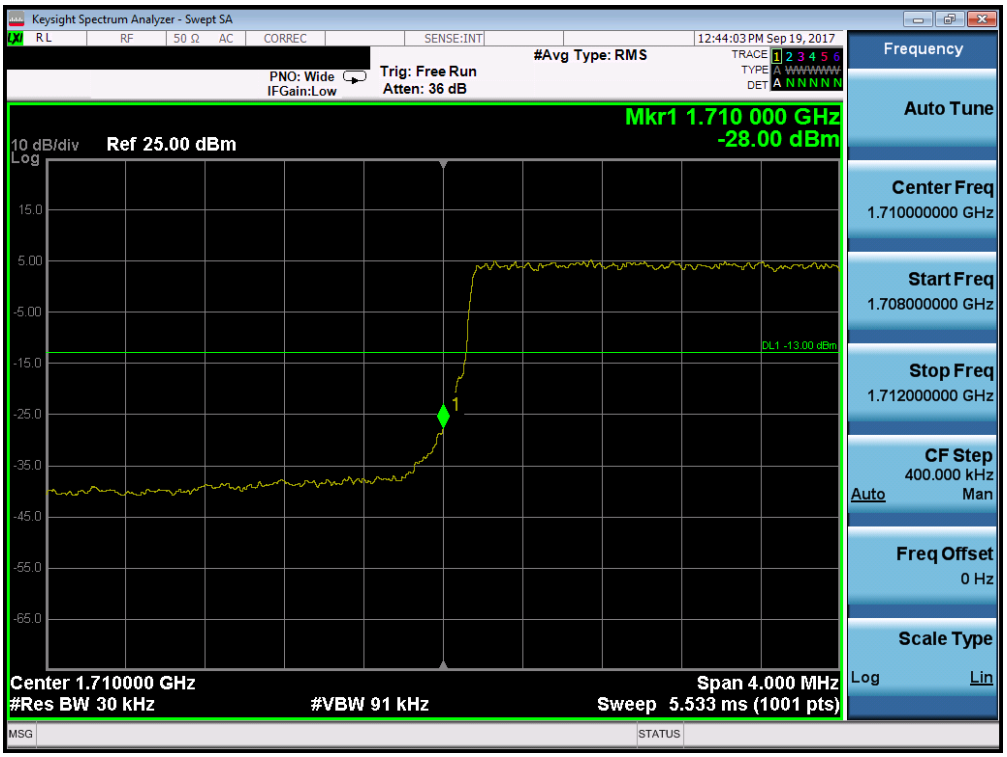
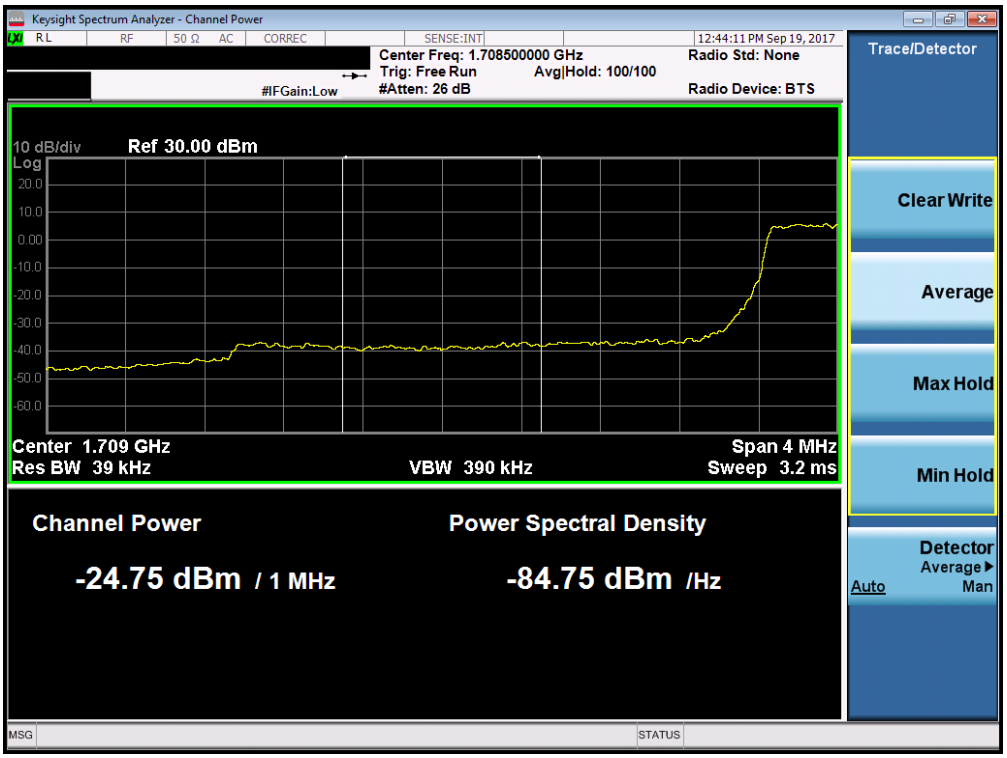


Plot 7-110. Lower Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-111. . Lower Extended Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)

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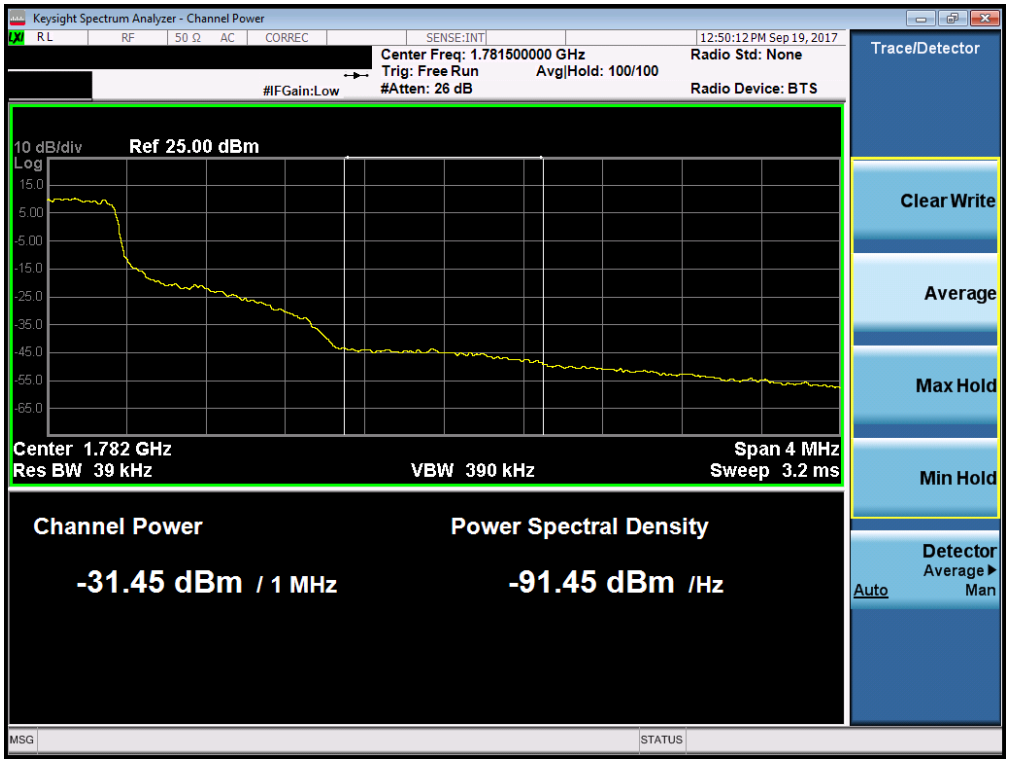
Plot 7-112. Upper Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-113. . Upper Extended Band Edge Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)

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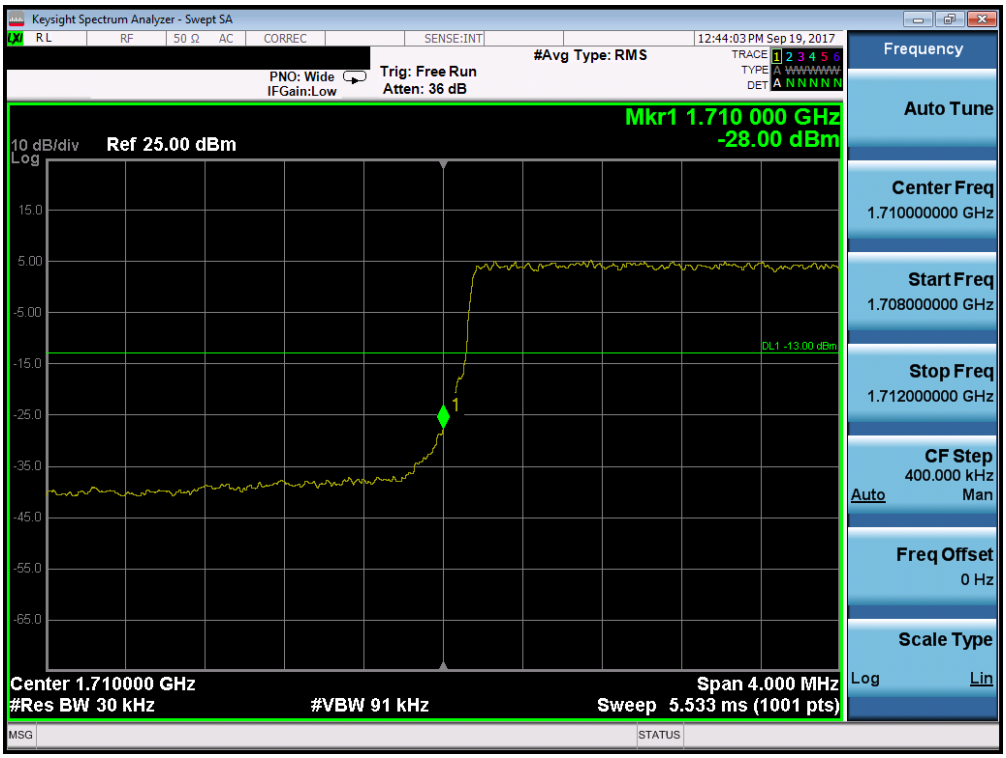
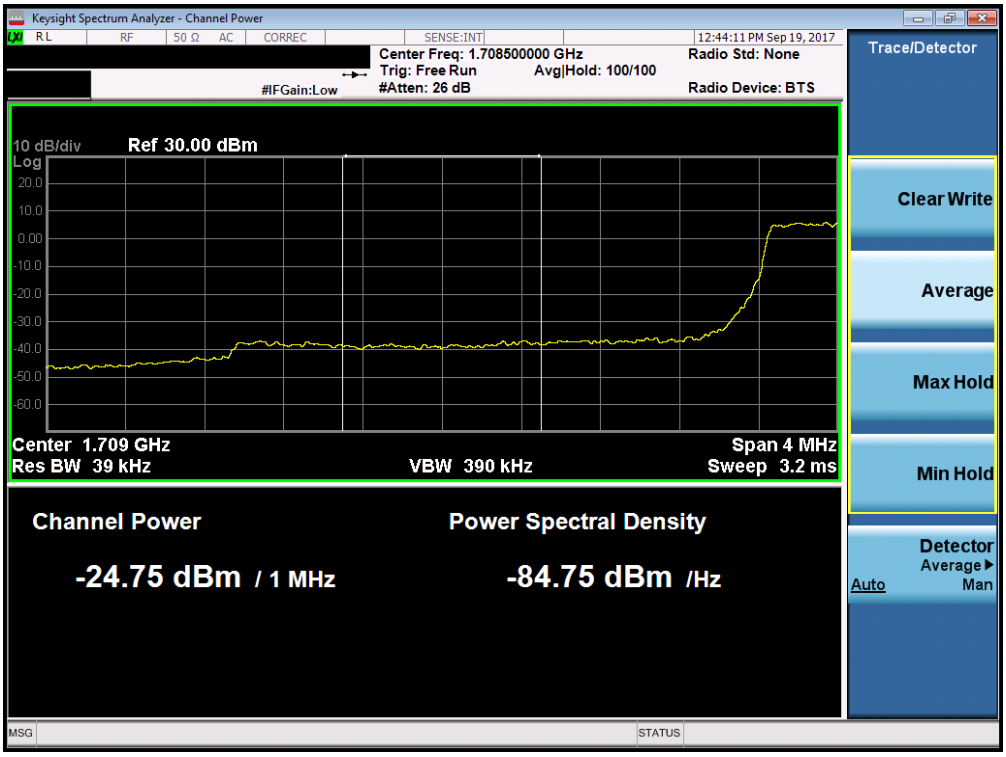


Plot 7-114. Lower Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-115. . Lower Extended Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)

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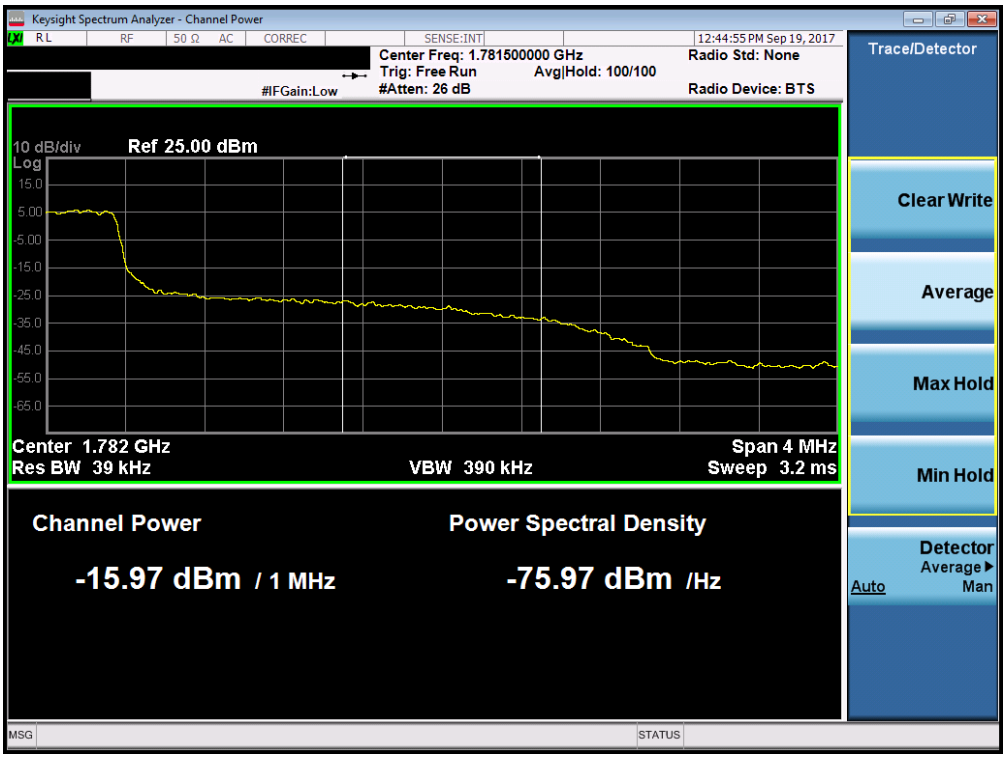
Plot 7-116. Upper Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-117. . Upper Extended Band Edge Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)

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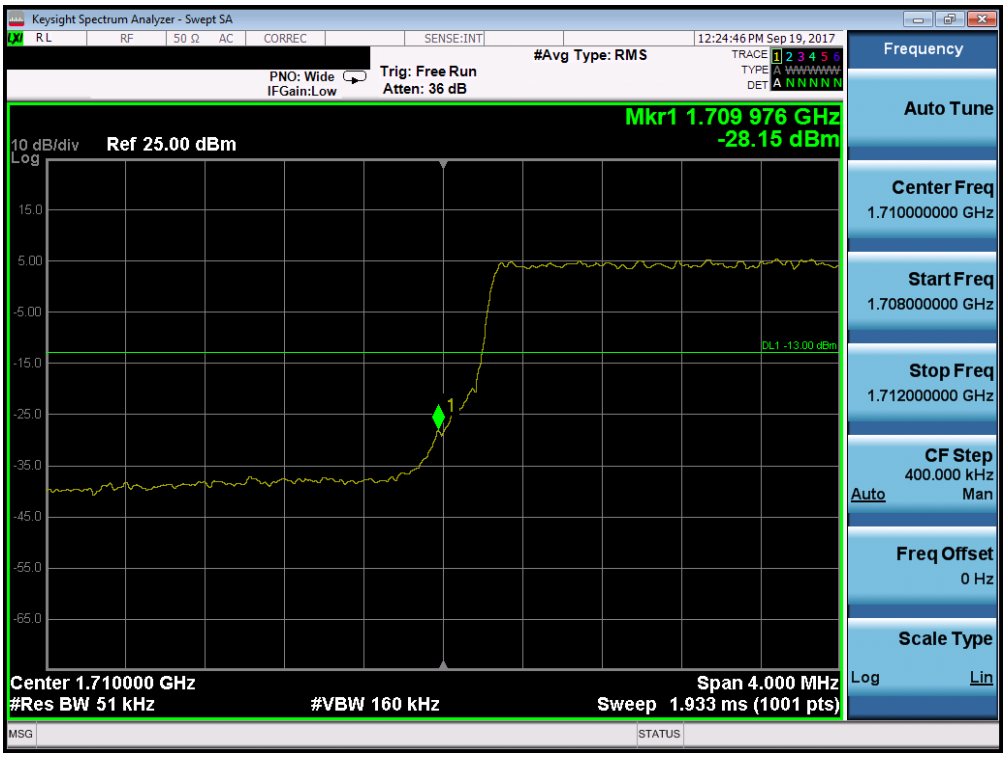
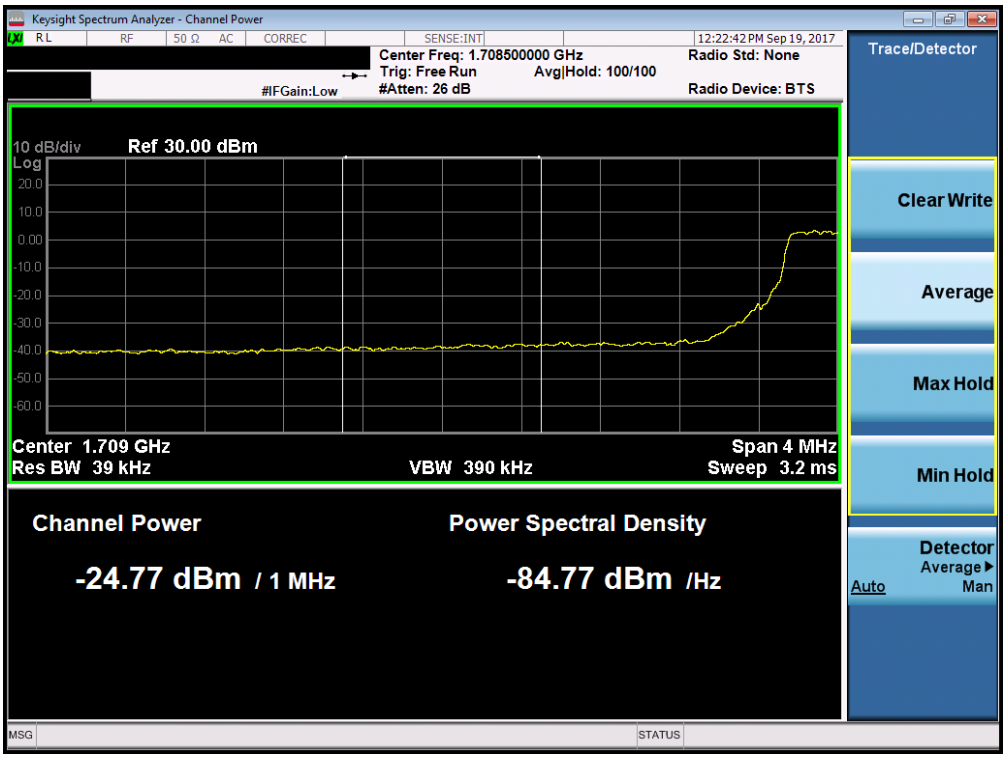


Plot 7-118. Lower Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-119. . Lower Extended Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)

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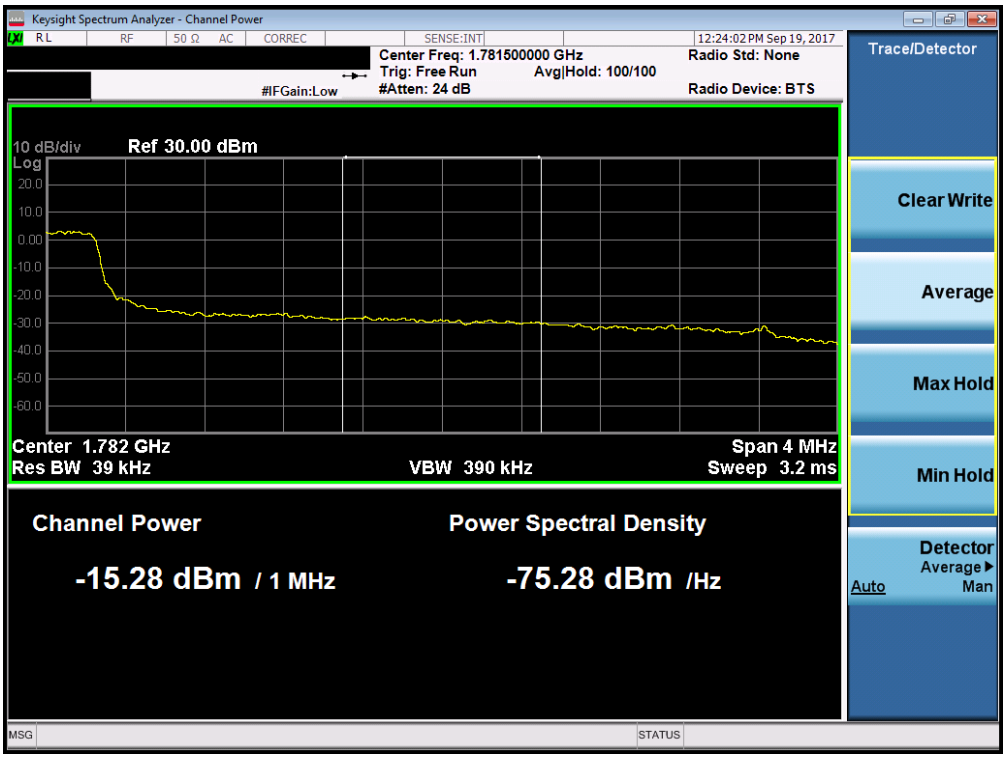
Plot 7-120. Upper Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-121. . Upper Extended Band Edge Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)

