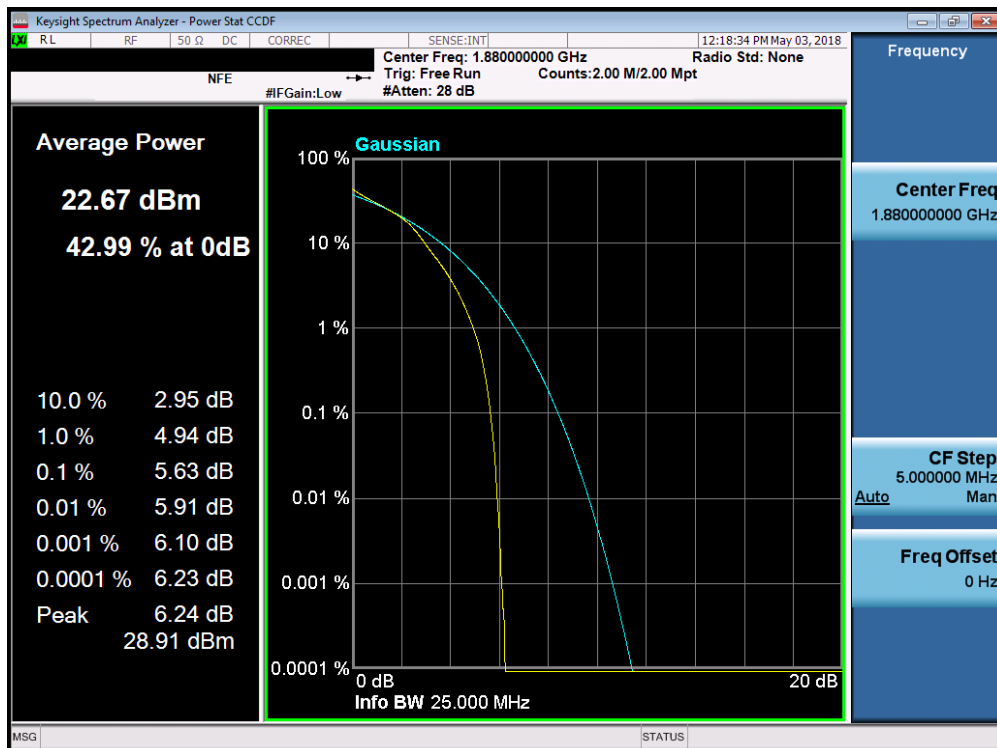


Plot 7-151. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: Portable Handset		Page 95 of 122

