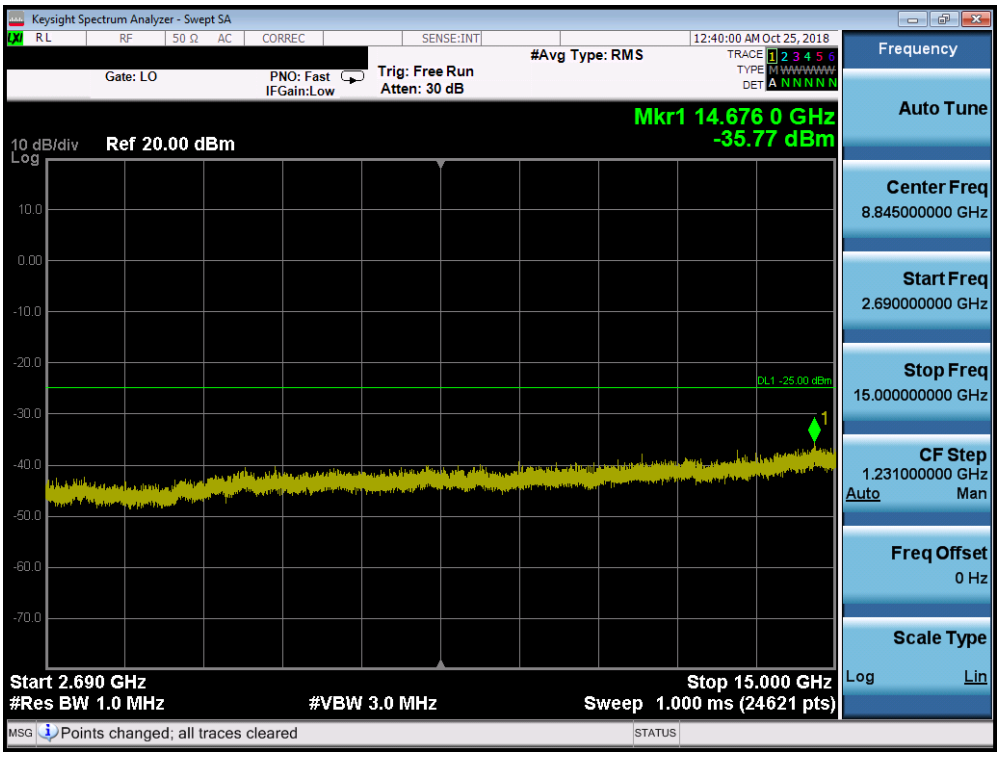

Plot 7-95. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-96. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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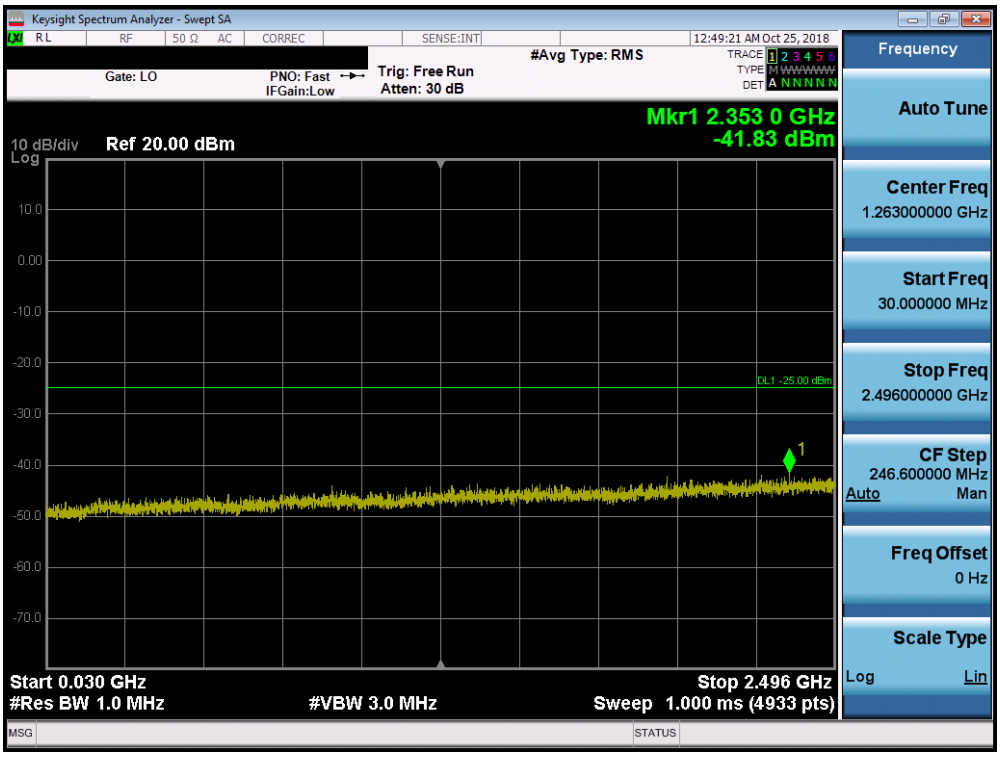
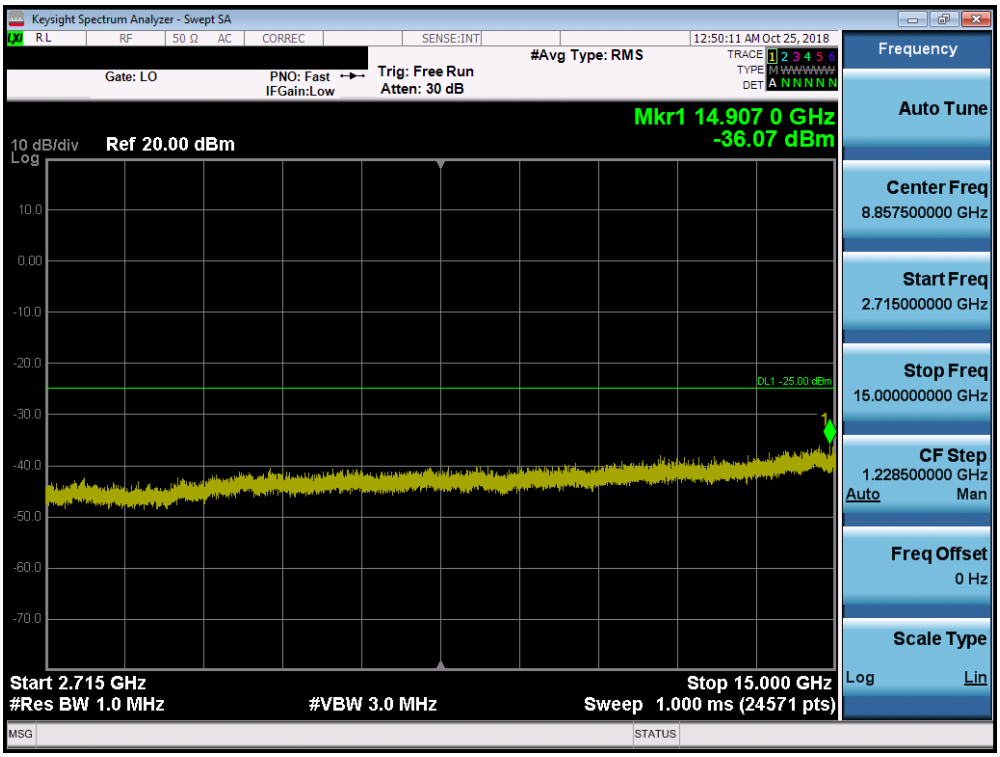


Plot 7-97. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-98. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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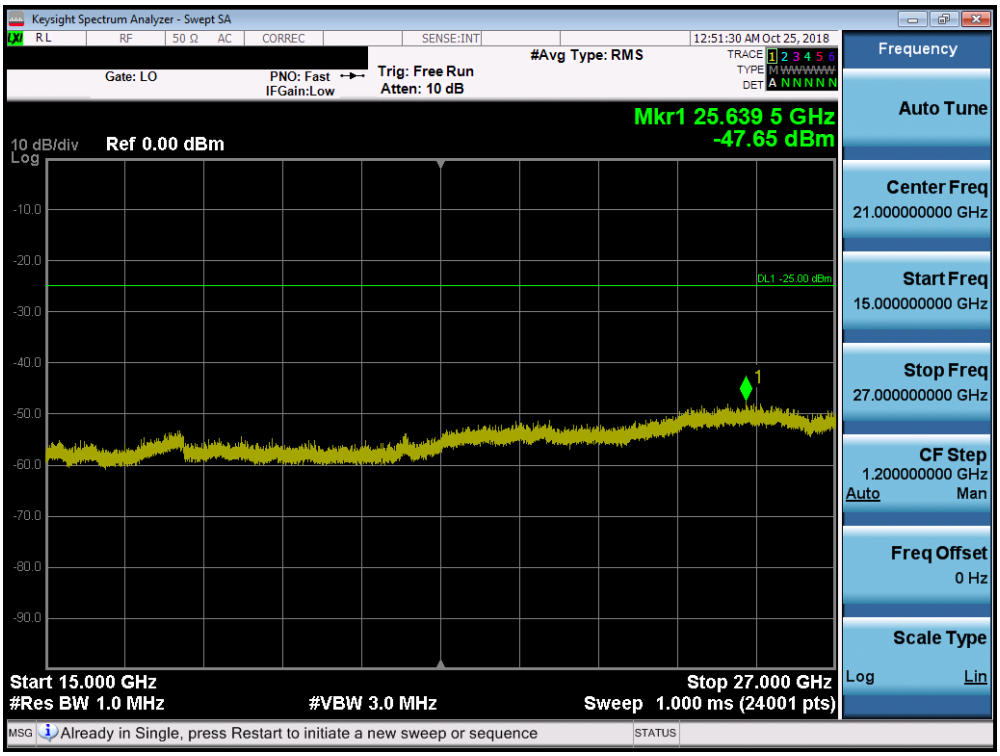

Plot 7-99. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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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 + 10log$_{10}$(P$_{[Watts]}$), where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 41 is as noted in the Test Notes on the following page.

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 ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
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.

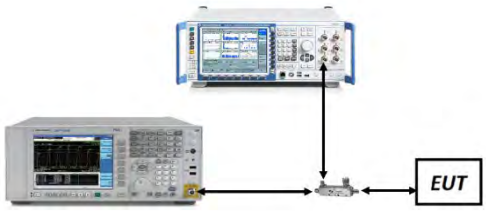

Figure 7-3. Test Instrument & Measurement Setup

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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.

Per 27.53(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

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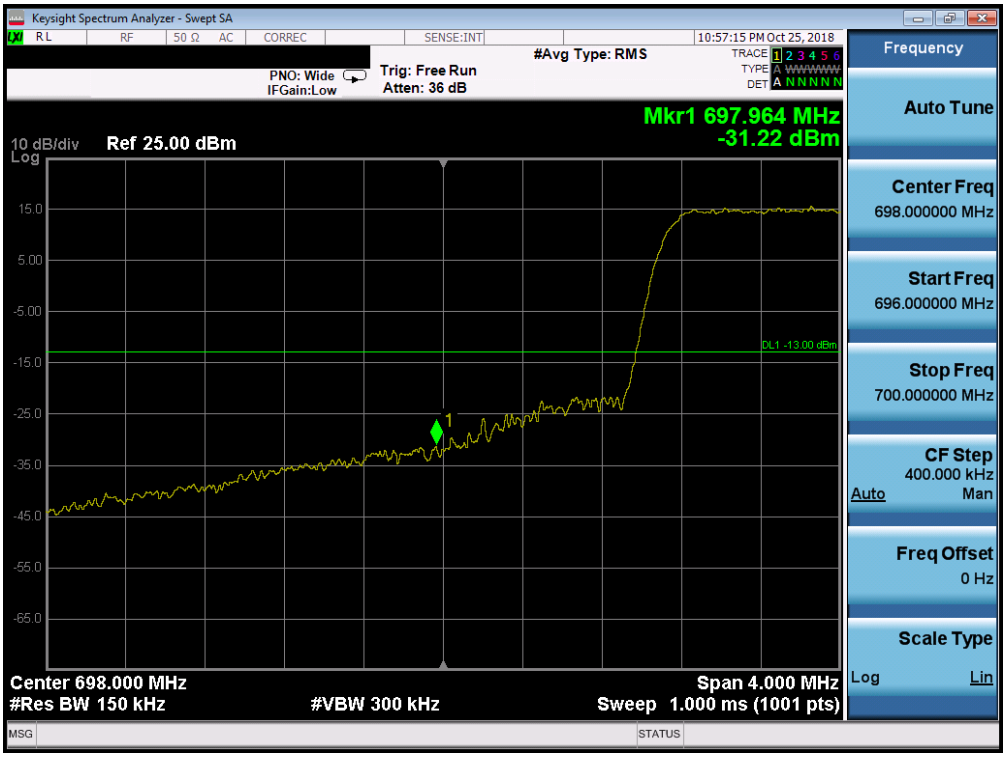
Band 12



Plot 7-100. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

Plot 7-101. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

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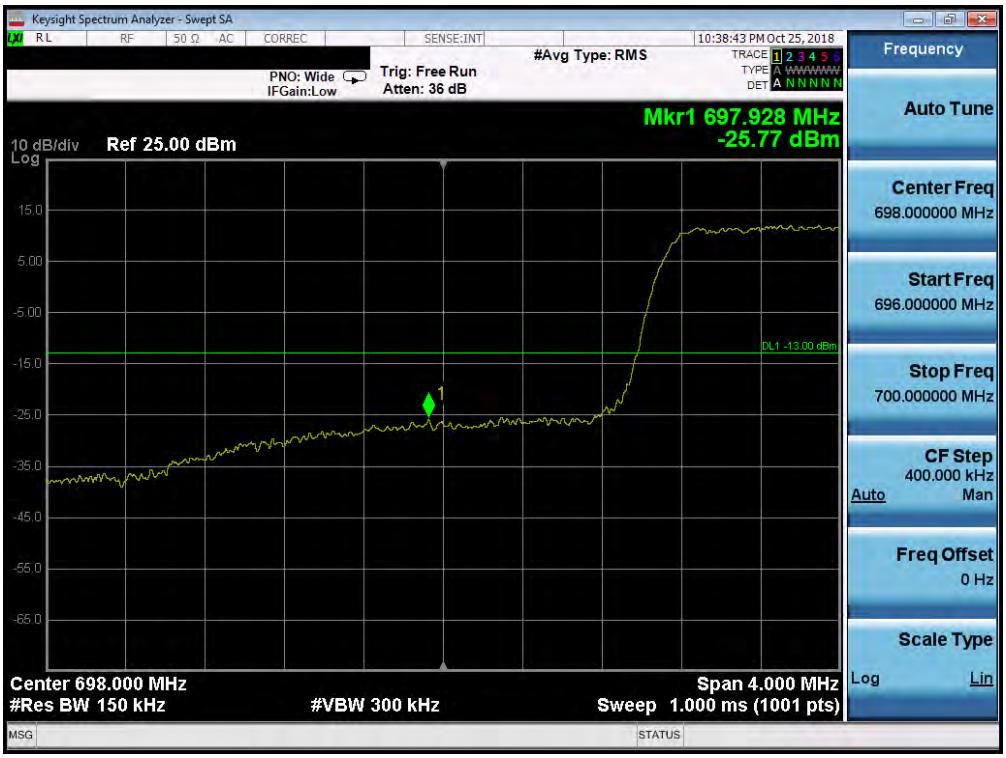
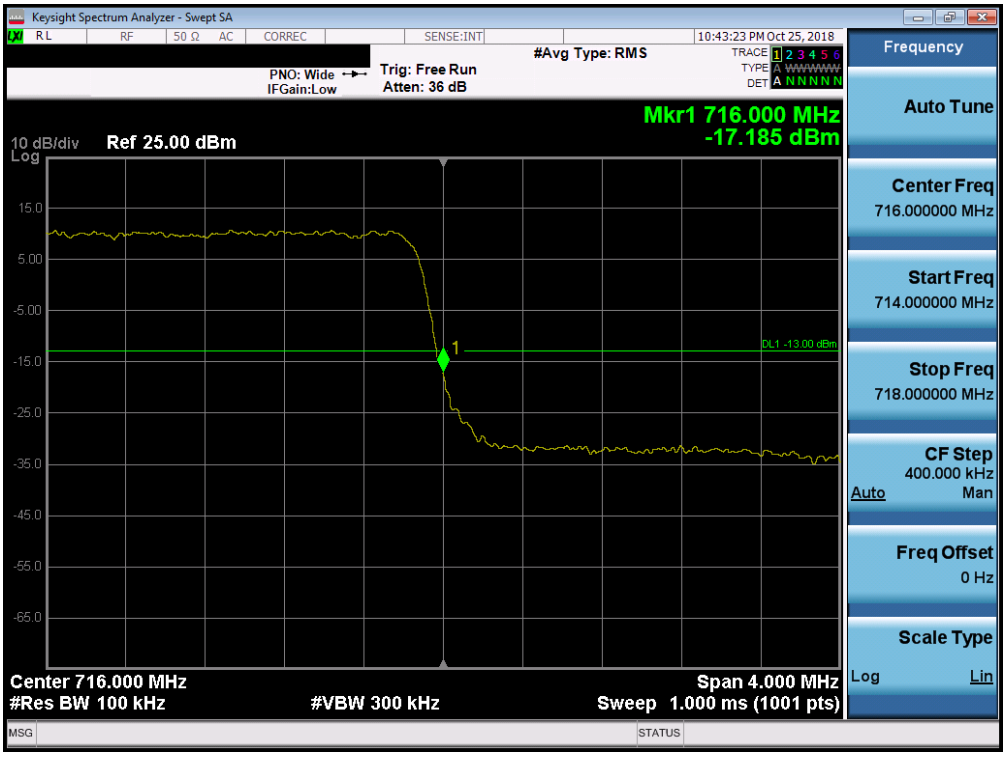


Plot 7-102. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-103. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

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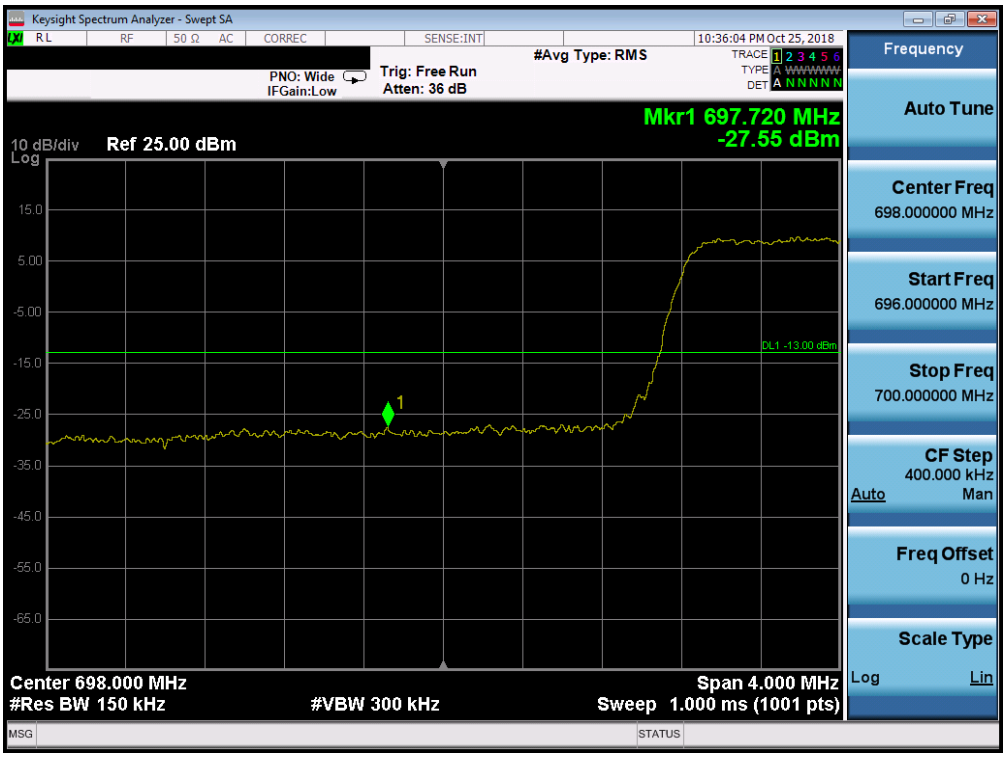

Plot 7-104. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-105. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

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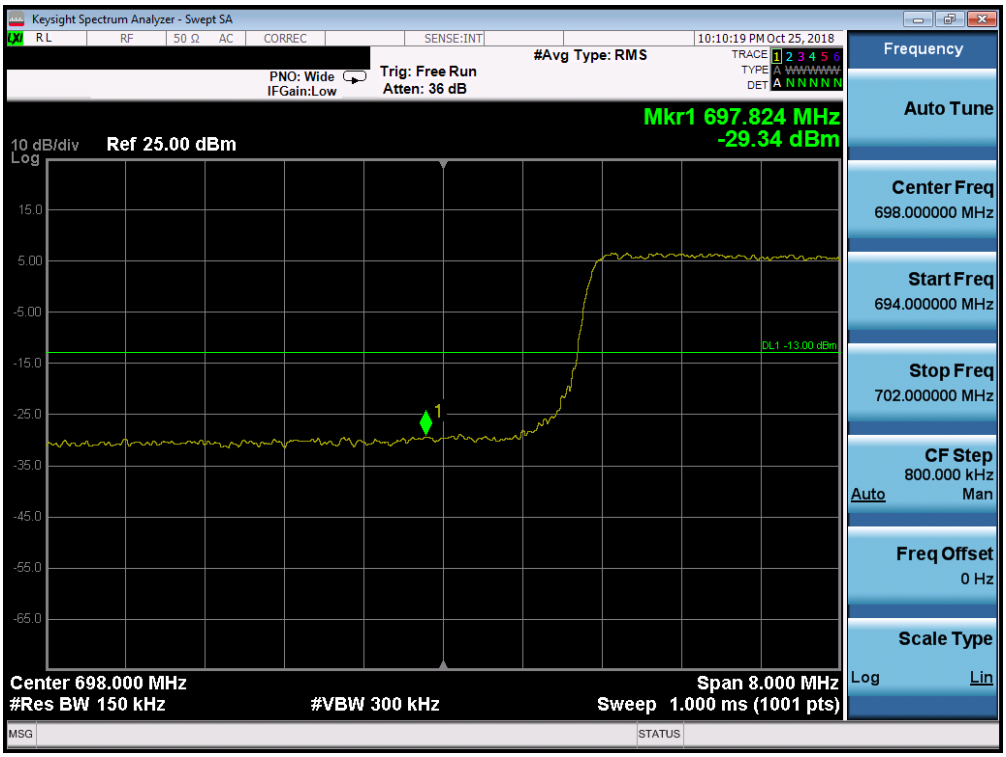
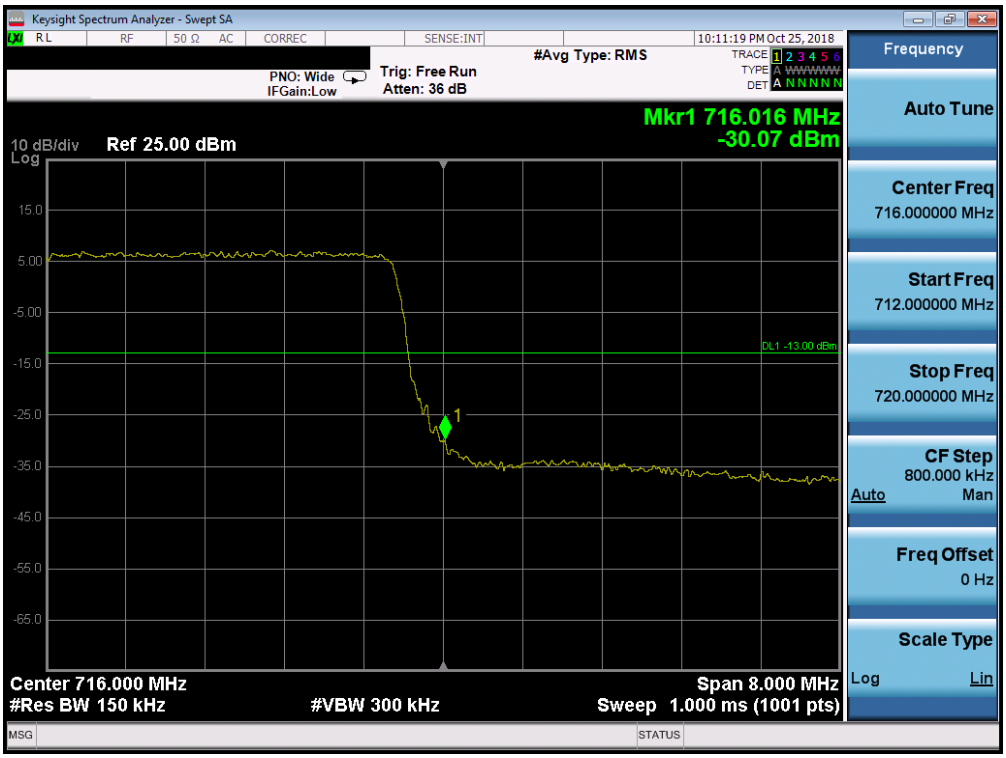


Plot 7-106. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-107. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

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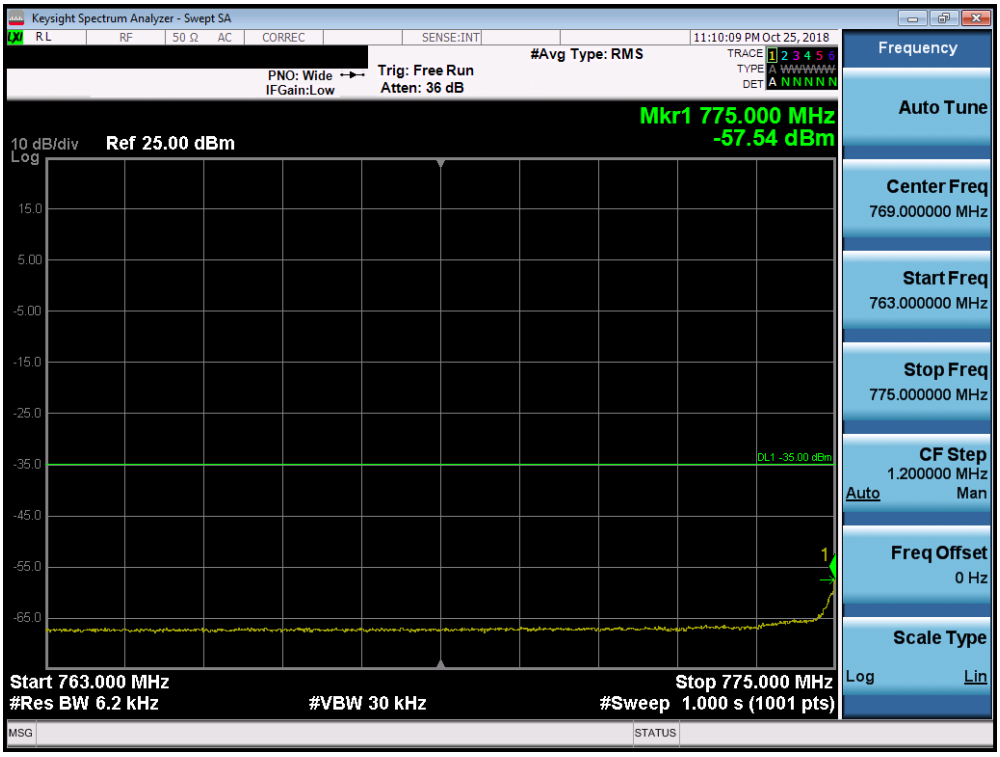
Band 13

Plot 7-108. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-109. Lower Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

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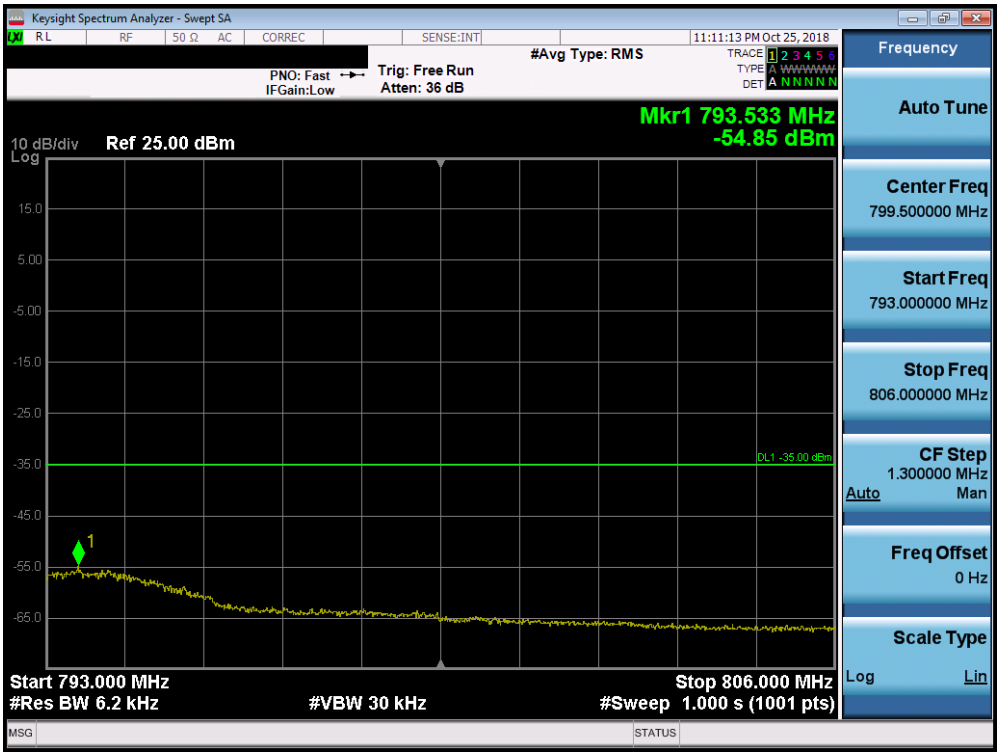
Plot 7-110. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-111. Upper Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