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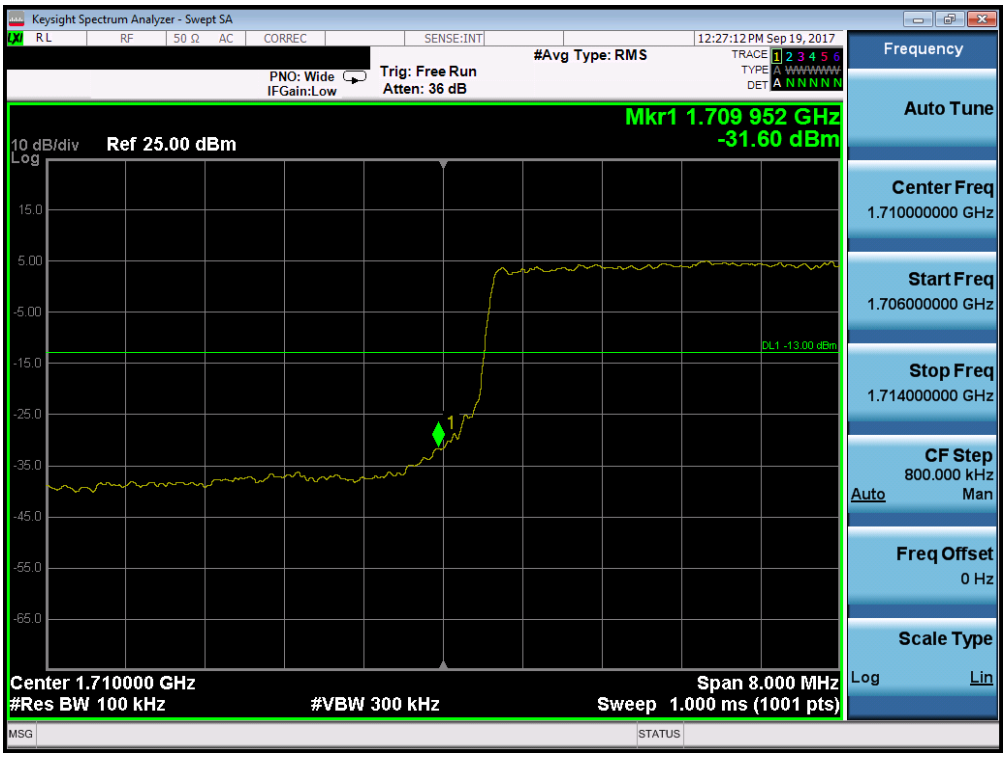

Plot 7-122. Lower Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-123. . Lower Extended Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

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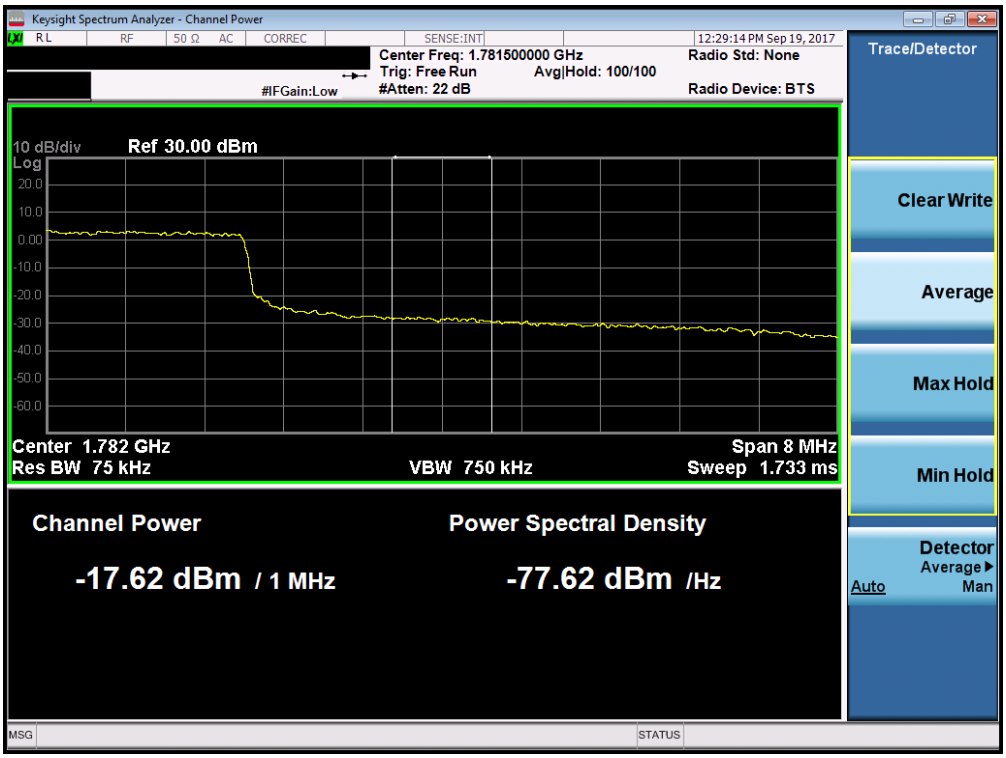
Plot 7-124. Upper Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-125. . Upper Extended Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

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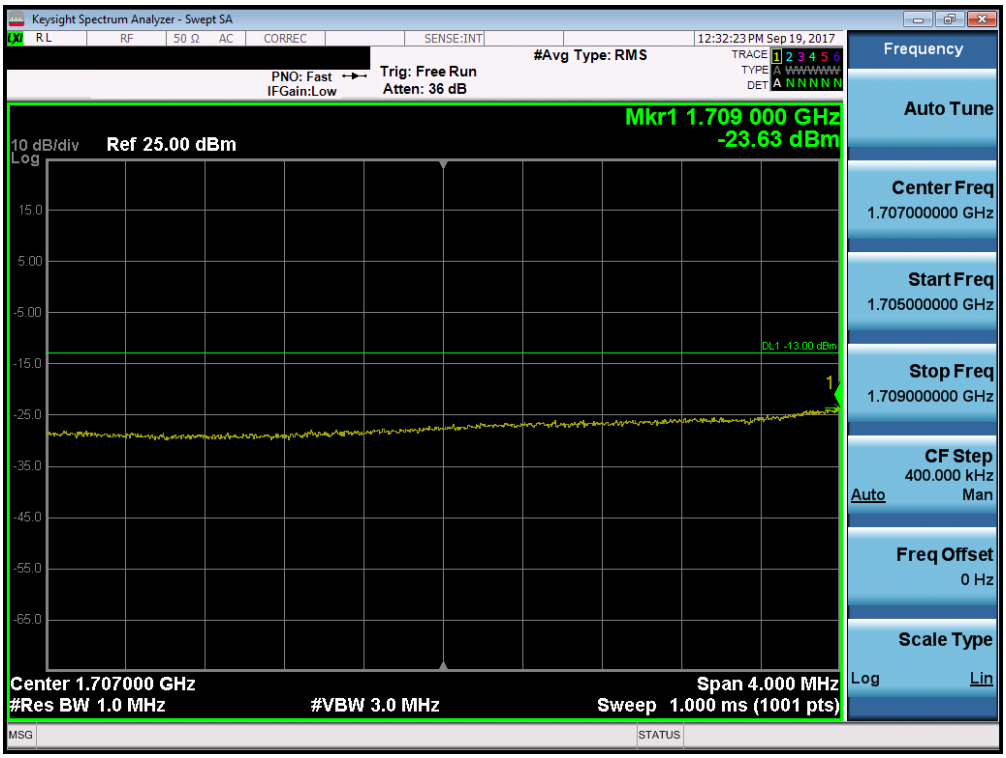
Plot 7-126. Lower Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-127. . Lower Extended Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)

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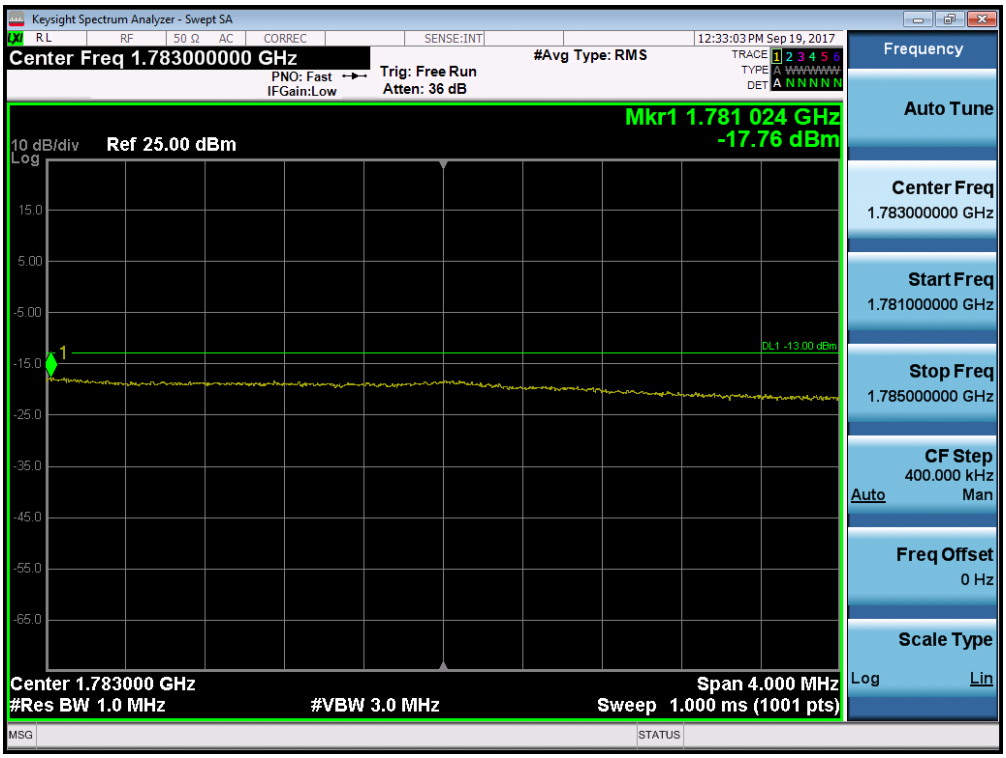
Plot 7-128. Upper Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-129. . Upper Extended Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)

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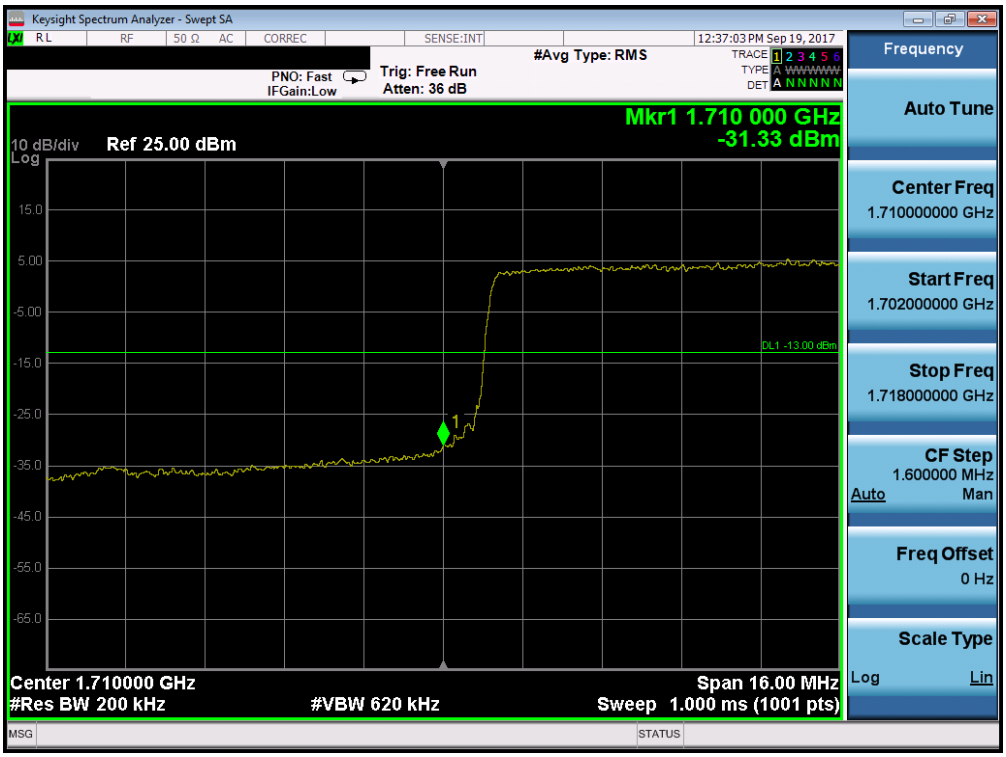

Plot 7-130. Lower Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

Plot 7-131. . Lower Extended Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

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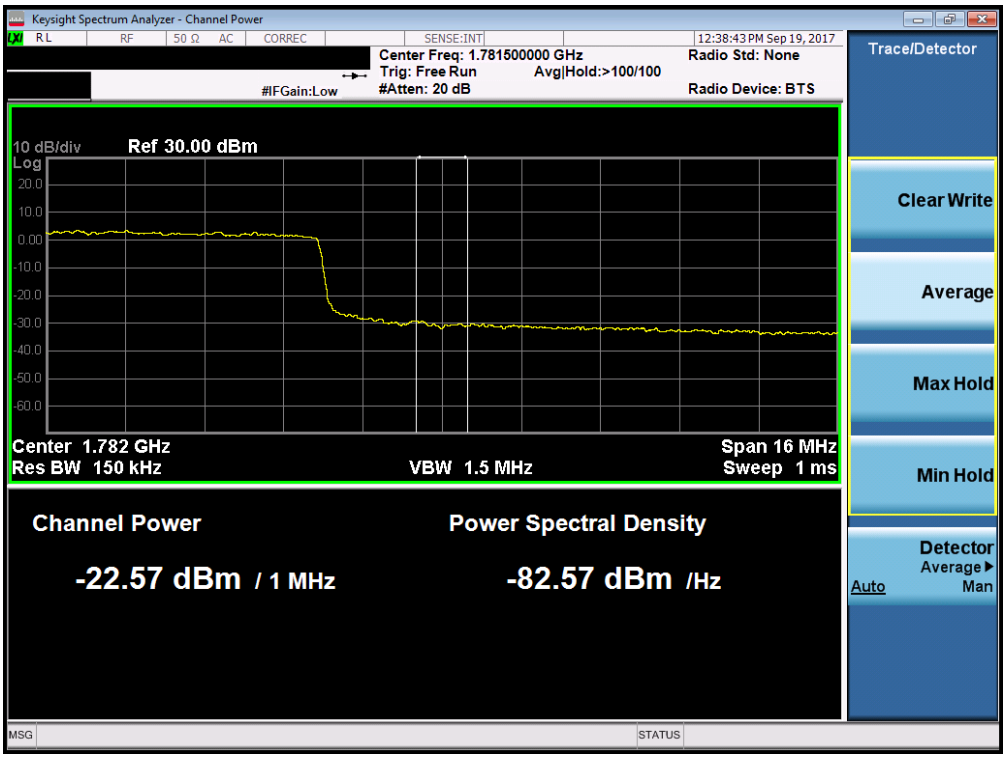
Plot 7-132. Upper Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-133. . Upper Extended Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

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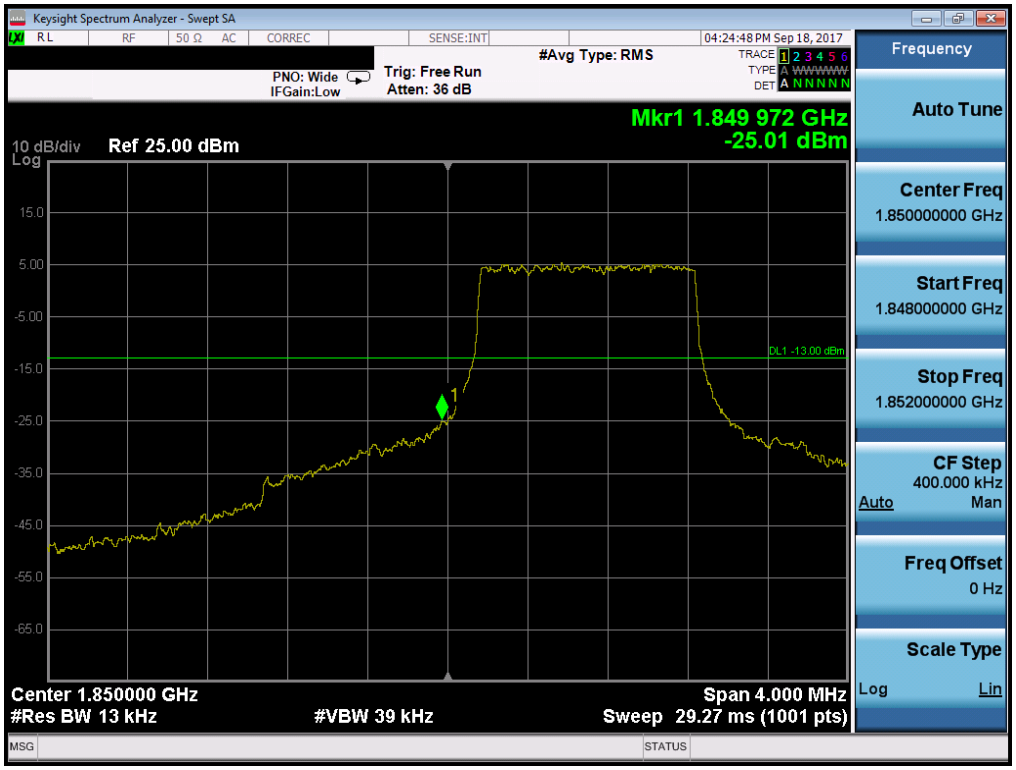
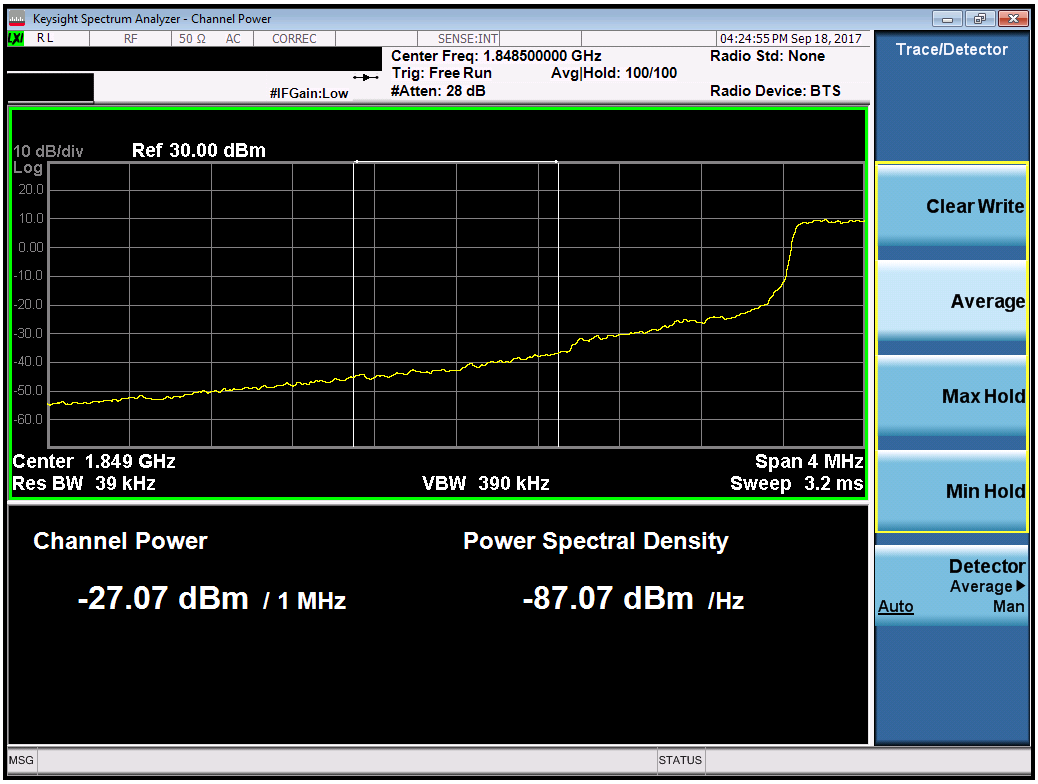


Plot 7-134. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK - Full RB Configuration)



Plot 7-135. . Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

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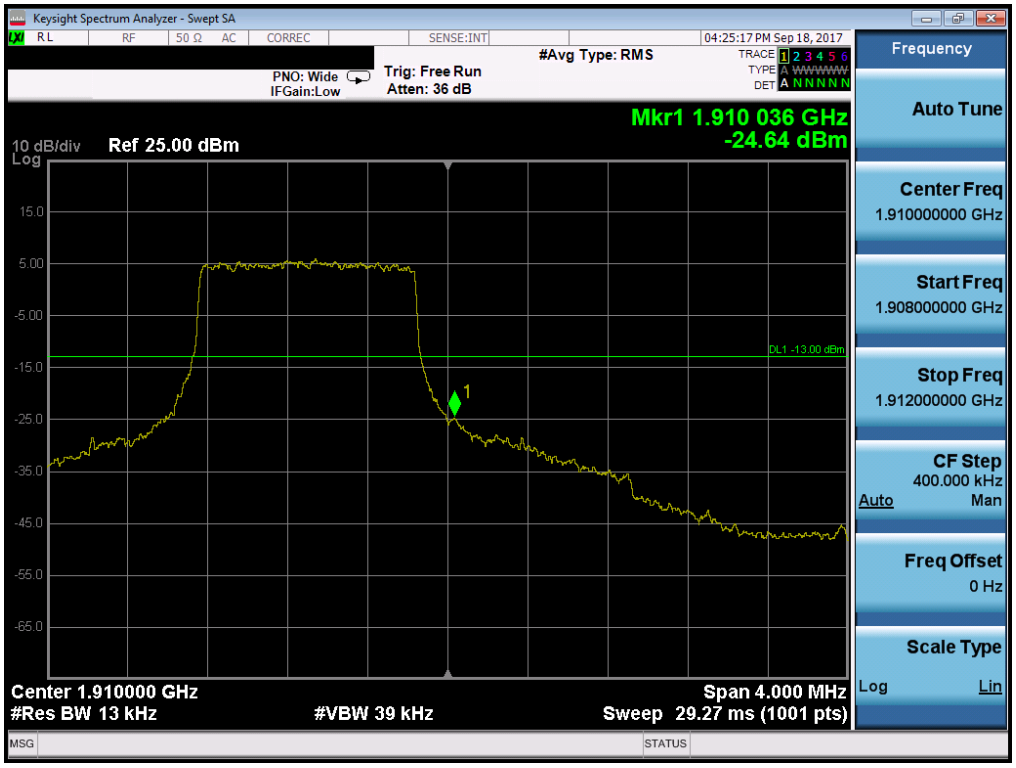
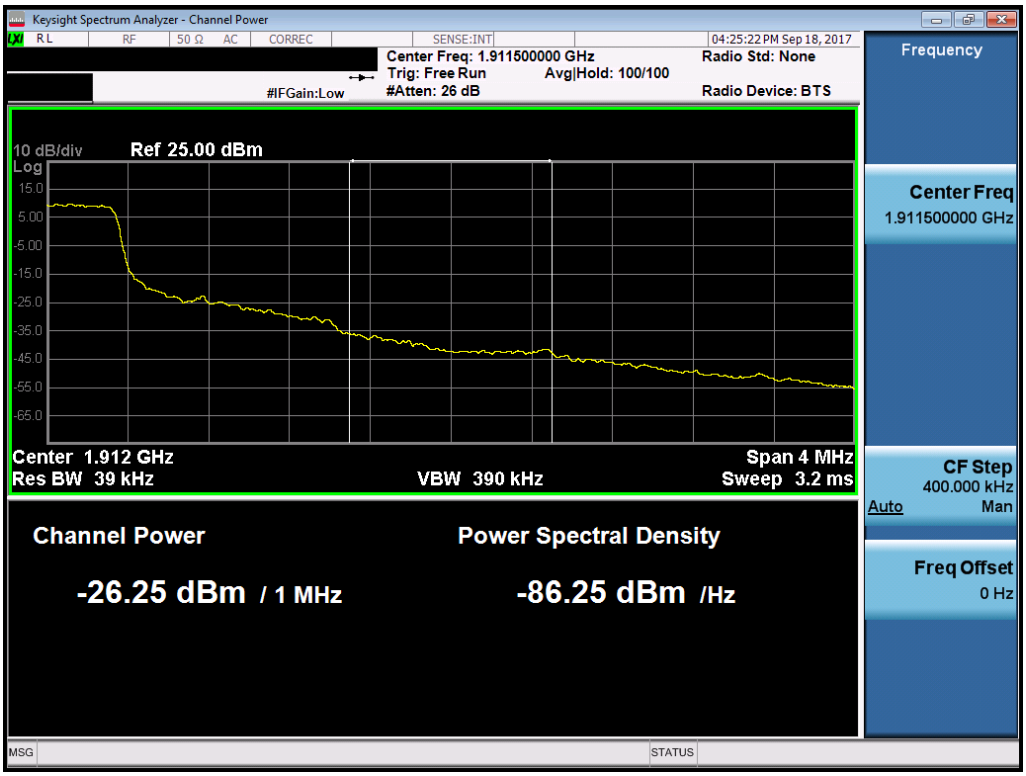