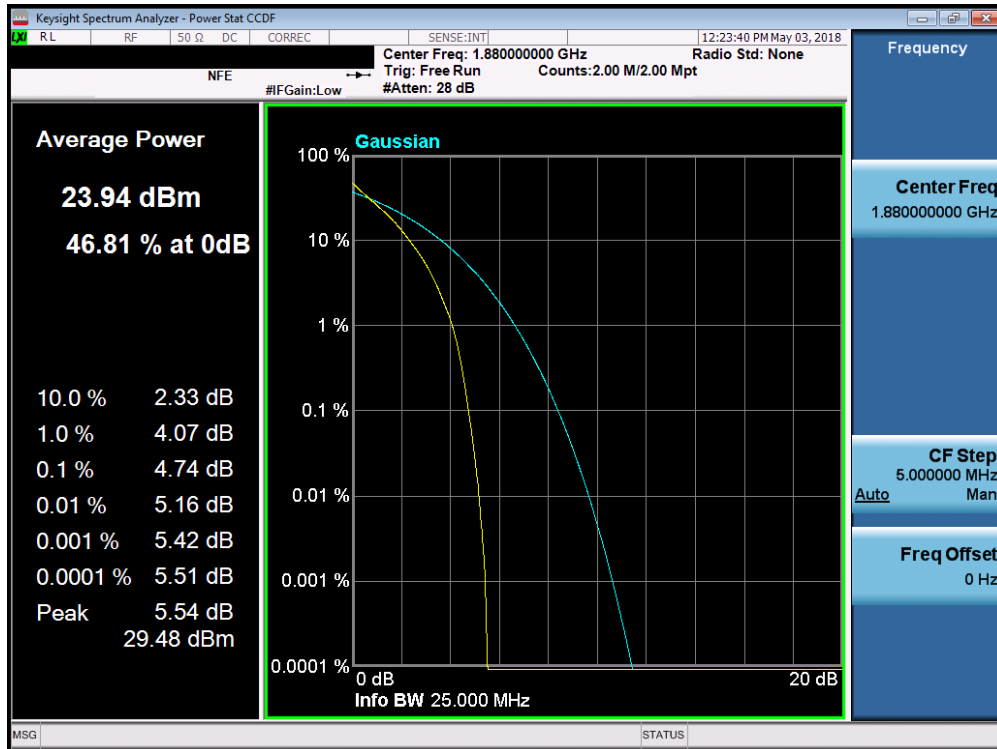


Plot 7-152. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

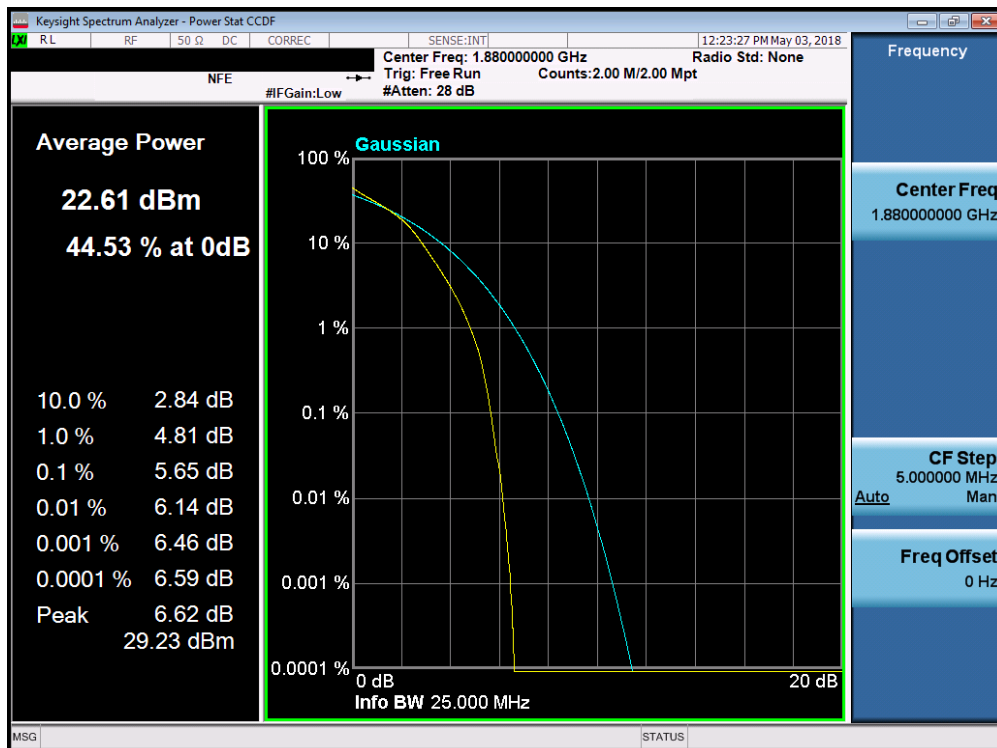


Plot 7-153. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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