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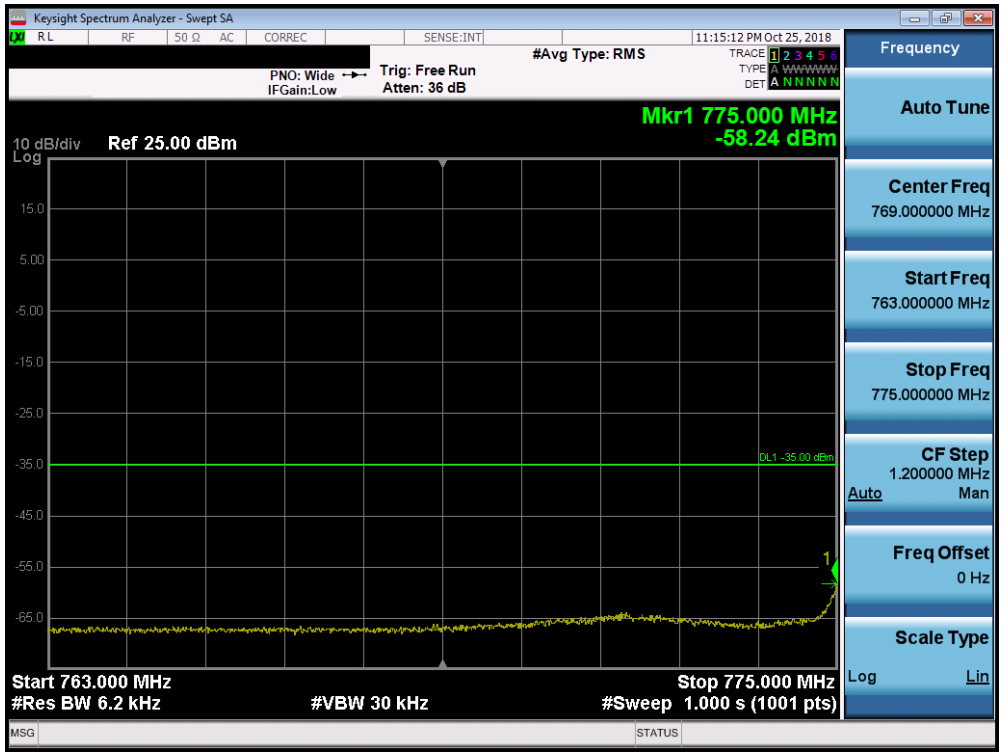
Plot 7-112. Lower Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-113. Lower Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

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Plot 7-114. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-115. Upper Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

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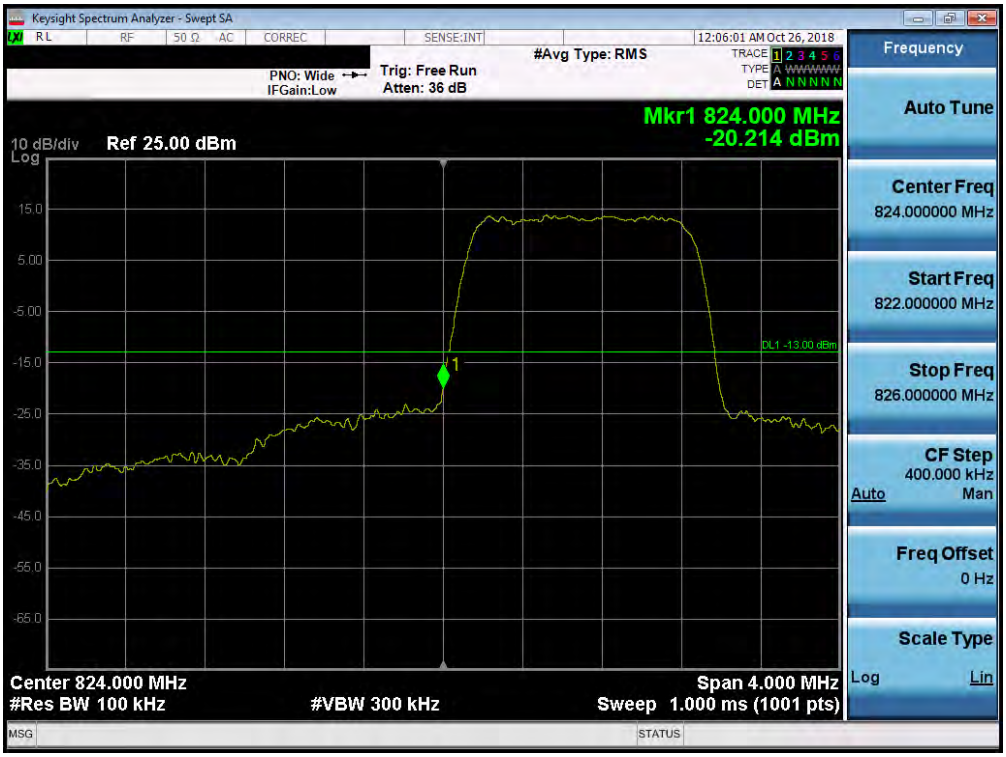
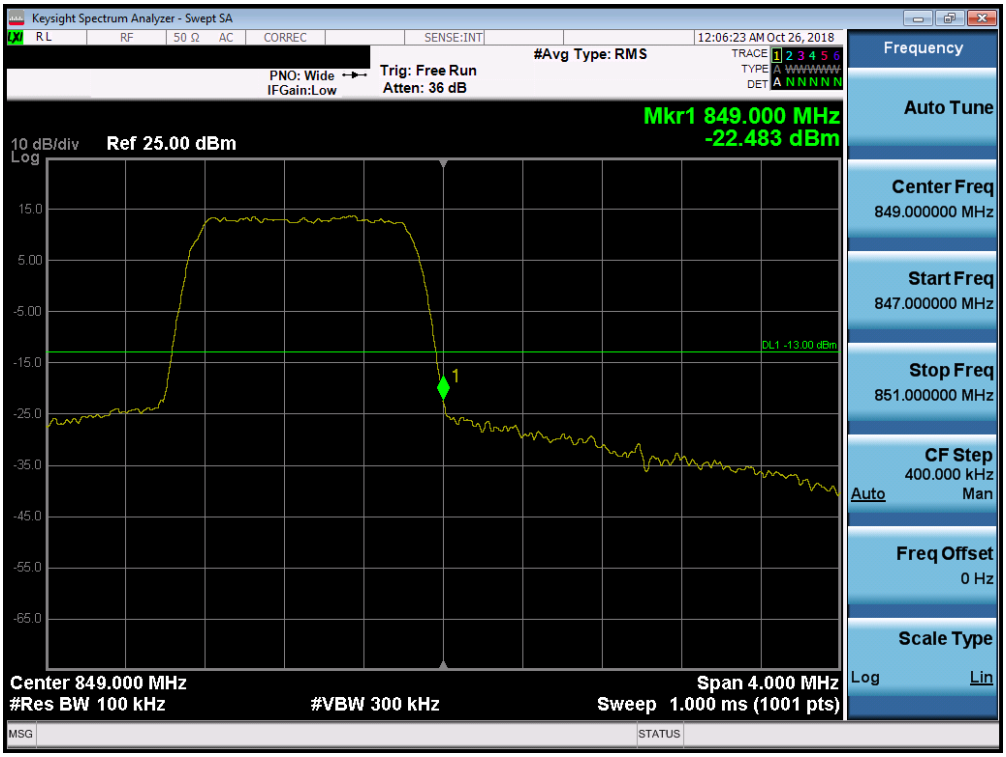
Band 5



Plot 7-116. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-117. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

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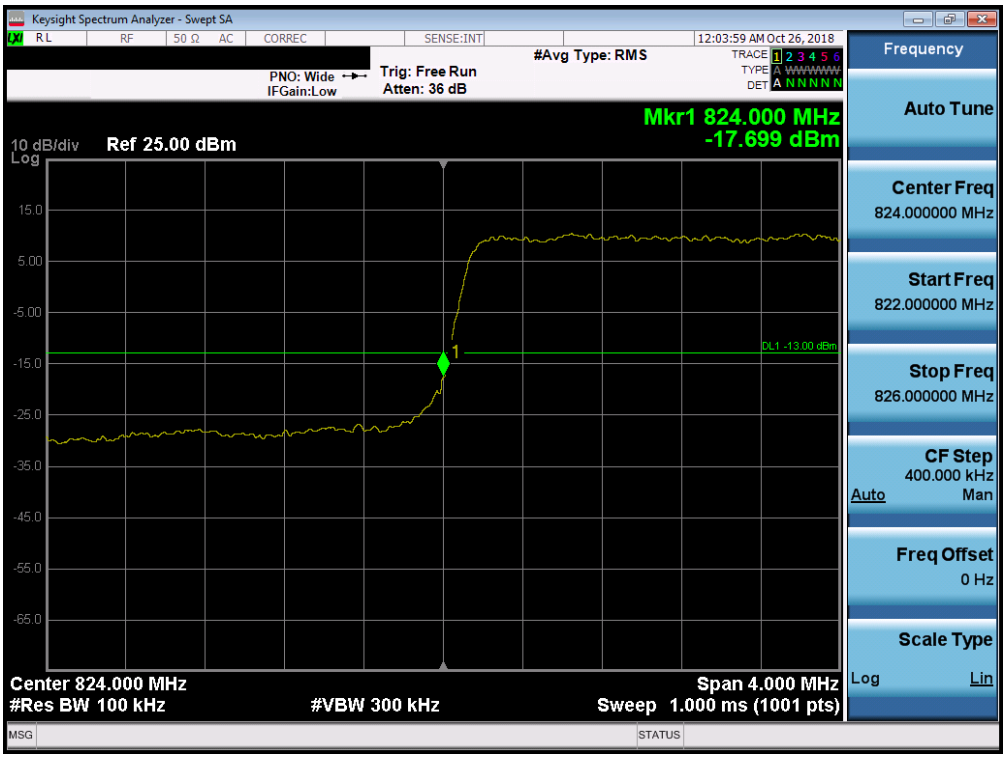
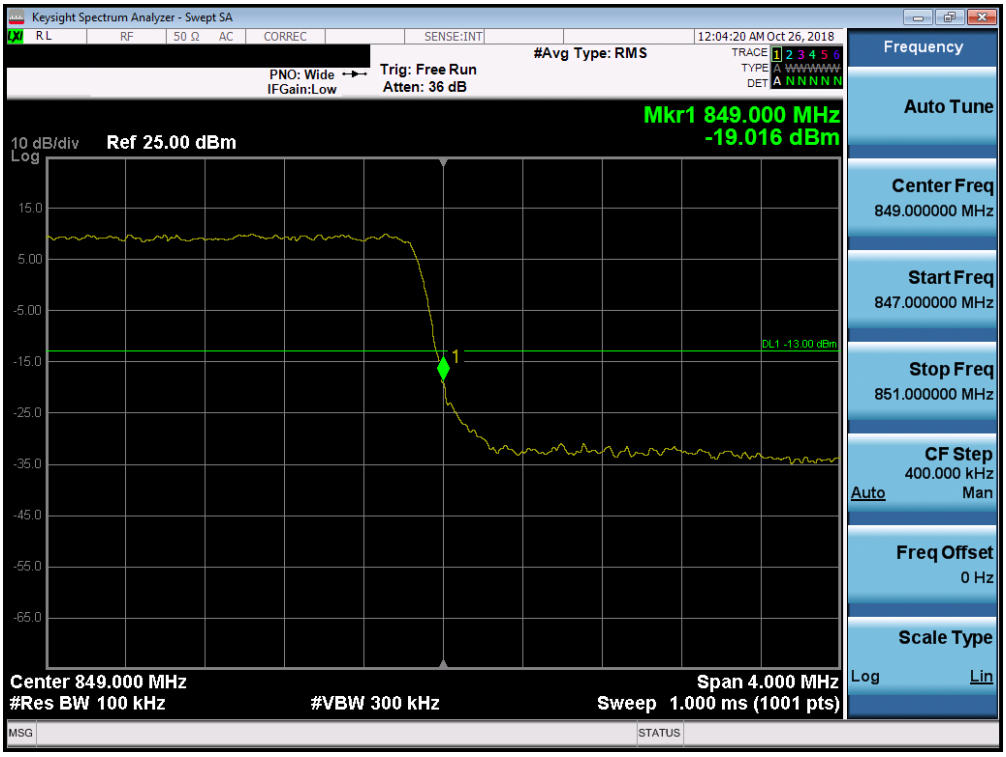


Plot 7-118. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-119. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

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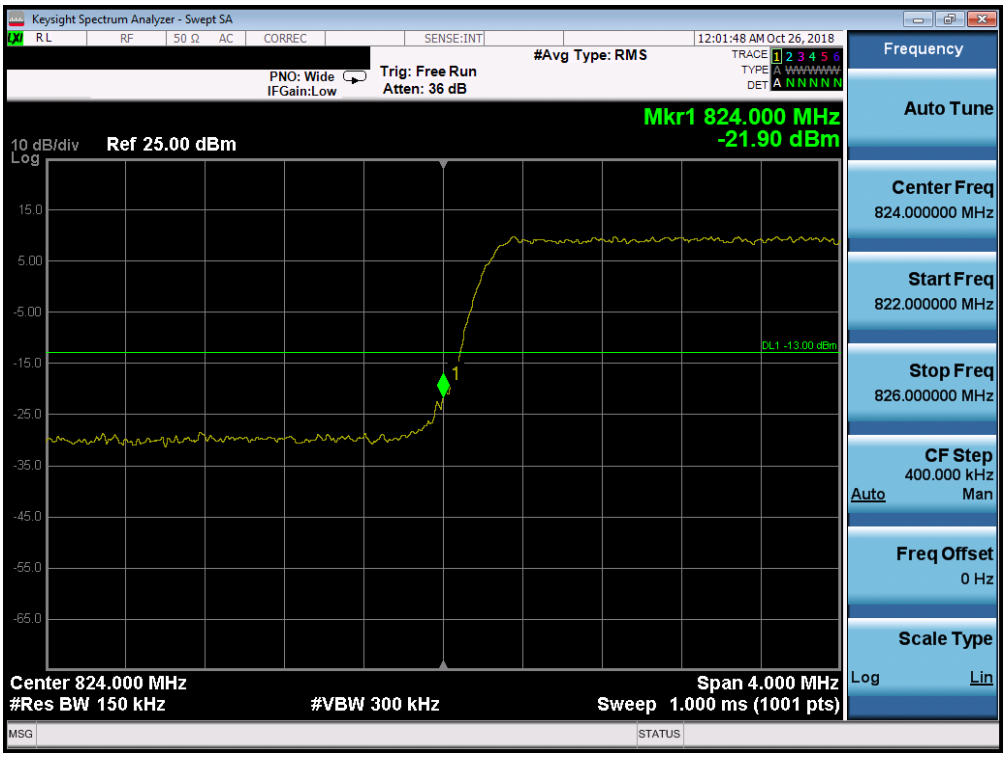
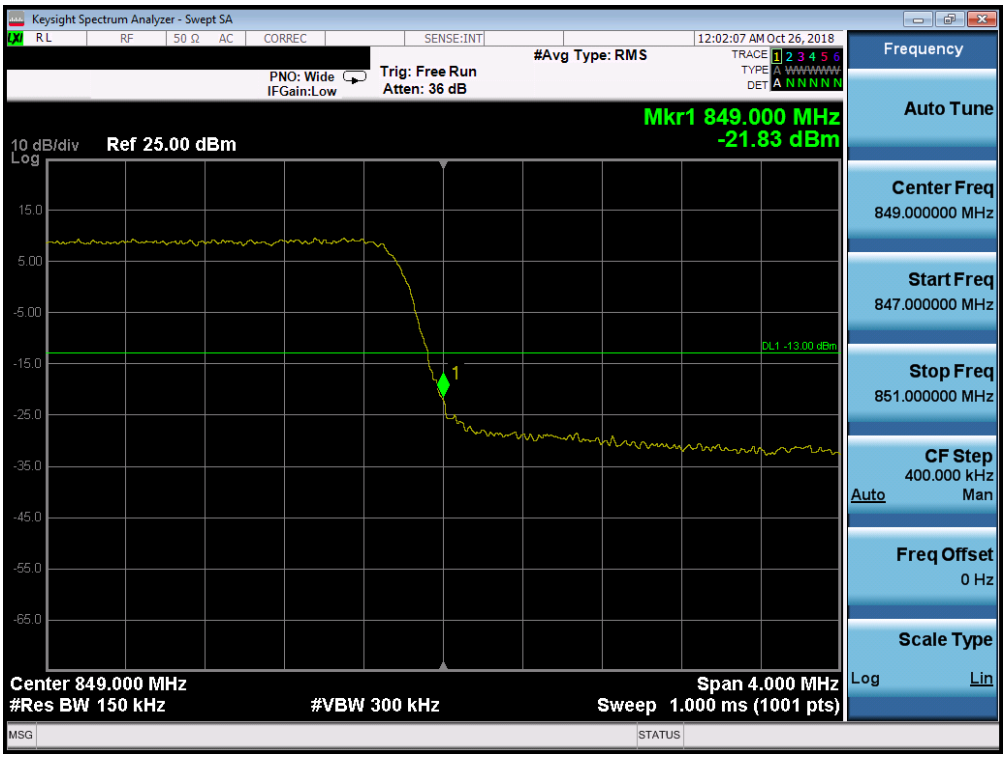


Plot 7-120. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-121. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

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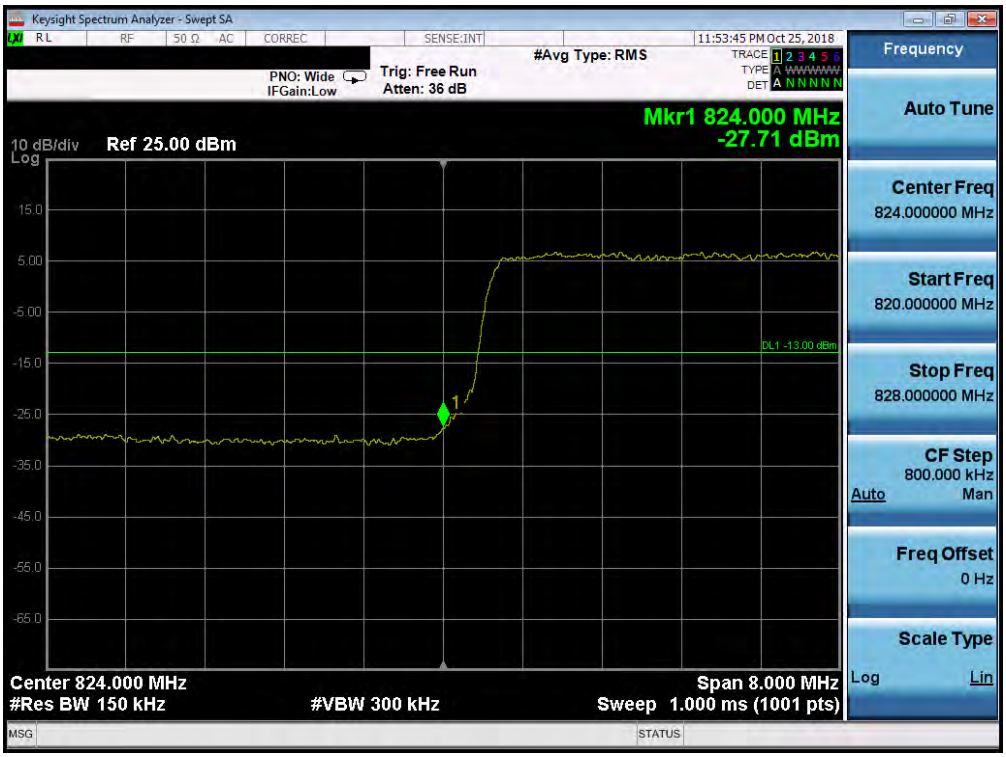
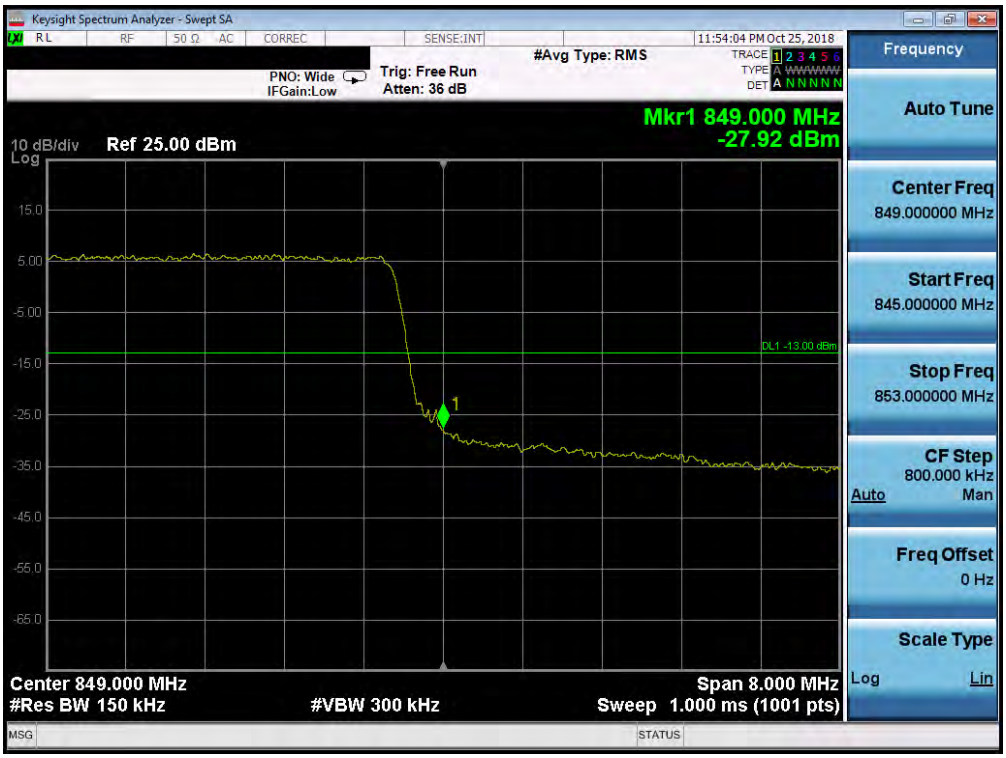


Plot 7-122. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-123. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

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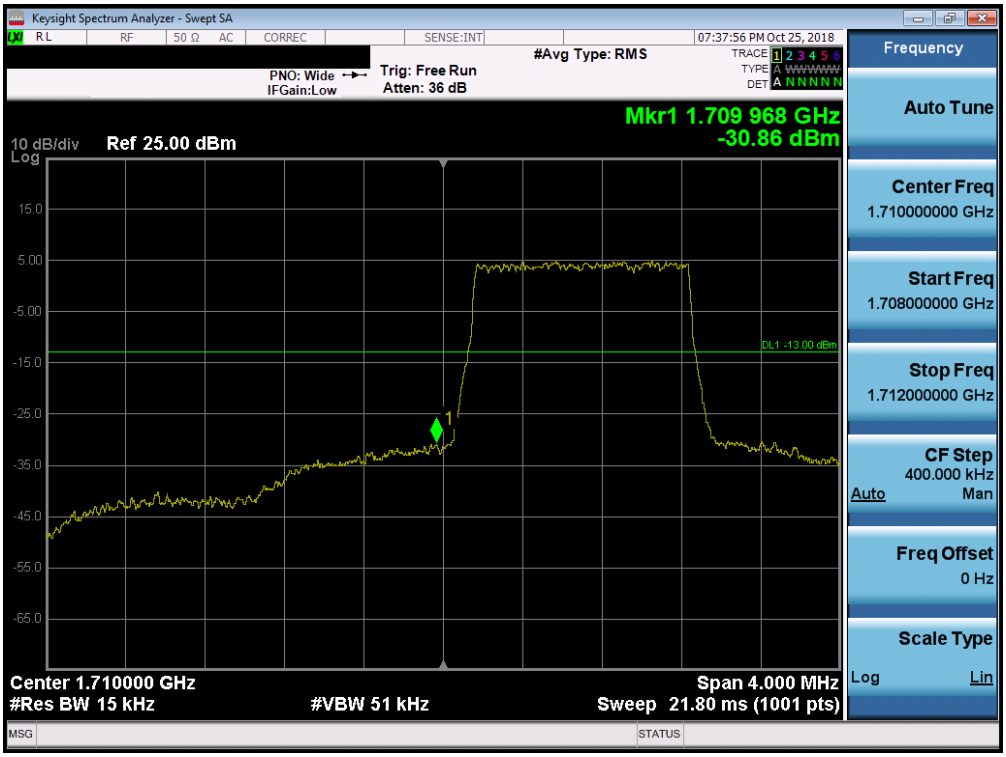
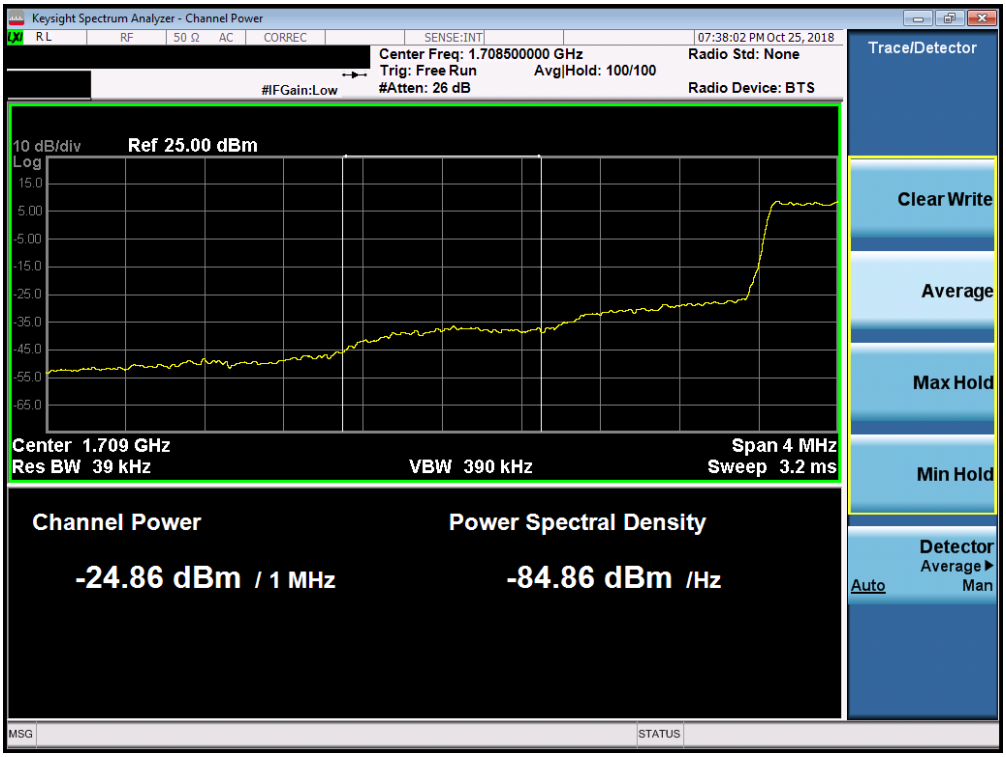
Band 4



Plot 7-124. Lower Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-125. Lower Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