Plot 7-136. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-137. . Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

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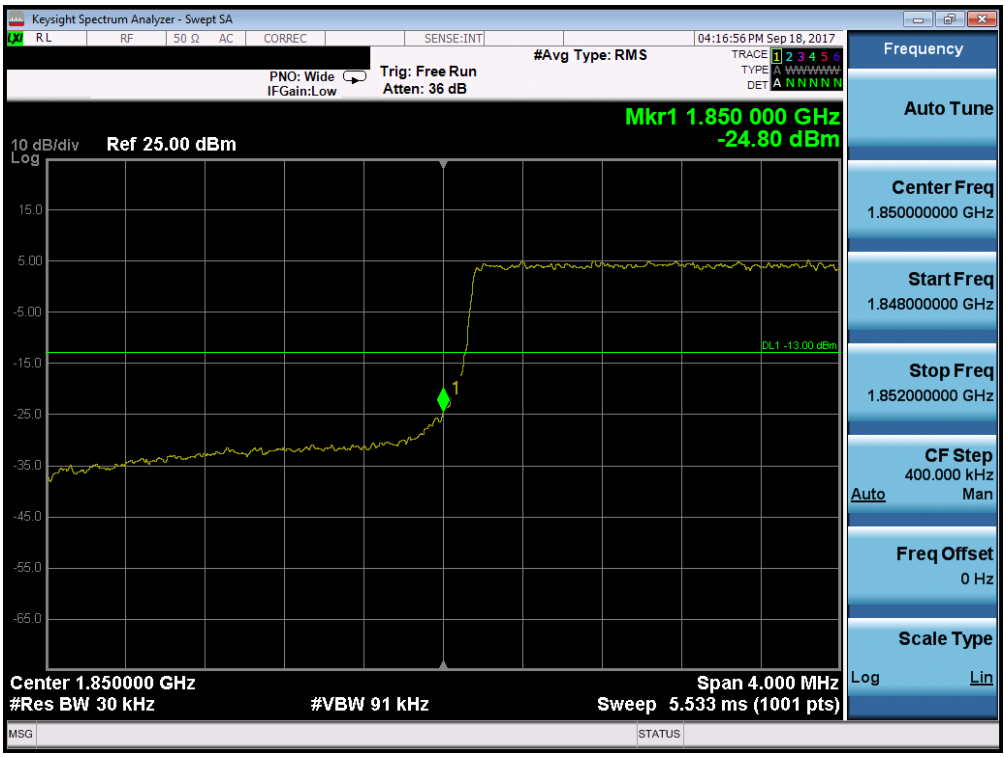
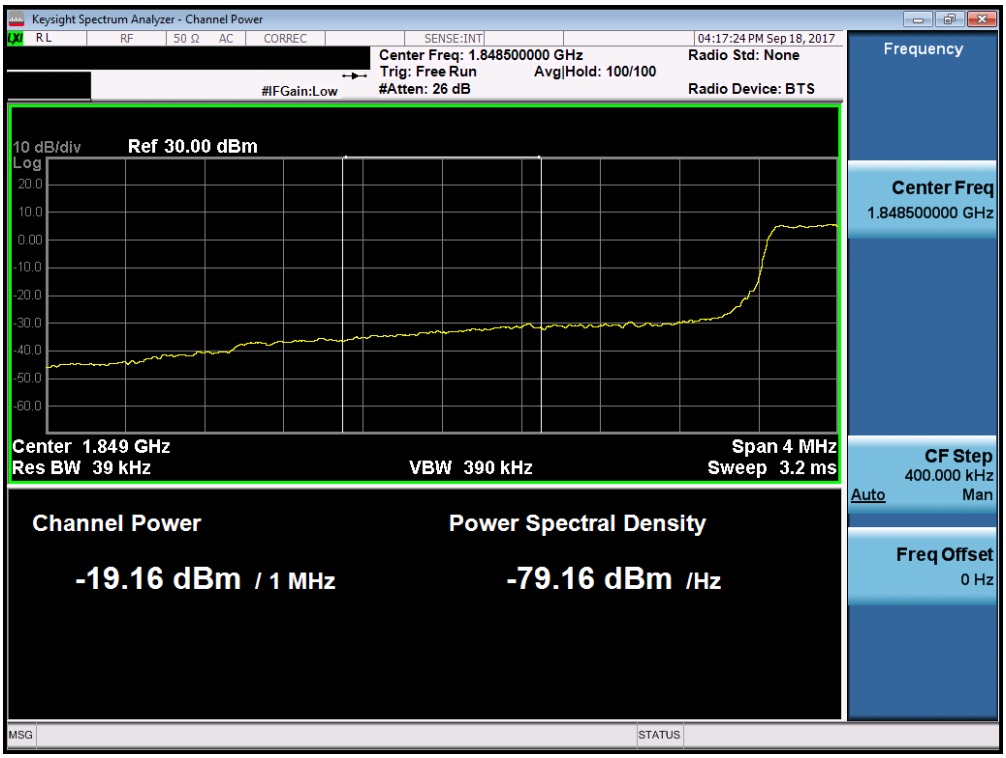


Plot 7-138. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-139. . Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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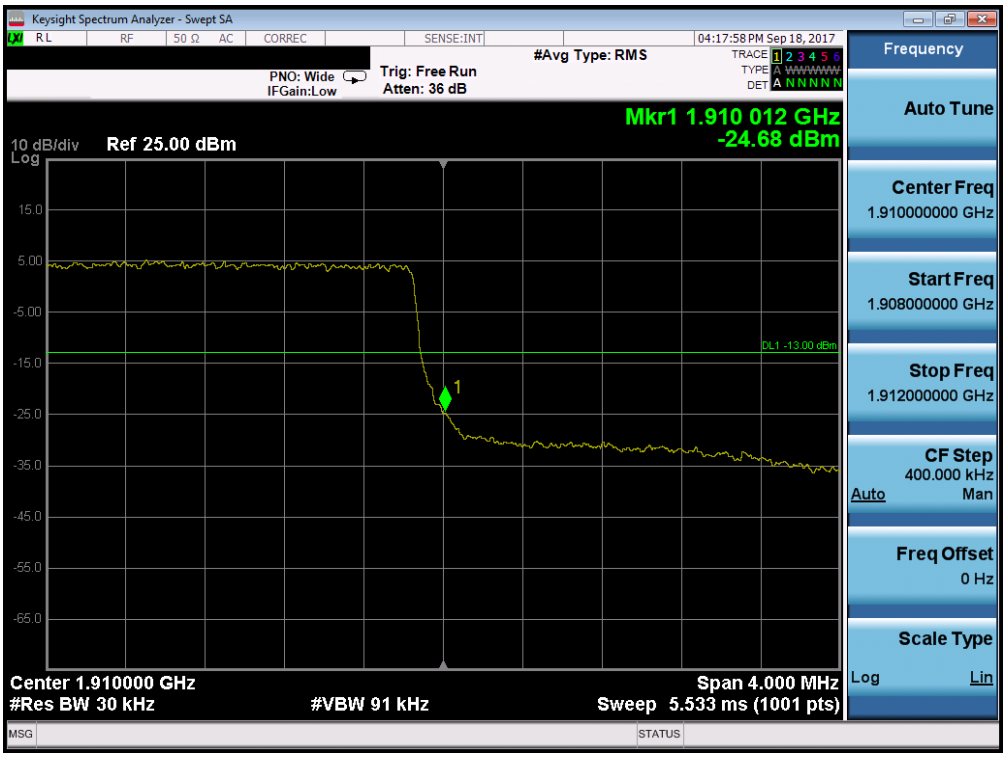
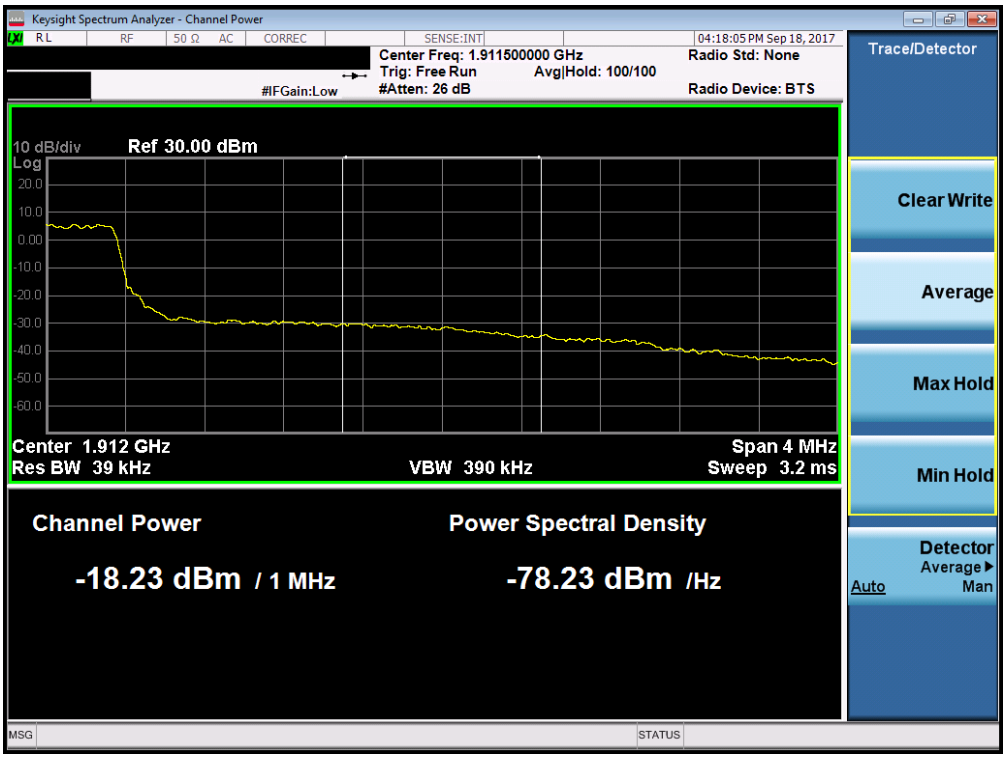


Plot 7-140. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-141. . Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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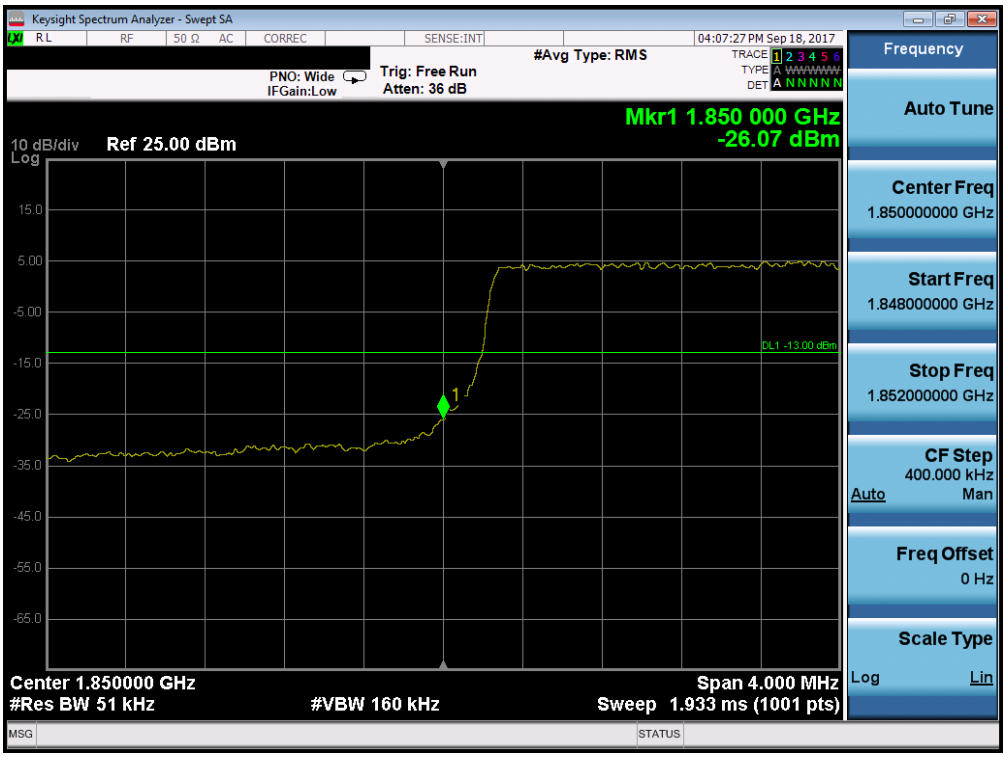
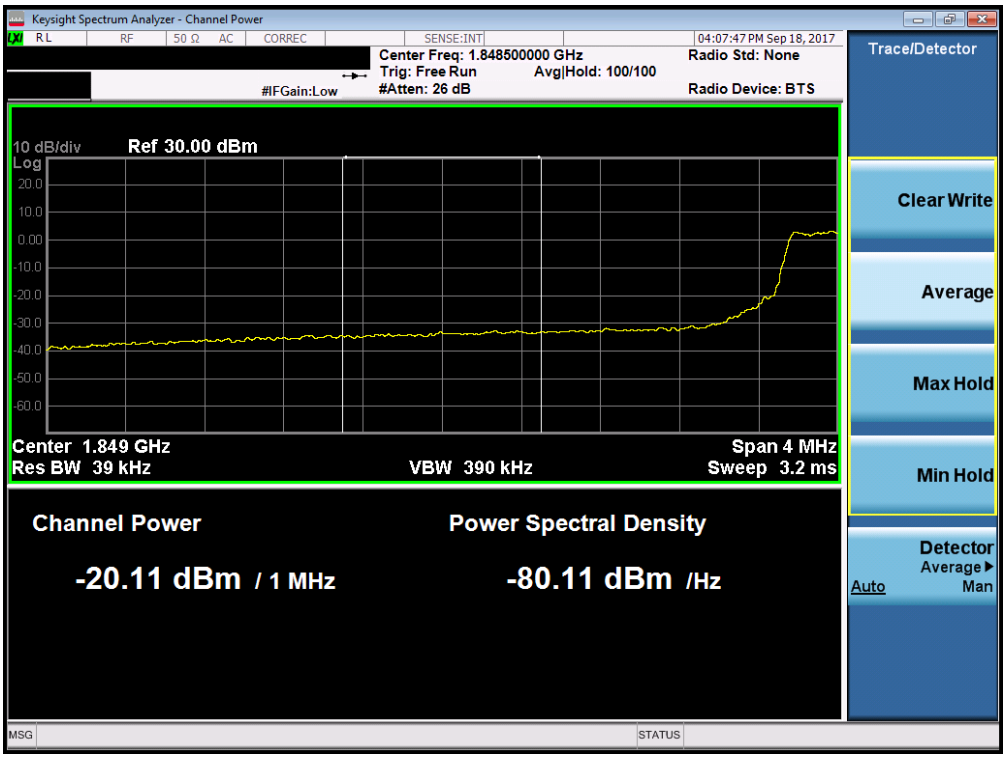


Plot 7-142. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-143. . Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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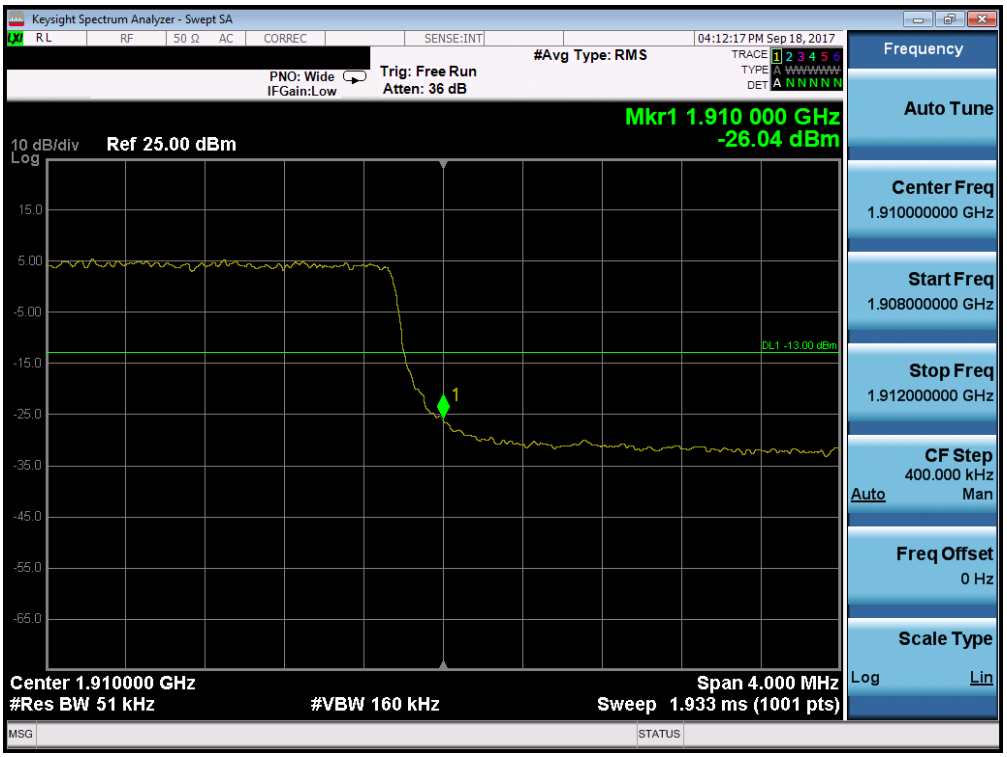
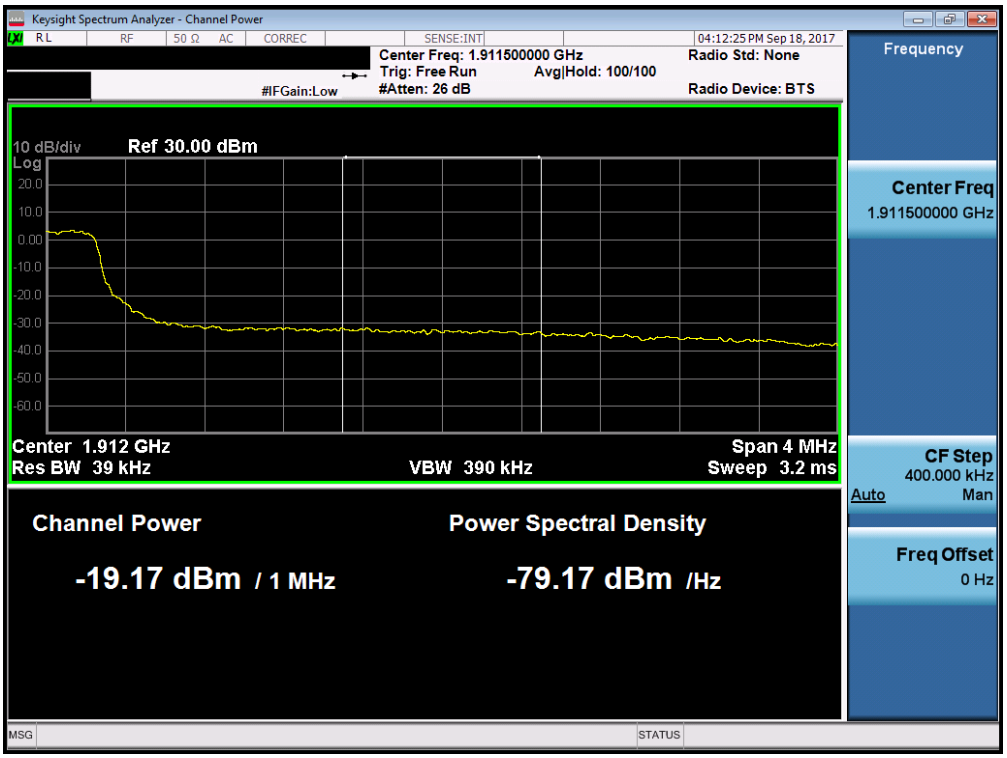