Test Setup

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

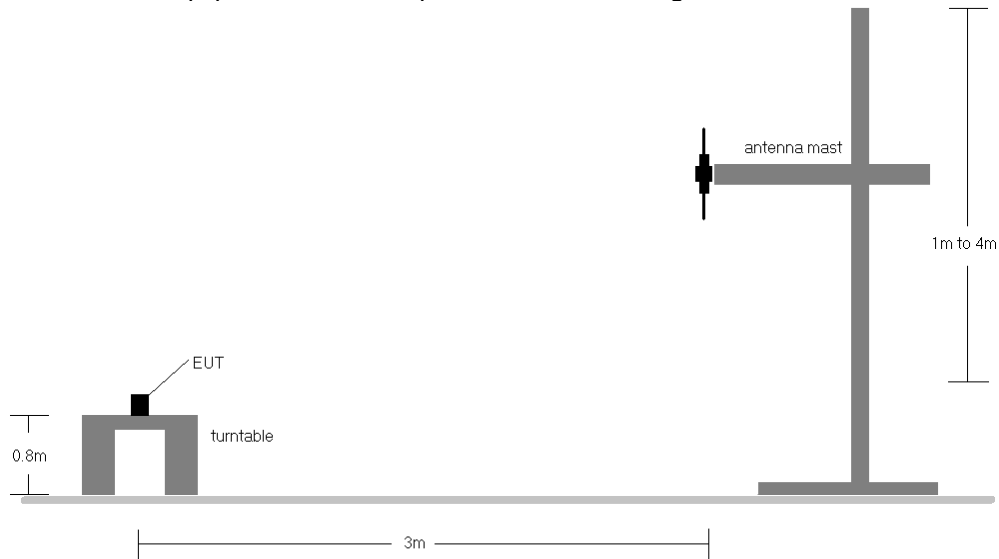


Figure 7-5. Radiated Test Setup <1GHz

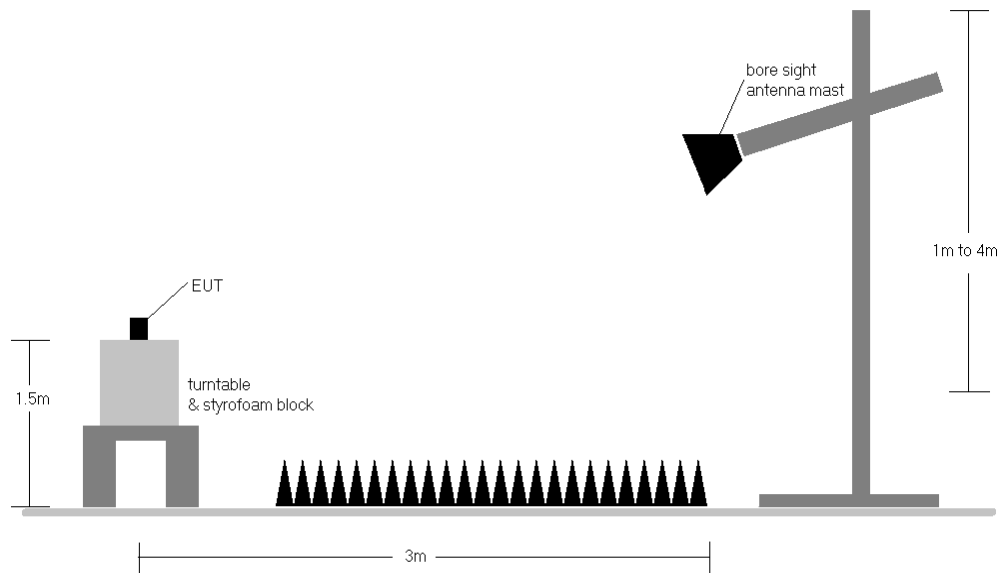


Figure 7-6. Radiated Test Setup >1GHz

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	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	20.92	0.124	34.77	-13.85	23.07	0.203	36.99	-13.92
707.50	1.4	16-QAM	V	150	5	1 / 5	20.72	1.13	19.70	0.093	34.77	-15.07	21.85	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	20.96	0.125	34.77	-13.81	23.11	0.205	36.99	-13.88
707.50	3	16-QAM	V	150	8	1 / 14	20.19	1.13	19.17	0.083	34.77	-15.60	21.32	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	20.87	0.122	34.77	-13.90	23.02	0.201	36.99	-13.97
707.50	5	16-QAM	V	150	7	1 / 24	20.20	1.13	19.18	0.083	34.77	-15.59	21.33	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	20.76	0.119	34.77	-14.01	22.91	0.196	36.99	-14.08
707.50	10	16-QAM	V	150	5	1 / 49	20.48	1.13	19.46	0.088	34.77	-15.31	21.61	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	20.70	0.117	38.45	-17.75	22.85	0.193	40.61	-17.76
848.30	1.4	16-QAM	H	150	3	1 / 0	20.16	1.50	19.51	0.089	38.45	-18.94	21.66	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	20.75	0.119	38.45	-17.70	22.90	0.195	40.61	-17.71
847.50	3	16-QAM	H	150	3	1 / 0	20.25	1.50	19.60	0.091	38.45	-18.85	21.75	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	20.24	0.106	38.45	-18.21	22.39	0.173	40.61	-18.22
846.50	5	16-QAM	H	150	359	1 / 0	19.50	1.50	18.85	0.077	38.45	-19.60	21.00	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	20.33	0.108	38.45	-18.12	22.48	0.177	40.61	-18.13
844.00	10	16-QAM	H	150	0	1 / 0	19.72	1.50	19.07	0.081	38.45	-19.38	21.22	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	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	23.19	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	21.90	0.155	30.00	-8.10
1711.50	3	QPSK	H	118	220	1 / 0	15.03	8.22	23.25	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	22.28	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	23.12	0.205	30.00	-6.88
1752.50	5	16-QAM	H	127	33	1 / 0	13.75	7.91	21.66	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	23.77	0.238	30.00	-6.23
1750.00	10	16-QAM	H	118	37	1 / 0	14.46	7.93	22.39	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	23.54	0.226	30.00	-6.46
1747.50	15	16-QAM	H	126	5	1 / 0	14.30	7.95	22.25	0.168	30.00	-7.75
1720.00	20	QPSK	H	128	5	1 / 0	13.82	8.15	21.98	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	21.09	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	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	22.41	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	21.32	0.136	33.01	-11.69
1851.50	3	QPSK	H	118	230	1 / 0	14.44	7.72	22.16	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	21.02	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	23.07	0.203	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	21.85	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	22.68	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	21.69	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	22.47	0.177	33.01	-10.54
1902.50	15	16-QAM	H	116	5	1 / 0	13.79	7.87	21.66	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	22.50	0.178	33.01	-10.51
1900.00	20	16-QAM	H	114	5	1 / 0	13.54	7.86	21.40	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	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: Portable Handset	Page 103 of 122