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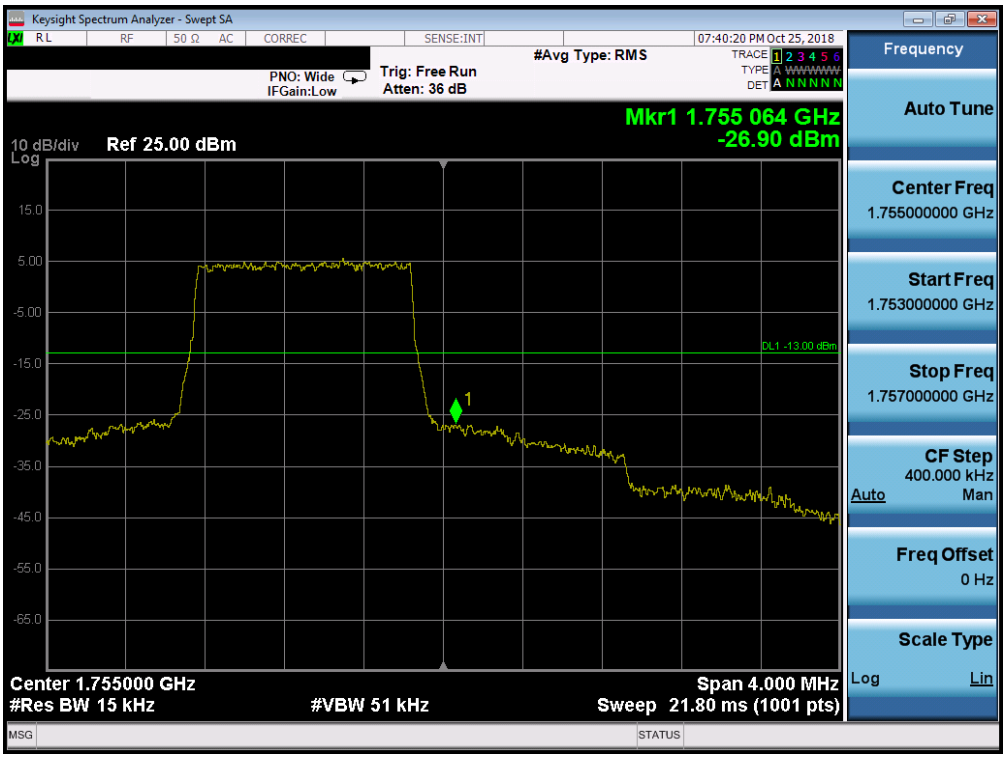
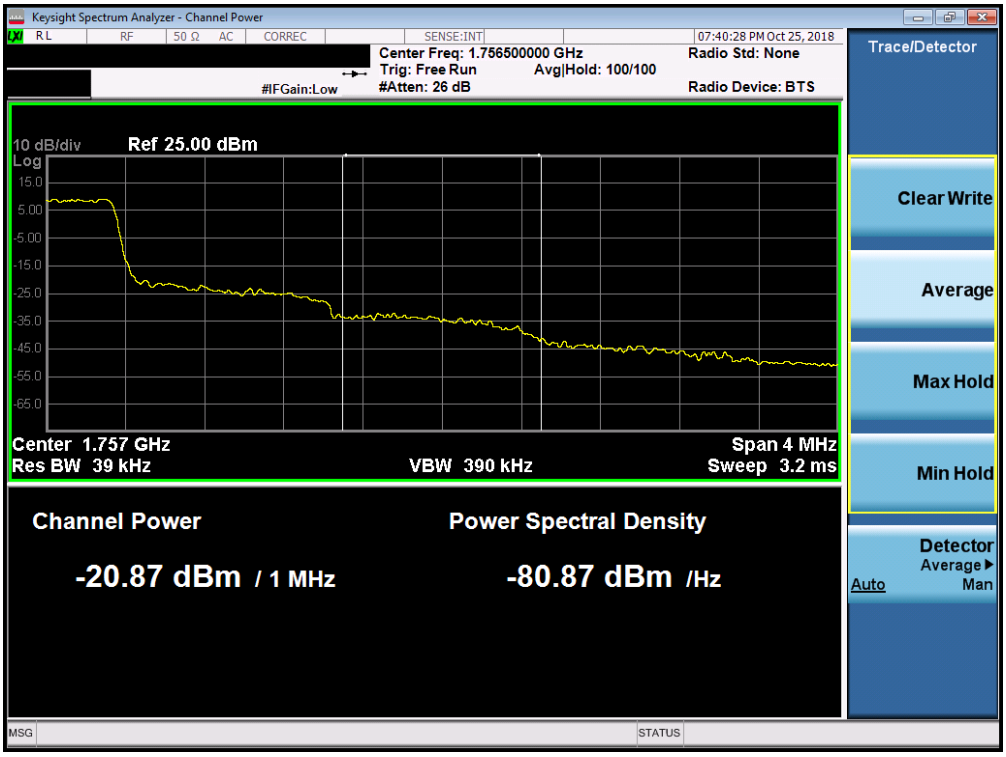


Plot 7-126. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-127. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

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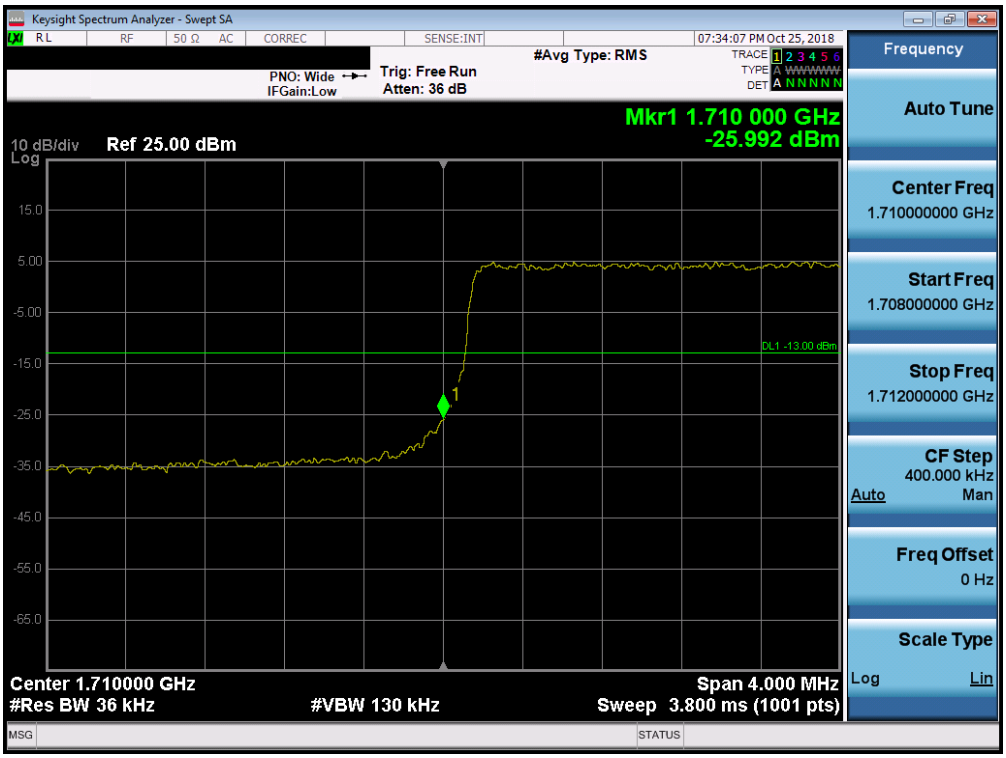
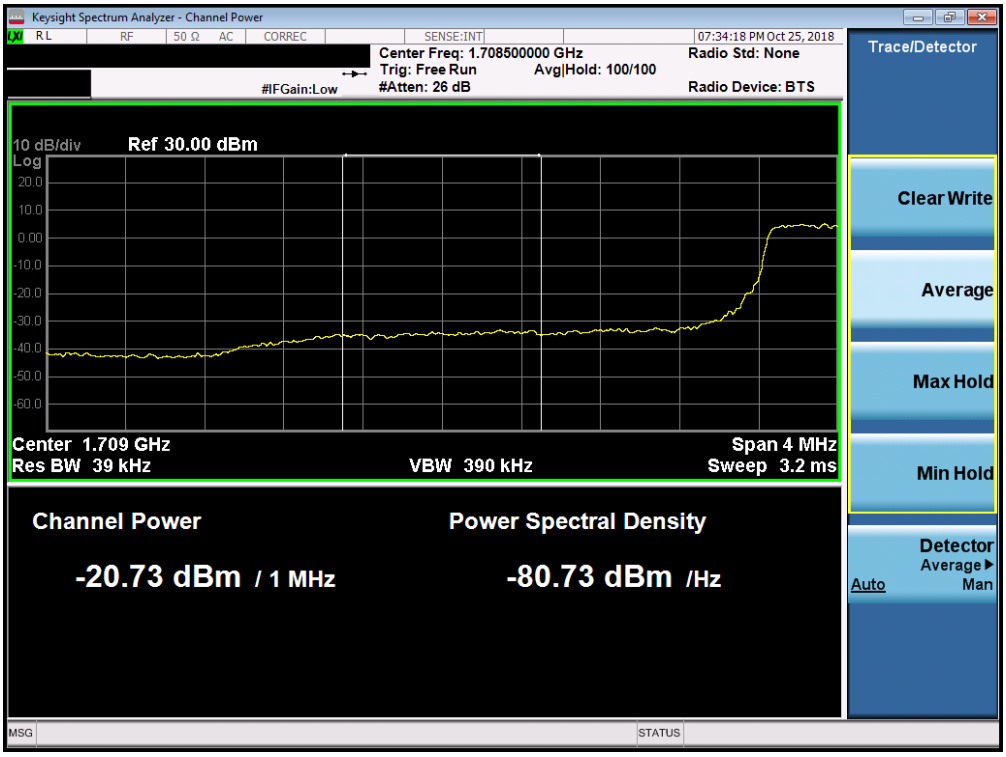


Plot 7-128. Lower Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-129. Lower Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

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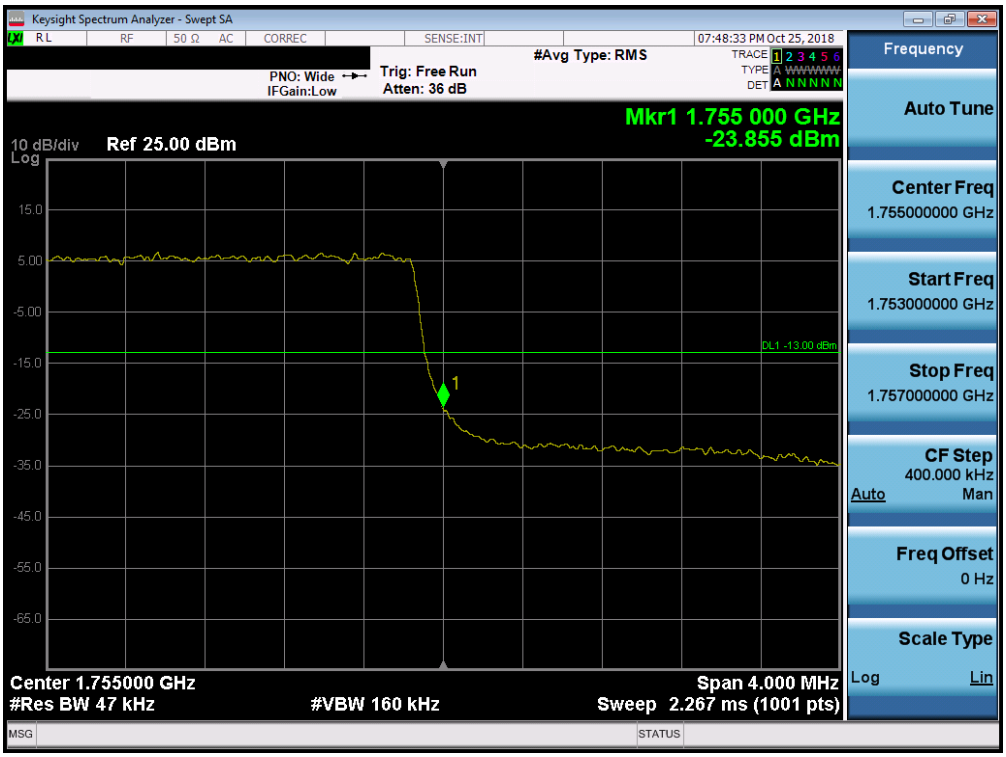
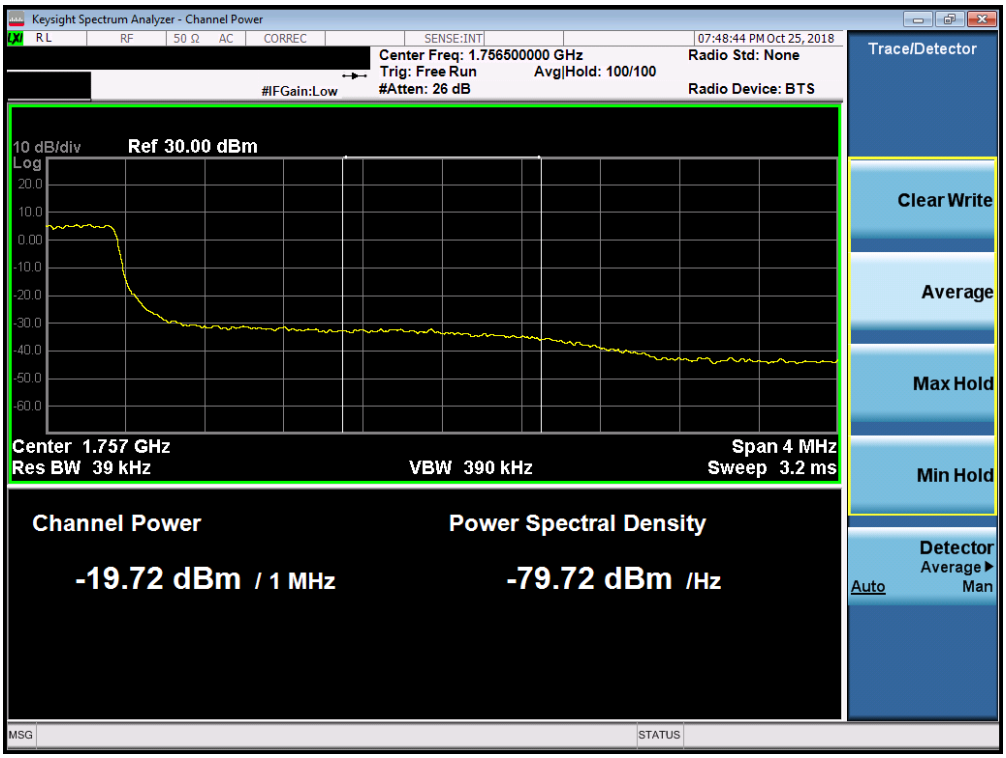


Plot 7-130. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-131. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

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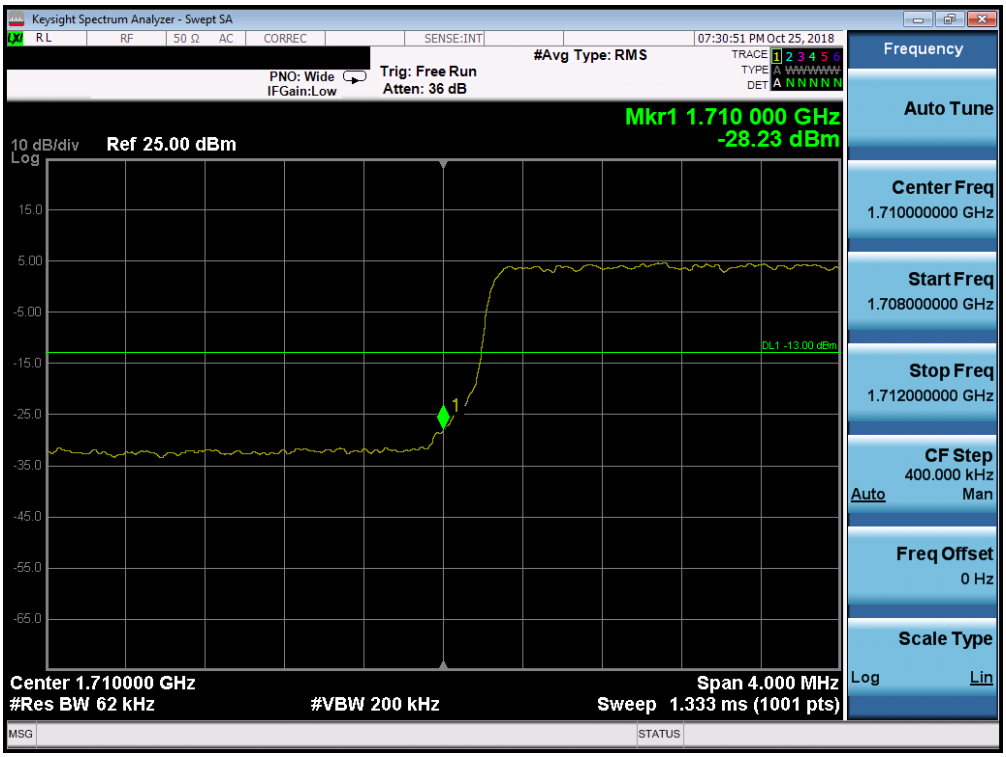
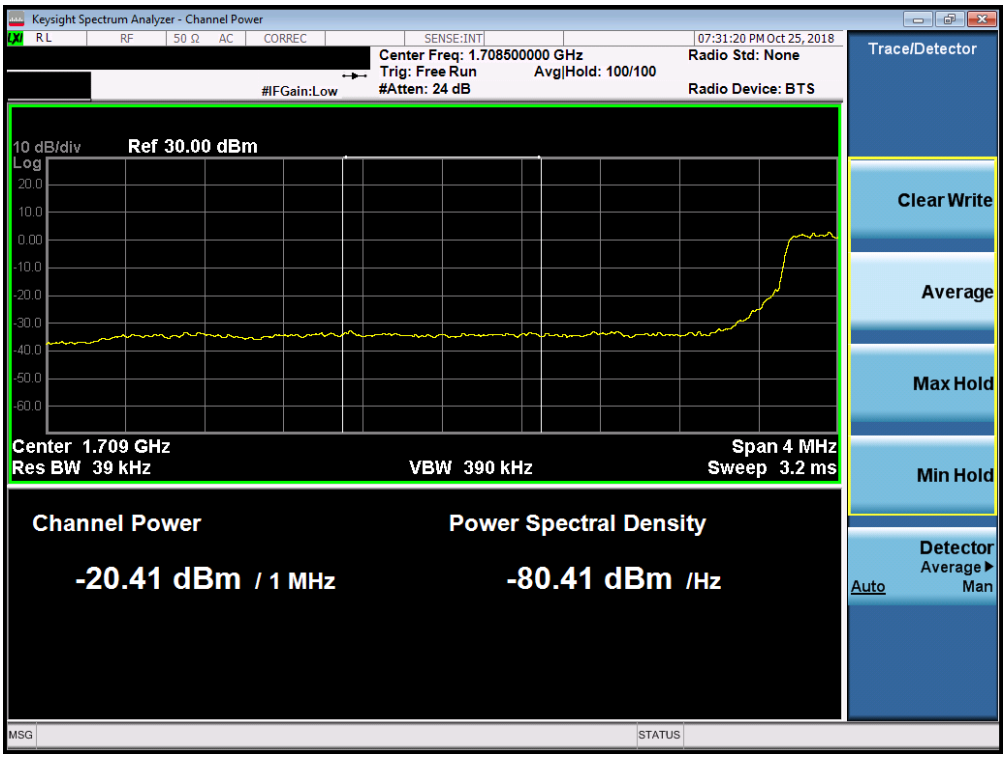


Plot 7-132. Lower Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-133. Lower Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

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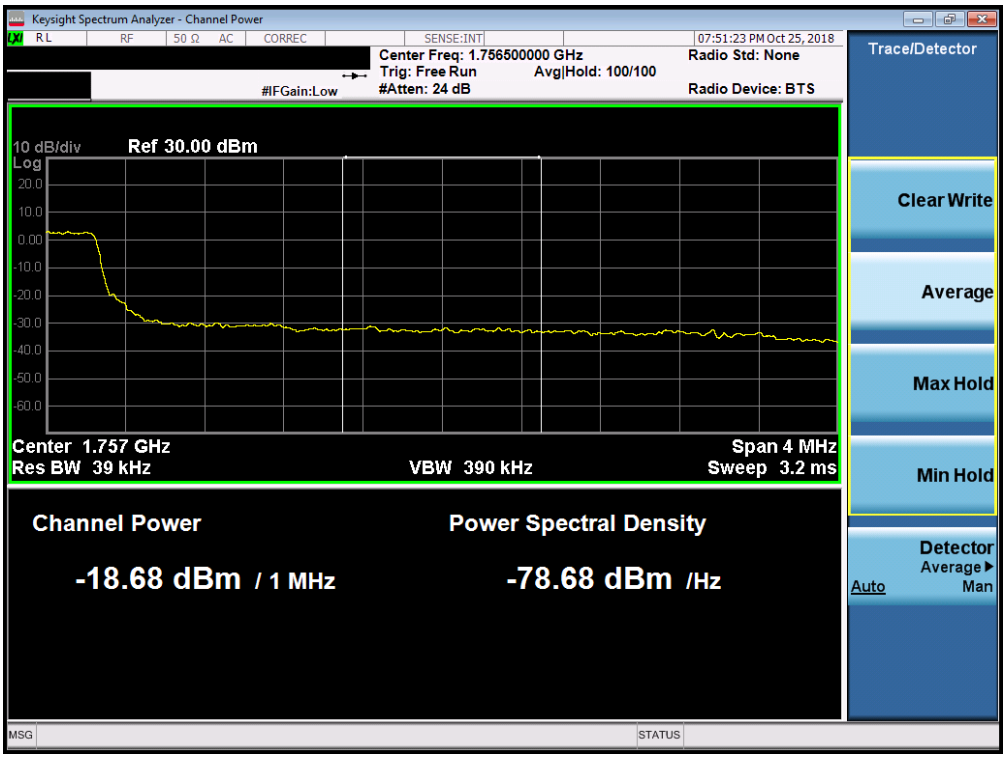
Plot 7-134. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-135. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

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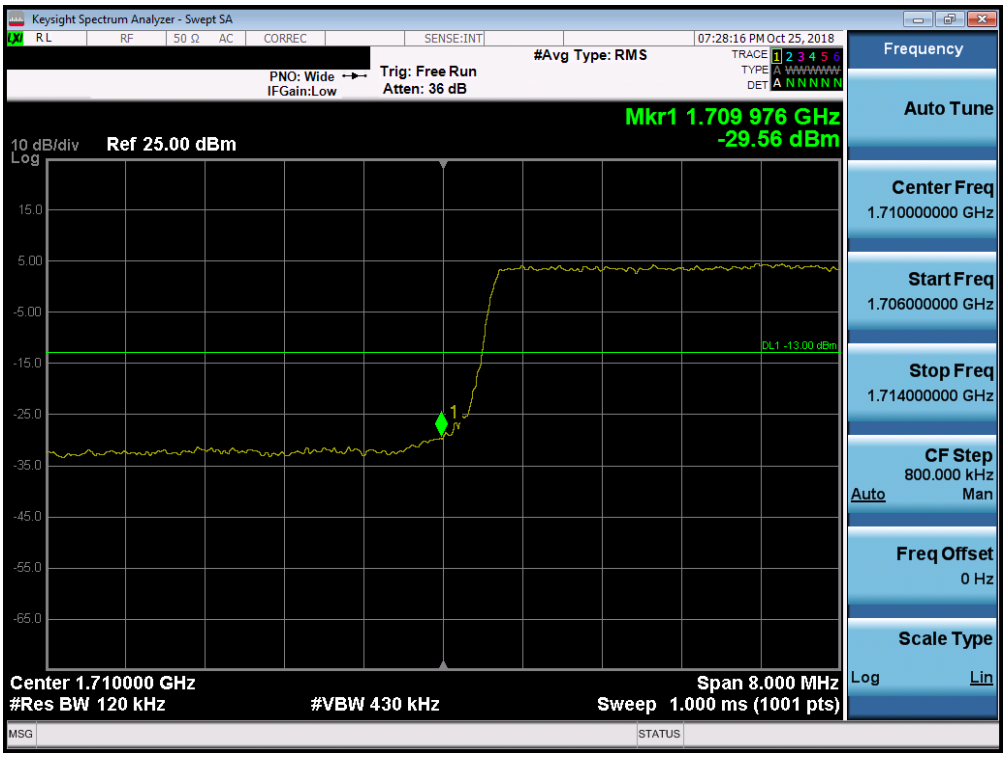
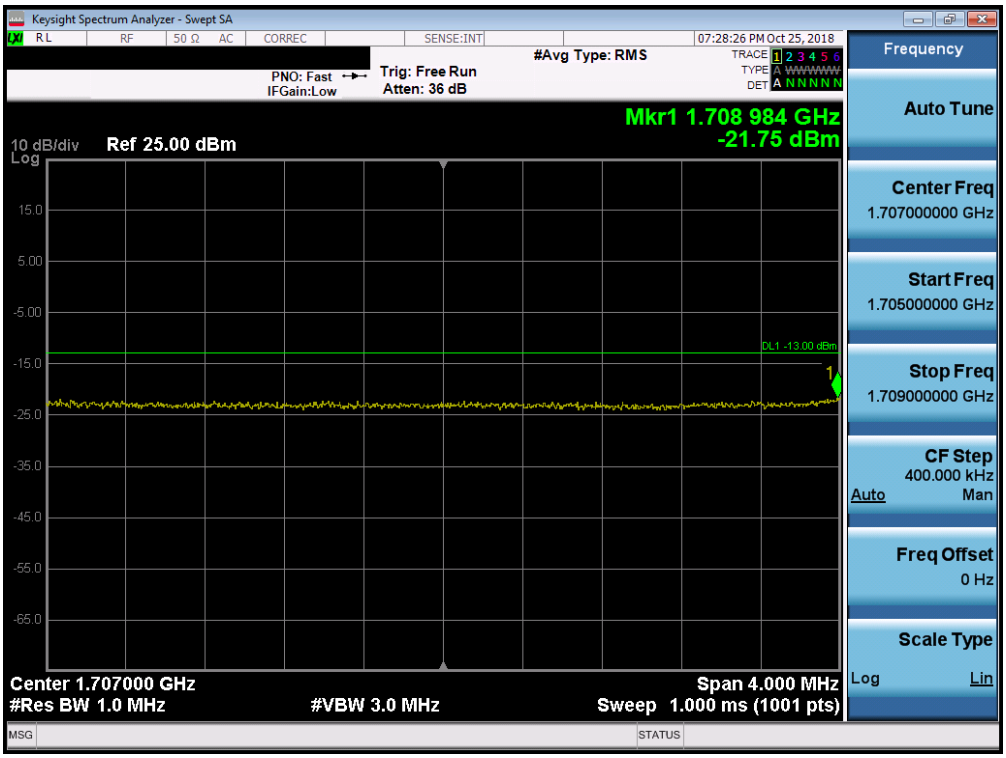


Plot 7-136. Lower Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-137. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

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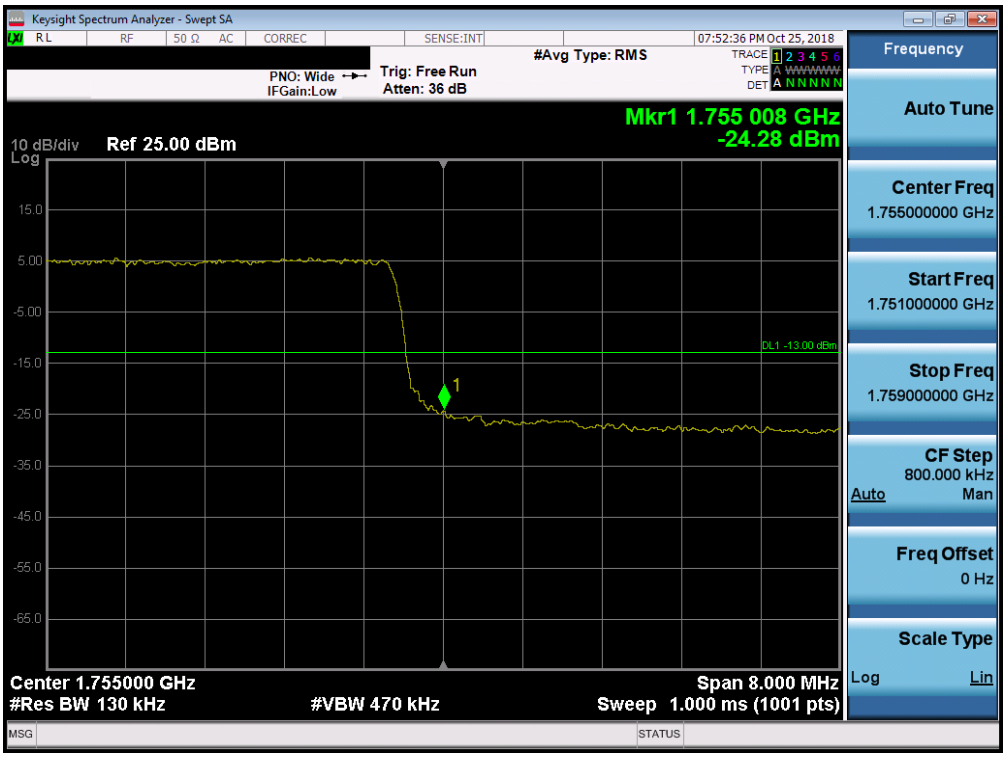
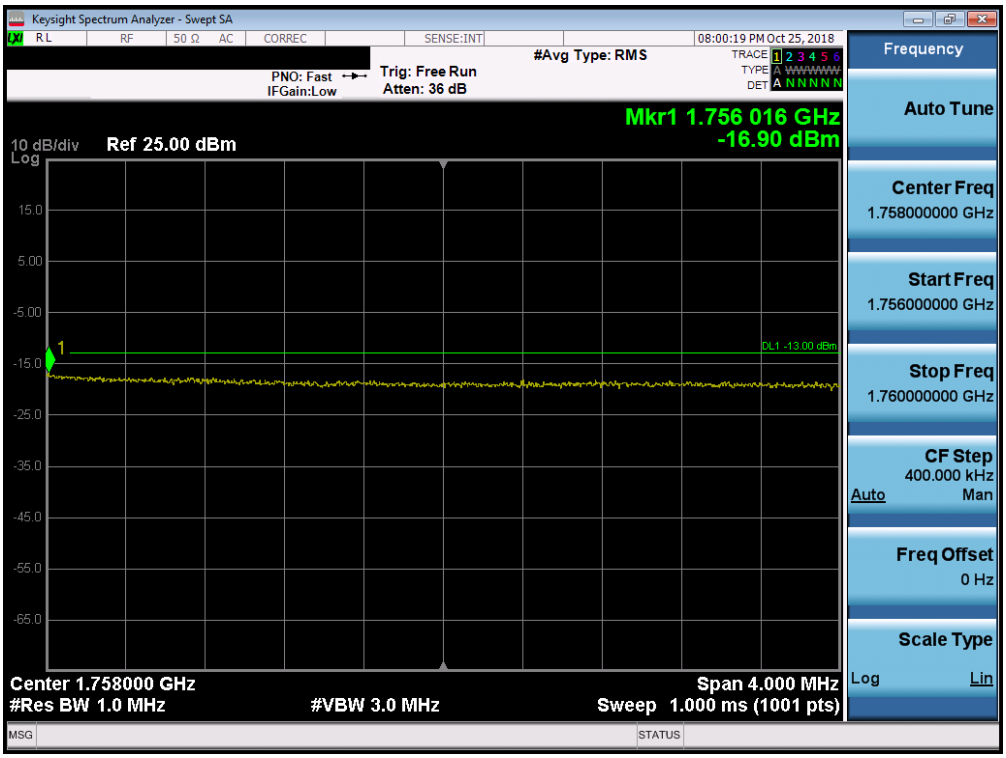