Plot 7-144. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-145. . Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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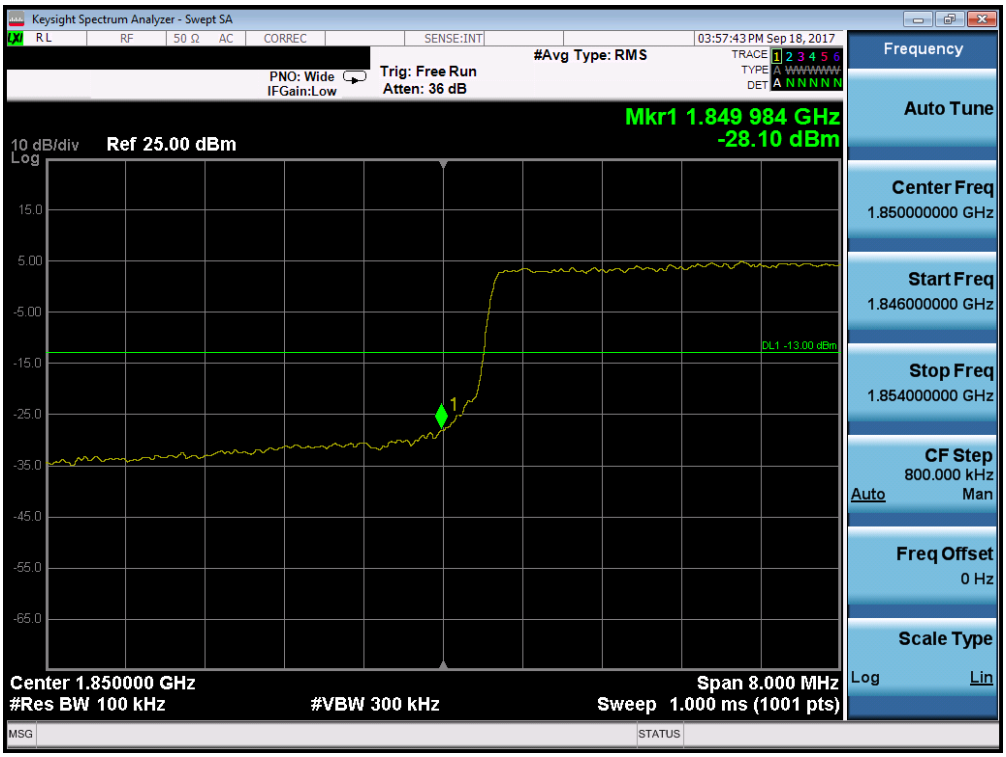
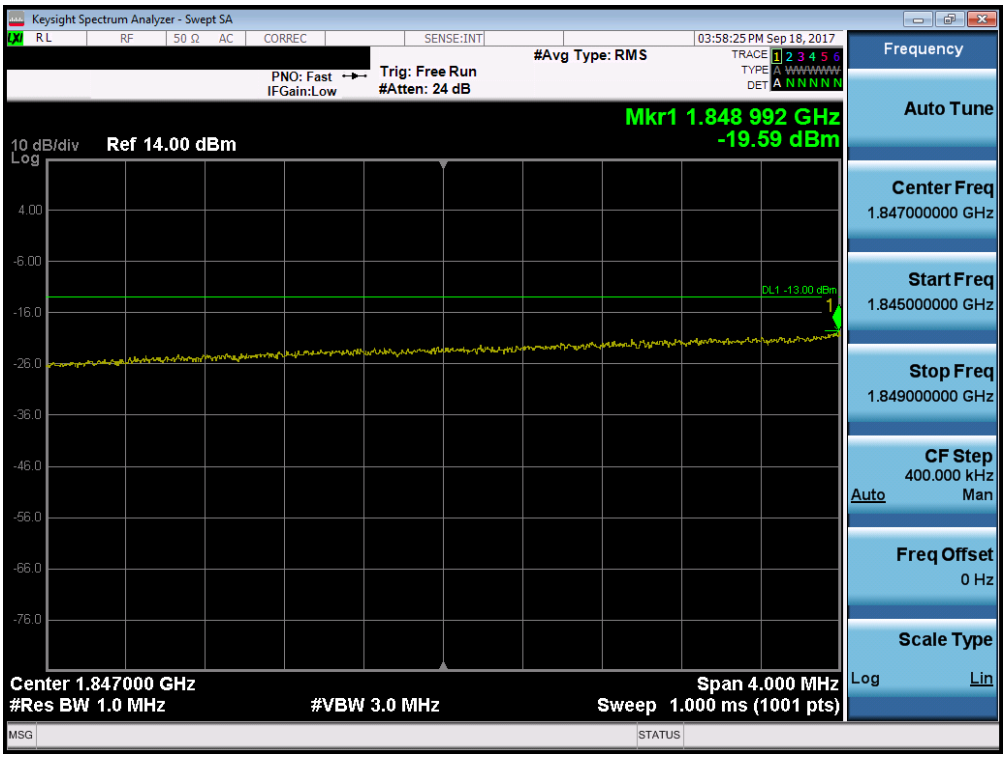


Plot 7-146. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-147. . Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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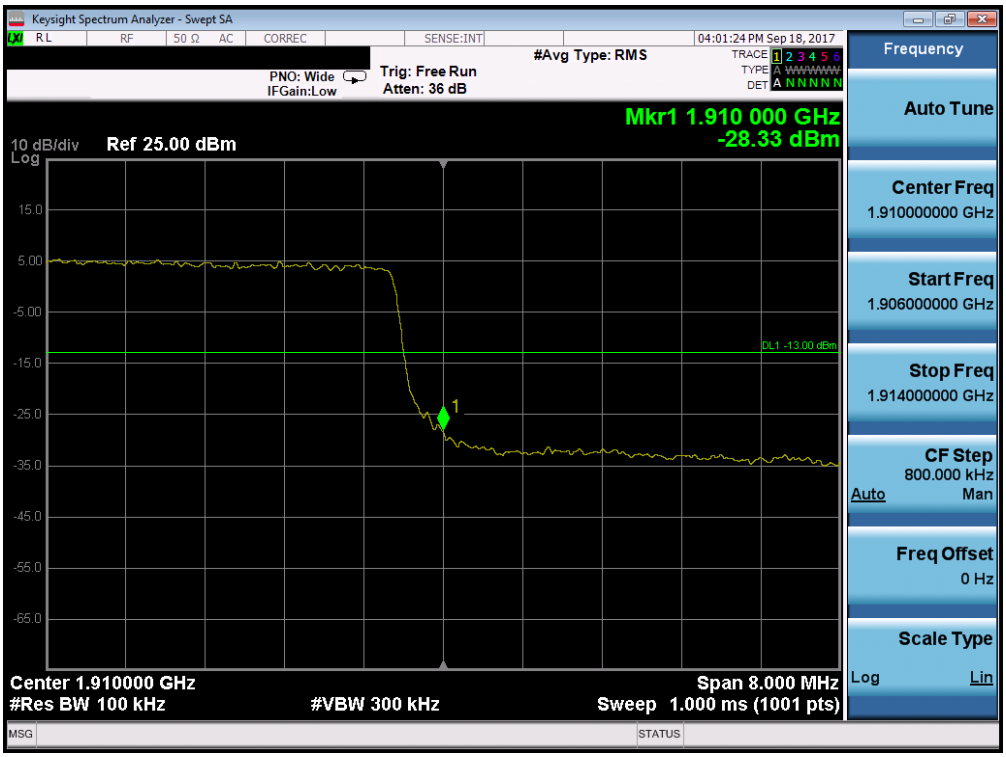
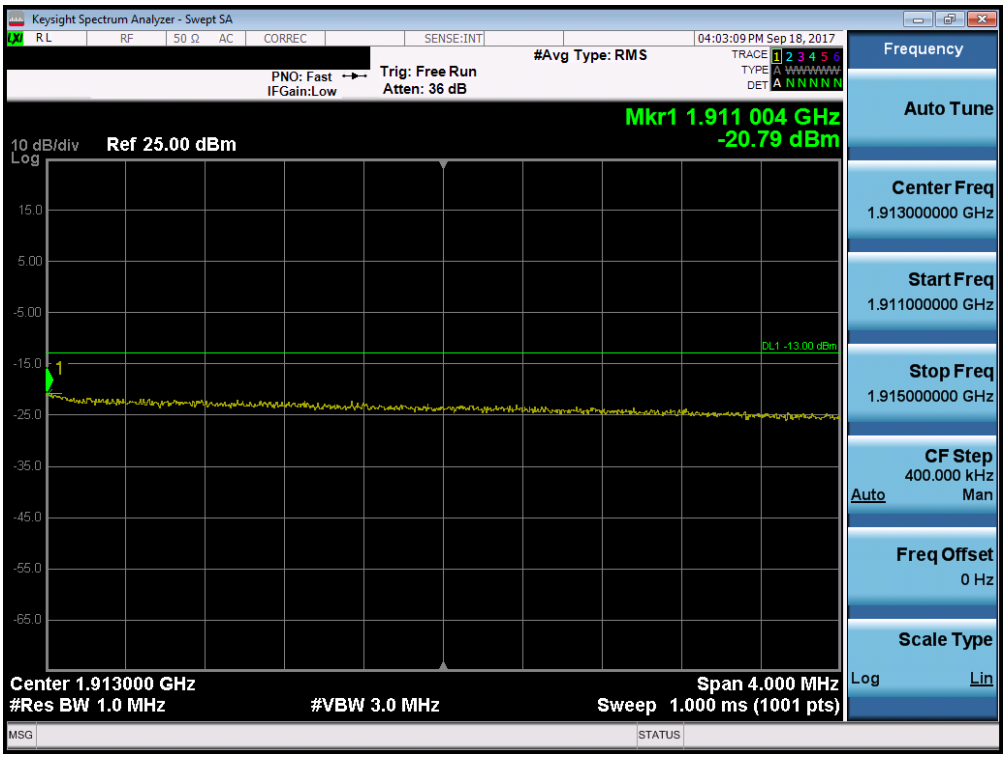


Plot 7-148. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-149. . Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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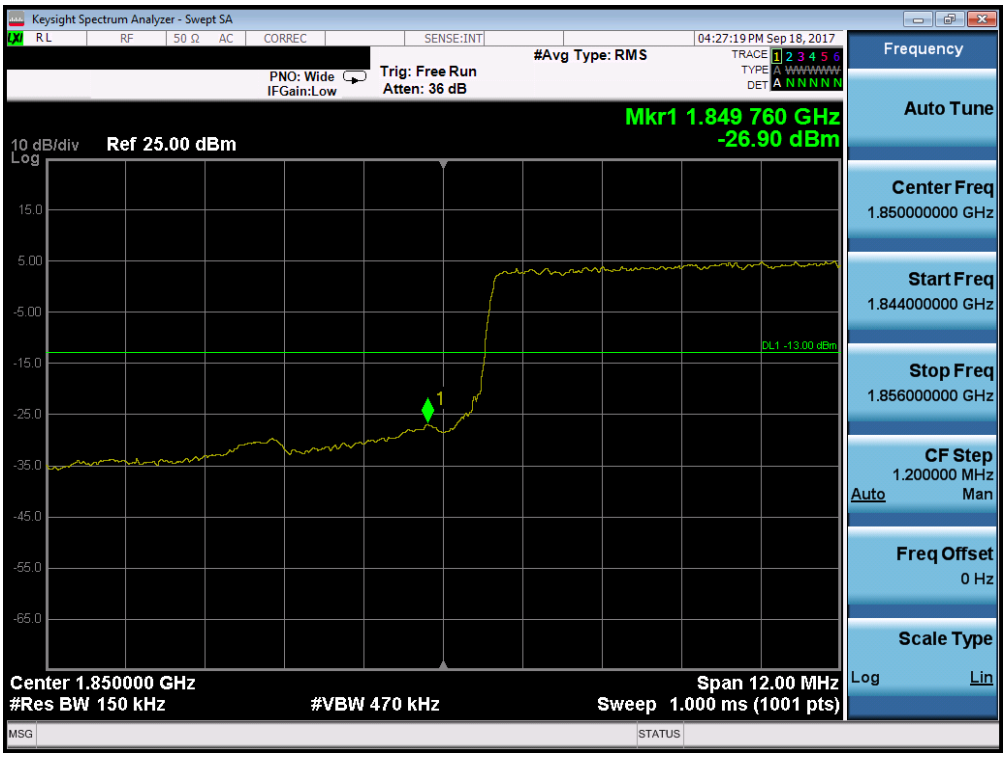
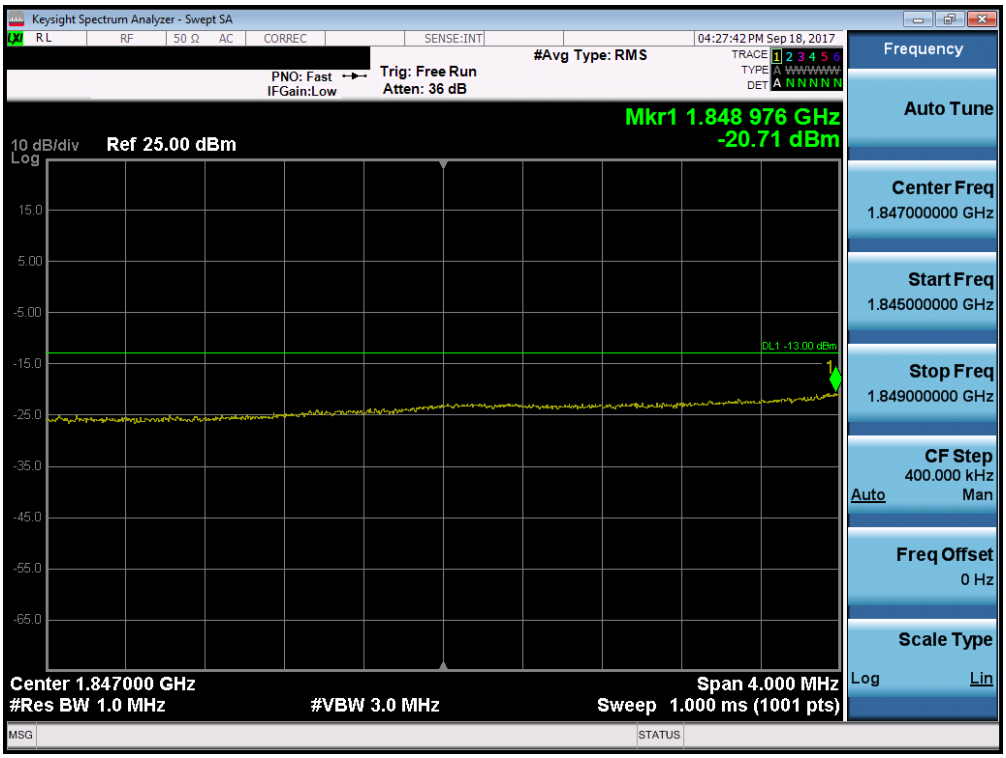


Plot 7-150. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-151. . Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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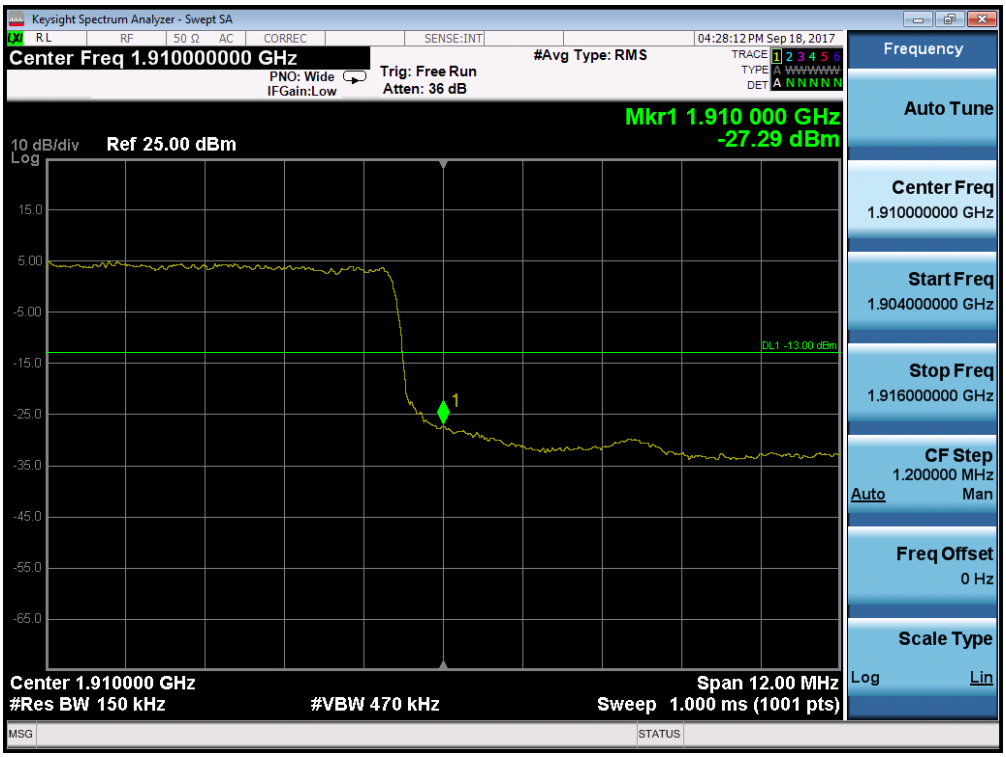
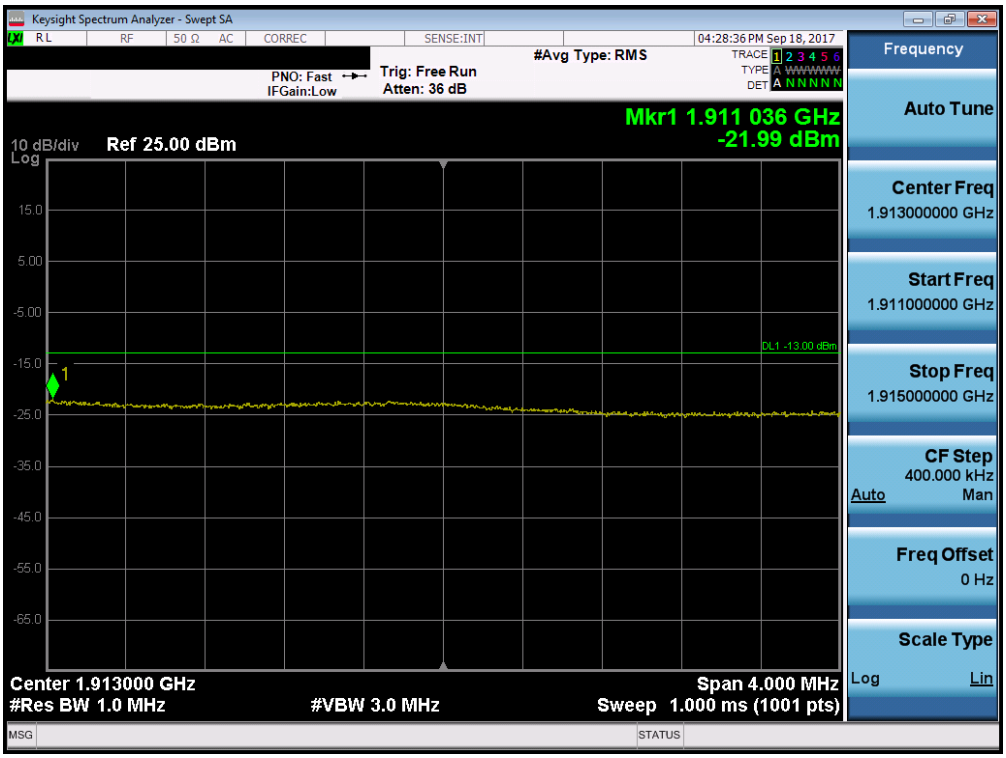


Plot 7-152. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-153. . Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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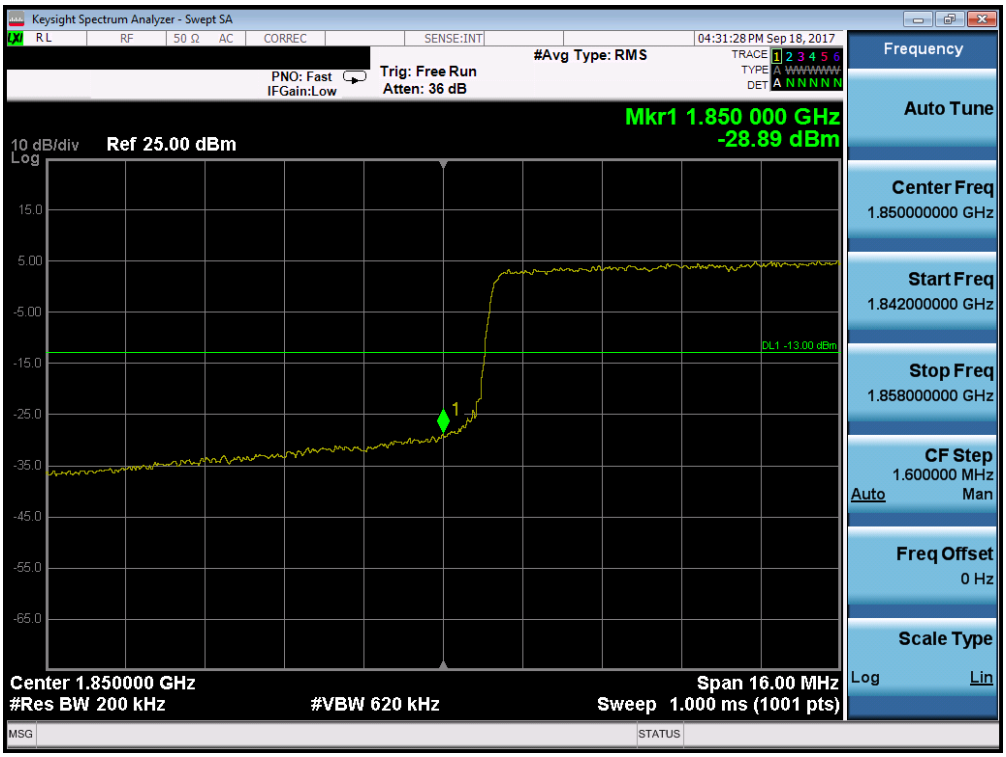
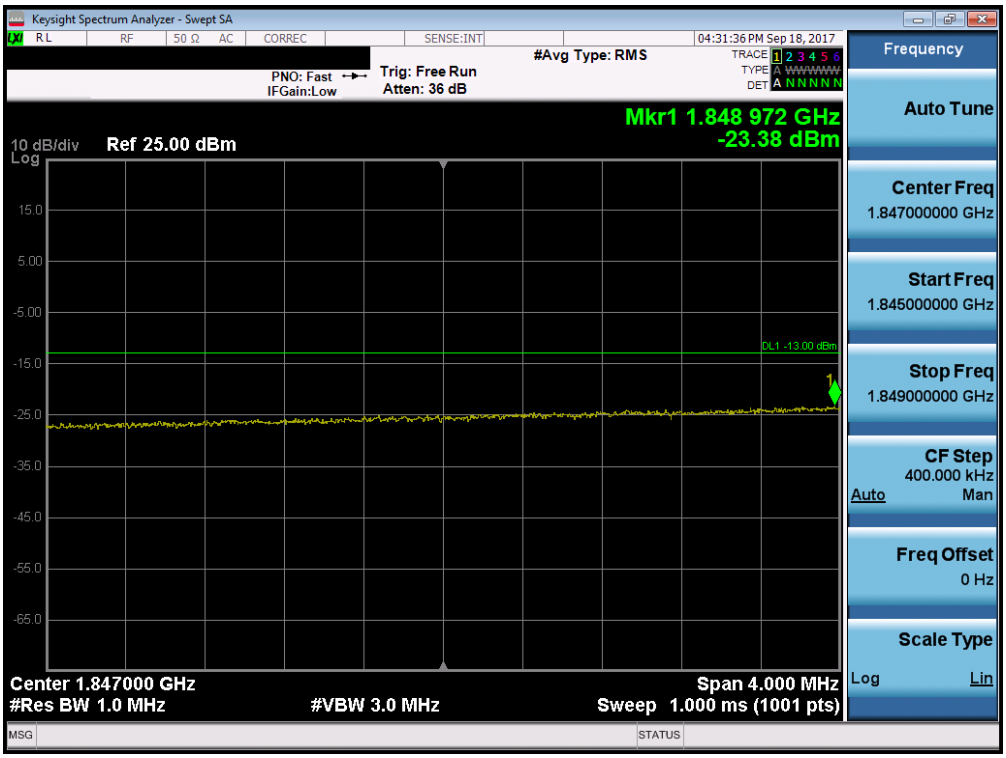