Test Setup

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

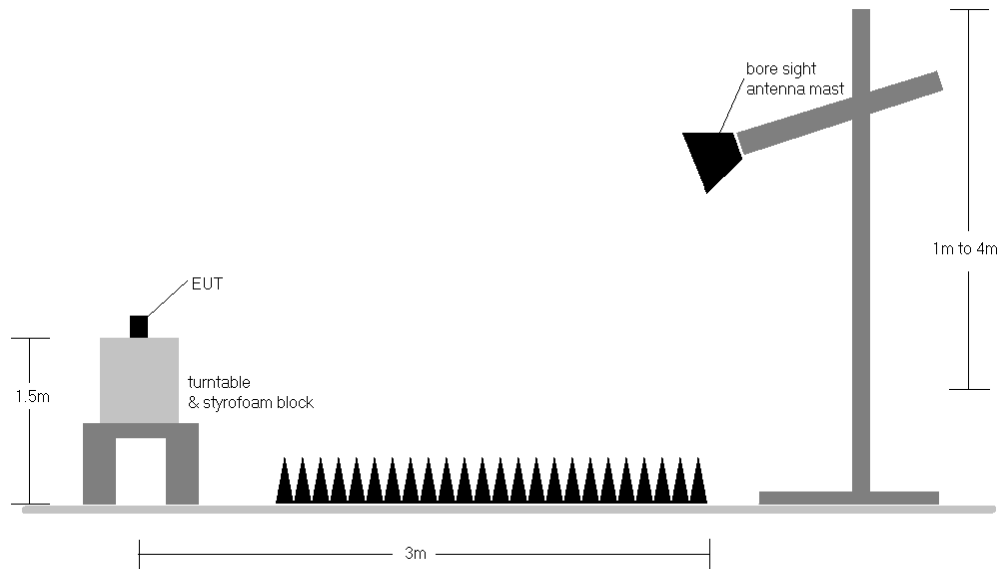


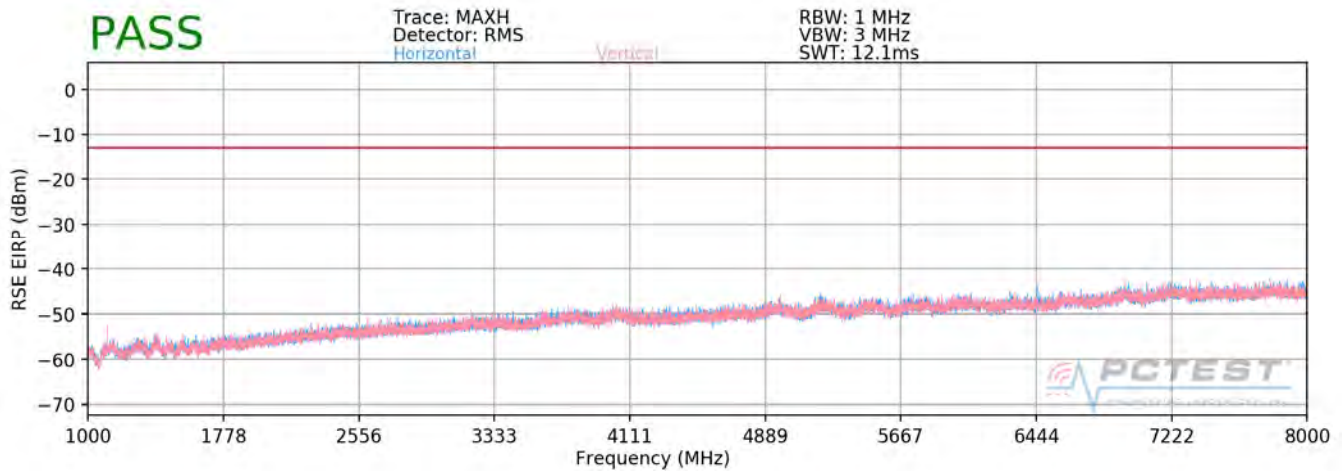
Figure 7-7. Test Instrument & Measurement Setup

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	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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)