Plot 7-138. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-139. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

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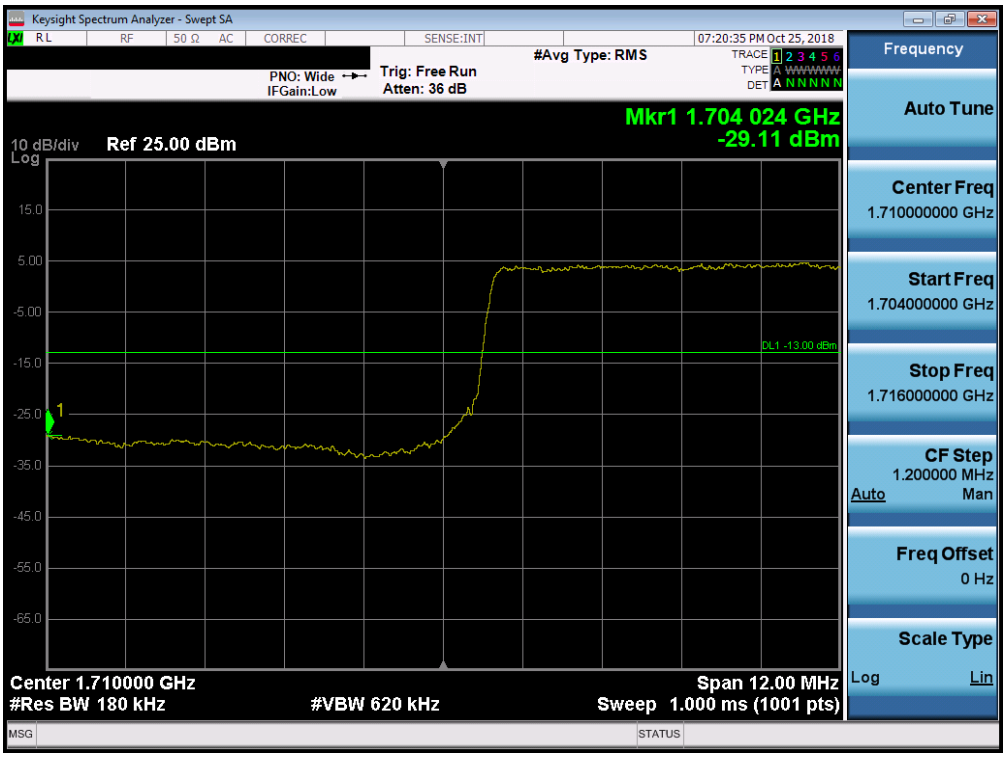
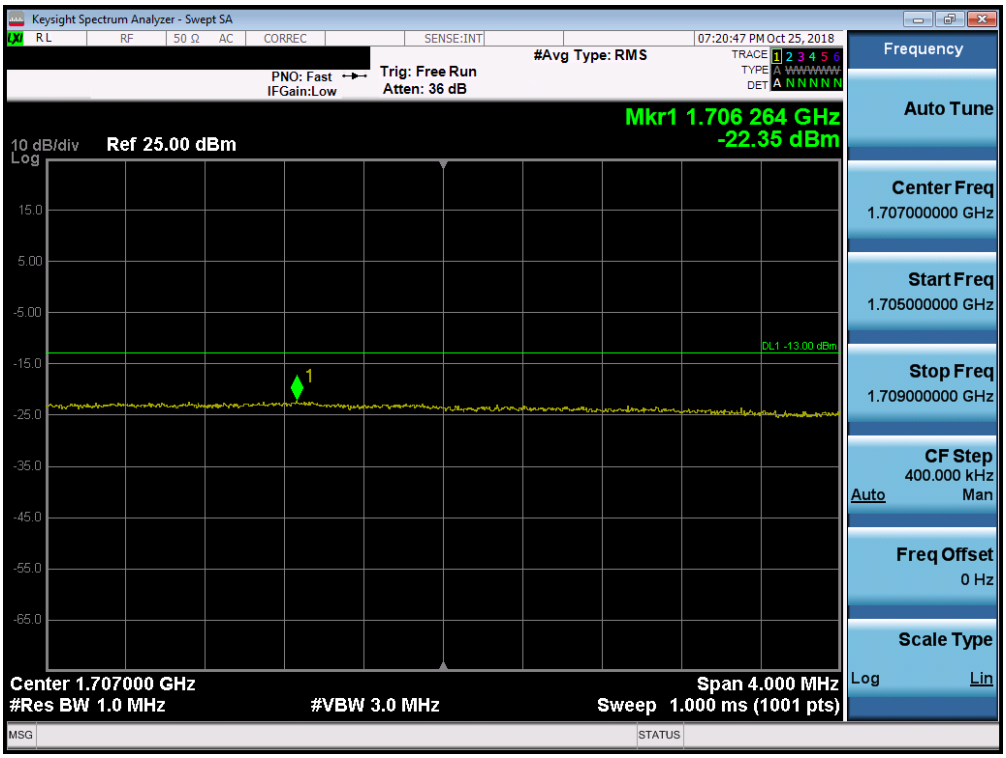


Plot 7-140. Lower Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-141. Lower Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

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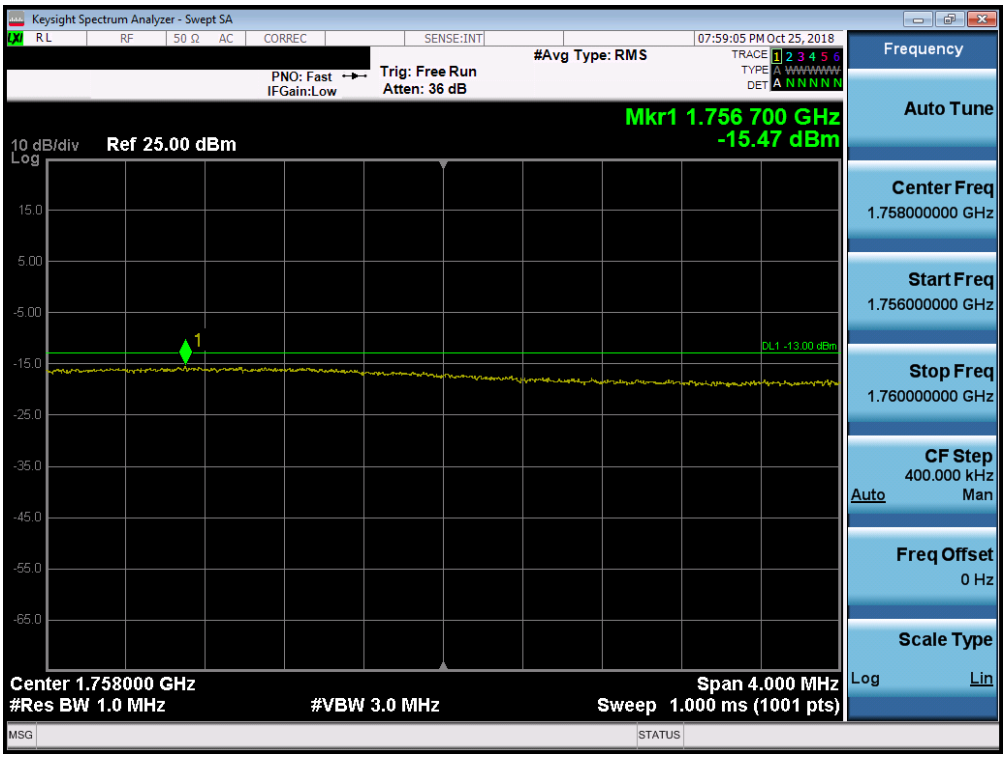
Plot 7-142. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-143. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

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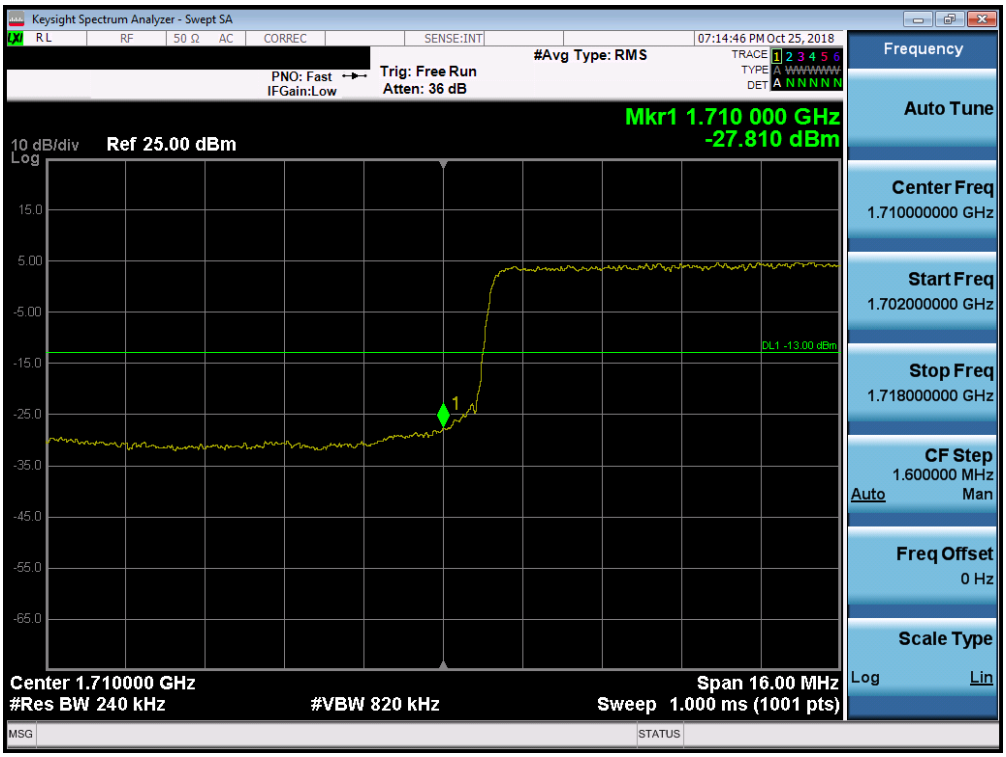
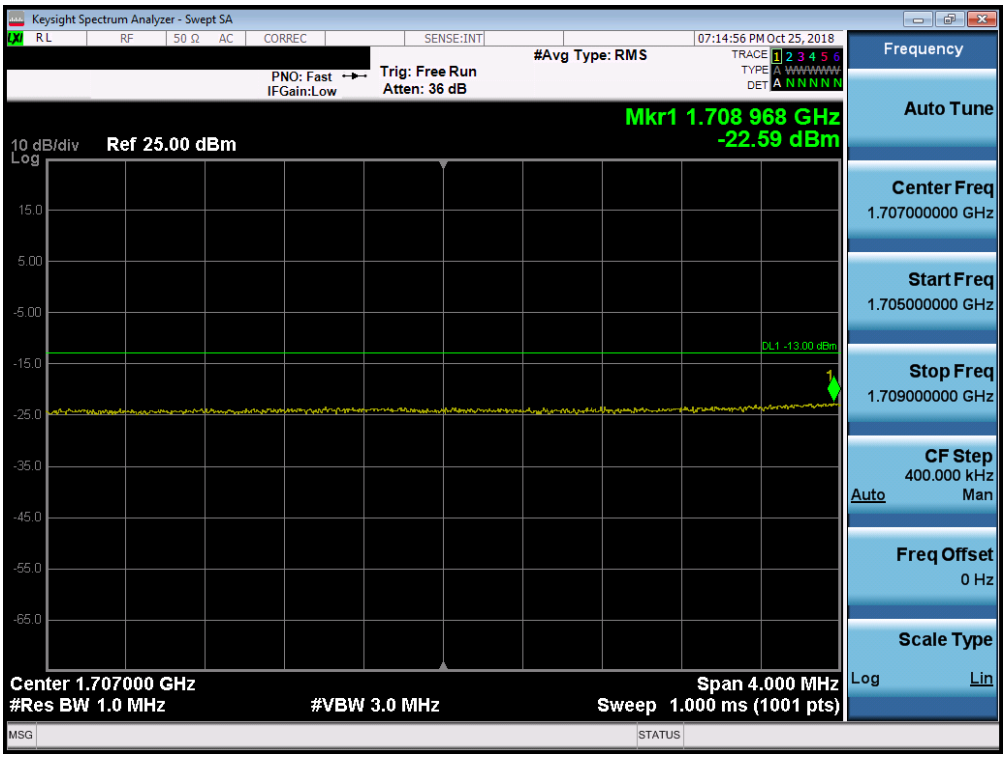


Plot 7-144. Lower Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-145. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

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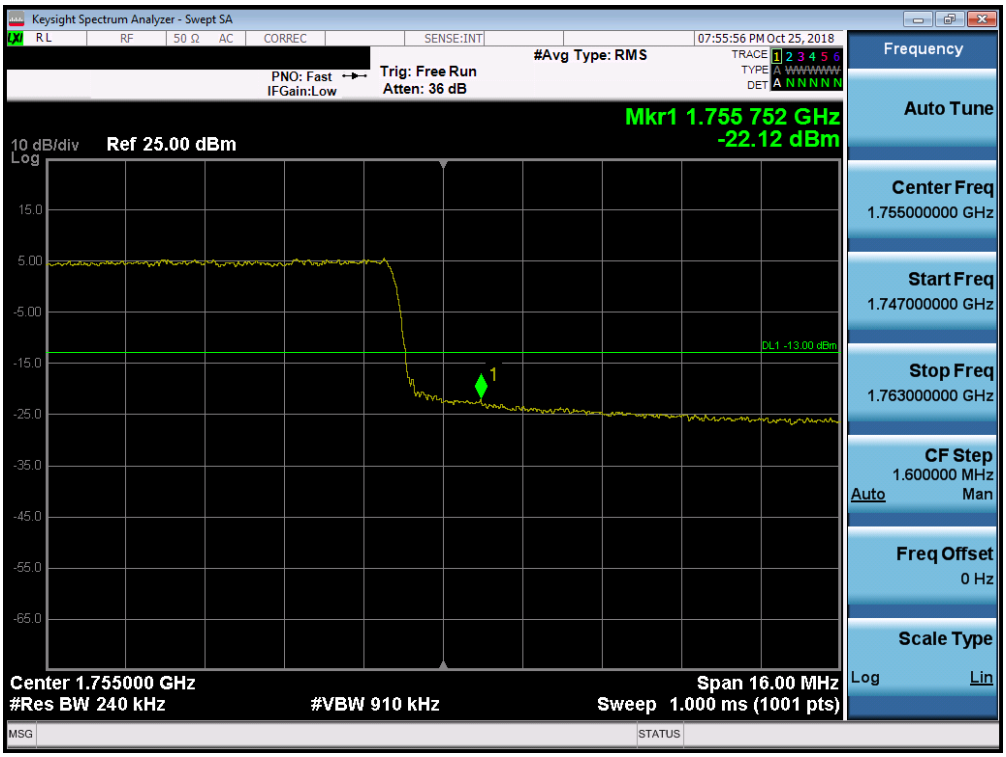
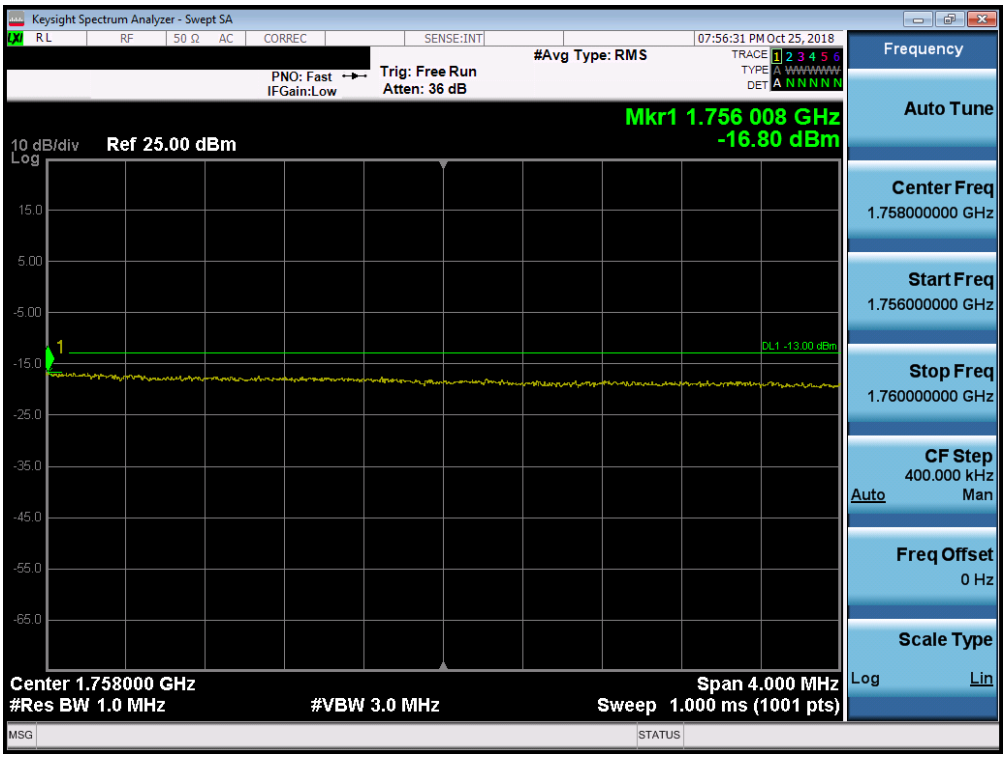


Plot 7-146. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-147. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

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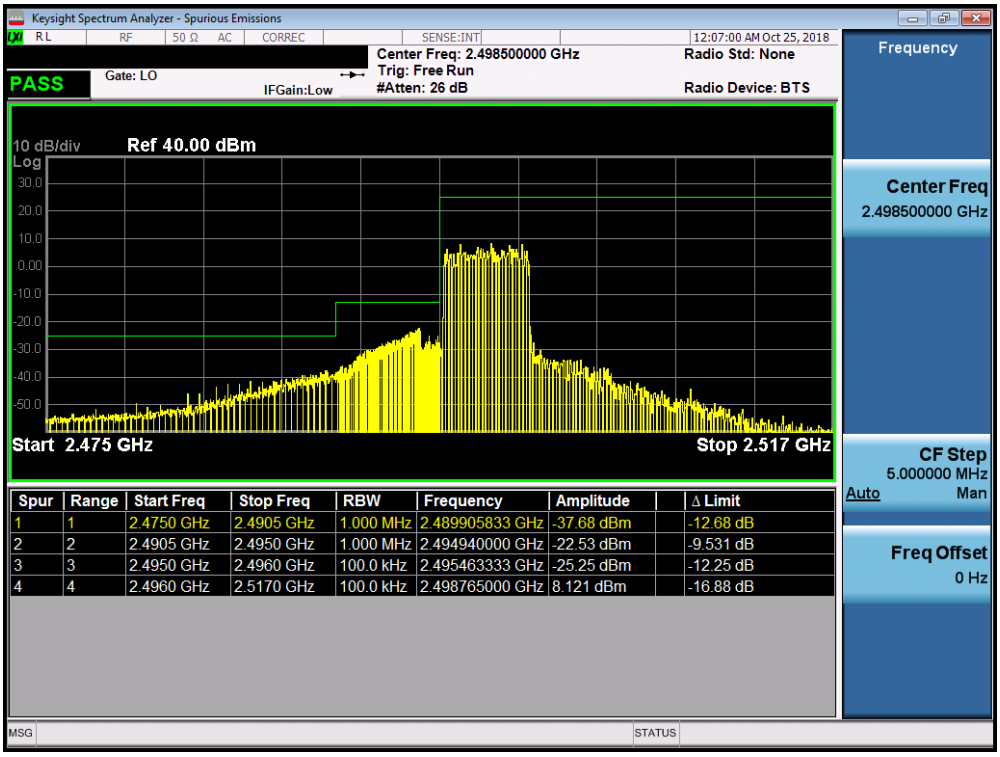
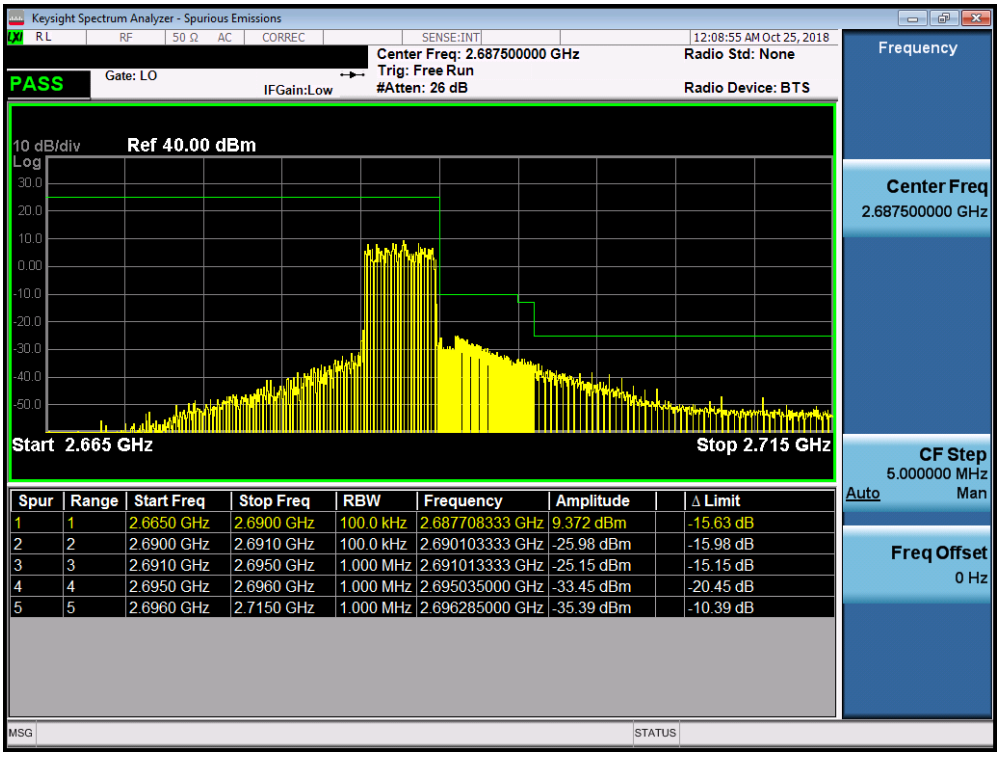
Band 41 (PC3)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489905833 GHz	-37.68 dBm	-12.68 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494940000 GHz	-22.53 dBm	-9.531 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495463333 GHz	-25.25 dBm	-12.25 dB
4	4	2.4960 GHz	2.5170 GHz	100.0 kHz	2.498765000 GHz	8.121 dBm	-16.88 dB

Plot 7-148. Lower ACP Plot (Band 41 PC3 - 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	100.0 kHz	2.687708333 GHz	9.372 dBm	-15.63 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690103333 GHz	-25.98 dBm	-15.98 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691013333 GHz	-25.15 dBm	-15.15 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695035000 GHz	-33.45 dBm	-20.45 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696285000 GHz	-35.39 dBm	-10.39 dB

Plot 7-149. Upper ACP Plot (Band 41 PC3 - 5.0MHz QPSK - Full RB Configuration)

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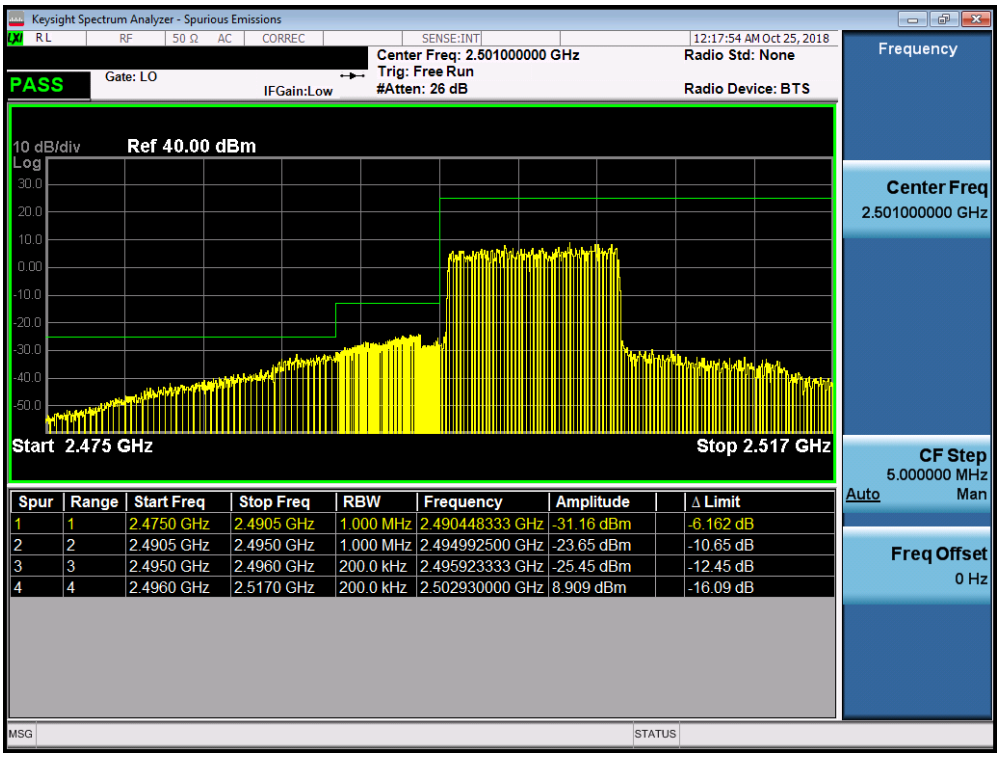
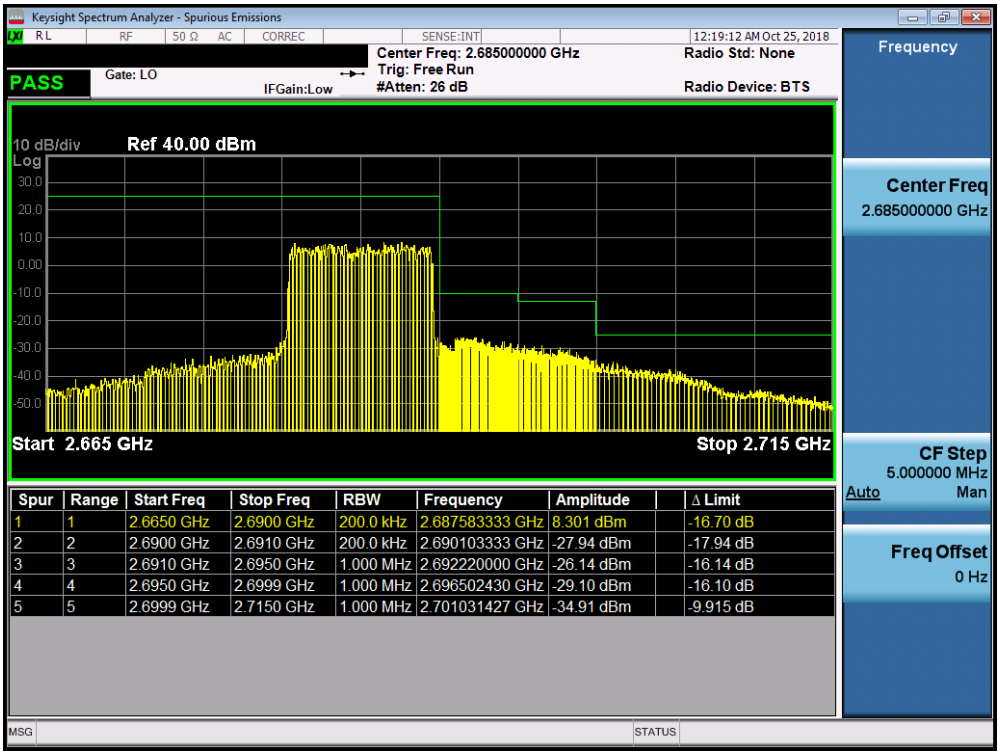


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490448333 GHz	-31.16 dBm	-6.162 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494992500 GHz	-23.65 dBm	-10.65 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495923333 GHz	-25.45 dBm	-12.45 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.502930000 GHz	8.909 dBm	-16.09 dB

Plot 7-150. Lower ACP Plot (Band 41 PC3- 10.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	200.0 kHz	2.687583333 GHz	8.301 dBm	-16.70 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690103333 GHz	-27.94 dBm	-17.94 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692220000 GHz	-26.14 dBm	-16.14 dB
4	4	2.6950 GHz	2.6999 GHz	1.000 MHz	2.696502430 GHz	-29.10 dBm	-16.10 dB
5	5	2.6999 GHz	2.7150 GHz	1.000 MHz	2.701031427 GHz	-34.91 dBm	-9.915 dB

Plot 7-151. Upper ACP Plot (Band 41 PC3 - 10.0MHz QPSK - Full RB Configuration)