Plot 7-154. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-155. . Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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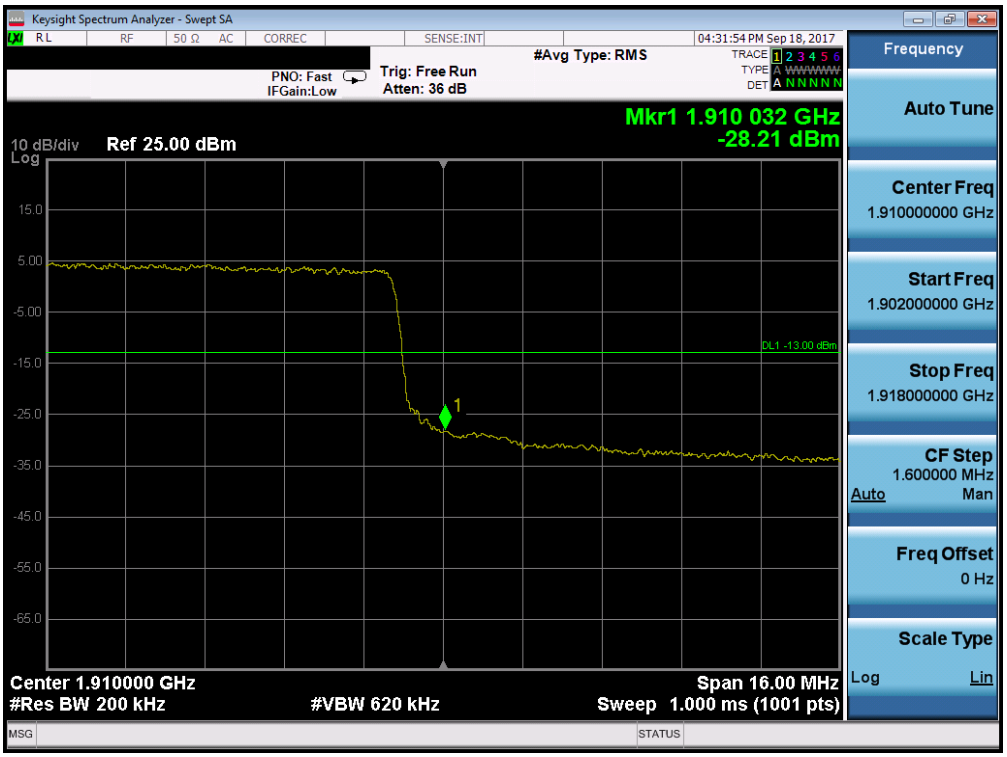
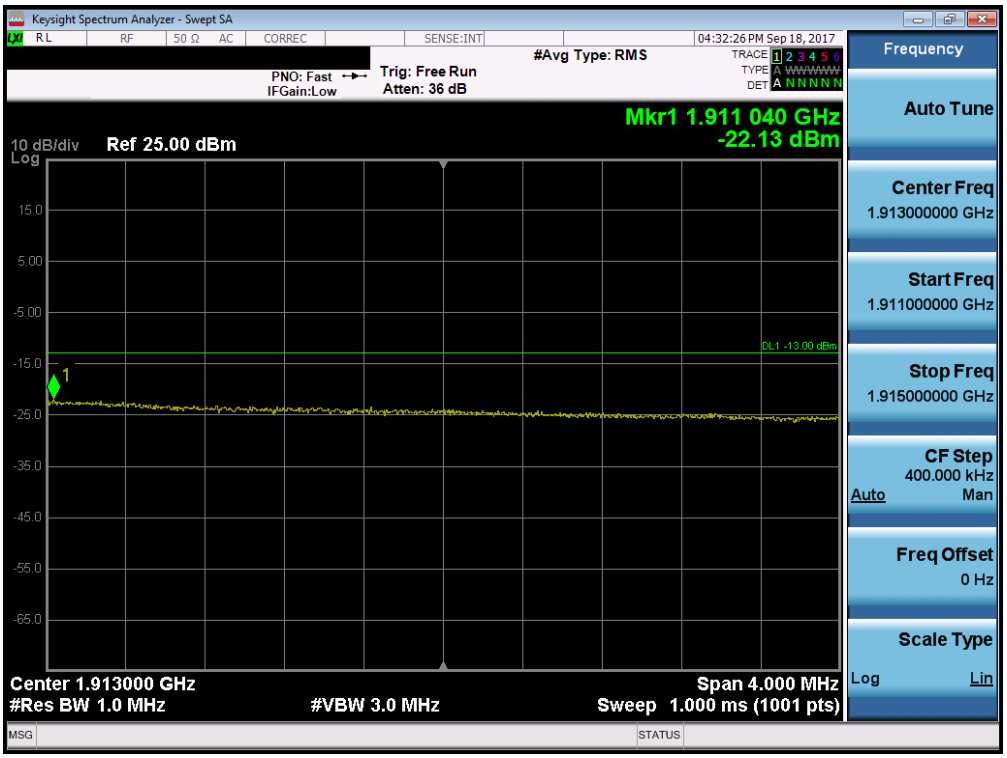


Plot 7-156. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-157. . Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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7.5 Peak-Average Ratio

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

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v02r02 – 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.

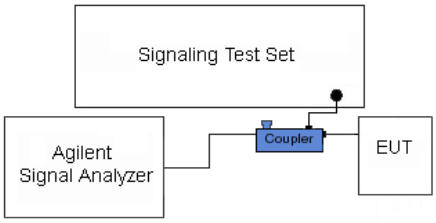

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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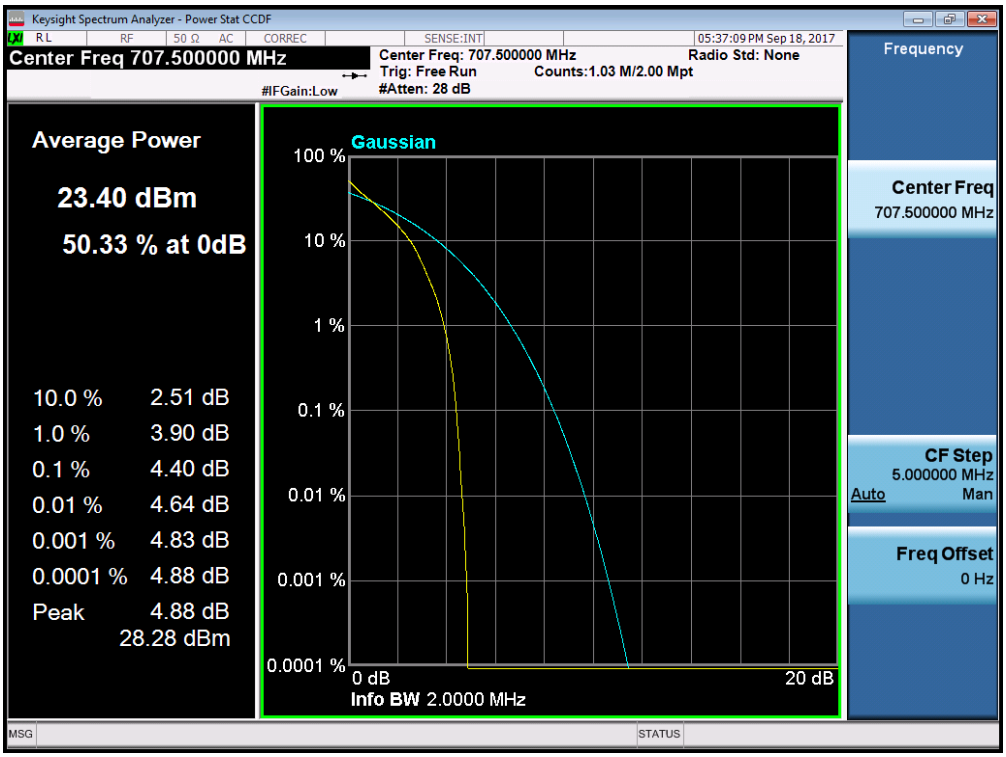
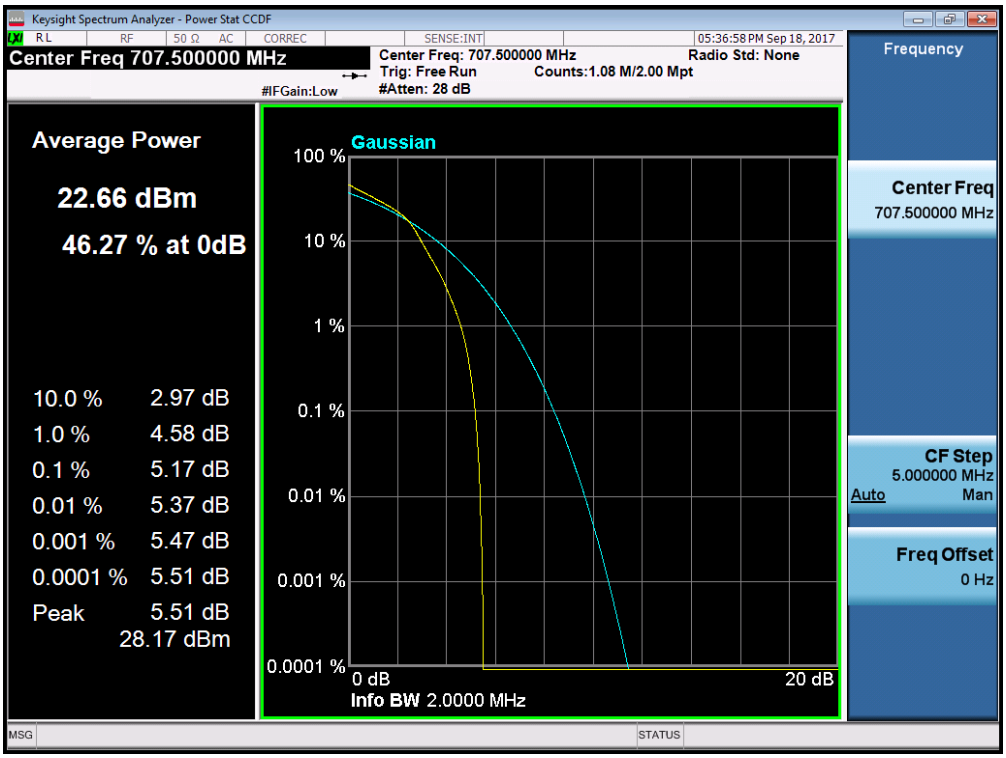


Plot 7-158. PAR Plot (Band 12 - 1.4.0MHz QPSK - Full RB Configuration)



Plot 7-159. PAR Plot (Band 12 - 1.4.0MHz 16-QAM - Full RB Configuration)

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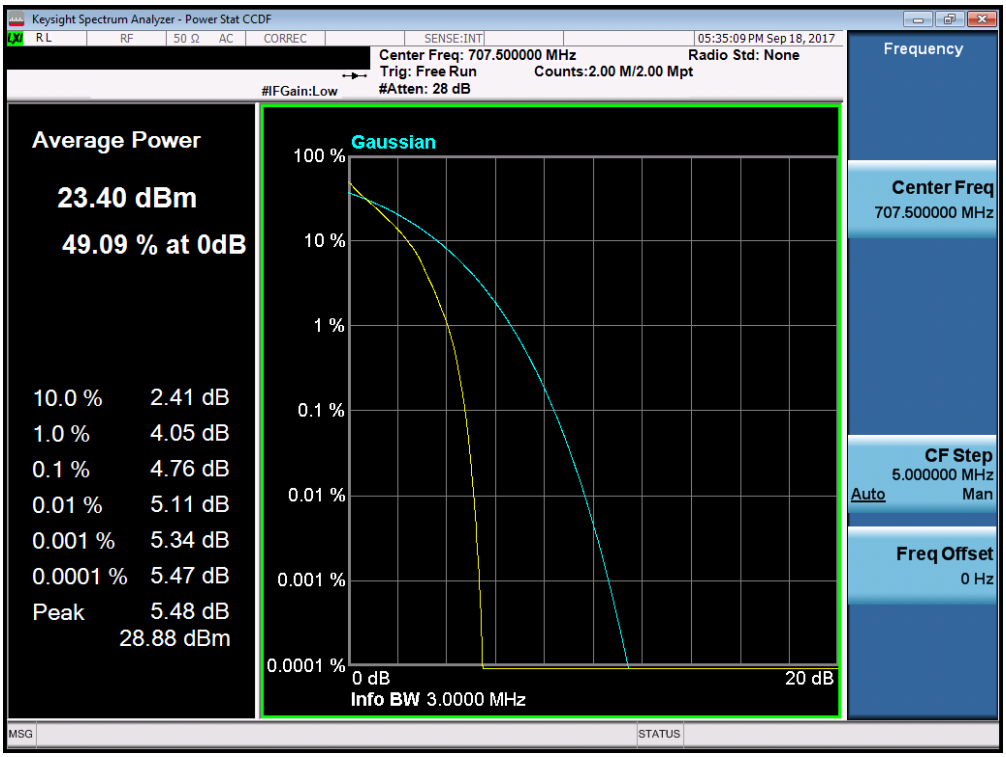
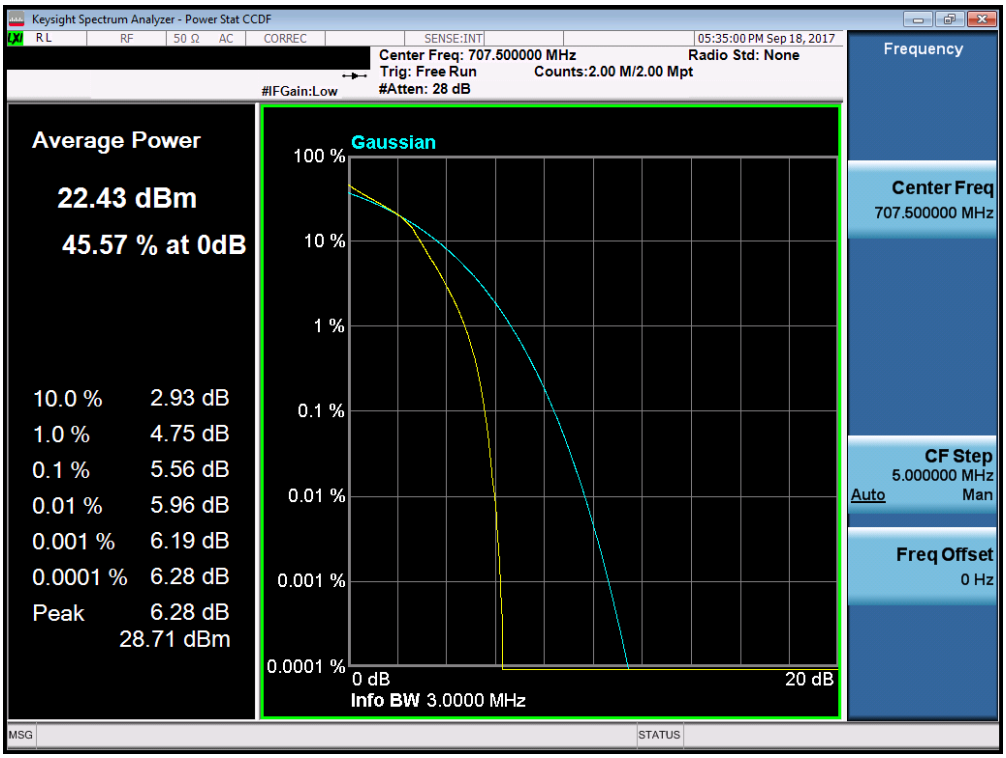


Plot 7-160. PAR Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-161. PAR Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

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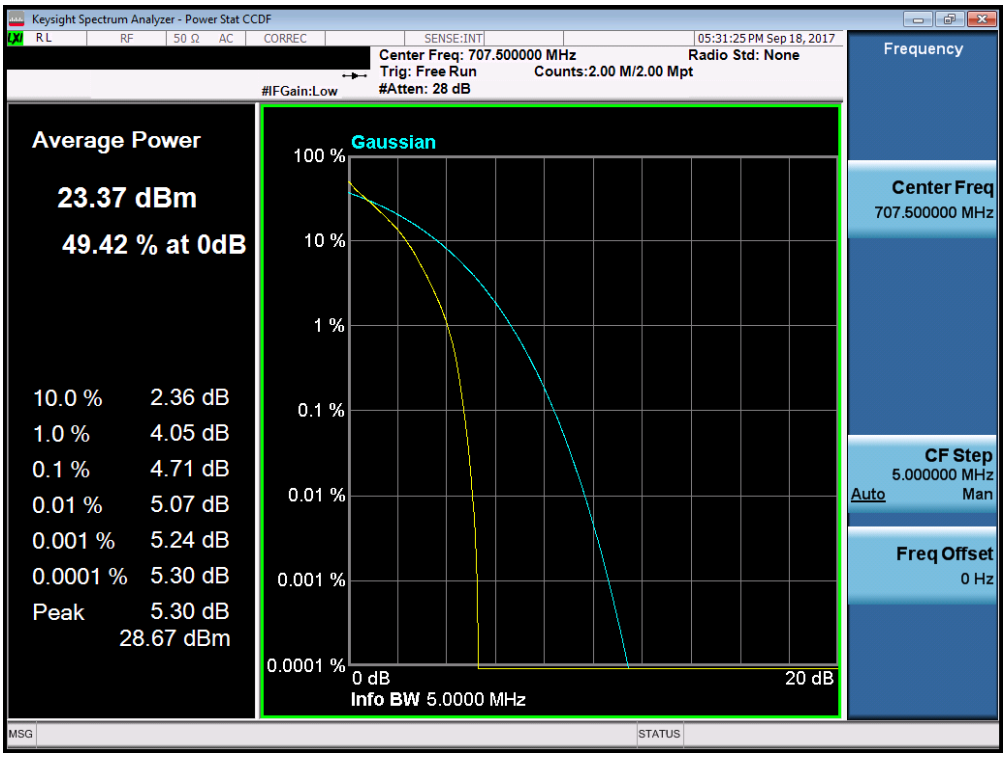
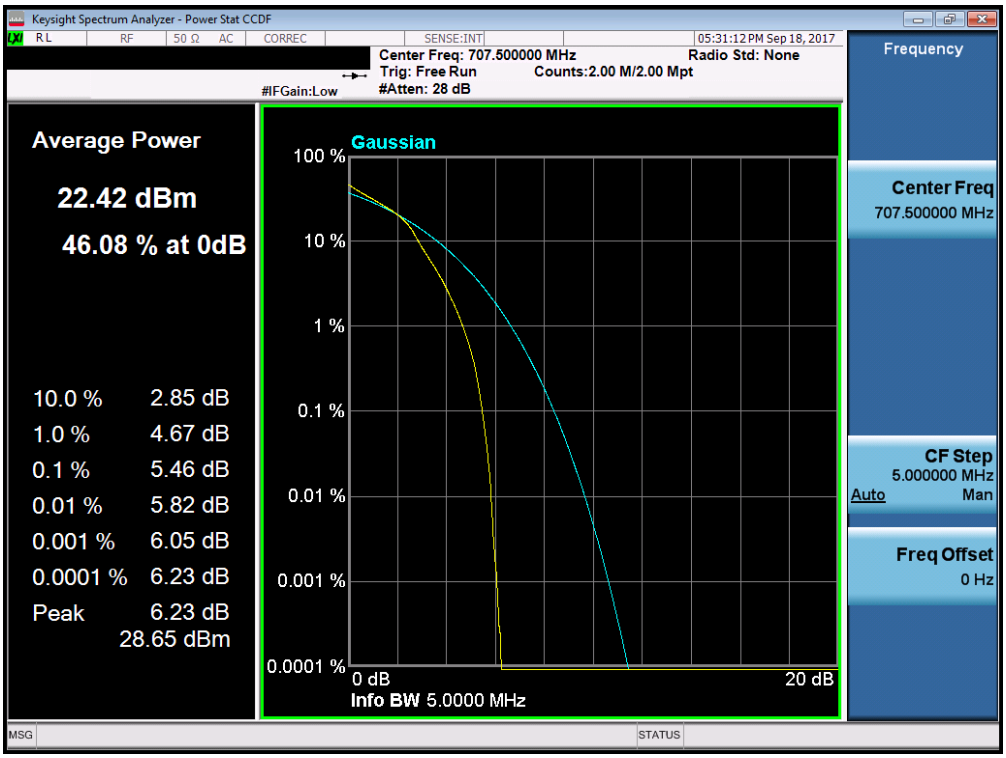


Plot 7-162. PAR Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-163. PAR Plot (Band 12 - 5.0MHz 16-QAM - Full RB Configuration)

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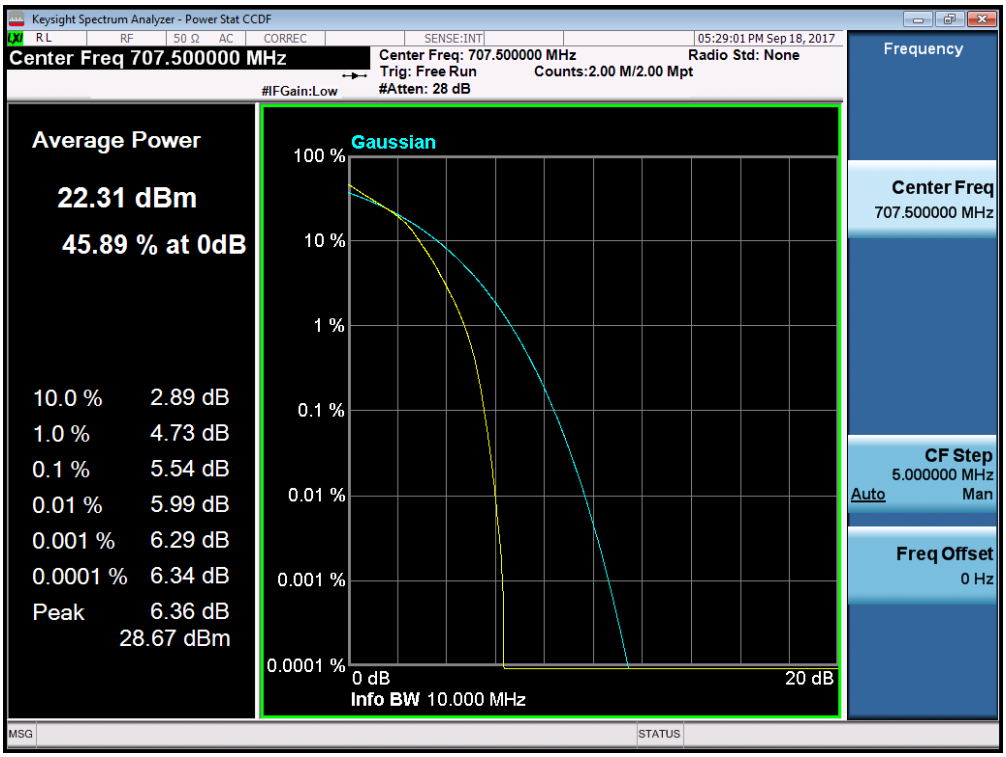
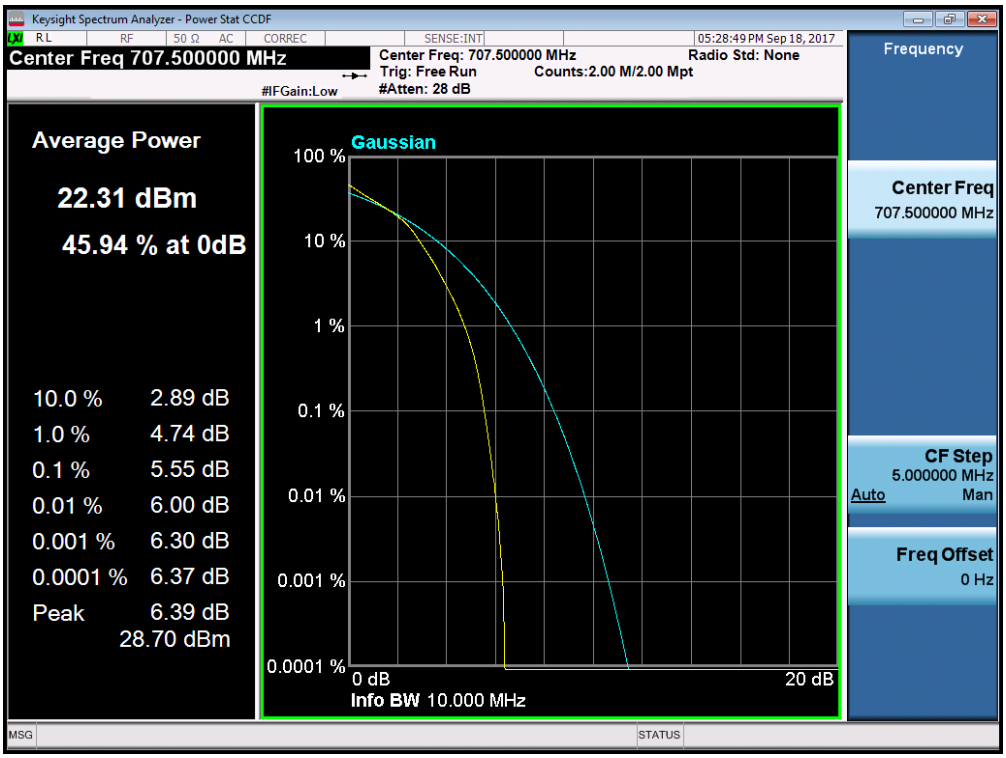