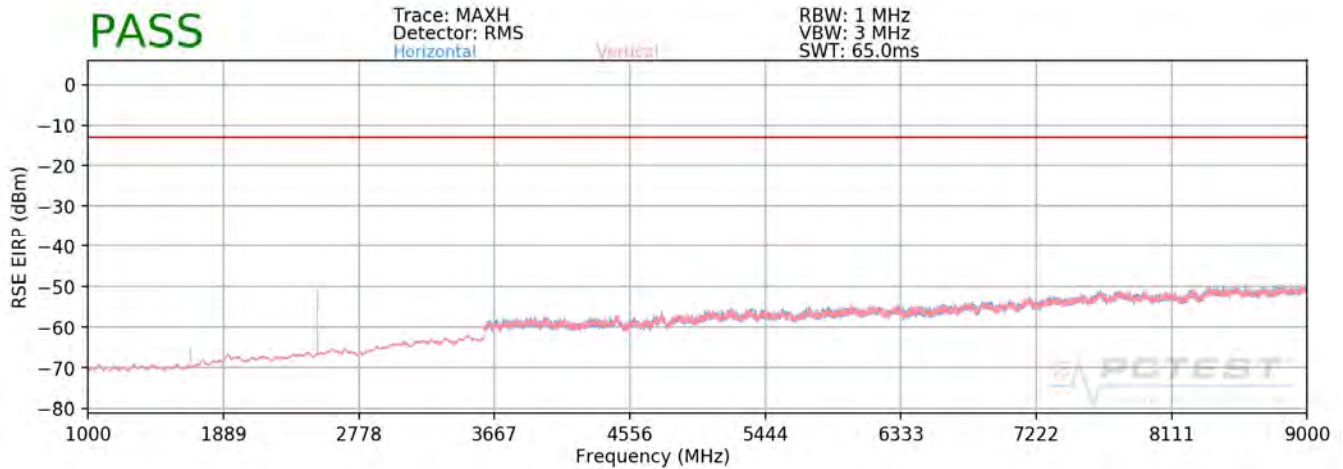
OPERATING FREQUENCY: 714.50 MHz
 CHANNEL: 23165
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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)

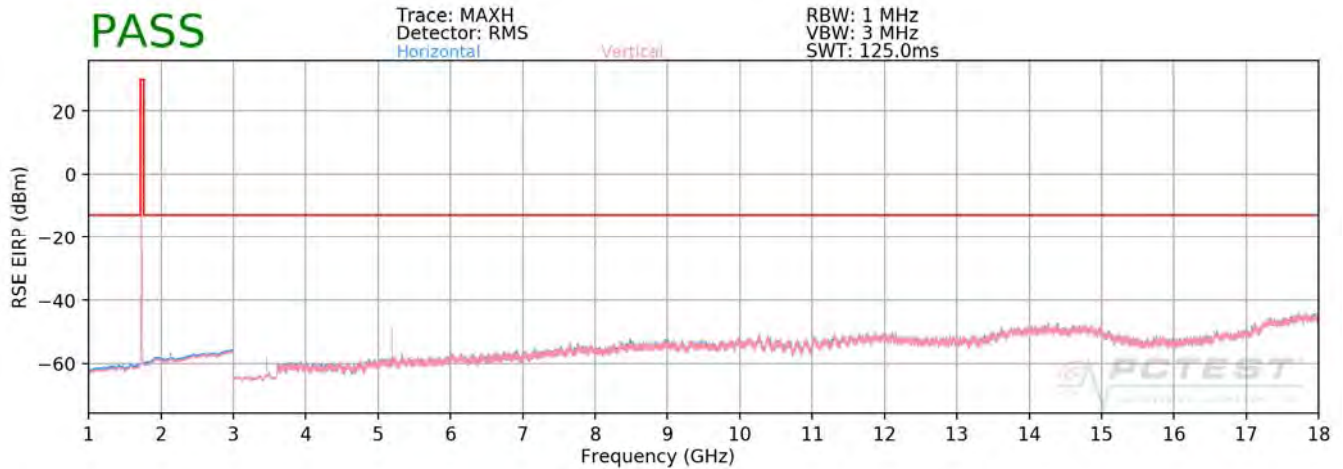
OPERATING FREQUENCY: 847.50 MHz
 CHANNEL: 20635
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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)