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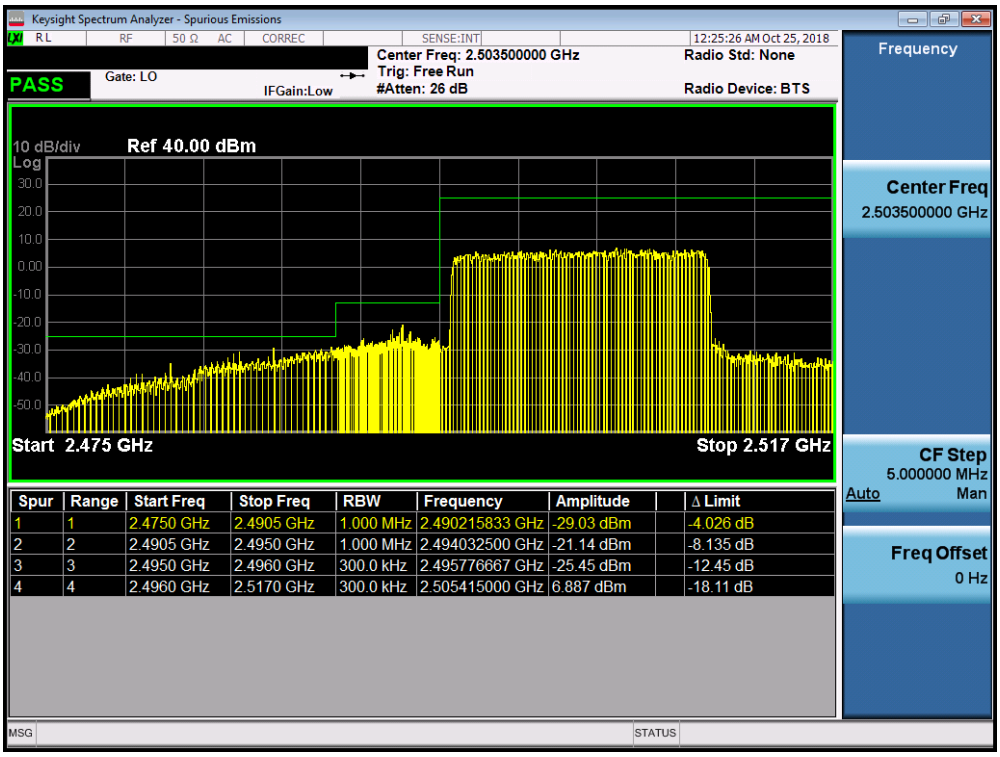
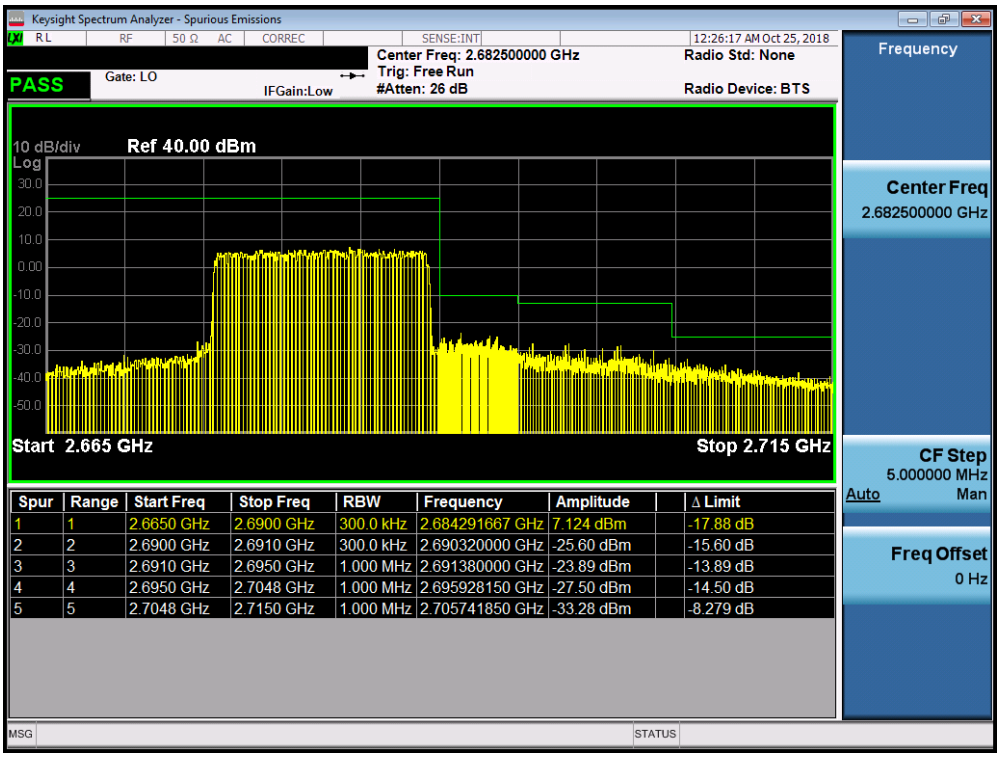


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490215833 GHz	-29.03 dBm	-4.026 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494032500 GHz	-21.14 dBm	-8.135 dB
3	3	2.4950 GHz	2.4960 GHz	300.0 kHz	2.495776667 GHz	-25.45 dBm	-12.45 dB
4	4	2.4960 GHz	2.5170 GHz	300.0 kHz	2.505415000 GHz	6.887 dBm	-18.11 dB

Plot 7-152. Lower ACP Plot (Band 41 PC3 - 15.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	300.0 kHz	2.684291667 GHz	7.124 dBm	-17.88 dB
2	2	2.6900 GHz	2.6910 GHz	300.0 kHz	2.690320000 GHz	-25.60 dBm	-15.60 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691380000 GHz	-23.89 dBm	-13.89 dB
4	4	2.6950 GHz	2.7048 GHz	1.000 MHz	2.695928150 GHz	-27.50 dBm	-14.50 dB
5	5	2.7048 GHz	2.7150 GHz	1.000 MHz	2.705741850 GHz	-33.28 dBm	-8.279 dB

Plot 7-153. Upper ACP Plot (Band 41 PC3 - 15.0MHz QPSK - Full RB Configuration)

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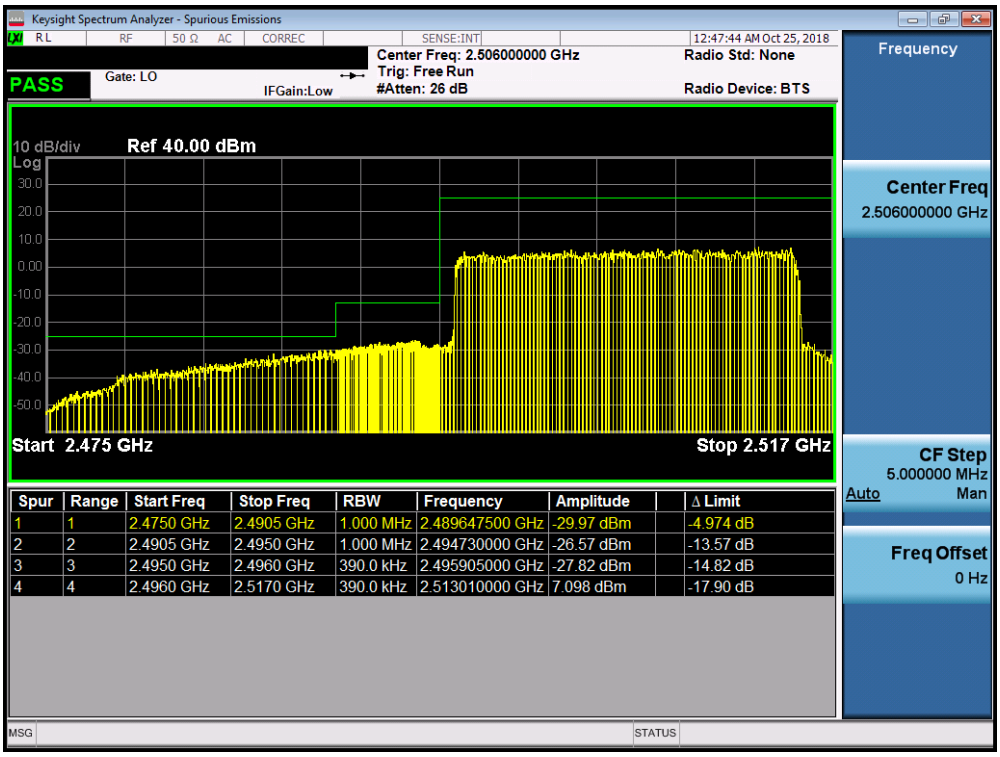
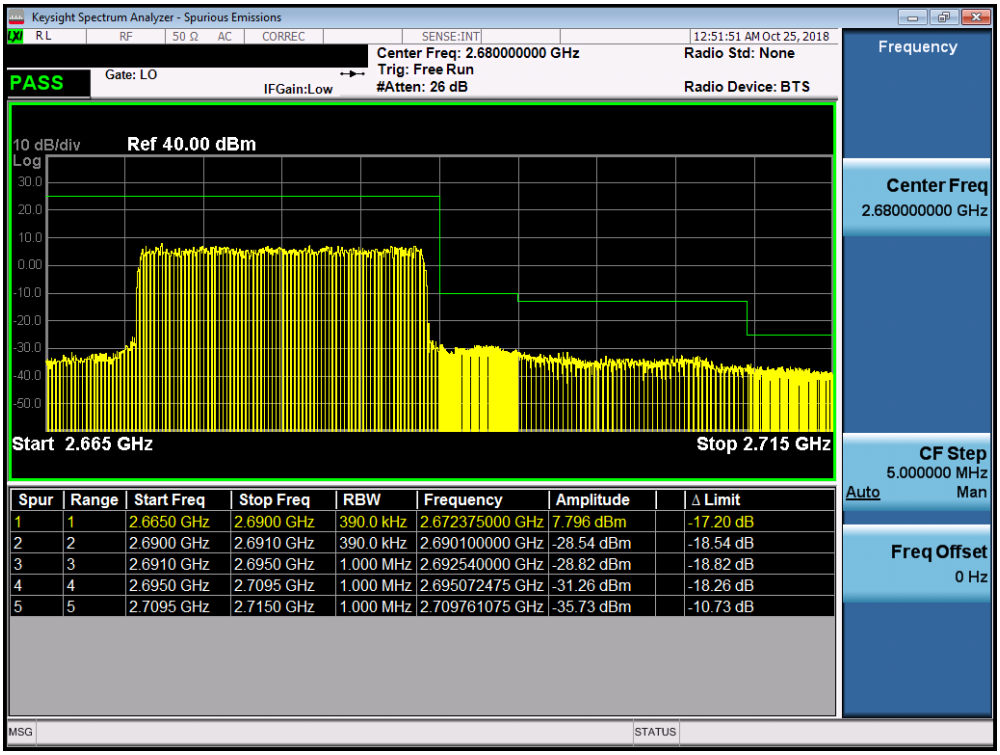


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489647500 GHz	-29.97 dBm	-4.974 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494730000 GHz	-26.57 dBm	-13.57 dB
3	3	2.4950 GHz	2.4960 GHz	390.0 kHz	2.495905000 GHz	-27.82 dBm	-14.82 dB
4	4	2.4960 GHz	2.5170 GHz	390.0 kHz	2.513010000 GHz	7.098 dBm	-17.90 dB

Plot 7-154. Lower ACP Plot (Band 41 PC3 - 20.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	390.0 kHz	2.672375000 GHz	7.796 dBm	-17.20 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690100000 GHz	-28.54 dBm	-18.54 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692540000 GHz	-28.82 dBm	-18.82 dB
4	4	2.6950 GHz	2.7095 GHz	1.000 MHz	2.695072475 GHz	-31.26 dBm	-18.26 dB
5	5	2.7095 GHz	2.7150 GHz	1.000 MHz	2.709761075 GHz	-35.73 dBm	-10.73 dB

Plot 7-155. Upper ACP Plot (Band 41 PC3 - 20.0MHz QPSK - Full RB Configuration)

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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 ≥ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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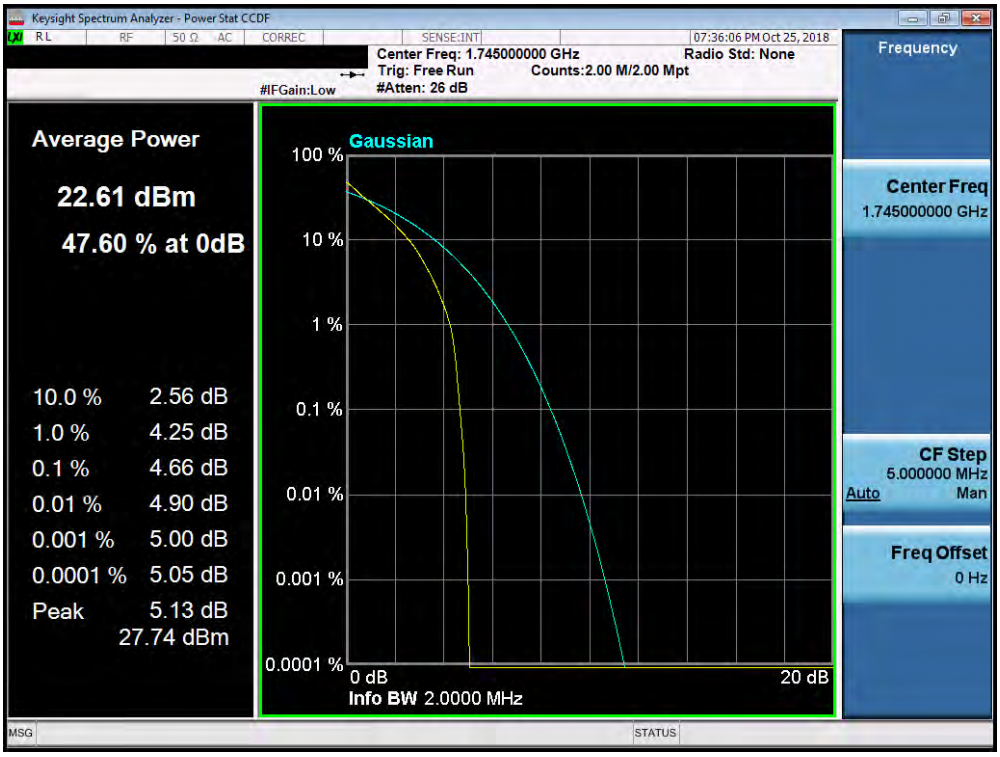
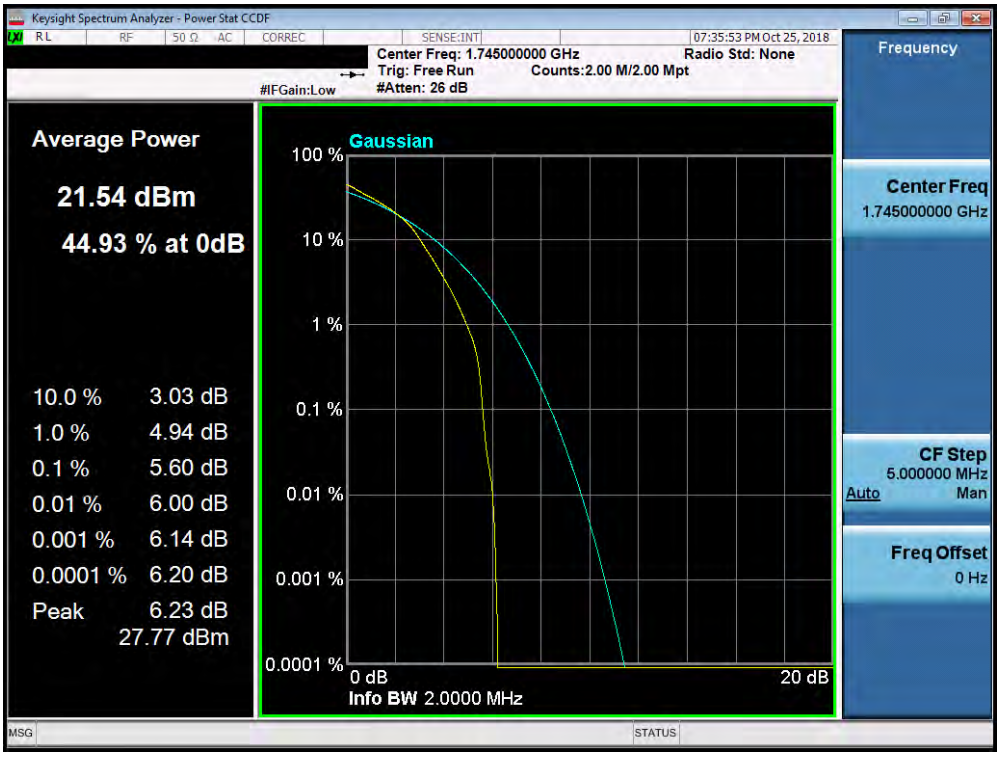
Band 4



Plot 7-156. PAR Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-157. PAR Plot (Band 4 - 1.4MHz 16-QAM - Full RB Configuration)

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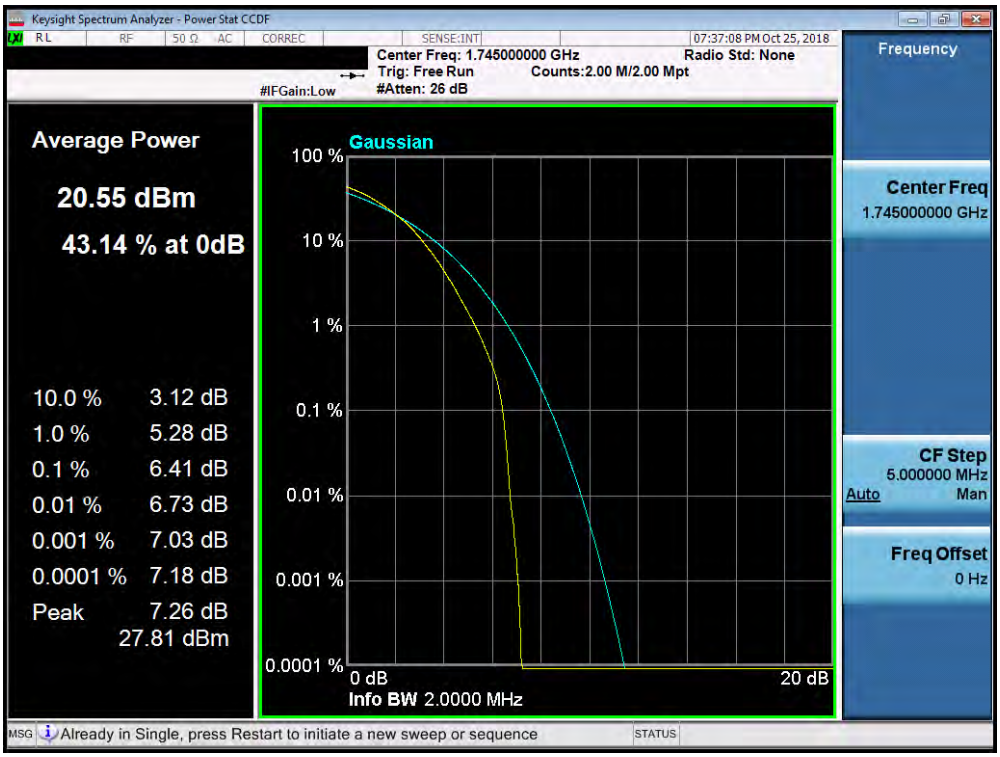
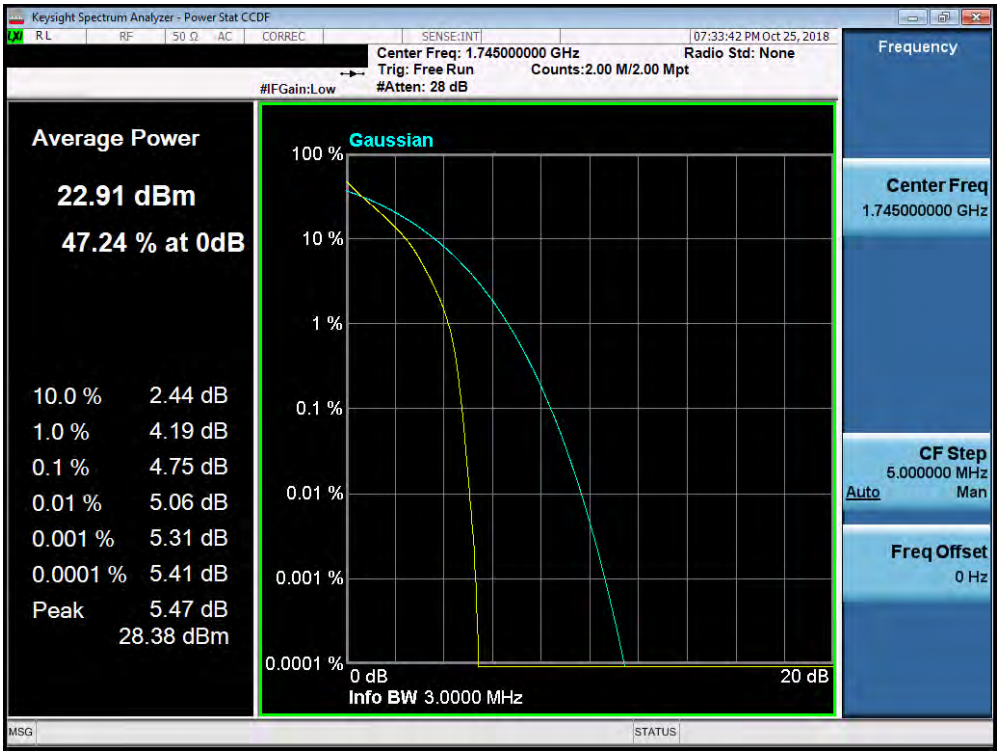


Plot 7-158. PAR Plot (Band 4 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-159. PAR Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

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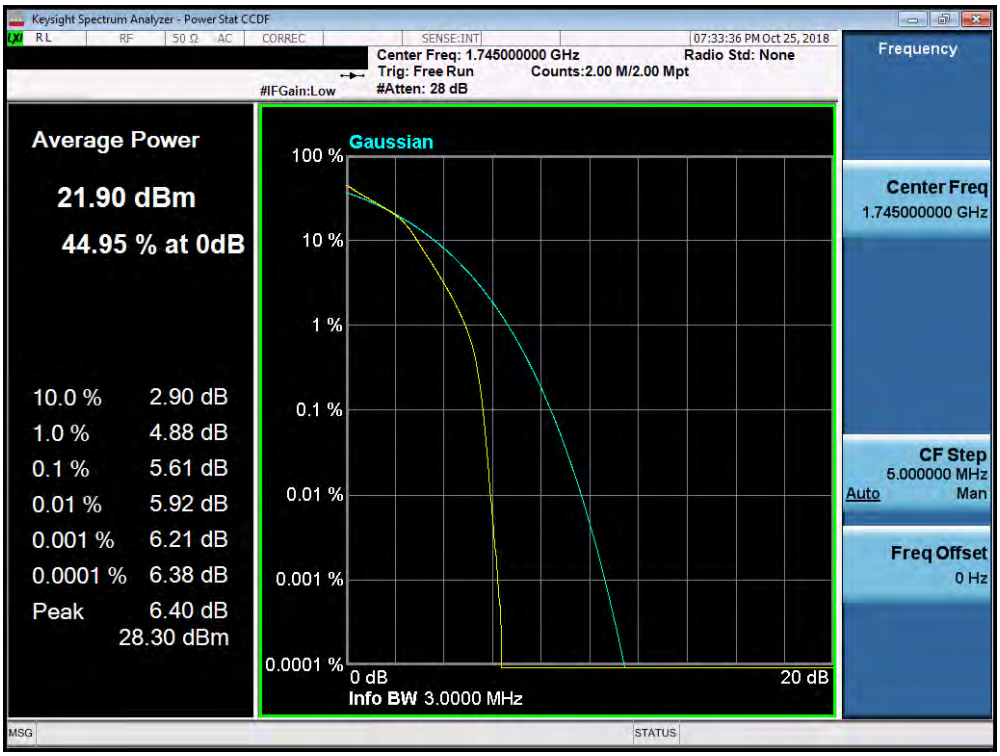
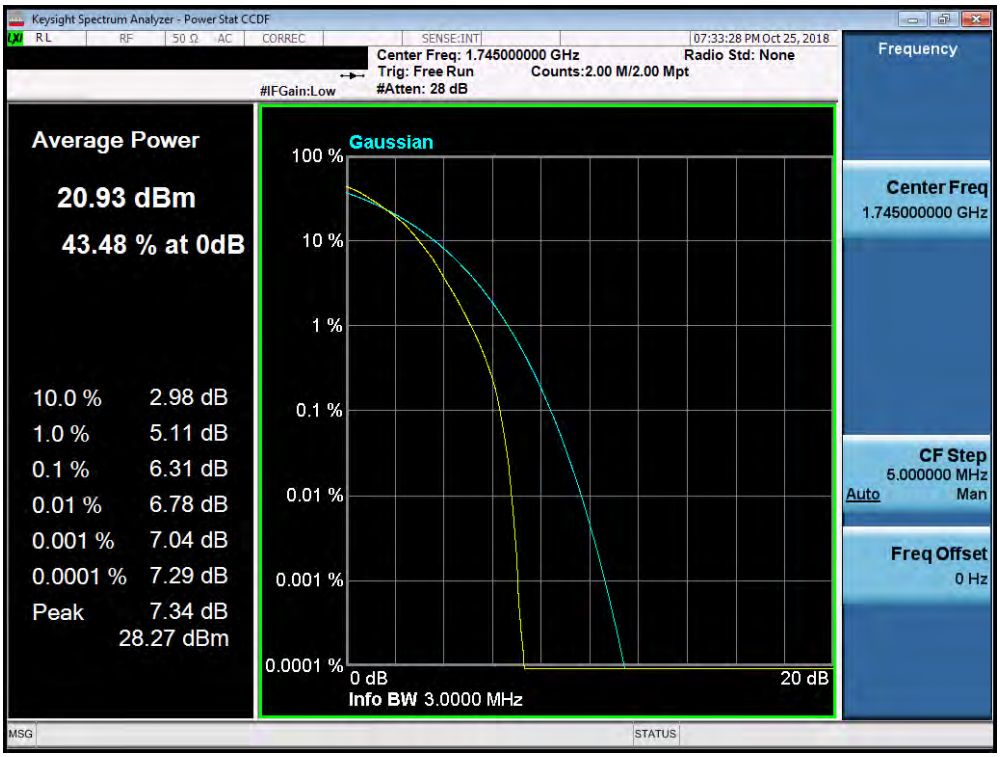


Plot 7-160. PAR Plot (Band 4 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-161. PAR Plot (Band 4 - 3.0MHz 64-QAM - Full RB Configuration)

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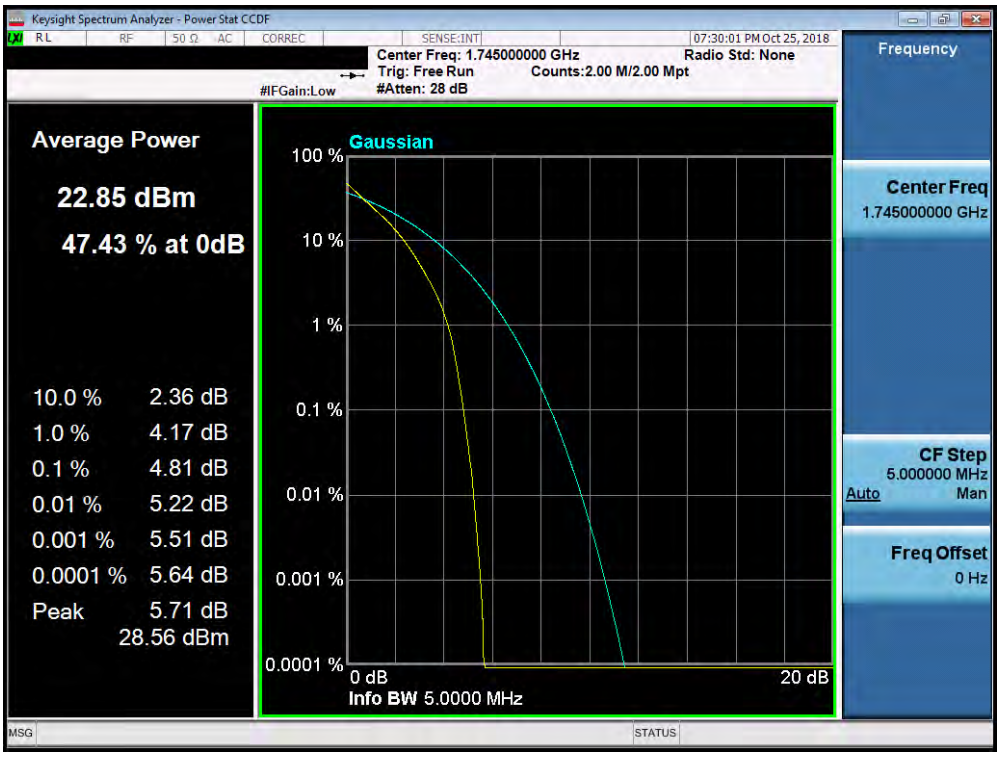
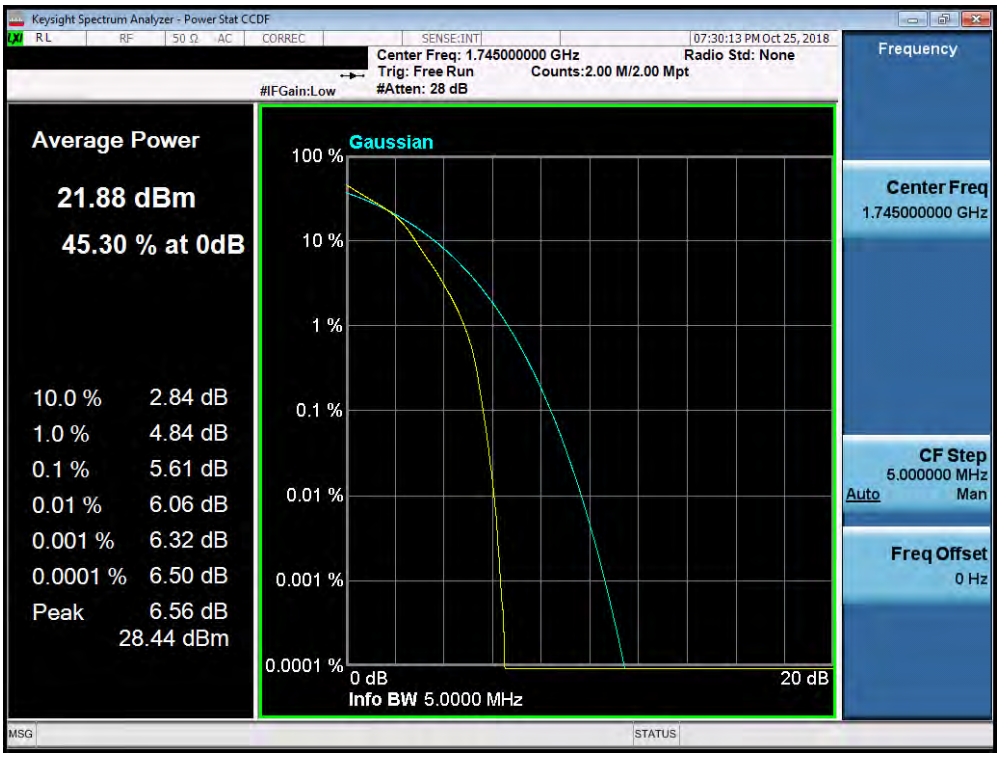