Plot 7-164. PAR Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-165. PAR Plot (Band 12 - 10.0MHz 16-QAM - Full RB Configuration)

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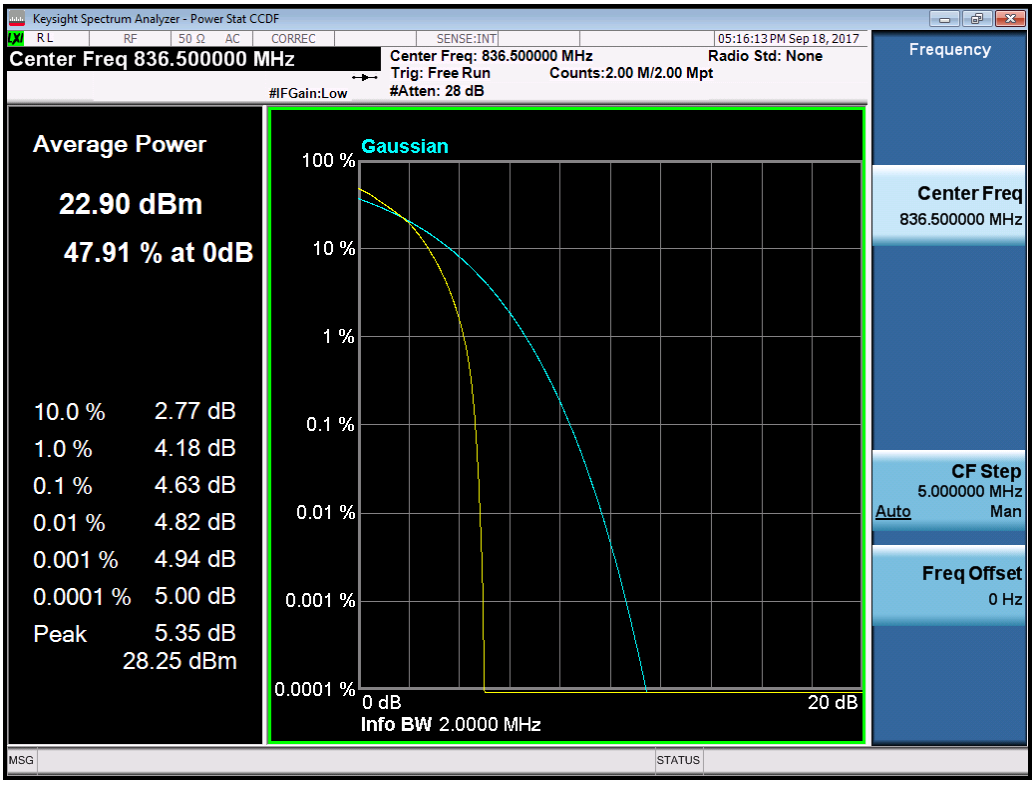
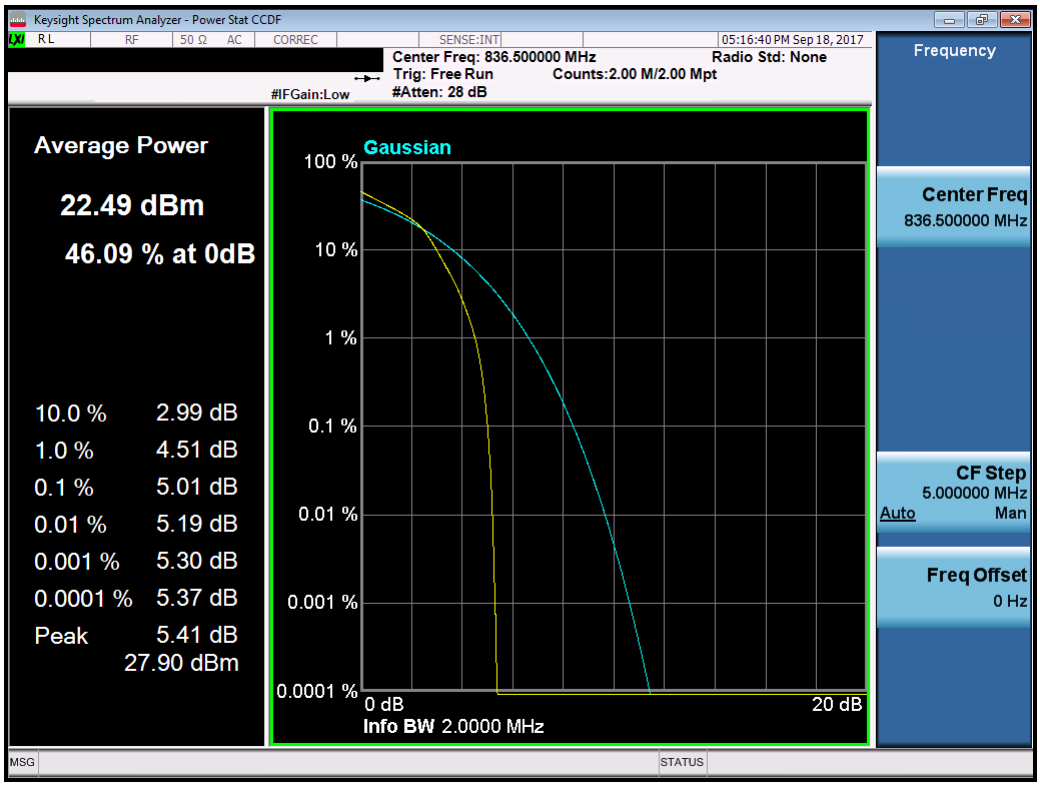


Plot 7-166. PAR Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-167. PAR Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)

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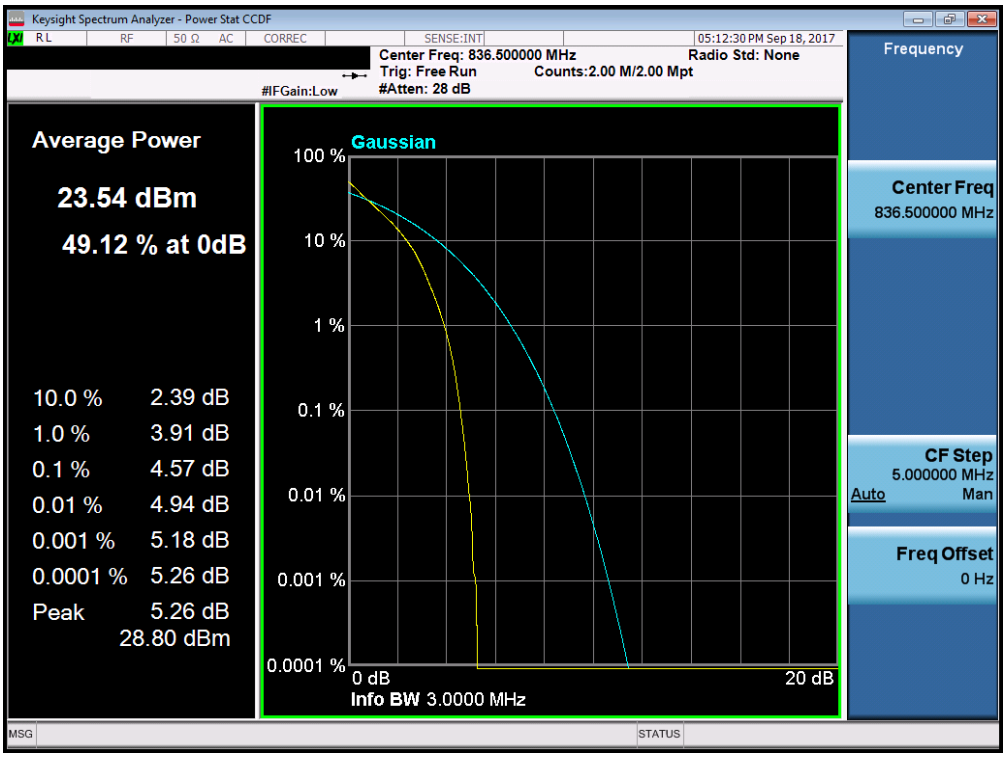
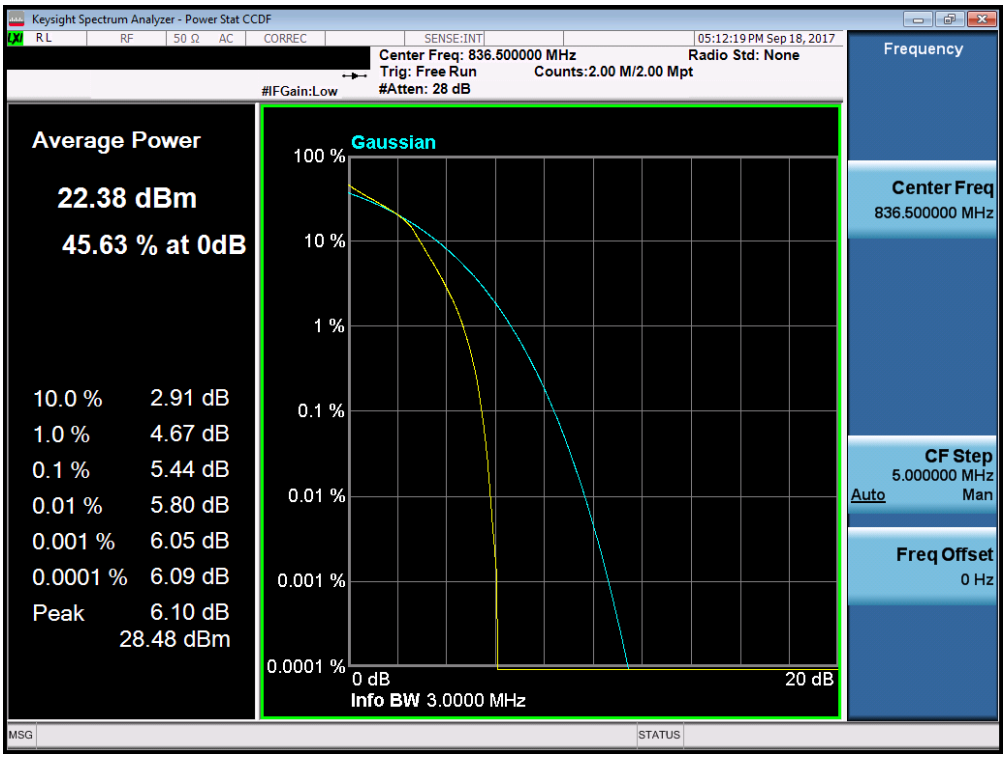


Plot 7-168. PAR Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-169. PAR Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)

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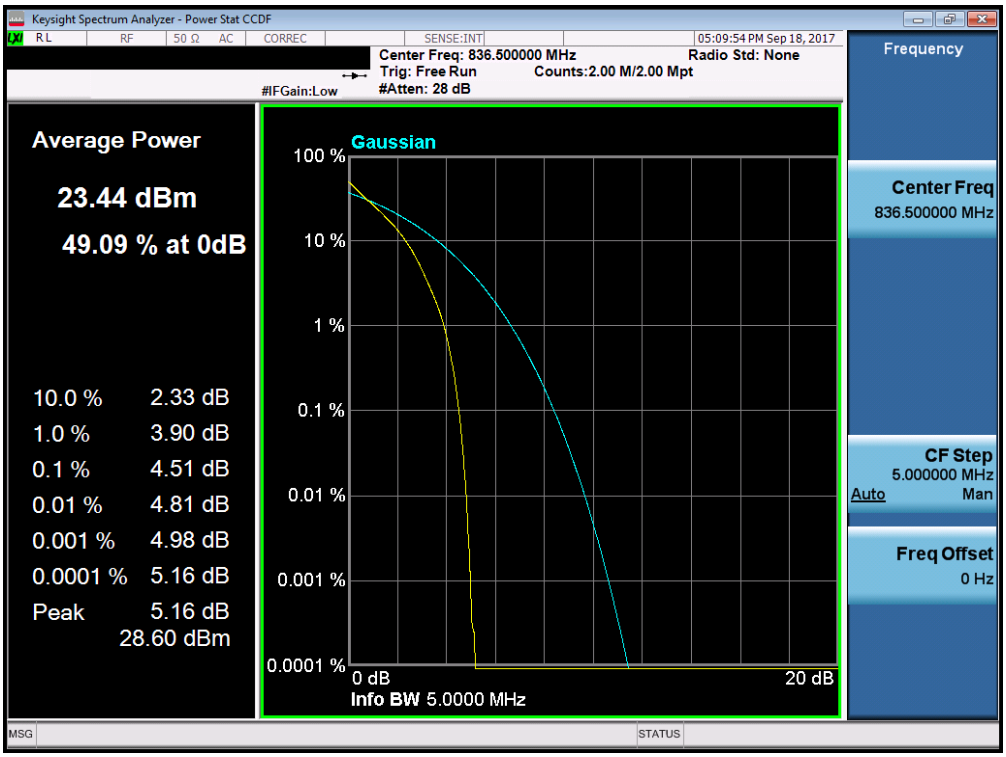
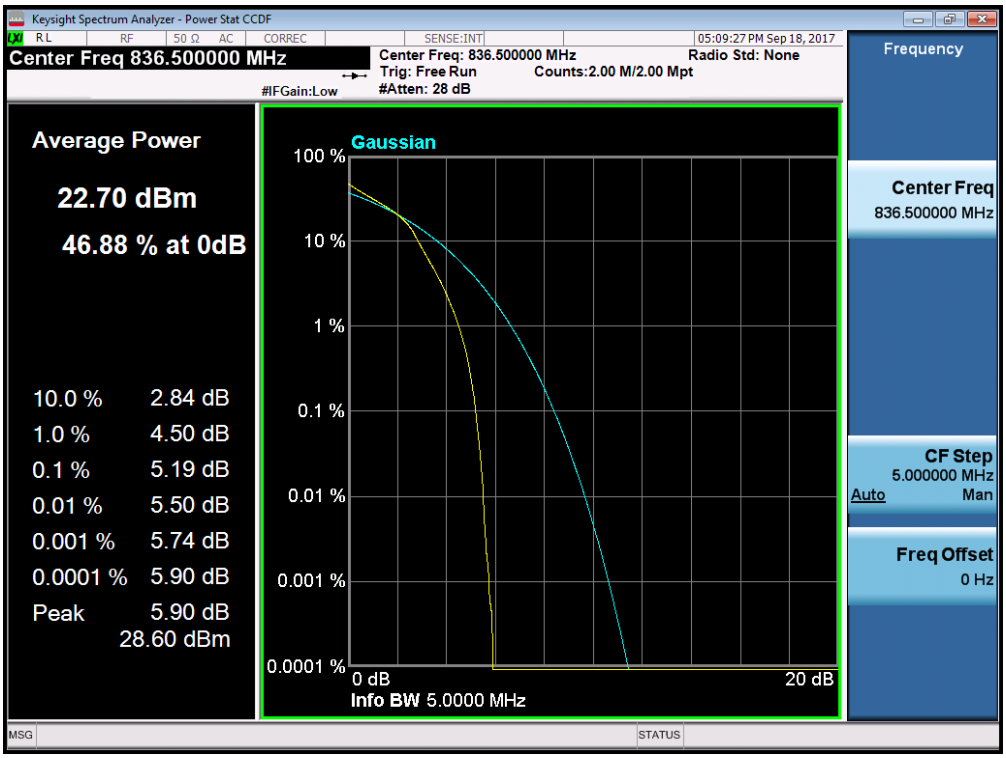


Plot 7-170. PAR Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-171. PAR Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)

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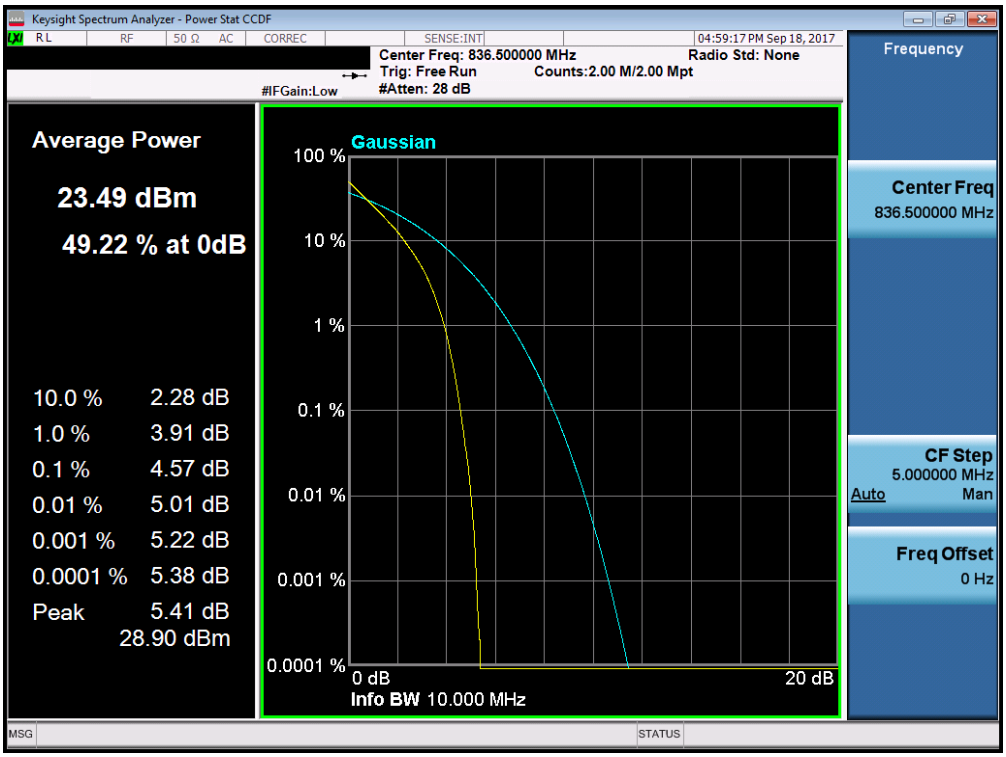
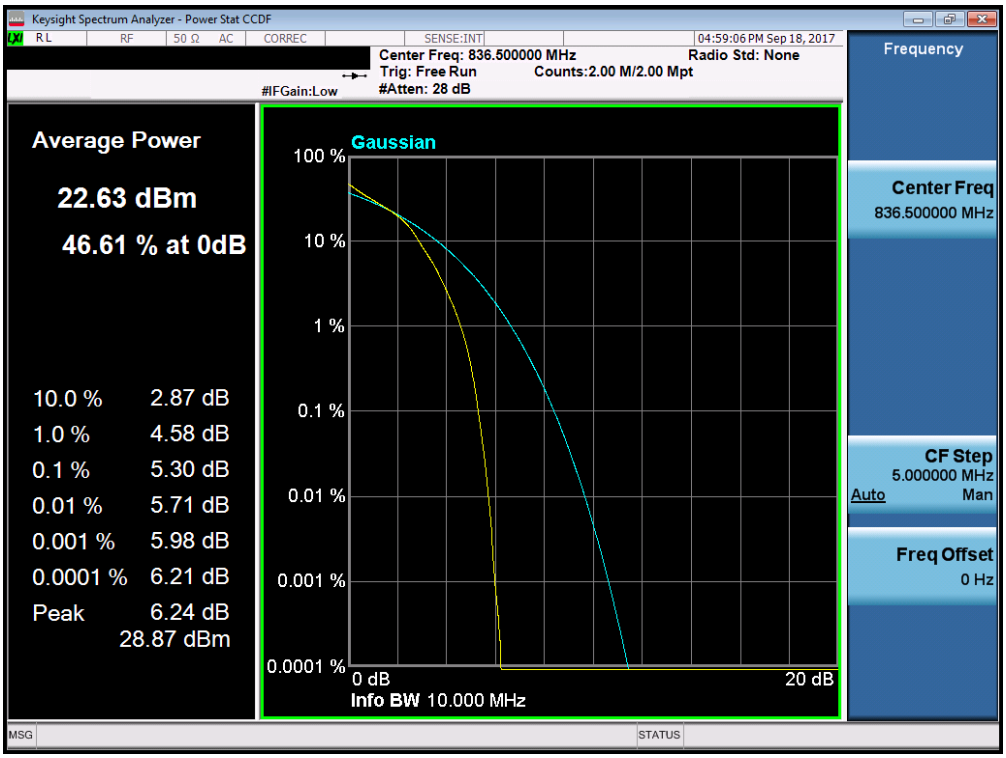


Plot 7-172. PAR Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-173. PAR Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)