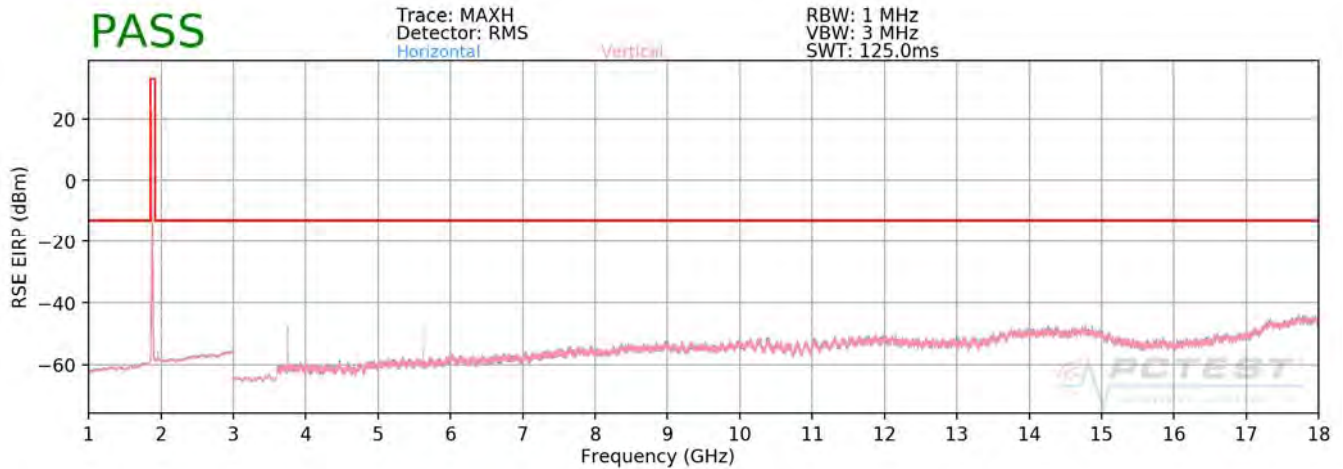
OPERATING FREQUENCY: 1750.00 MHz
 CHANNEL: 20350
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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 (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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 $\pm 0.00025\%$ (± 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	 MEASUREMENT REPORT (CERTIFICATION)		 Approved by: Quality Manager
Test Report S/N: 1M1804200078-03.ZNF	Test Dates: 4/24 - 5/9/2018	EUT Type: 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.

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Band 12 Frequency Stability Measurements

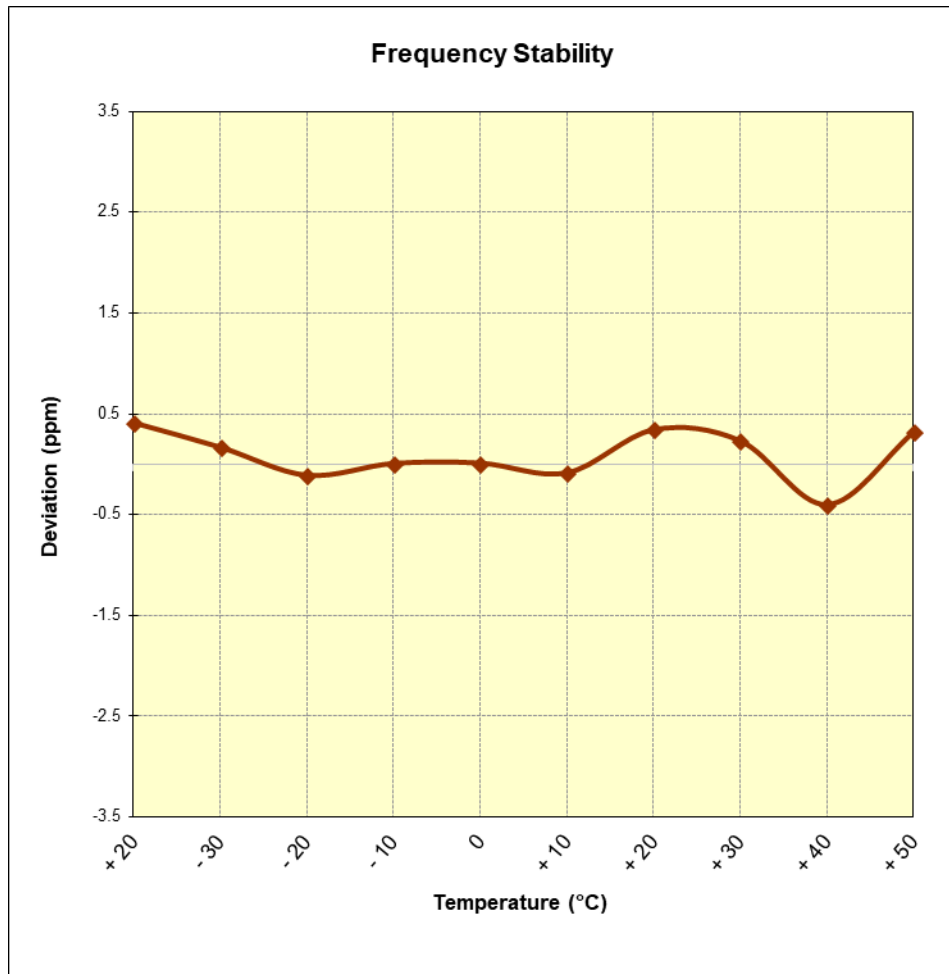


Figure 7-8. Frequency Stability Graph (Band 12)