Plot 7-162. PAR Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-163. PAR Plot (Band 4 - 5.0MHz 16-QAM - Full RB Configuration)

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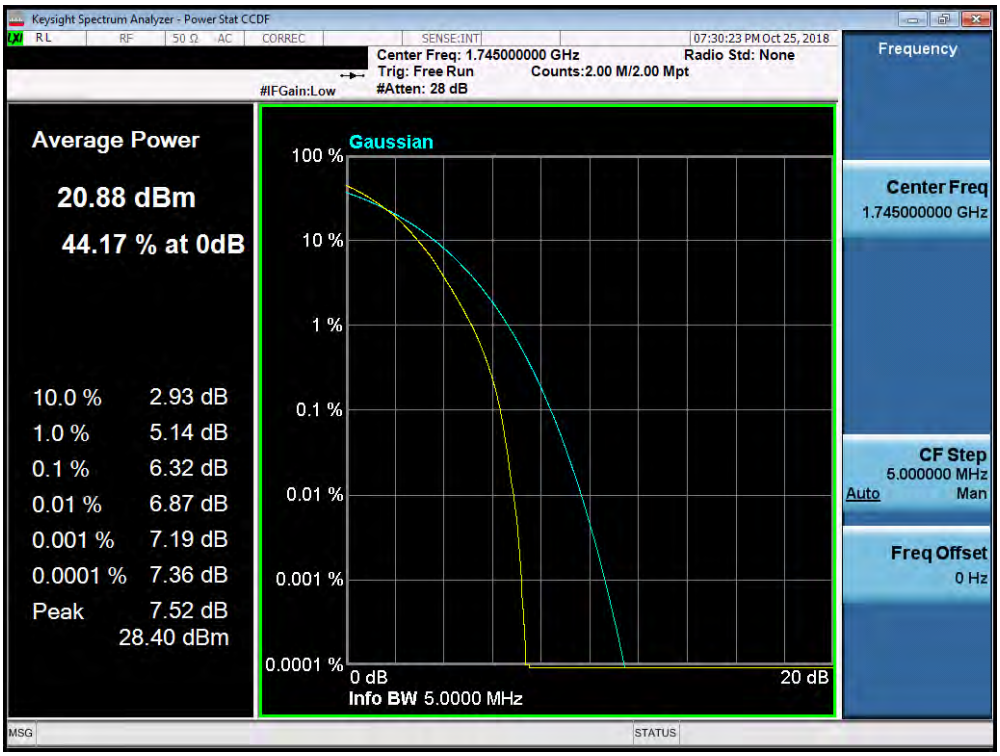
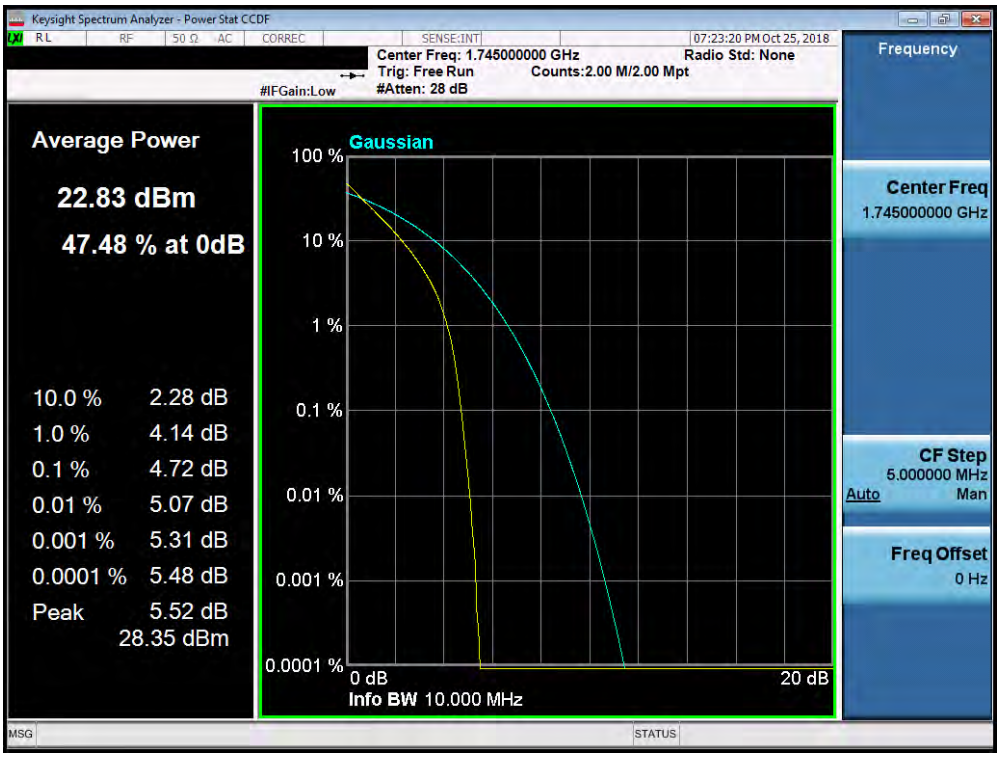


Plot 7-164. PAR Plot (Band 4 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-165. PAR Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

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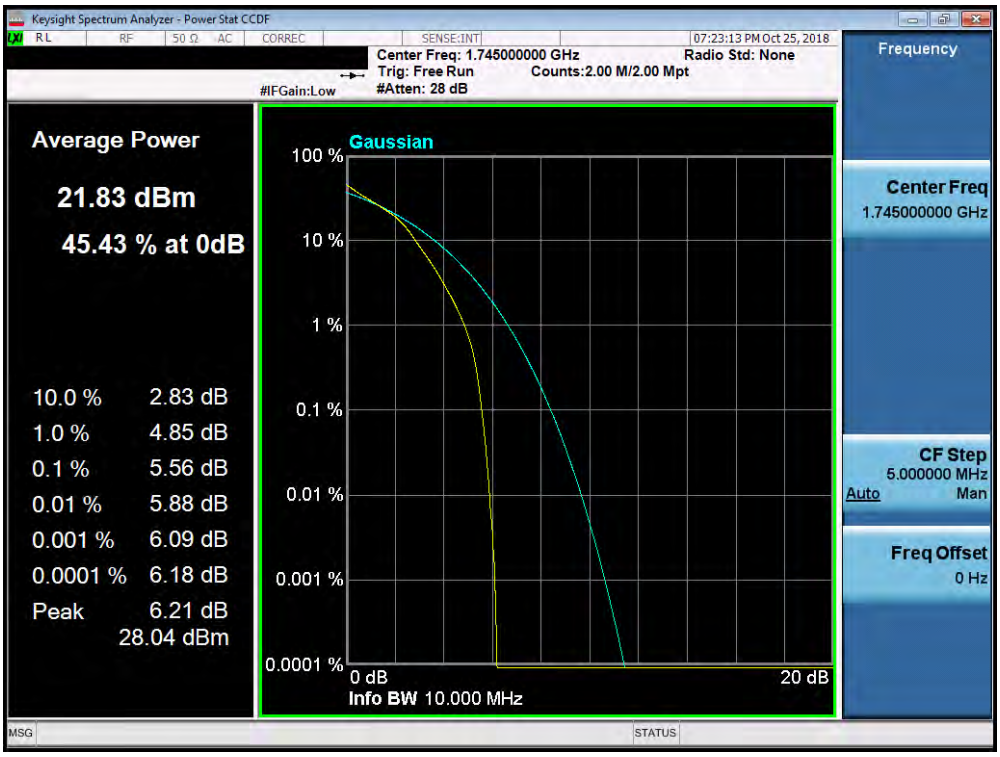
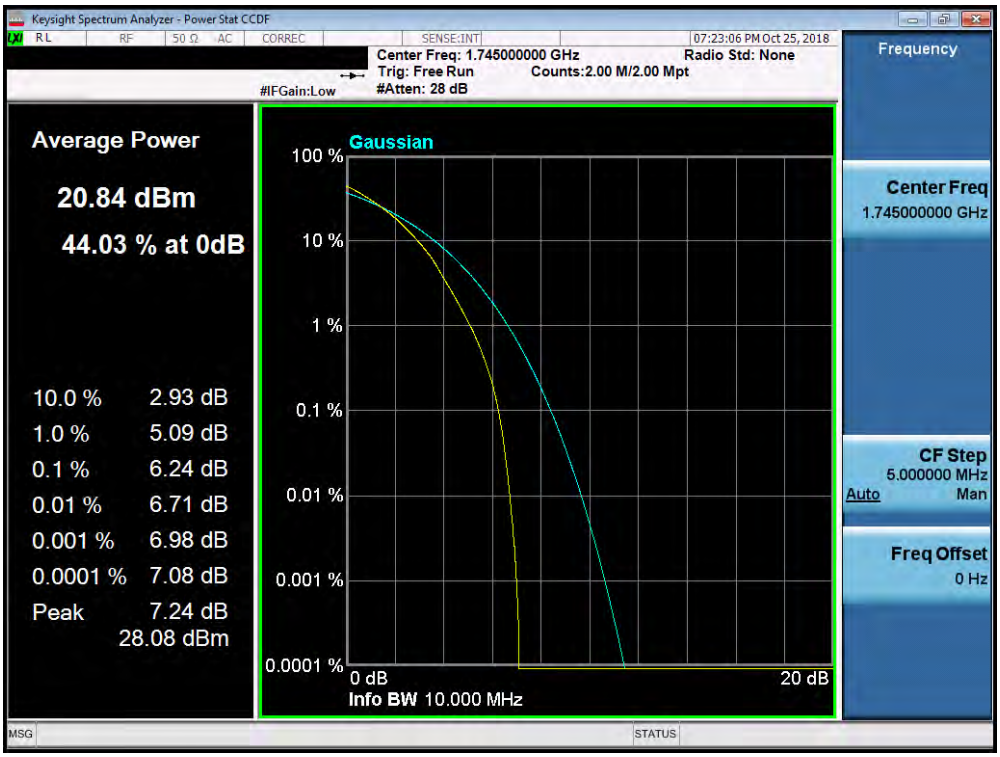


Plot 7-166. PAR Plot (Band 4 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-167. PAR Plot (Band 4 - 10.0MHz 64-QAM - Full RB Configuration)

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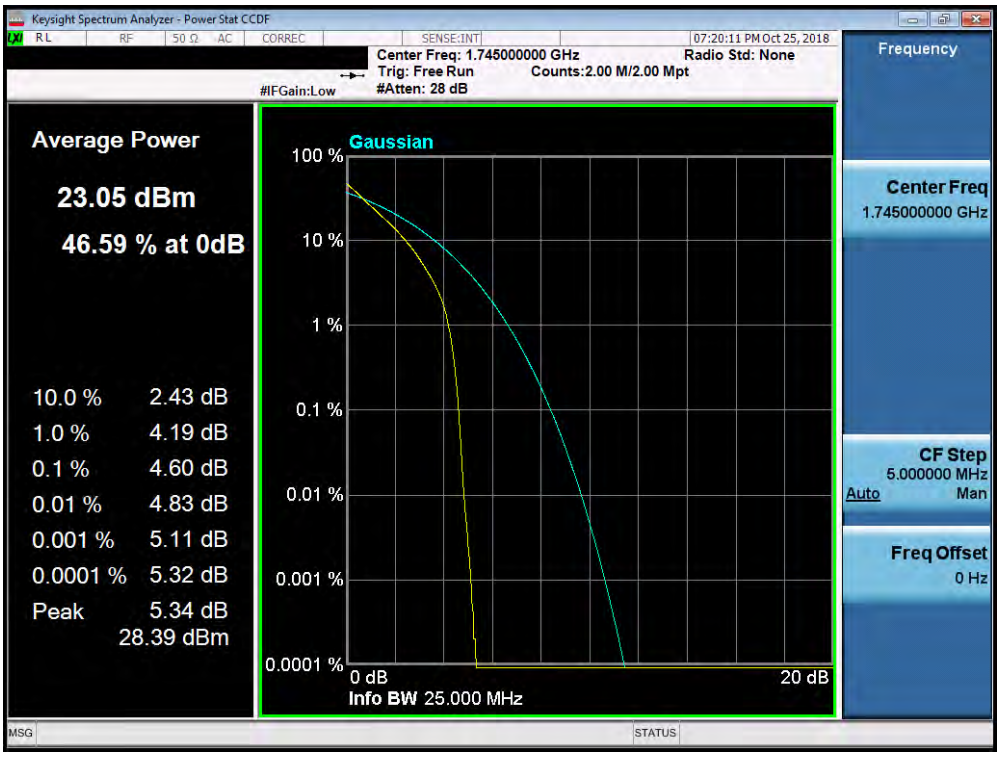
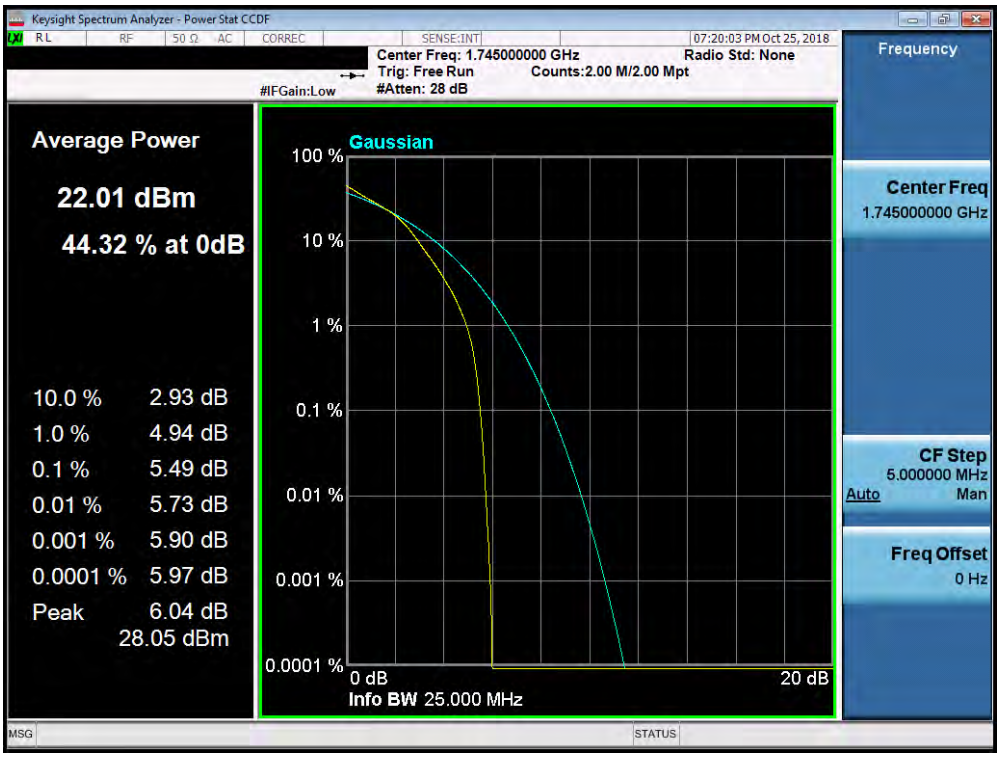


Plot 7-168. PAR Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-169. PAR Plot (Band 4 - 15.0MHz 16-QAM - Full RB Configuration)

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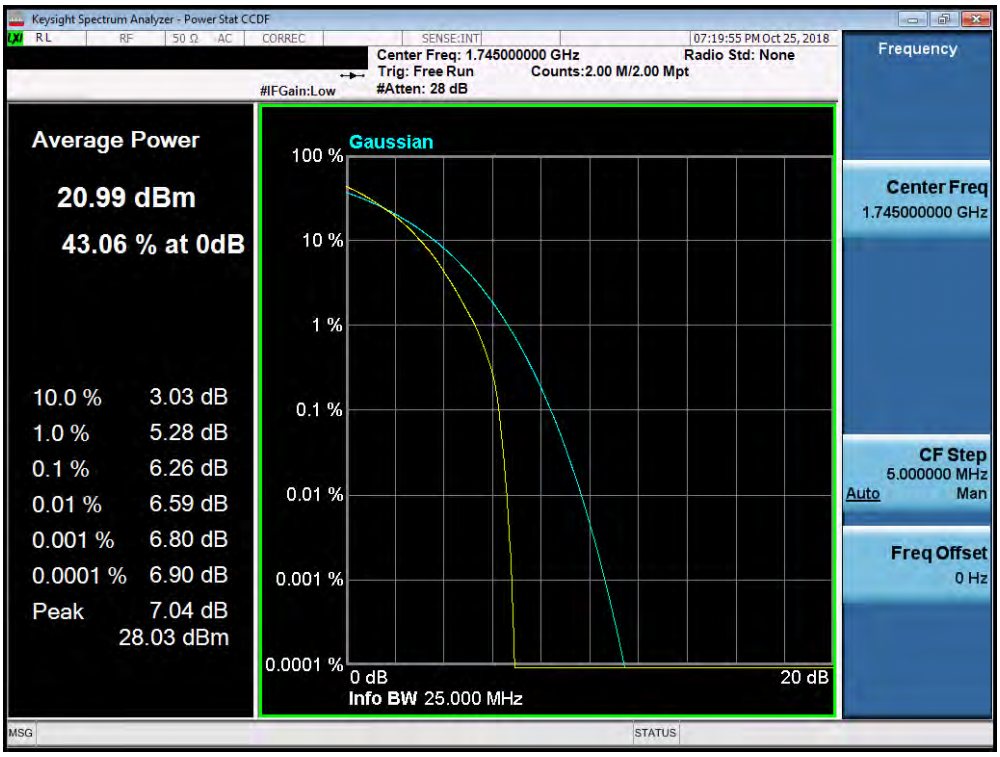
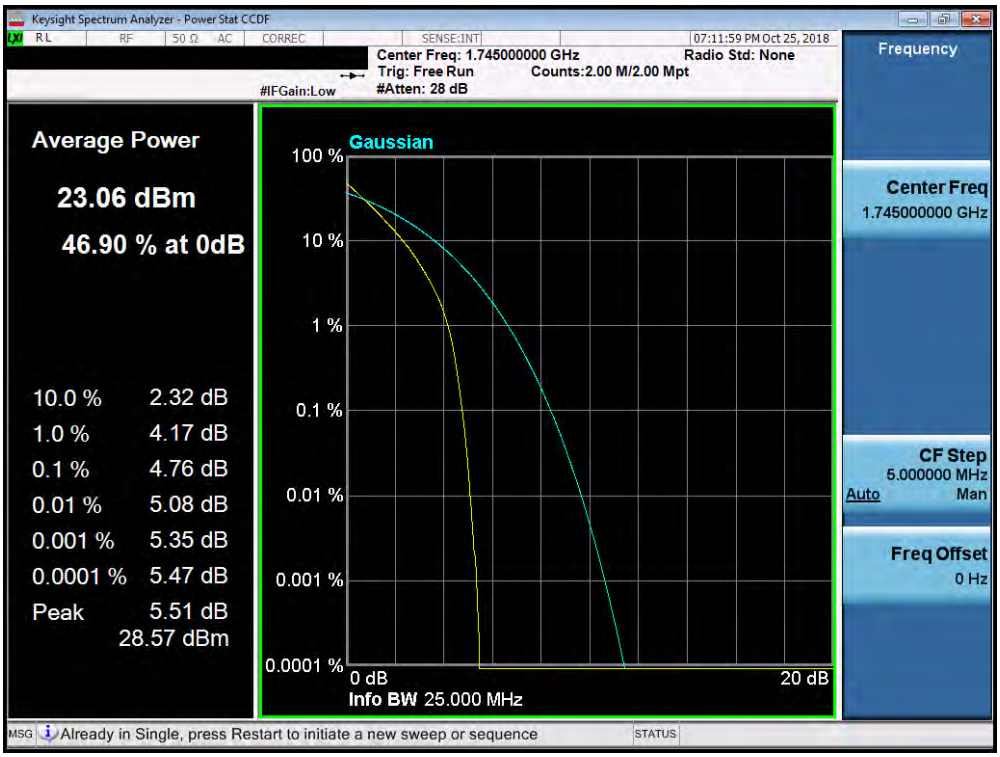


Plot 7-170. PAR Plot (Band 4 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-171. PAR Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

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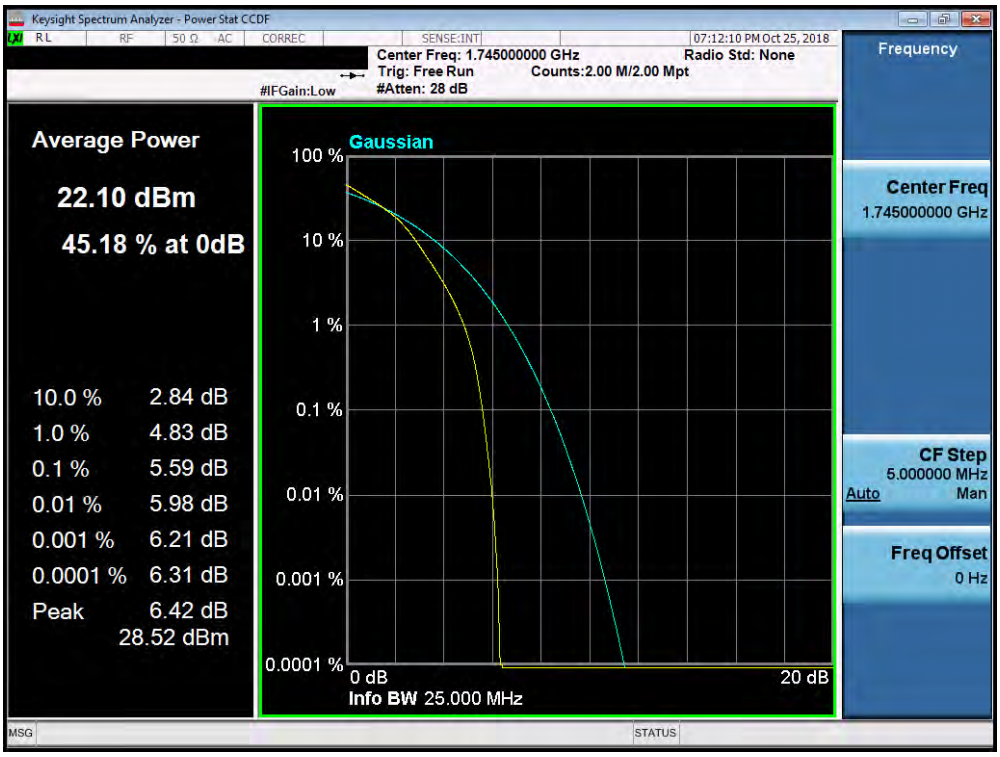
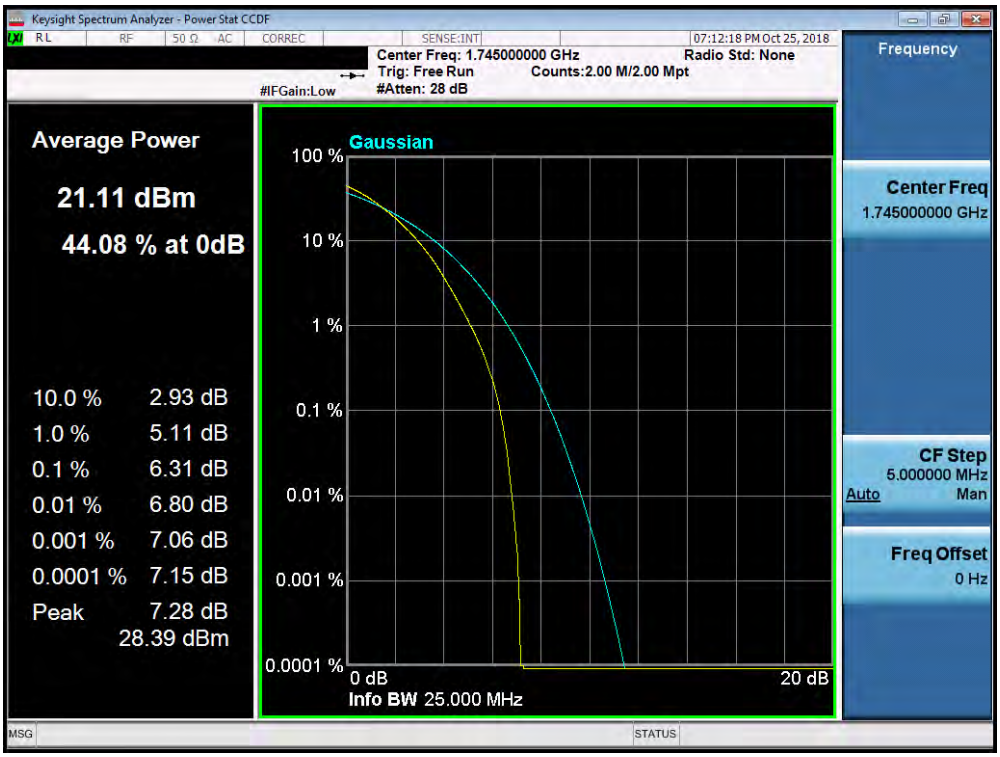


Plot 7-172. PAR Plot (Band 4 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-173. PAR Plot (Band 4 - 20.0MHz 64-QAM - Full RB Configuration)

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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. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