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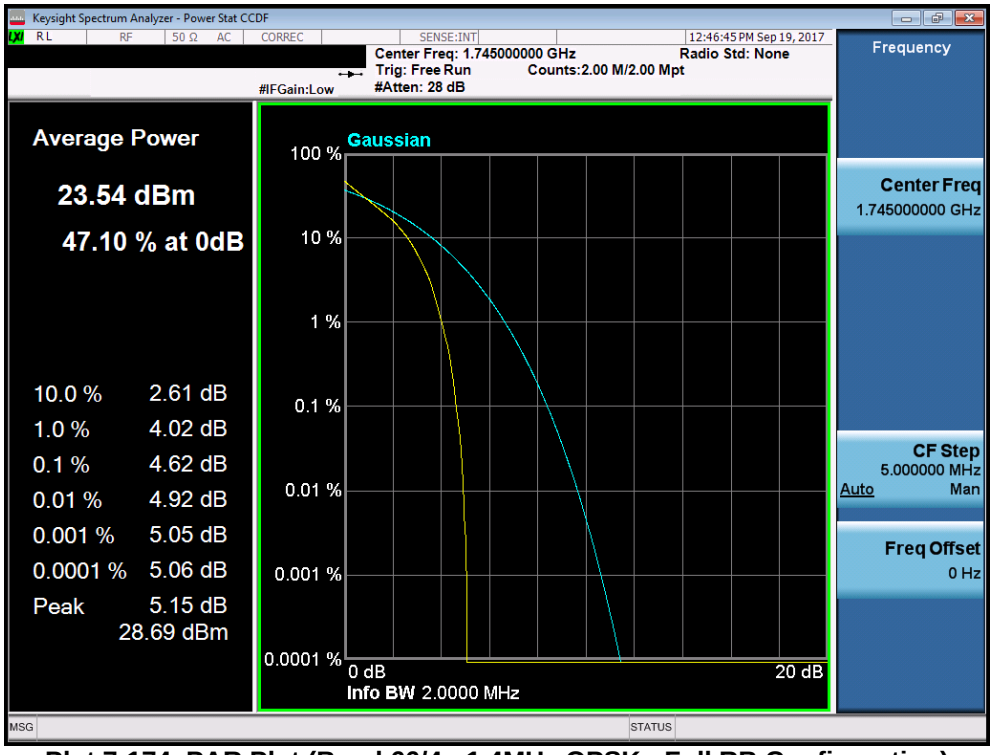
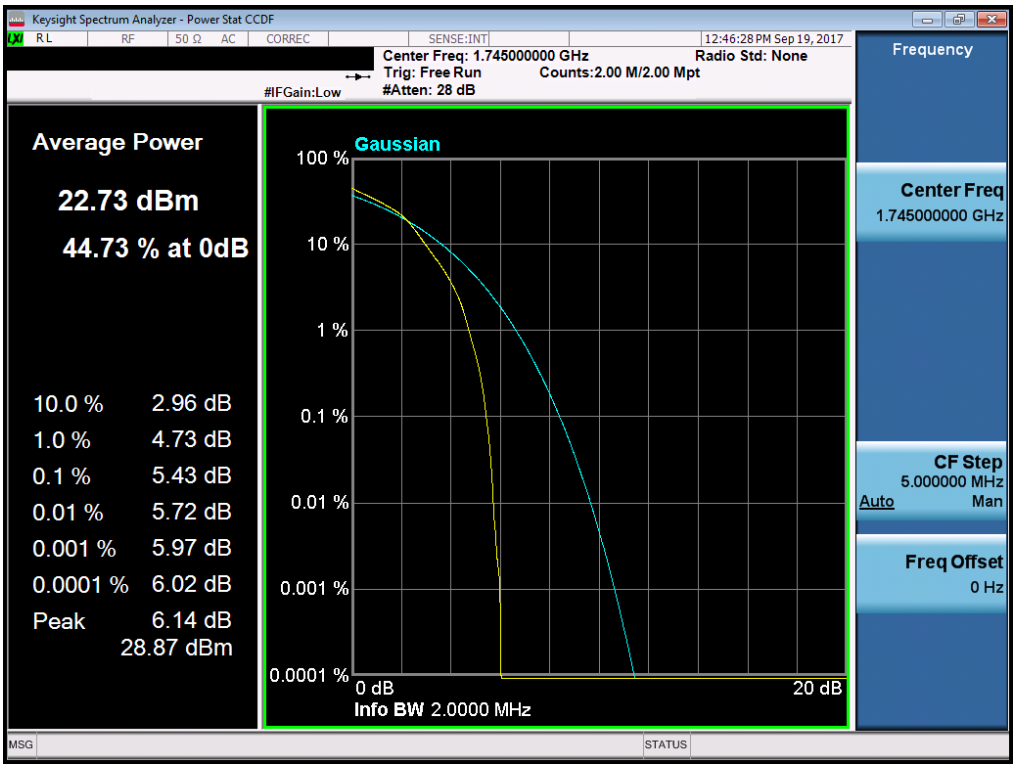


Plot 7-174. PAR Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-175. PAR Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

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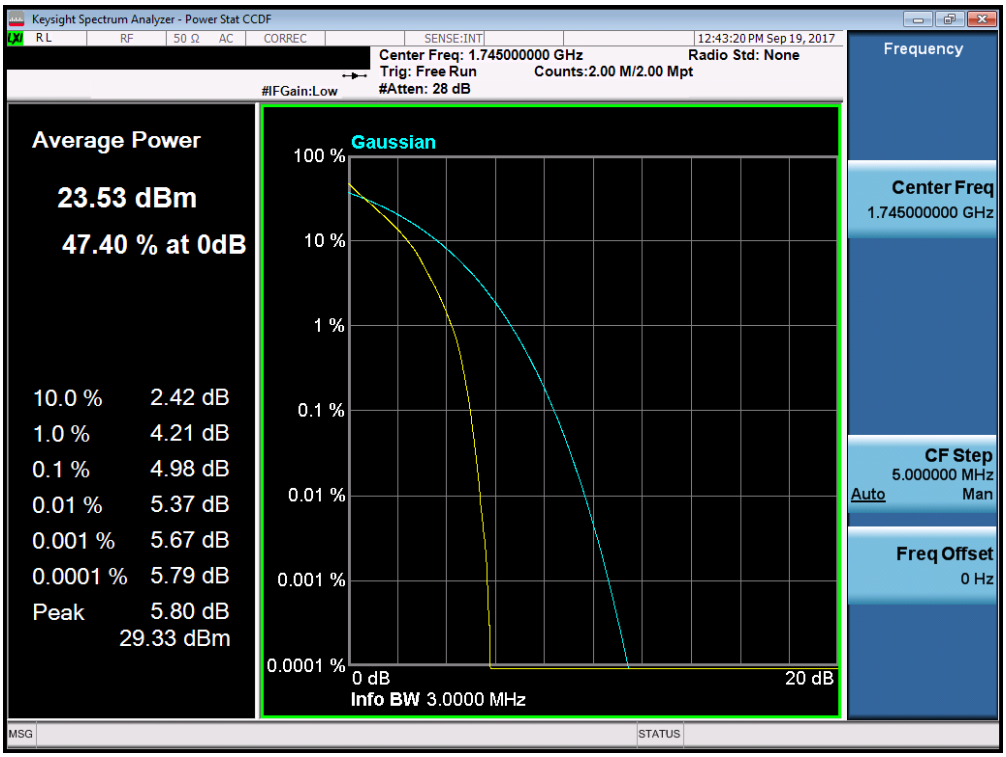
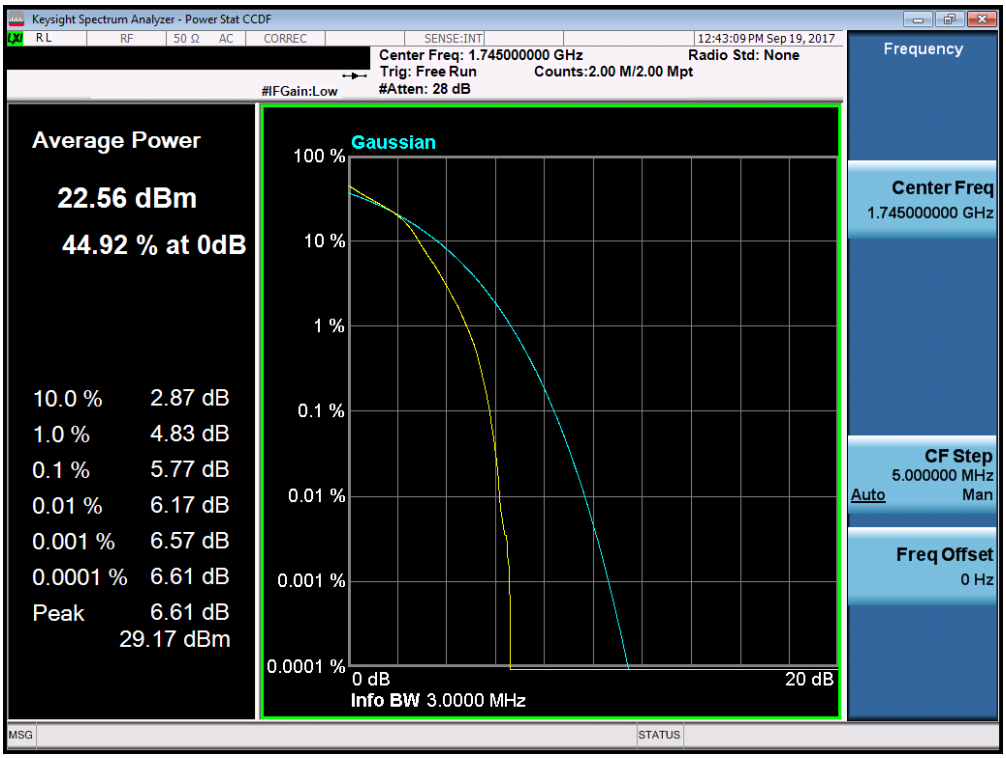


Plot 7-176. PAR Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-177. PAR Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

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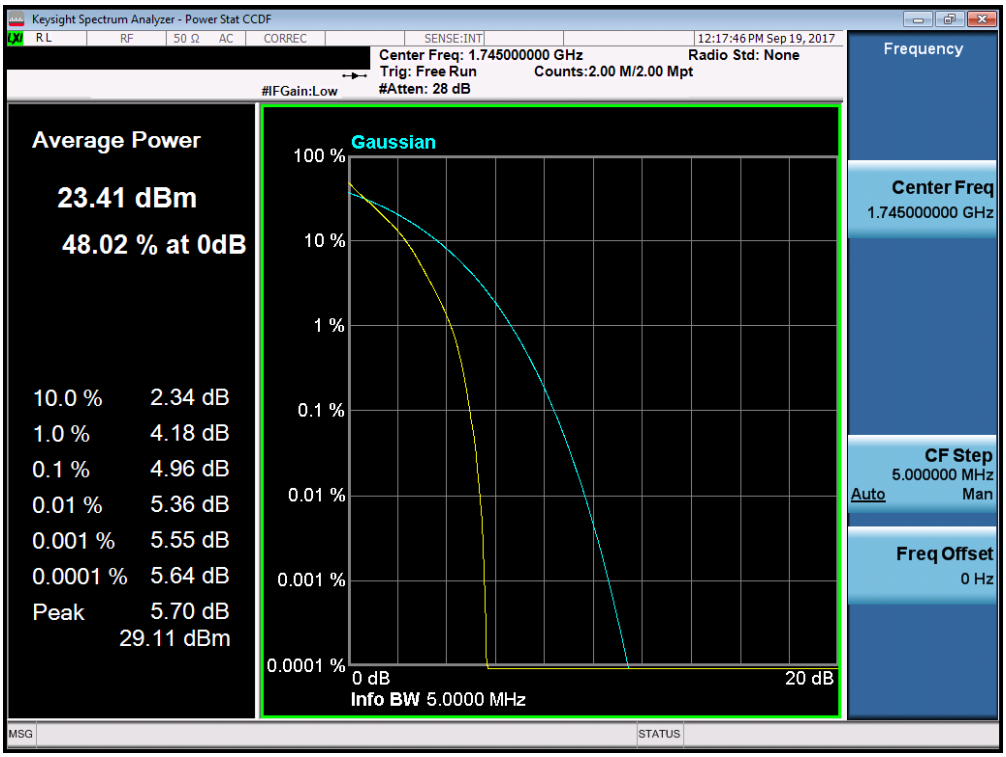
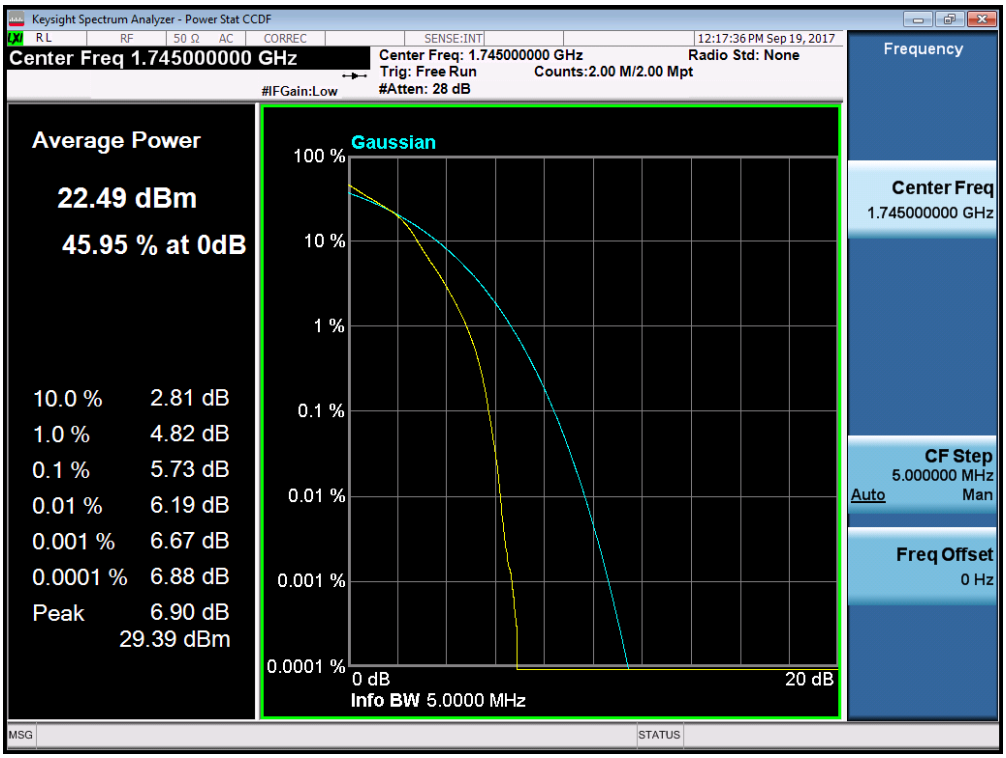


Plot 7-178. PAR Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-179. PAR Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

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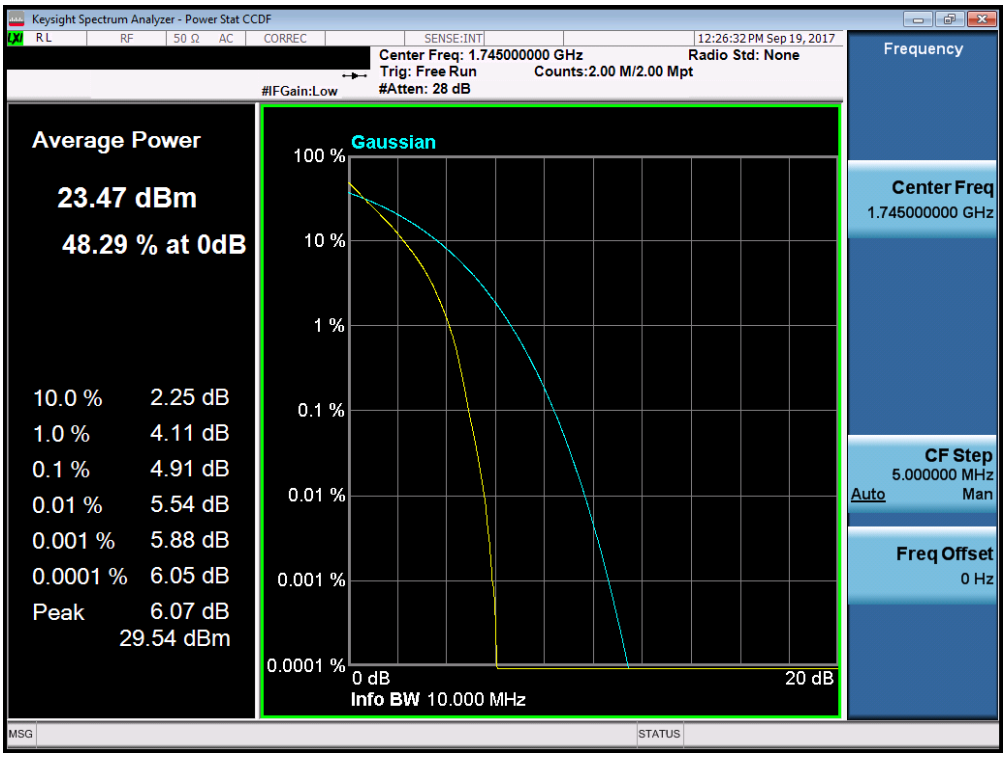
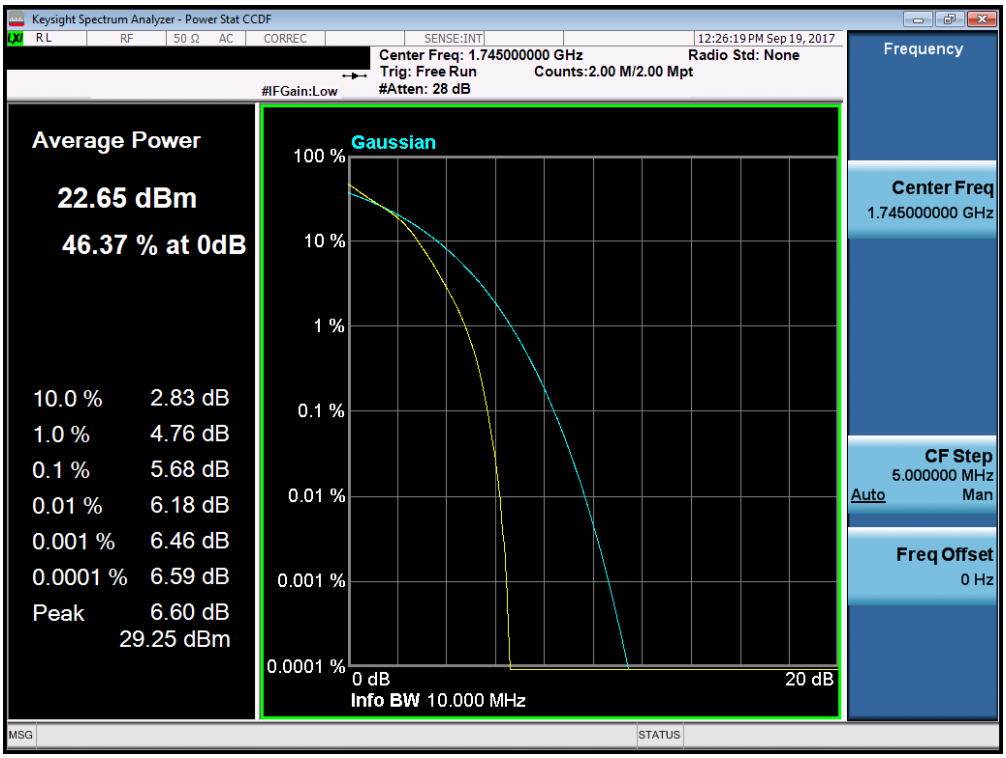


Plot 7-180. PAR Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-181. PAR Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

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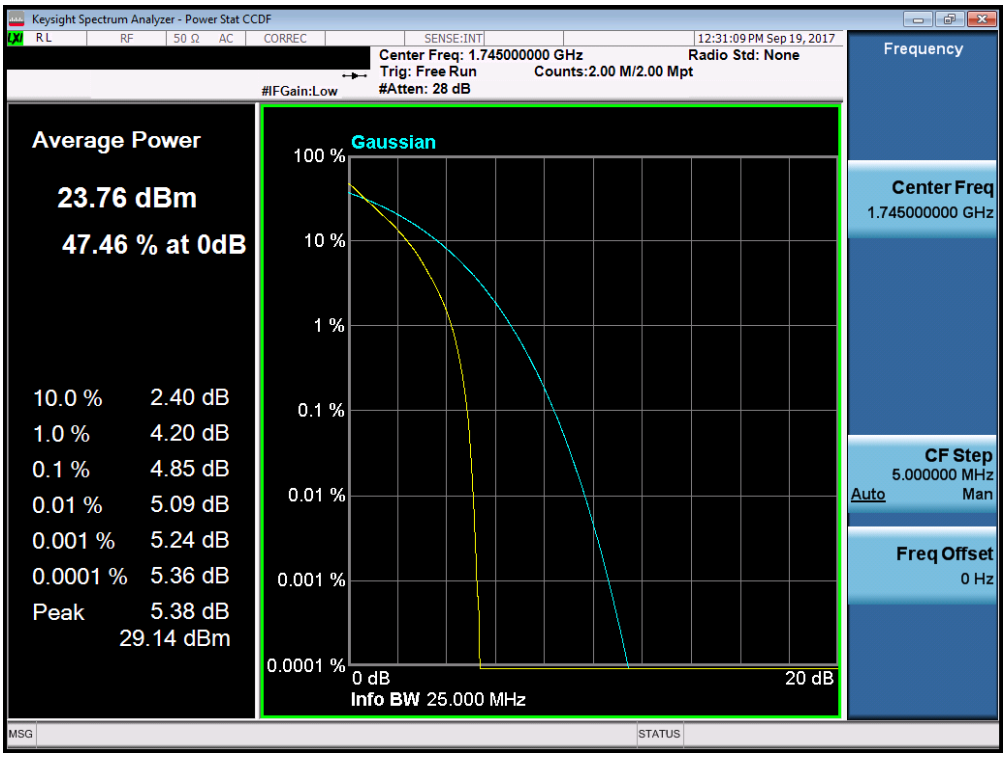
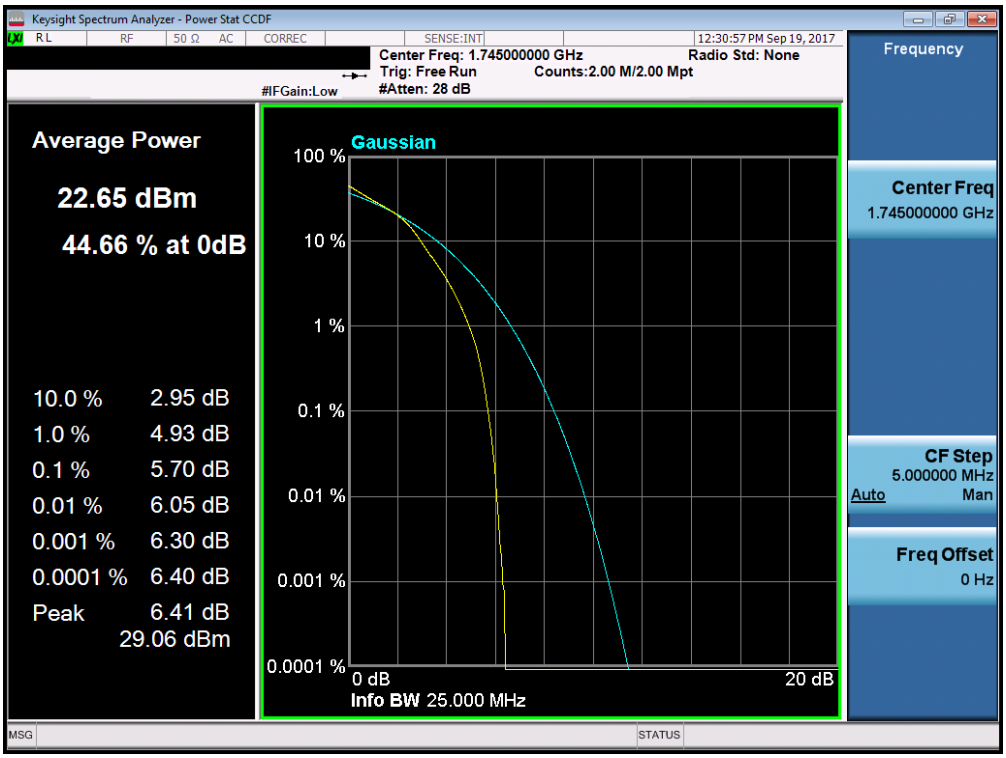