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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	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements

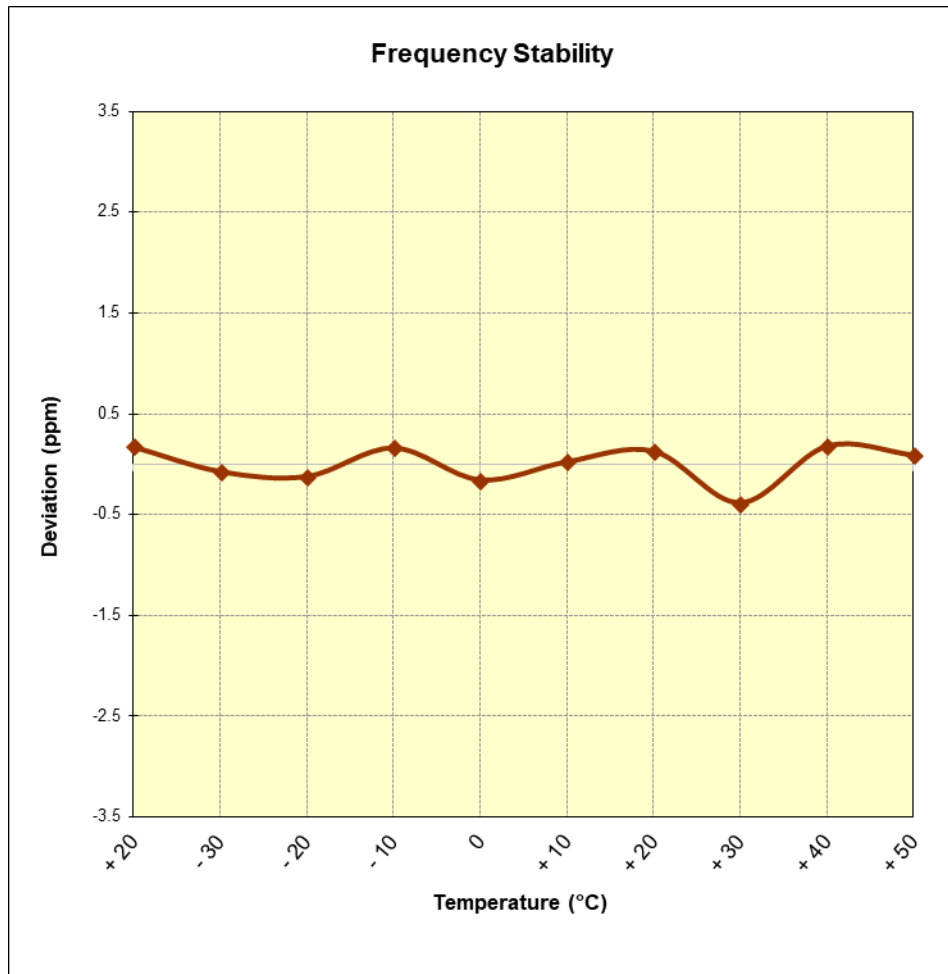


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFX410CS	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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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.

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Band 4 Frequency Stability Measurements