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

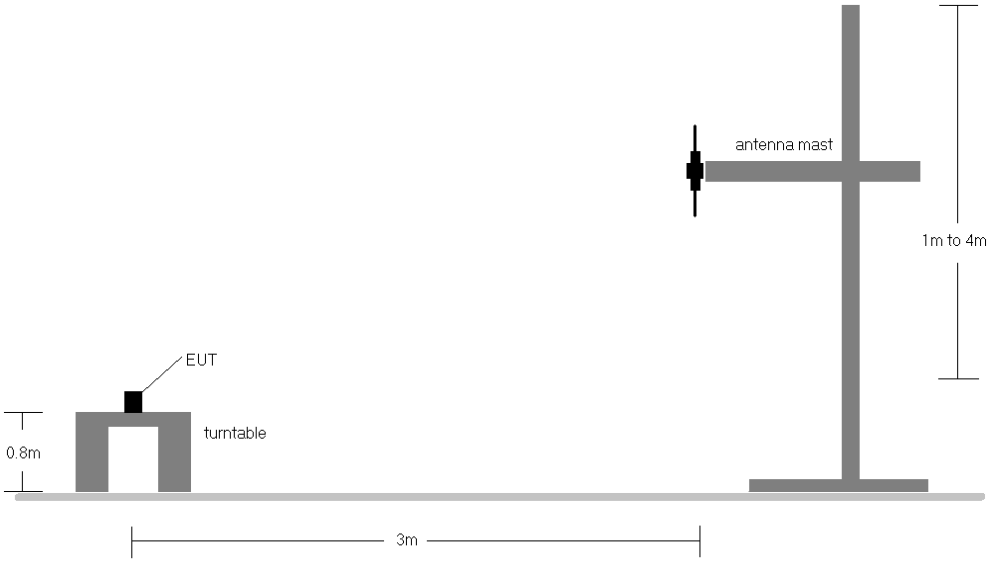

Figure 7-5. Radiated Test Setup <1GHz

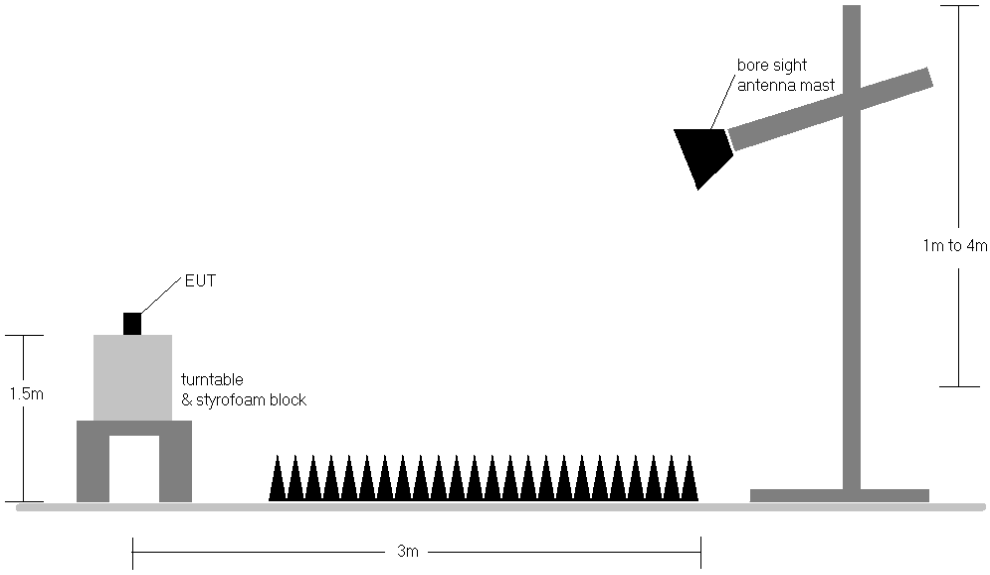

Figure 7-6. Radiated Test Setup >1GHz

Test Notes

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

2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	264	244	1 / 0	15.82	4.00	17.67	0.058	34.77	-17.10
707.50	1.4	QPSK	H	264	244	1 / 0	16.58	4.22	18.65	0.073	34.77	-16.13
715.30	1.4	QPSK	H	264	244	1 / 0	17.89	4.44	**20.18**	0.104	34.77	-14.59
715.30	1.4	16-QAM	H	264	244	1 / 0	16.69	4.44	**18.98**	0.079	34.77	-15.79
715.30	1.4	64-QAM	H	264	244	1 / 0	15.22	4.44	**17.51**	0.056	34.77	-17.26
700.50	3	QPSK	H	264	243	1 / 14	16.92	4.01	18.78	0.076	34.77	-15.99
707.50	3	QPSK	H	264	243	1 / 14	17.68	4.22	19.75	0.094	34.77	-15.03
714.50	3	QPSK	H	264	243	1 / 0	17.94	4.41	**20.20**	0.105	34.77	-14.57
714.50	3	16-QAM	H	264	243	1 / 14	16.47	4.41	**18.73**	0.075	34.77	-16.04
714.50	3	64-QAM	H	264	243	1 / 14	15.76	4.41	**18.02**	0.063	34.77	-16.75
701.50	5	QPSK	H	267	256	1 / 0	16.93	4.04	18.82	0.076	34.77	-15.95
707.50	5	QPSK	H	267	256	1 / 24	17.61	4.22	**19.68**	0.093	34.77	-15.10
713.50	5	QPSK	H	267	256	1 / 0	17.39	4.39	19.63	0.092	34.77	-15.14
707.50	5	16-QAM	H	267	256	1 / 24	16.73	4.22	**18.80**	0.076	34.77	-15.98
707.50	5	64-QAM	H	267	256	1 / 24	15.29	4.22	**17.36**	0.054	34.77	-17.42
704.00	10	QPSK	H	265	235	1 / 49	18.89	4.12	20.86	0.122	34.77	-13.92
707.50	10	QPSK	H	265	235	1 / 49	19.16	4.22	**21.23**	**0.133**	34.77	-13.55
711.00	10	QPSK	H	265	235	1 / 49	17.89	4.32	20.06	0.101	34.77	-14.72
707.50	10	16-QAM	H	265	235	1 / 49	18.28	4.22	**20.35**	0.108	34.77	-14.43
707.50	10	64-QAM	H	265	235	1 / 49	16.84	4.22	**18.91**	0.078	34.77	-15.87
707.50	10	QPSK	V	418	312	1 / 49	14.36	3.90	16.11	0.041	34.77	-18.66
707.50	10 (WCP)	QPSK	H	255	234	1 / 49	17.19	4.22	19.26	0.084	34.77	-15.52

Table 7-3. ERP Data (Band 12)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	335	95	1 / 24	19.94	1.32	19.11	0.081	34.77	-15.66
782.00	5	QPSK	H	349	97	1 / 24	20.54	1.33	**19.72**	**0.094**	34.77	-15.05
784.50	5	QPSK	H	324	103	1 / 24	20.42	1.34	19.61	0.091	34.77	-15.16
782.00	5	16-QAM	H	349	97	1 / 24	19.95	1.33	**19.13**	0.082	34.77	-15.64
782.00	5	64-QAM	H	349	97	1 / 24	19.04	1.33	**18.22**	0.066	34.77	-16.55
782.00	10	QPSK	H	351	84	1 / 49	20.30	1.33	**19.48**	0.089	34.77	-15.29
782.00	10	16-QAM	H	351	84	1 / 49	19.40	1.33	**18.58**	0.072	34.77	-16.19
782.00	10	64-QAM	H	351	84	1 / 49	18.55	1.33	**17.73**	0.059	34.77	-17.04
782.00	5	QPSK	V	73	316	1 / 24	9.08	1.33	8.26	0.007	34.77	-26.51
782.00	5 (WCP)	QPSK	H	363	283	1 / 24	19.74	1.33	18.92	0.078	34.77	-15.85

Table 7-4. ERP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	347	10	1 / 0	20.26	1.50	**19.61**	0.091	38.45	-18.84
836.50	1.4	QPSK	H	1	4	3 / 2	20.23	1.50	19.58	0.091	38.45	-18.87
848.30	1.4	QPSK	H	332	3	3 / 2	19.69	1.50	19.04	0.080	38.45	-19.41
824.70	1.4	16-QAM	H	347	10	1 / 5	19.79	1.50	**19.14**	0.082	38.45	-19.31
824.70	1.4	64-QAM	H	347	10	1 / 0	18.62	1.50	**17.97**	0.063	38.45	-20.48
825.50	3	QPSK	H	1	11	1 / 0	20.36	1.50	**19.71**	0.094	38.45	-18.74
836.50	3	QPSK	H	358	13	1 / 14	19.93	1.50	19.28	0.085	38.45	-19.17
847.50	3	QPSK	H	356	6	1 / 0	20.28	1.50	19.63	0.092	38.45	-18.82
825.50	3	16-QAM	H	1	11	1 / 14	19.66	1.50	**19.01**	0.080	38.45	-19.44
825.50	3	64-QAM	H	1	11	1 / 14	18.79	1.50	**18.14**	0.065	38.45	-20.31
826.50	5	QPSK	H	5	4	1 / 24	20.74	1.50	20.09	0.102	38.45	-18.36
836.50	5	QPSK	H	1	6	1 / 0	20.85	1.50	**20.20**	**0.105**	38.45	-18.25
846.50	5	QPSK	H	5	4	1 / 0	20.24	1.50	19.59	0.091	38.45	-18.86
836.50	5	16-QAM	H	1	6	1 / 24	19.89	1.50	**19.24**	0.084	38.45	-19.21
836.50	5	64-QAM	H	1	6	1 / 0	19.14	1.50	**18.49**	0.071	38.45	-19.96
829.00	10	QPSK	H	1	10	1 / 0	20.74	1.50	**20.09**	0.102	38.45	-18.36
836.50	10	QPSK	H	4	4	1 / 0	20.72	1.50	20.07	0.102	38.45	-18.38
844.00	10	QPSK	H	355	362	1 / 49	20.24	1.50	19.59	0.091	38.45	-18.86
829.00	10	16-QAM	H	1	10	1 / 0	20.03	1.50	**19.38**	0.087	38.45	-19.07
829.00	10	64-QAM	H	1	10	1 / 49	19.00	1.50	**18.35**	0.068	38.45	-20.10
836.50	5	QPSK	V	120	289	1 / 0	17.95	1.50	17.30	0.054	38.45	-21.15
836.50	5 (WCP)	QPSK	H	1	6	1 / 0	18.99	1.50	18.34	0.068	38.45	-20.11

Table 7-5. ERP Data (Band 5)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	186	209	1 / 0	13.10	8.16	21.26	0.134	30.00	-8.74
1732.50	1.4	QPSK	H	217	201	1 / 5	13.23	8.19	21.42	0.139	30.00	-8.58
1754.30	1.4	QPSK	H	118	204	1 / 5	13.63	8.25	**21.88**	0.154	30.00	-8.12
1754.30	1.4	16-QAM	H	118	204	1 / 5	12.62	8.25	**20.87**	0.122	30.00	-9.13
1754.30	1.4	64-QAM	H	118	204	1 / 5	11.57	8.25	**19.82**	0.096	30.00	-10.18
1711.50	3	QPSK	H	171	214	1 / 14	14.05	8.16	22.21	0.166	30.00	-7.79
1732.50	3	QPSK	H	218	212	1 / 14	13.93	8.19	22.12	0.163	30.00	-7.88
1753.50	3	QPSK	H	119	205	1 / 14	14.37	8.25	**22.62**	0.183	30.00	-7.38
1753.50	3	16-QAM	H	119	205	1 / 14	13.36	8.25	**21.61**	0.145	30.00	-8.39
1753.50	3	64-QAM	H	119	205	1 / 14	12.31	8.25	**20.56**	0.114	30.00	-9.44
1712.50	5	QPSK	H	175	199	1 / 24	14.80	8.16	**22.96**	0.198	30.00	-7.04
1732.50	5	QPSK	H	227	213	1 / 24	14.19	8.19	22.38	0.173	30.00	-7.62
1752.50	5	QPSK	H	131	200	1 / 0	14.35	8.25	22.60	0.182	30.00	-7.40
1712.50	5	16-QAM	H	175	199	1 / 24	13.82	8.16	**21.98**	0.158	30.00	-8.02
1712.50	5	64-QAM	H	175	199	1 / 24	12.72	8.16	**20.88**	0.122	30.00	-9.12
1715.00	10	QPSK	H	176	211	1 / 49	14.65	8.16	**22.81**	0.191	30.00	-7.19
1732.50	10	QPSK	H	220	208	1 / 49	14.20	8.19	22.39	0.174	30.00	-7.61
1750.00	10	QPSK	H	135	210	1 / 0	14.42	8.24	22.66	0.185	30.00	-7.34
1715.00	10	16-QAM	H	176	211	1 / 49	13.67	8.16	**21.83**	0.152	30.00	-8.17
1715.00	10	64-QAM	H	176	211	1 / 49	12.57	8.16	**20.73**	0.118	30.00	-9.27
1717.50	15	QPSK	H	177	196	1 / 74	14.83	8.16	22.99	0.199	30.00	-7.01
1732.50	15	QPSK	H	218	197	1 / 74	14.11	8.19	22.30	0.170	30.00	-7.70
1747.50	15	QPSK	H	133	196	1 / 0	15.08	8.24	**23.32**	**0.215**	30.00	-6.68
1747.50	15	16-QAM	H	133	196	1 / 0	13.85	8.24	**22.09**	0.162	30.00	-7.91
1747.50	15	64-QAM	H	133	196	1 / 0	13.08	8.24	**21.32**	0.135	30.00	-8.68
1720.00	20	QPSK	H	174	189	1 / 0	14.72	8.17	22.89	0.194	30.00	-7.11
1732.50	20	QPSK	H	138	184	1 / 99	14.04	8.19	22.23	0.167	30.00	-7.77
1745.00	20	QPSK	H	133	195	1 / 0	14.67	8.23	**22.90**	0.195	30.00	-7.10
1745.00	20	16-QAM	H	133	195	1 / 0	13.87	8.23	**22.10**	0.162	30.00	-7.90
1745.00	20	64-QAM	H	133	195	1 / 0	12.67	8.23	**20.90**	0.123	30.00	-9.10
1747.50	15	QPSK	V	400	260	1 / 0	8.38	8.24	16.62	0.046	30.00	-13.38
1747.50	15 (WCP)	QPSK	H	136	184	1 / 0	14.82	8.24	23.06	0.202	30.00	-6.94

Table 7-6. EIRP Data (Band 4)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	105	295	1 / 0	14.83	7.71	**22.54**	0.179	33.01	-10.47
2593.00	5	QPSK	H	110	301	1 / 0	14.47	7.52	21.99	0.158	33.01	-11.02
2687.50	5	QPSK	H	110	301	1 / 0	14.00	7.90	21.90	0.155	33.01	-11.11
2502.50	5	16-QAM	H	105	295	1 / 0	14.50	7.71	**22.21**	0.166	33.01	-10.80
2502.50	5	64-QAM	H	105	295	1 / 0	14.01	7.71	**21.72**	0.149	33.01	-11.29
2505.00	10	QPSK	H	102	294	1 / 49	15.36	7.71	**23.07**	0.203	33.01	-9.94
2593.00	10	QPSK	H	110	299	1 / 49	14.86	7.53	22.39	0.173	33.01	-10.62
2685.00	10	QPSK	H	110	299	1 / 0	14.42	7.90	22.32	0.171	33.01	-10.69
2505.00	10	16-QAM	H	102	294	1 / 49	14.91	7.71	**22.62**	0.183	33.01	-10.39
2505.00	10	64-QAM	H	102	294	1 / 0	14.37	7.71	**22.08**	0.161	33.01	-10.93
2507.50	15	QPSK	H	104	298	1 / 0	15.52	7.71	**23.23**	**0.210**	33.01	-9.78
2593.00	15	QPSK	H	110	300	1 / 74	14.55	7.53	22.08	0.161	33.01	-10.93
2682.50	15	QPSK	H	110	300	1 / 0	14.15	7.89	22.04	0.160	33.01	-10.97
2507.50	15	16-QAM	H	104	298	1 / 74	14.65	7.71	**22.36**	0.172	33.01	-10.65
2507.50	15	64-QAM	H	104	298	1 / 0	13.88	7.71	21.59	0.144	33.01	-11.42
2510.00	20	QPSK	H	104	297	1 / 99	14.79	7.71	**22.50**	0.178	33.01	-10.51
2593.00	20	QPSK	H	114	295	1 / 0	14.19	7.54	21.73	0.149	33.01	-11.29
2680.00	20	QPSK	H	114	295	1 / 0	14.08	7.89	21.97	0.157	33.01	-11.04
2510.00	20	16-QAM	H	104	297	1 / 99	14.14	7.71	**21.85**	0.153	33.01	-11.16
2510.00	20	64-QAM	H	104	297	1 / 0	13.60	7.71	**21.31**	0.135	33.01	-11.70
2507.50	15	QPSK	H	126	69	1 / 0	12.61	7.88	20.49	0.112	33.01	-12.52
2507.50	15 (WCP)	QPSK	H	119	251	1 / 0	14.09	7.71	21.80	0.151	33.01	-11.21

Table 7-7. EIRP Data (Band 41 – PC3)

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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 ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

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

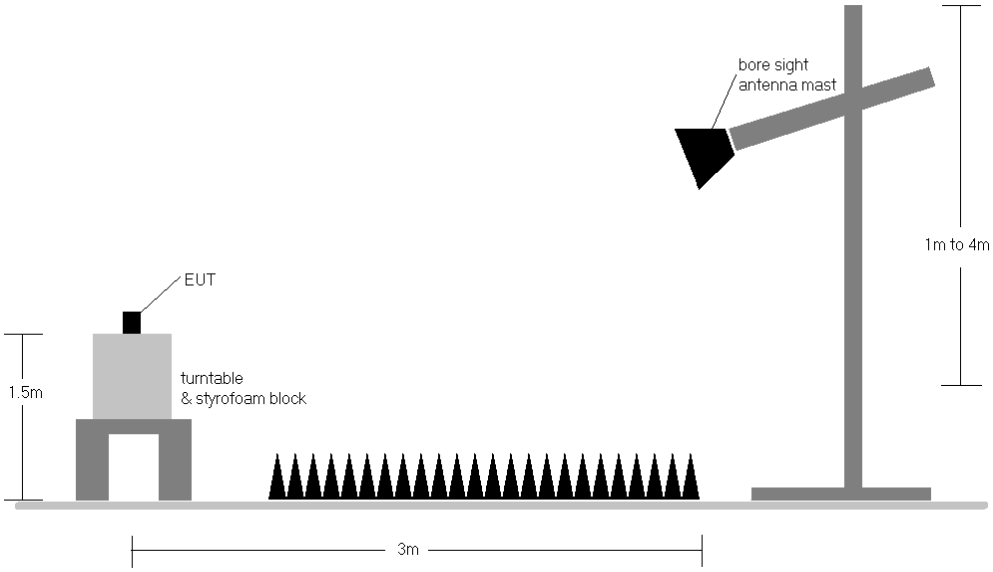

Figure 7-7. Test Instrument & Measurement Setup

Test Notes

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

2) This unit was tested with its standard battery.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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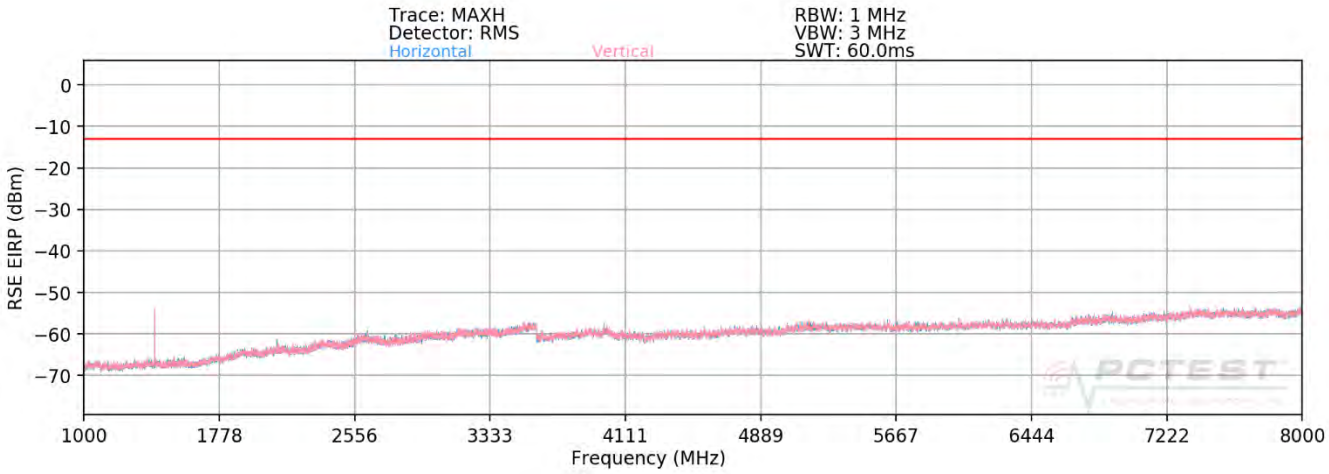
Band 12



Plot 7-174. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	704.00	MHz
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]
1408.00	H	149	202	-60.93	2.30	-58.63	-45.6
2112.00	H	-	-	-66.92	3.12	-63.80	-50.8
2816.00	H	-	-	-68.53	4.82	-63.71	-50.7

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

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OPERATING FREQUENCY: 707.50 MHz
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]
1415.00	H	151	199	-58.46	2.39	-56.06	-43.1
2122.50	H	-	-	-67.15	3.14	-64.01	-51.0
2830.00	H	-	-	-68.29	4.87	-63.43	-50.4

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

OPERATING FREQUENCY: 711.00 MHz
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]
1422.00	H	139	193	-58.18	2.53	-55.66	-42.7
2133.00	H	-	-	-67.40	3.11	-64.29	-51.3
2844.00	H	-	-	-68.00	4.91	-63.09	-50.1

Table 7-10. Radiated Spurious Data (Band 12 – High Channel)

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OPERATING FREQUENCY:	711.00	MHz
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]
1422.00	H	156	1711	-58.71	2.53	-56.19	-43.2
2133.00	H	-	-	-67.64	3.11	-64.53	-51.5
2844.00	H	-	-	-68.06	4.91	-63.15	-50.1

Table 7-11. Radiated Spurious Data with WCP (Band 12 – High Channel)

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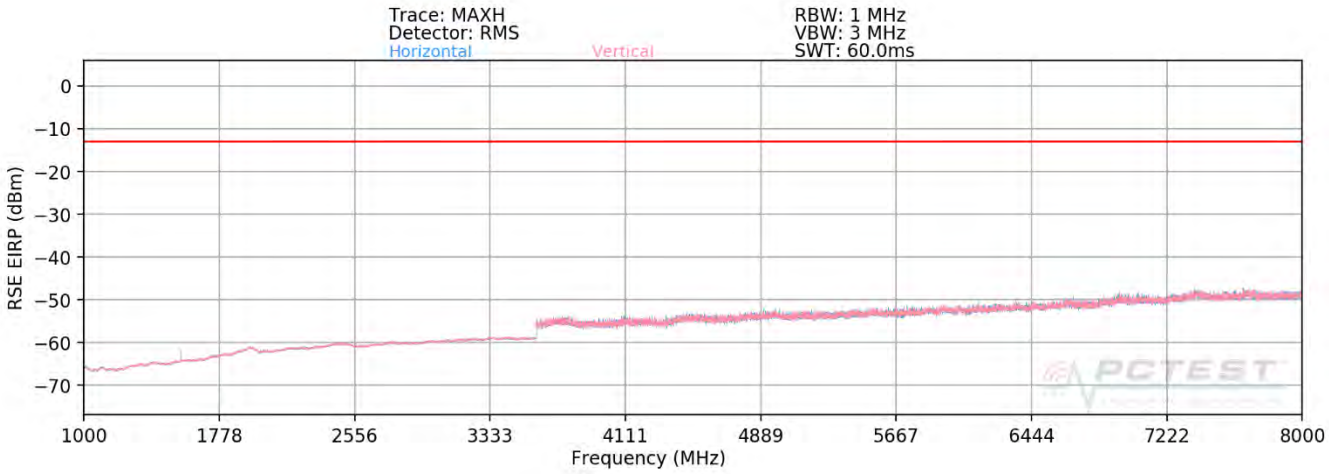
Band 13



Plot 7-175. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	779.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
2338.50	H	-	-	-66.60	3.61	-62.99	-50.0
3118.00	H	-	-	-68.04	5.71	-62.34	-49.3

Table 7-12. Radiated Spurious Data (Band 13 – Low Channel)

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	H	-	-	-67.71	3.64	-64.07	-51.1
3128.00	H	-	-	-68.10	5.73	-62.37	-49.4

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

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OPERATING FREQUENCY: 784.50 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 5.0 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]
2353.50	H	-	-	-67.60	3.66	-63.94	-50.9
3138.00	H	-	-	-68.59	5.76	-62.83	-49.8

Table 7-14. Radiated Spurious Data (Band 13 – High Channel)

MODULATION SIGNAL: QPSK
BANDWIDTH: 5.00 MHz
DISTANCE: 3 meters
NARROWBAND EMISSION LIMIT: -50 dBm
WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	H	199	205	-69.00	3.00	-66.00	-26.0
1564.00	H	240	194	-67.86	2.93	-64.92	-24.9
1569.00	H	-	-	-70.42	2.86	-67.56	-27.6

Table 7-15. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

OPERATING FREQUENCY: 782.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 5.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	H	-	-	-68.05	3.64	-64.41	-51.4
3128.00	H	-	-	-68.16	5.73	-62.43	-49.4

Table 7-16. Radiated Spurious Data with WCP (Band 13 –Mid Channel)

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MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	121	11	-68.91	2.93	-65.97	-26.0

Table 7-17. Radiated Spurious Data wit WCP (Band 13 – 1559-1610MHz Band)

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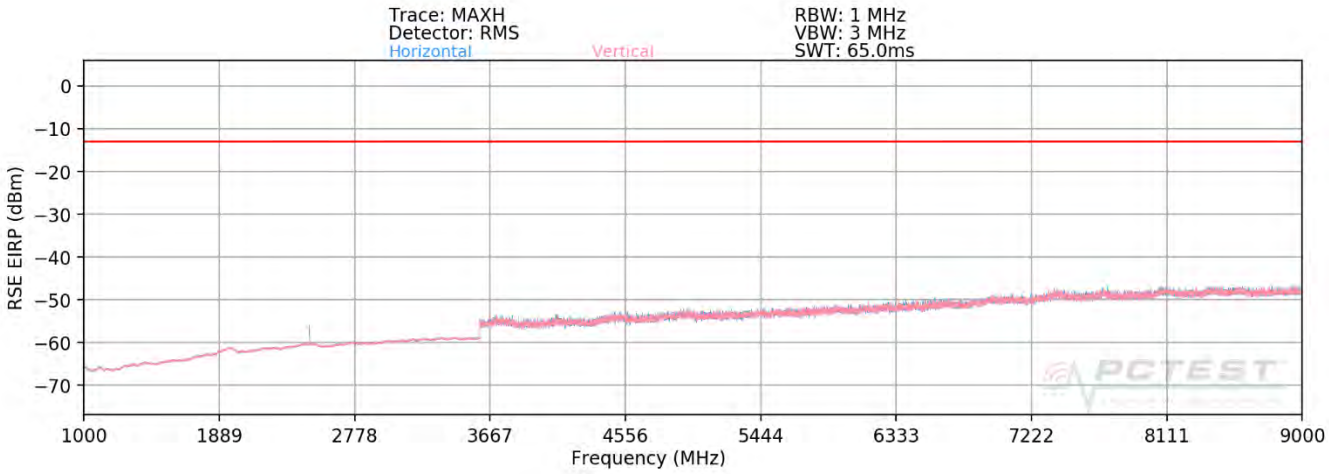
Band 5



Plot 7-176. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	826.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
1653.00	V	-	-	-69.34	3.61	-65.73	-52.7
2479.50	V	-	-	-67.26	4.23	-63.03	-50.0
3306.00	V	-	-	-67.65	5.80	-61.85	-48.9

Table 7-18. Radiated Spurious Data (Band 5 – Low Channel)

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OPERATING FREQUENCY: 836.50 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 5.0 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	V	-	-	-69.34	3.62	-65.72	-52.7
2509.50	V	-	-	-66.75	4.33	-62.41	-49.4
3346.00	V	-	-	-67.50	5.92	-61.58	-48.6

Table 7-19. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY: 846.50 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 5.0 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]
1693.00	V	-	-	-69.32	3.63	-65.69	-52.7
2539.50	V	-	-	-67.50	4.52	-62.99	-50.0
3386.00	V	-	-	-67.76	6.09	-61.67	-48.7

Table 7-20. Radiated Spurious Data (Band 5 – High Channel)

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OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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	V	-	-	-70.22	3.62	-66.60	-53.6
2509.50	V	-	-	-66.84	4.33	-62.50	-49.5

Table 7-21. Radiated Spurious Data with WCP (Band 5 – Mid Channel)

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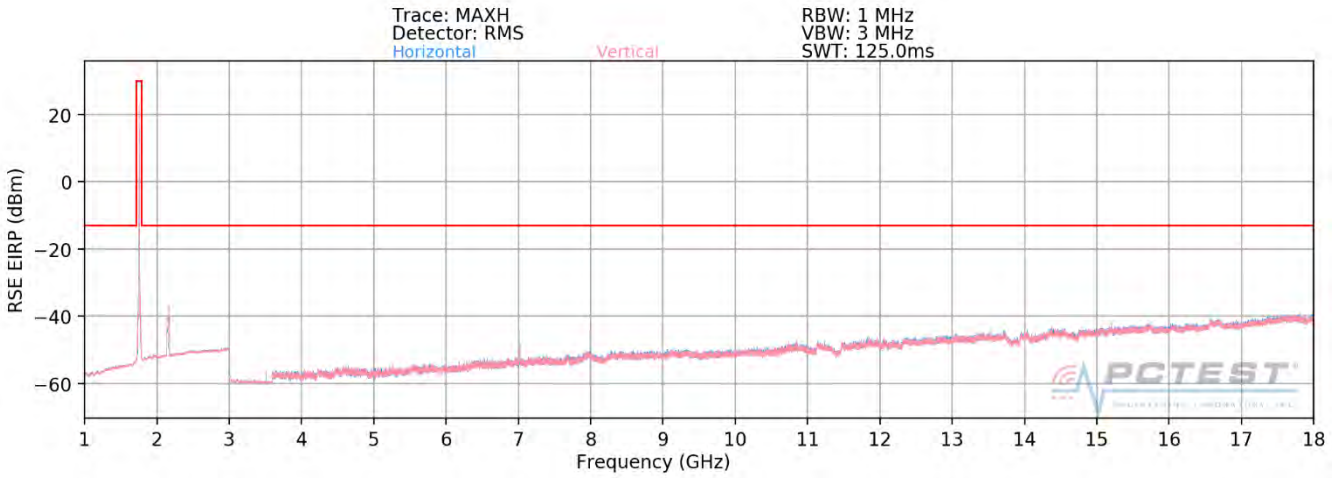
Band 4



Plot 7-177. Radiated Spurious Plot above 1GHz (Band 4)

OPERATING FREQUENCY:	1717.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3435.00	V	115	122	-63.95	9.84	-54.11	-41.1
5152.50	V	169	225	-64.16	10.70	-53.46	-40.5
6870.00	V	222	301	-57.07	11.67	-45.40	-32.4
8587.50	V	-	-	-65.06	11.10	-53.96	-41.0

Table 7-22. Radiated Spurious Data (Band 4 – Low Channel)

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OPERATING FREQUENCY: 1745.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 15.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	V	125	149	-66.56	9.91	-56.65	-43.6
5235.00	V	139	201	-65.48	10.73	-54.75	-41.7
6980.00	V	113	71	-62.14	11.82	-50.32	-37.3
8725.00	V	-	-	-66.74	11.00	-55.74	-42.7
10470.00	V	-	-	-66.98	12.58	-54.39	-41.4

Table 7-23. Radiated Spurious Data (Band 4 – Mid Channel)

OPERATING FREQUENCY: 1772.50 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 15.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3545.00	V	-	-	-69.34	9.89	-59.45	-46.4
5317.50	V	-	-	-67.38	10.69	-56.69	-43.7

Table 7-24. Radiated Spurious Data (Band 4 – High Channel)

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OPERATING FREQUENCY:	1717.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3435.00	V	141	176	-67.35	9.84	-57.51	-44.5
5152.50	V	207	255	-66.16	10.70	-55.46	-42.5
6870.00	V	265	331	-61.39	11.67	-49.72	-36.7
8587.50	V	-	-	-65.22	11.10	-54.12	-41.1

Table 7-25. Radiated Spurious Data with WCP (Band 4 – Low Channel)

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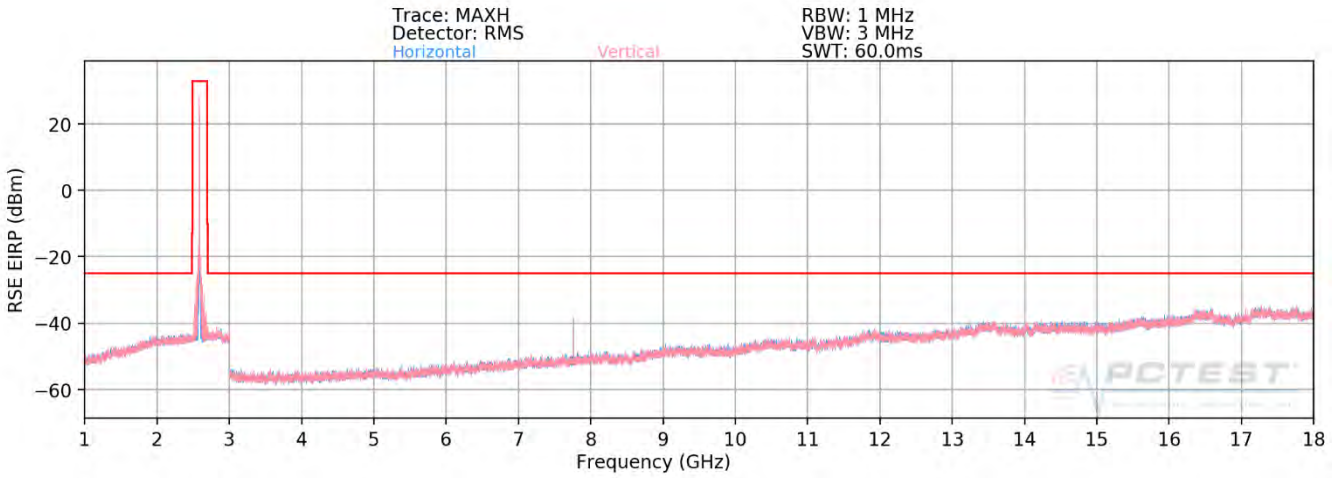
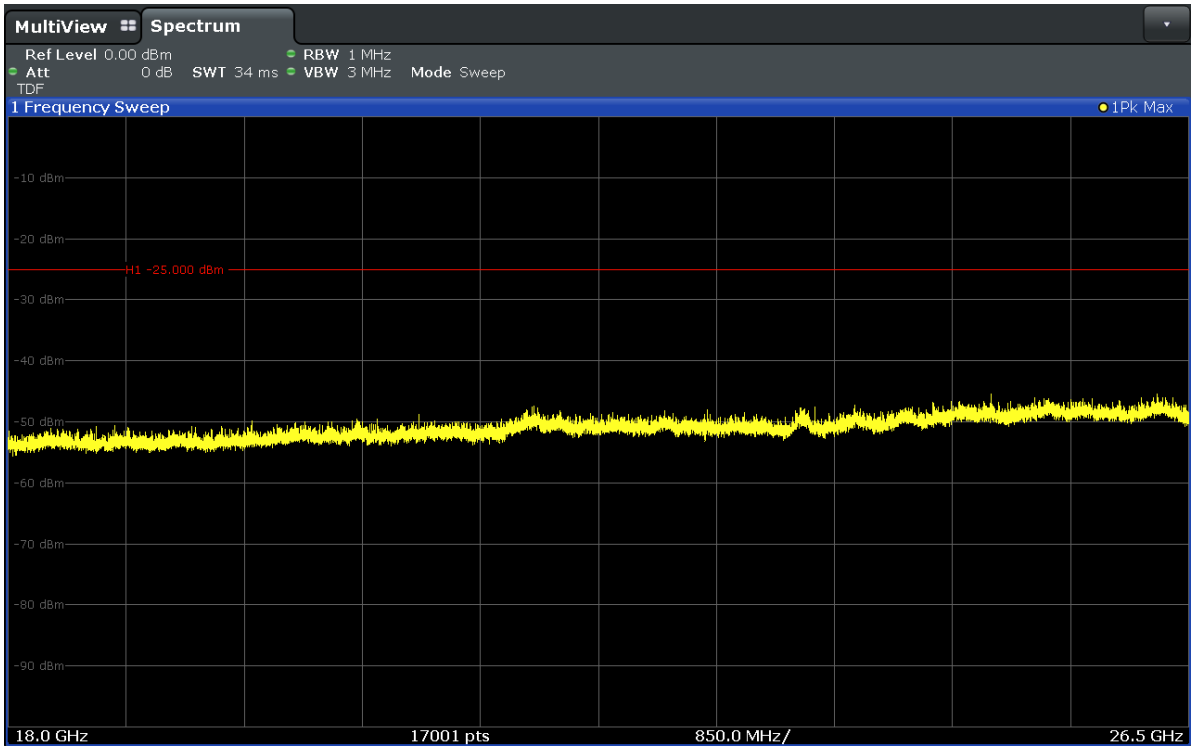
Band 41 – PC3



Plot 7-178. Radiated Spurious Plot 1GHz - 18GHz (Band 41 PC3)



Plot 7-179. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41 PC3 - H)

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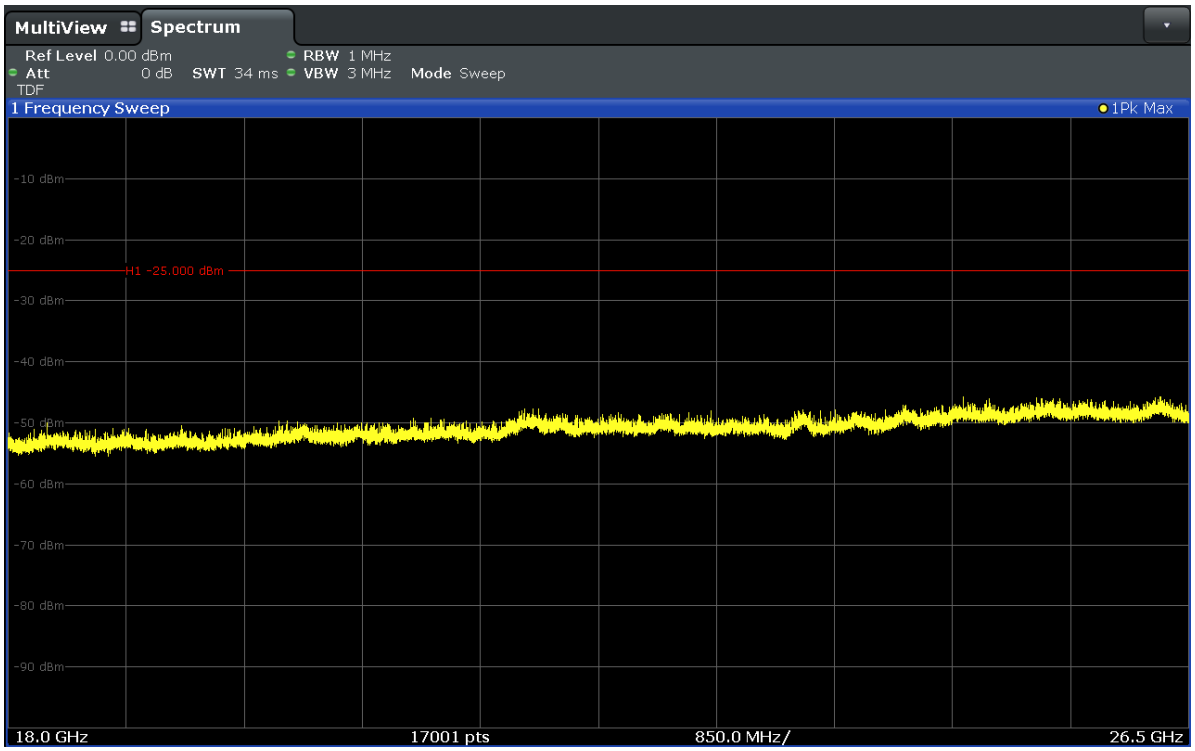

Plot 7-180. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41 PC3 - V)

OPERATING FREQUENCY:	2507.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	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]
5015.00	H	130	356	-54.39	8.56	-45.83	-20.8
7522.50	H	199	27	-50.00	8.46	-41.55	-16.5
10030.00	H	-	-	-54.50	9.85	-44.65	-19.6

Table 7-26. Radiated Spurious Data (Band 41 PC3 – Low Channel)

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OPERATING FREQUENCY: 2593.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 15.0 MHz
DISTANCE: 3 meters
LIMIT: -25 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]
5186.00	H	124	311	-54.24	8.70	-45.54	-20.5
7779.00	H	360	278	-48.38	8.69	-39.70	-14.7
10372.00	H	-	-	-53.03	9.62	-43.40	-18.4

Table 7-27. Radiated Spurious Data (Band 41 PC3 – Mid Channel)

OPERATING FREQUENCY: 2682.50 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 15.0 MHz
DISTANCE: 3 meters
LIMIT: -25 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]
5365.00	H	131	122	-50.84	8.70	-42.14	-17.1
8047.50	H	-	-	-55.49	8.95	-46.53	-21.5
10730.00	H	-	-	-52.22	9.32	-42.90	-17.9

Table 7-28. Radiated Spurious Data (Band 41 PC3 – High Channel)

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OPERATING FREQUENCY:	2593.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	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]
5186.00	H	133	22	-55.74	8.70	-47.04	-22.0
7779.00	H	151	69	-50.12	8.69	-41.44	-16.4
10372.00	H	-	-	-53.12	9.62	-43.49	-18.5

Table 7-29. Radiated Spurious Data with WCP (Band 41 PC3 – Mid Channel)

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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 ±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

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Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 4.31 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	707,499,743	-298	-0.0000421
100 %		- 20	707,500,401	360	0.0000509
100 %		- 10	707,500,191	150	0.0000212
100 %		0	707,500,485	444	0.0000628
100 %		+ 10	707,499,880	-161	-0.0000228
100 %		+ 20	707,499,990	-51	-0.0000072
100 %		+ 30	707,500,138	97	0.0000137
100 %		+ 40	707,500,041	0	0.0000000
100 %		+ 50	707,499,658	-383	-0.0000541
BATT. ENDPOINT	3.48	+ 20	707,500,030	-11	-0.0000016

Table 7-30. 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

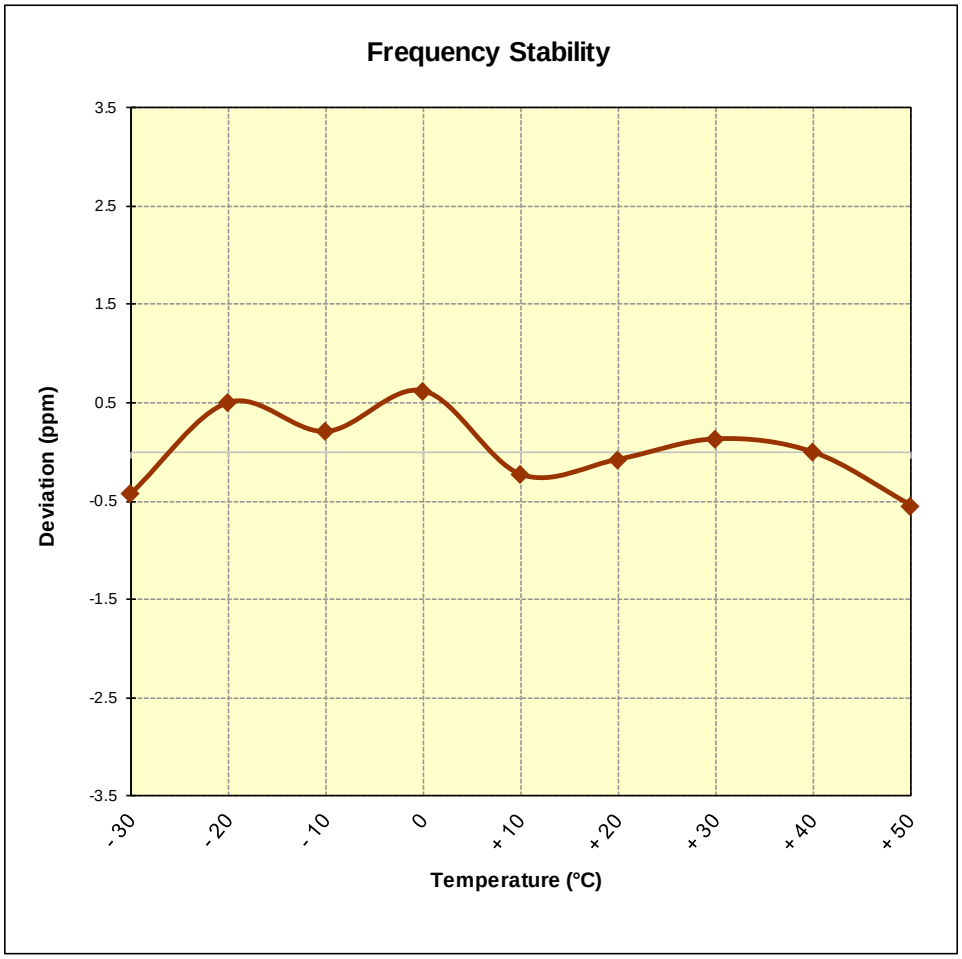

Figure 7-8. Frequency Stability Graph (Band 12)

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Band 13 Frequency Stability Measurements

OPERATING FREQUENCY: 782,000,000 Hz

CHANNEL: 23230

REFERENCE VOLTAGE: 4.31 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	782,000,378	125	0.0000160
100 %		- 20	782,000,131	-122	-0.0000156
100 %		- 10	781,999,873	-380	-0.0000486
100 %		0	782,000,564	311	0.0000398
100 %		+ 10	782,000,091	-162	-0.0000207
100 %		+ 20	782,000,594	341	0.0000436
100 %		+ 30	782,000,330	77	0.0000098
100 %		+ 40	782,000,192	-61	-0.0000078
100 %		+ 50	782,000,223	-30	-0.0000038
BATT. ENDPOINT	3.48	+ 20	782,000,632	379	0.0000485

Table 7-31. Frequency Stability Data (Band 13)

Note:

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

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Band 13 Frequency Stability Measurements

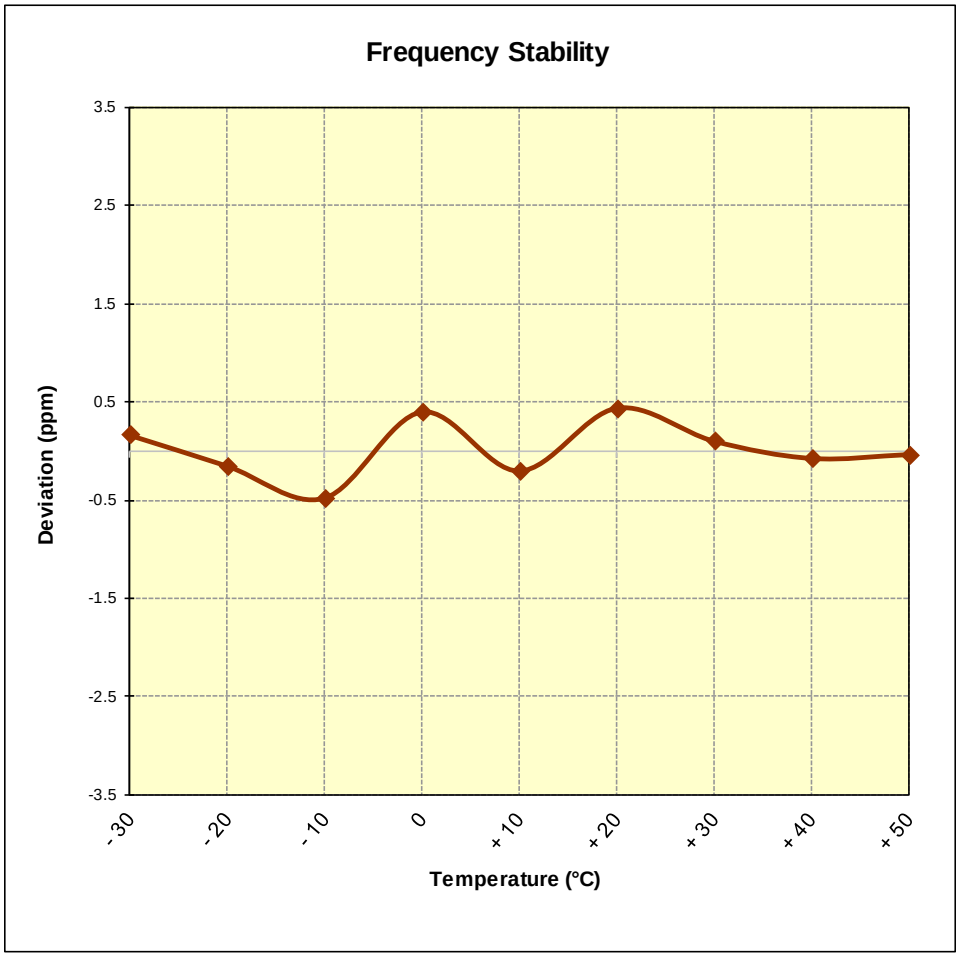

Figure 7-9. Frequency Stability Graph (Band 13)

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Band 5 Frequency Stability Measurements

OPERATING FREQUENCY: 836,500,000 Hz

CHANNEL: 20525

REFERENCE VOLTAGE: 4.31 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	836,499,657	-51	-0.0000061
100 %		- 20	836,500,061	353	0.0000422
100 %		- 10	836,499,352	-356	-0.0000426
100 %		0	836,499,429	-279	-0.0000334
100 %		+ 10	836,499,754	46	0.0000055
100 %		+ 20	836,499,616	-92	-0.0000110
100 %		+ 30	836,499,481	-227	-0.0000271
100 %		+ 40	836,499,909	201	0.0000240
100 %		+ 50	836,499,722	14	0.0000017
BATT. ENDPOINT	3.48	+ 20	836,499,469	-239	-0.0000286

Table 7-32. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

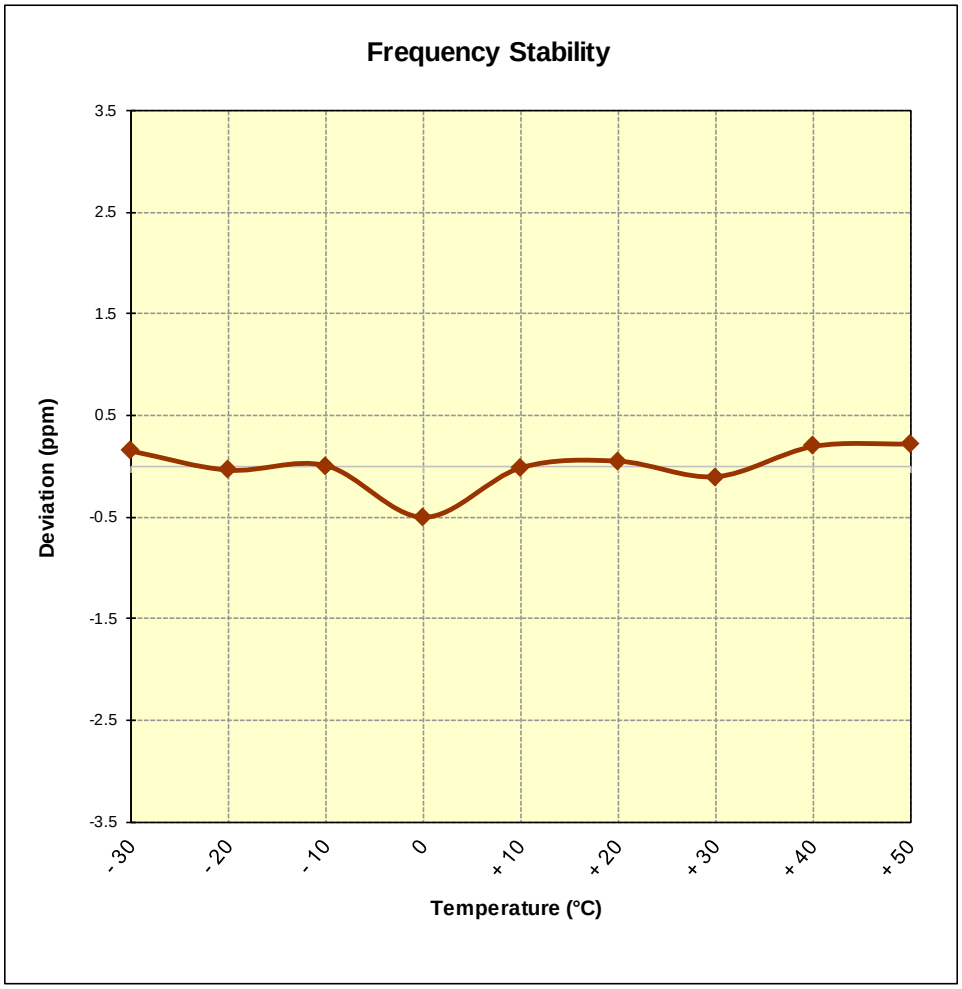

Figure 7-10. Frequency Stability Graph (Band 5)

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Band 4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,732,500,000 Hz

CHANNEL: 20175

REFERENCE VOLTAGE: 4.31 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	1,732,499,715	-15	-0.0000009
100 %		- 20	1,732,499,793	63	0.0000036
100 %		- 10	1,732,499,770	40	0.0000023
100 %		0	1,732,500,096	366	0.0000211
100 %		+ 10	1,732,499,643	-87	-0.0000050
100 %		+ 20	1,732,499,924	194	0.0000112
100 %		+ 30	1,732,499,808	78	0.0000045
100 %		+ 40	1,732,499,694	-36	-0.0000021
100 %		+ 50	1,732,500,042	312	0.0000180
BATT. ENDPOINT	3.48	+ 20	1,732,499,801	71	0.0000041

Table 7-33. 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

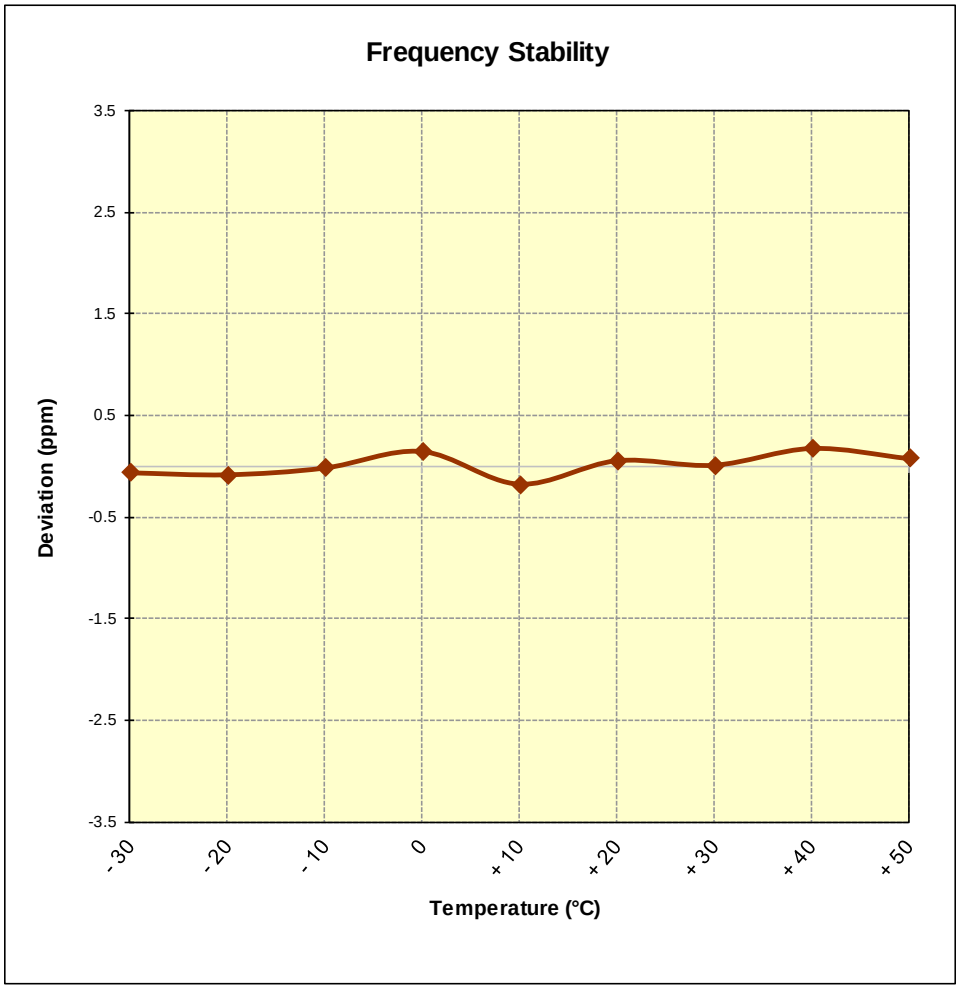

Figure 7-11. Frequency Stability Graph (Band 4)

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Band 41 Frequency Stability Measurements

OPERATING FREQUENCY: 2,593,000,000 Hz

CHANNEL: 40620

REFERENCE VOLTAGE: 4.31 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	2,592,999,830	-433	-0.0000167
100 %		- 20	2,593,000,096	-167	-0.0000064
100 %		- 10	2,593,000,226	-37	-0.0000014
100 %		0	2,593,000,198	-65	-0.0000025
100 %		+ 10	2,593,000,158	-105	-0.0000040
100 %		+ 20	2,593,000,337	74	0.0000029
100 %		+ 30	2,593,000,220	-43	-0.0000017
100 %		+ 40	2,593,000,189	-74	-0.0000029
100 %		+ 50	2,593,000,672	409	0.0000158
BATT. ENDPOINT	3.48	+ 20	2,592,999,923	-340	-0.0000131

Table 7-34. Frequency Stability Data (Band 41)

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 41 Frequency Stability Measurements

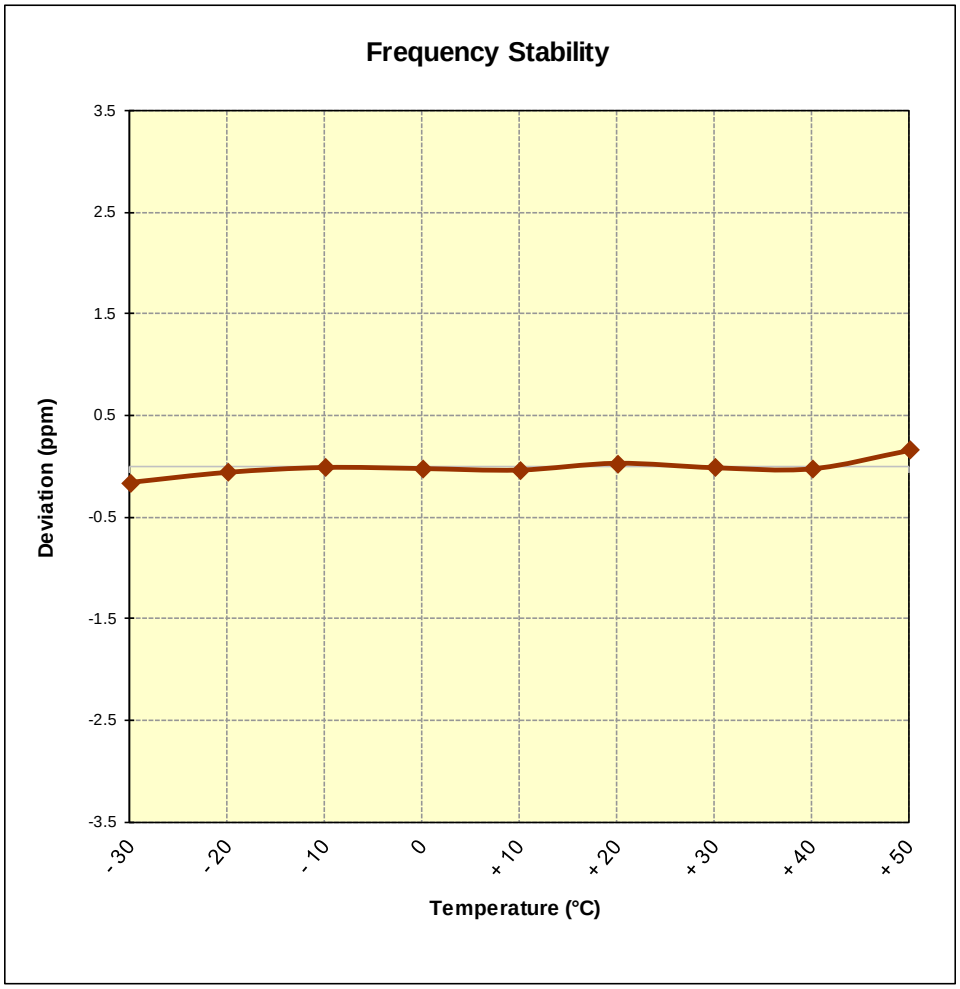

Figure 7-12. Frequency Stability Graph (Band 41)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSC03L** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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