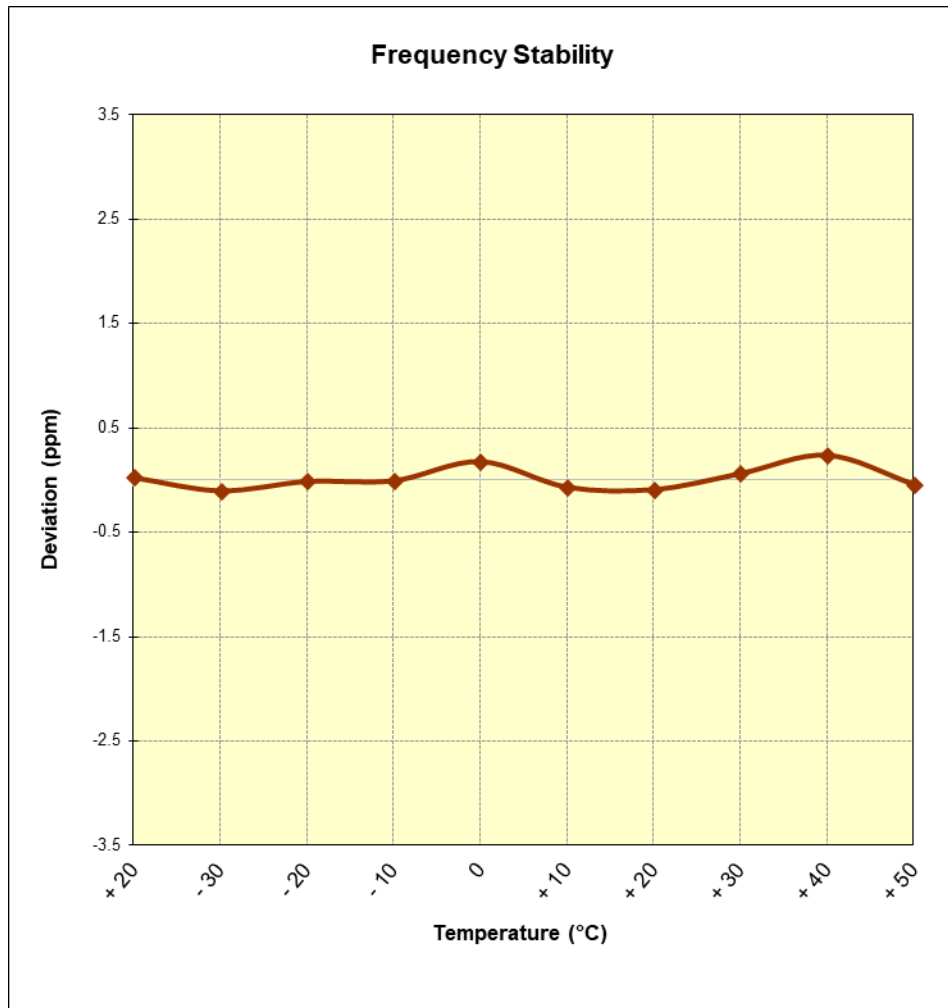


Figure 7-10. Frequency Stability Graph (Band 4)

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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	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 2 Frequency Stability Measurements

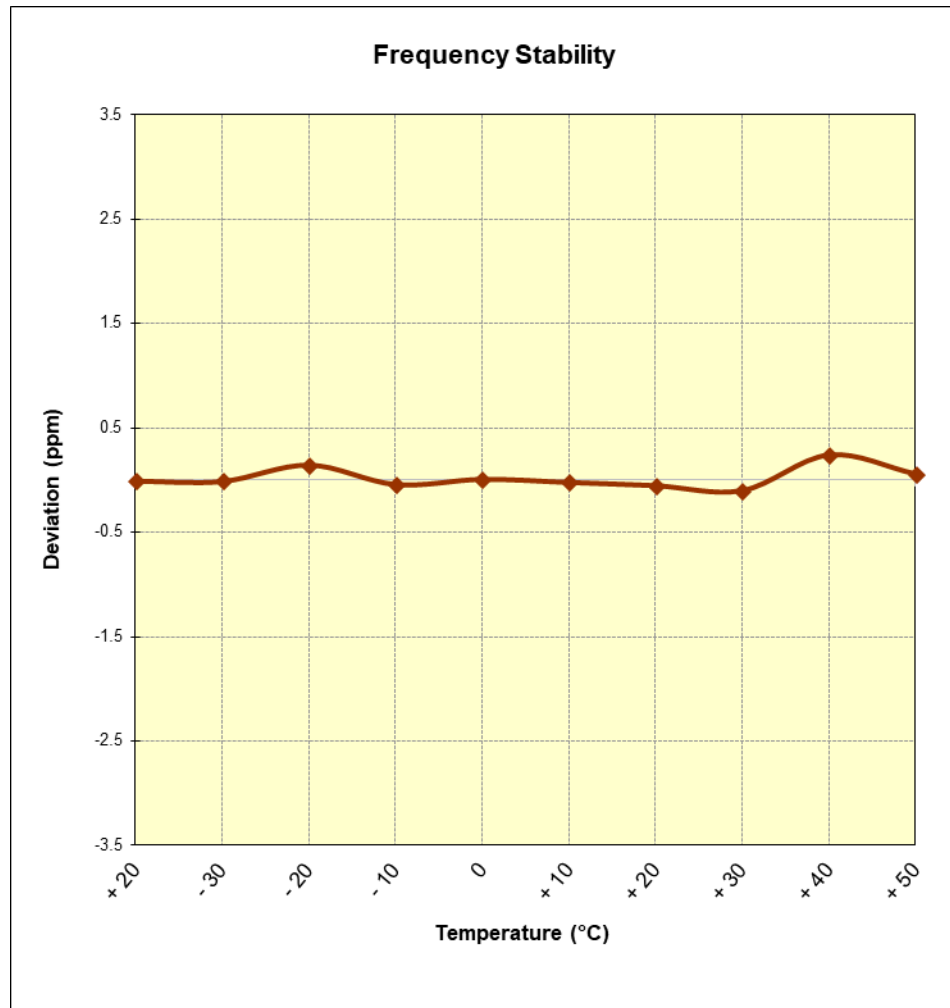


Figure 7-11. Frequency Stability Graph (Band 2)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **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	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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