Plot 7-182. PAR Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-183. PAR Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

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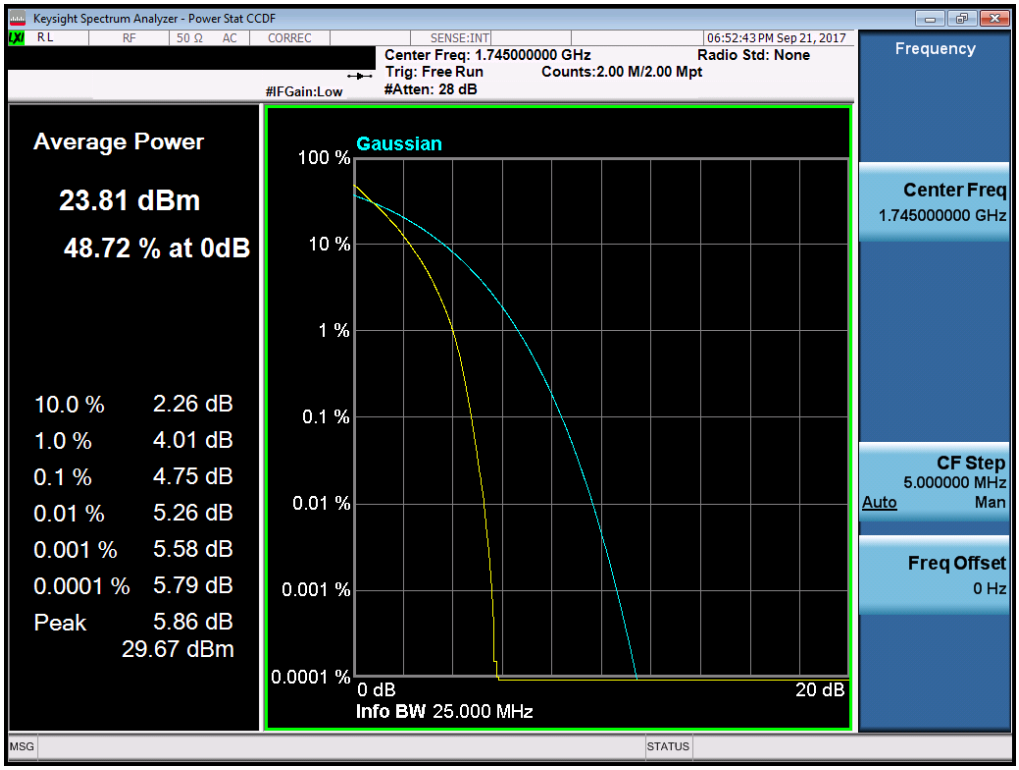
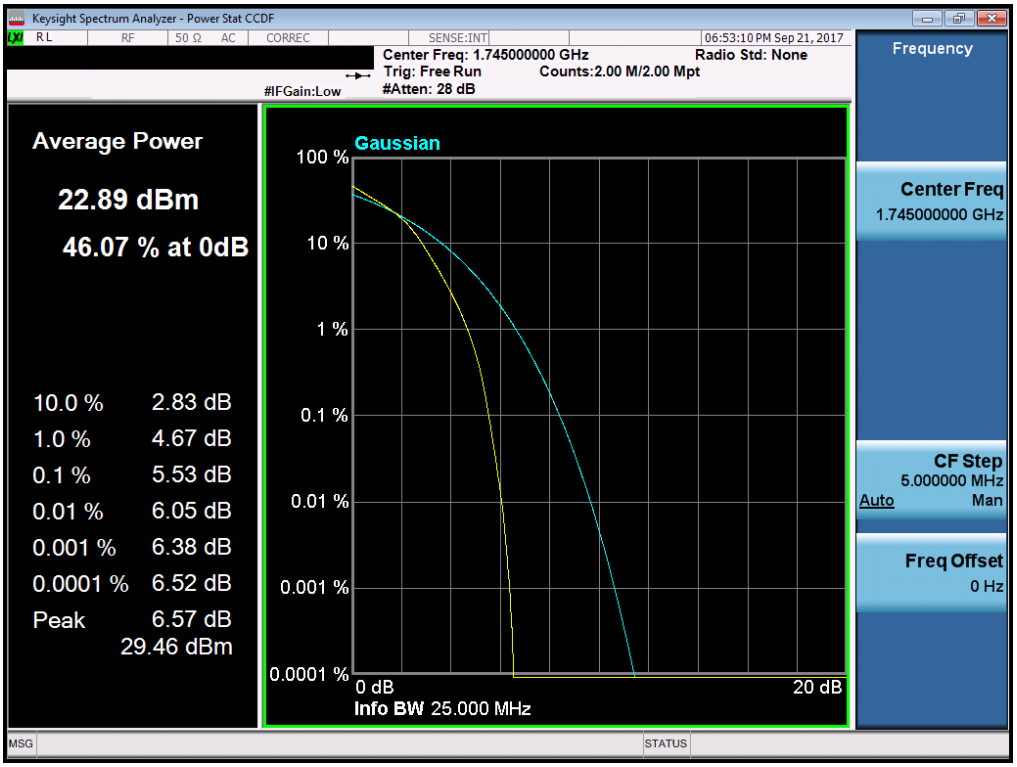


Plot 7-184. PAR Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-185. PAR Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

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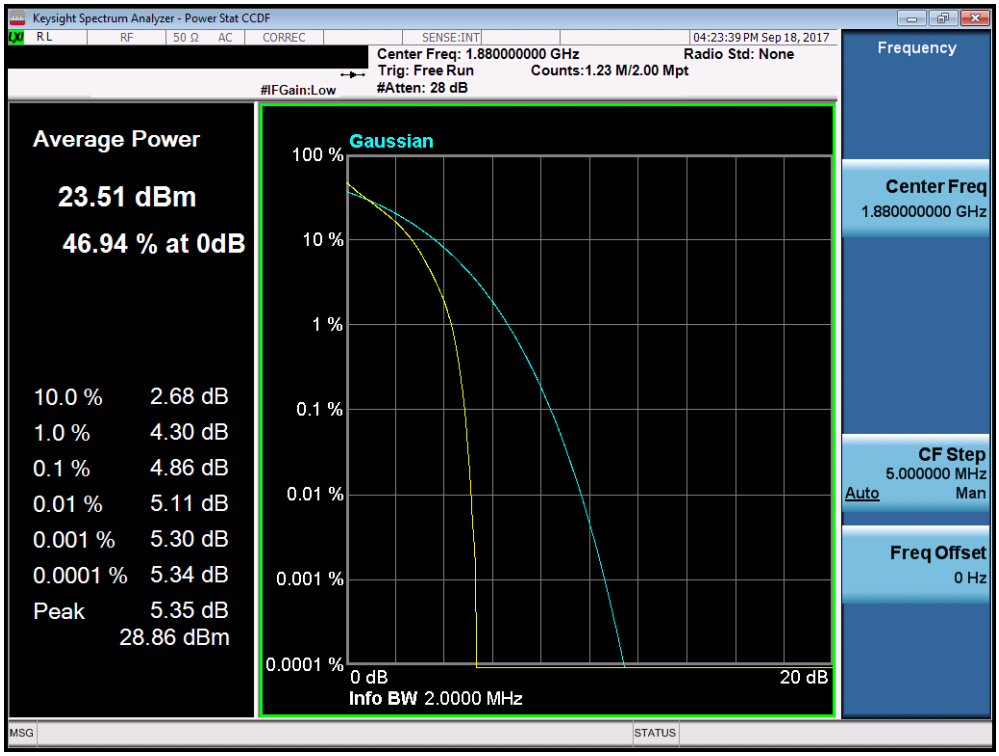
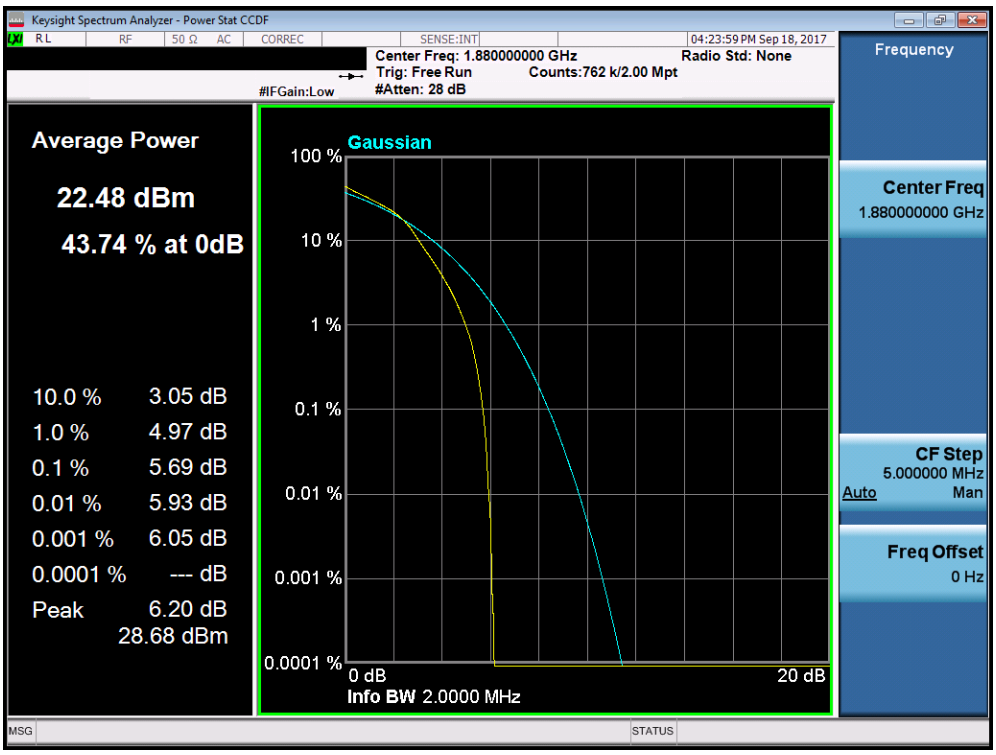


Plot 7-186. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-187. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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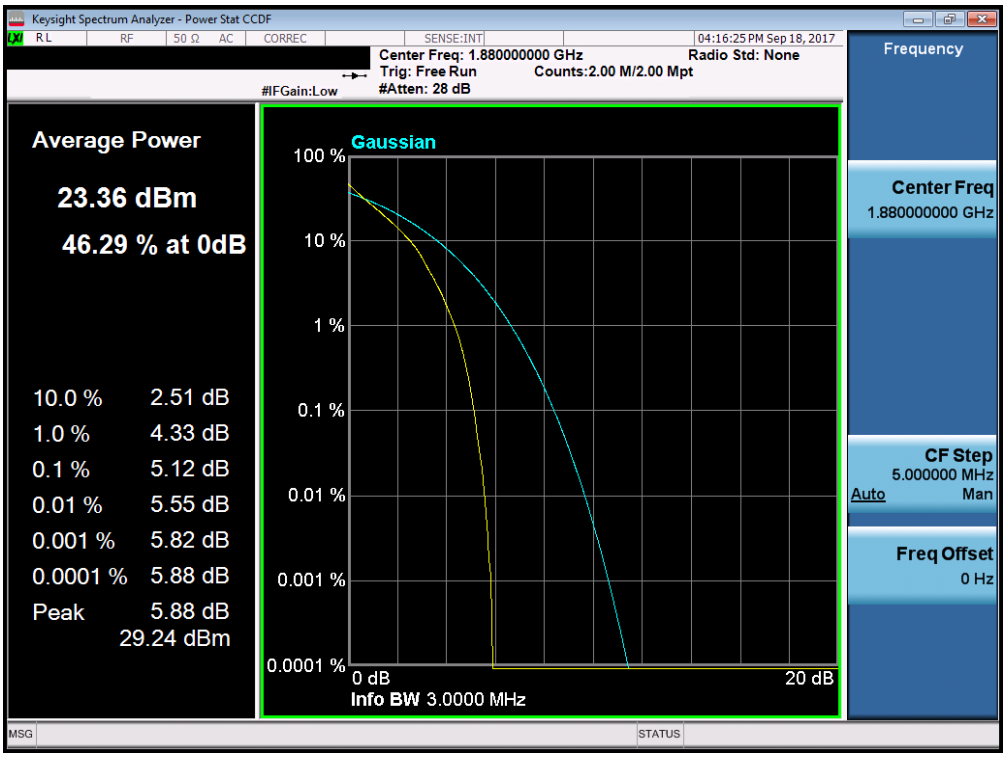
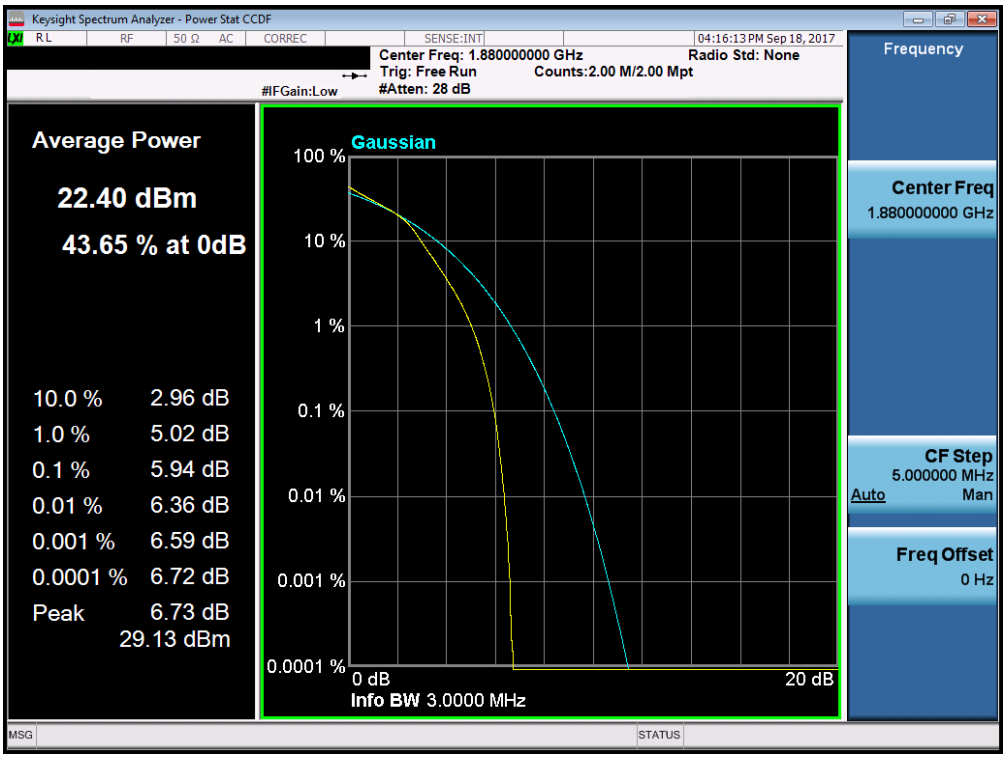


Plot 7-188. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-189. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

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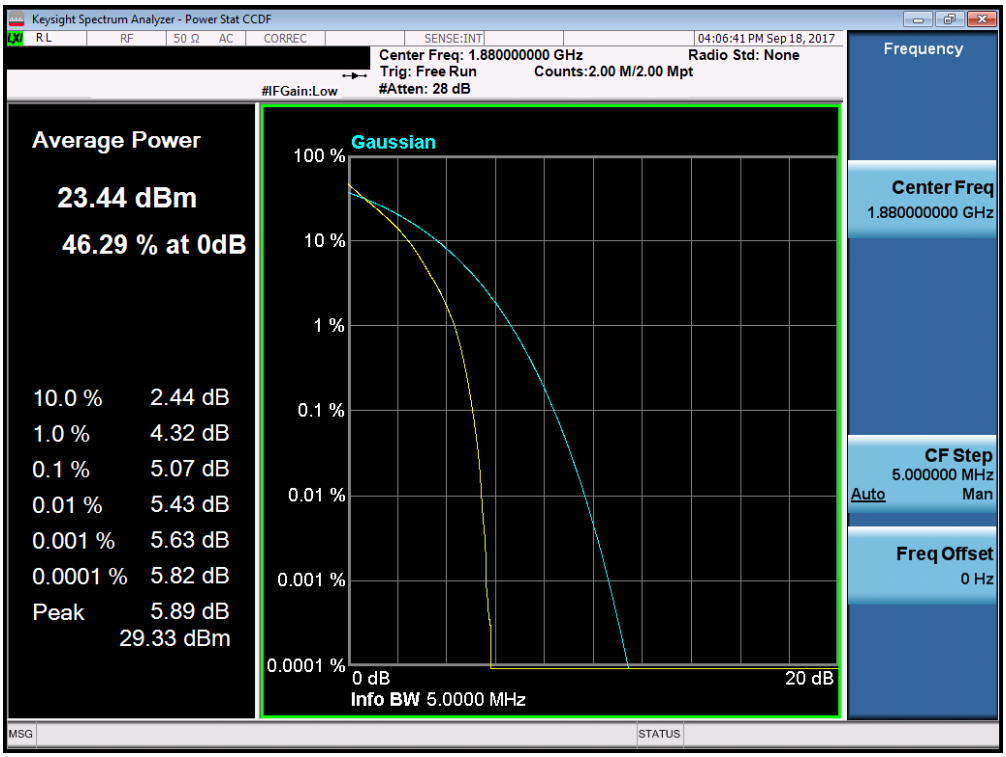
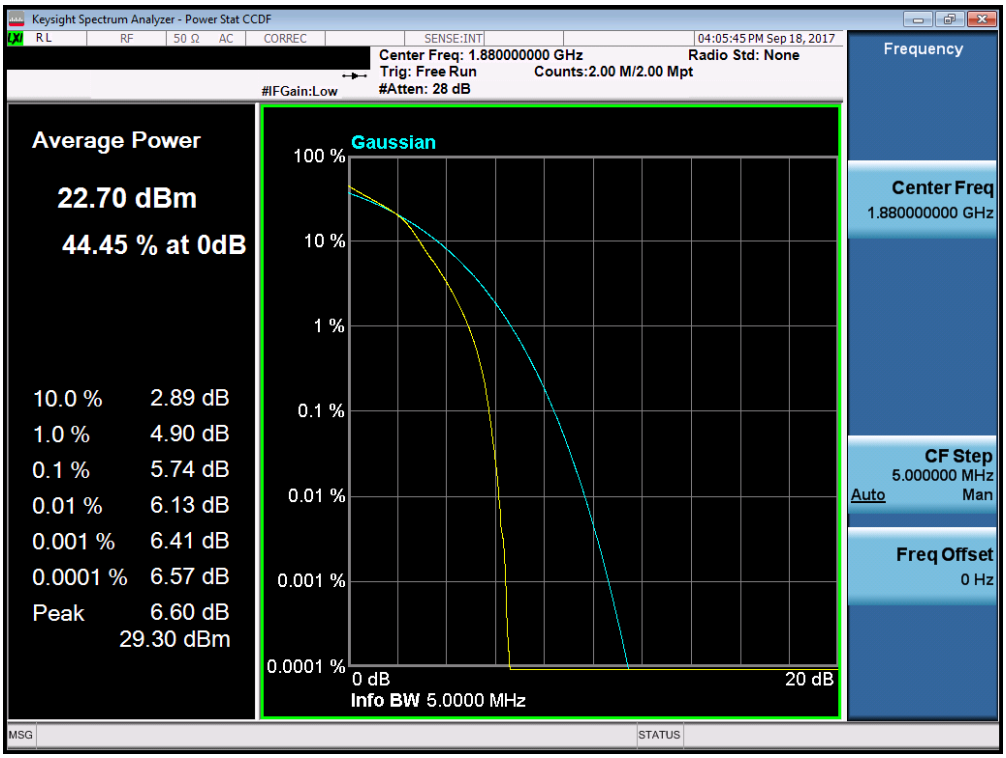


Plot 7-190. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-191. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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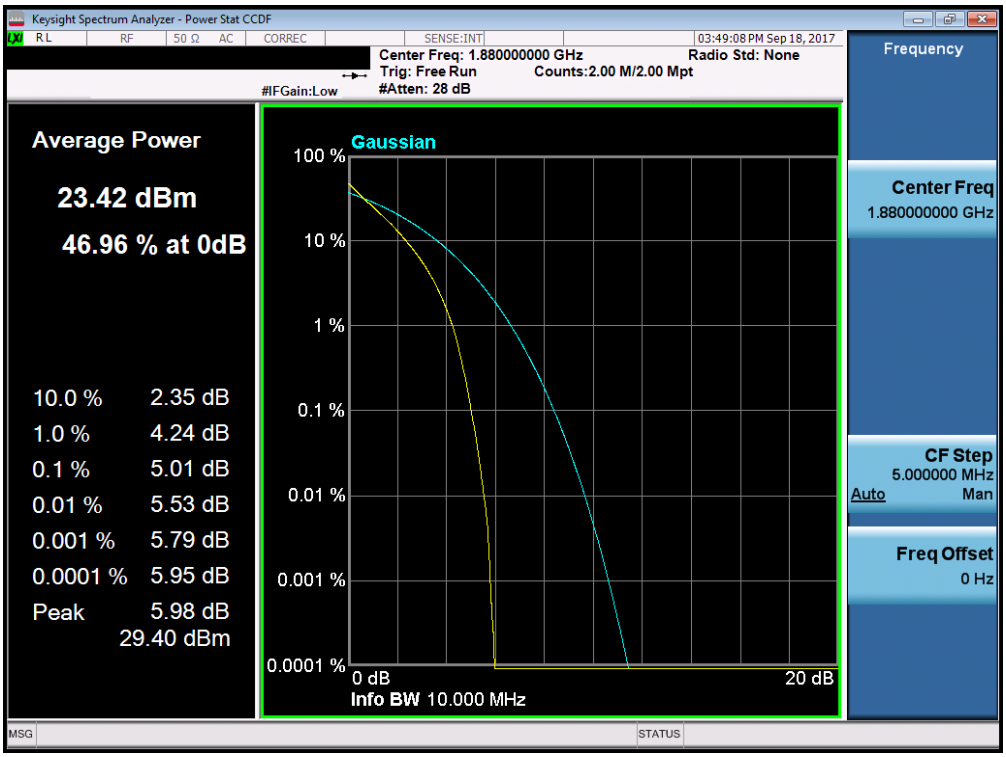
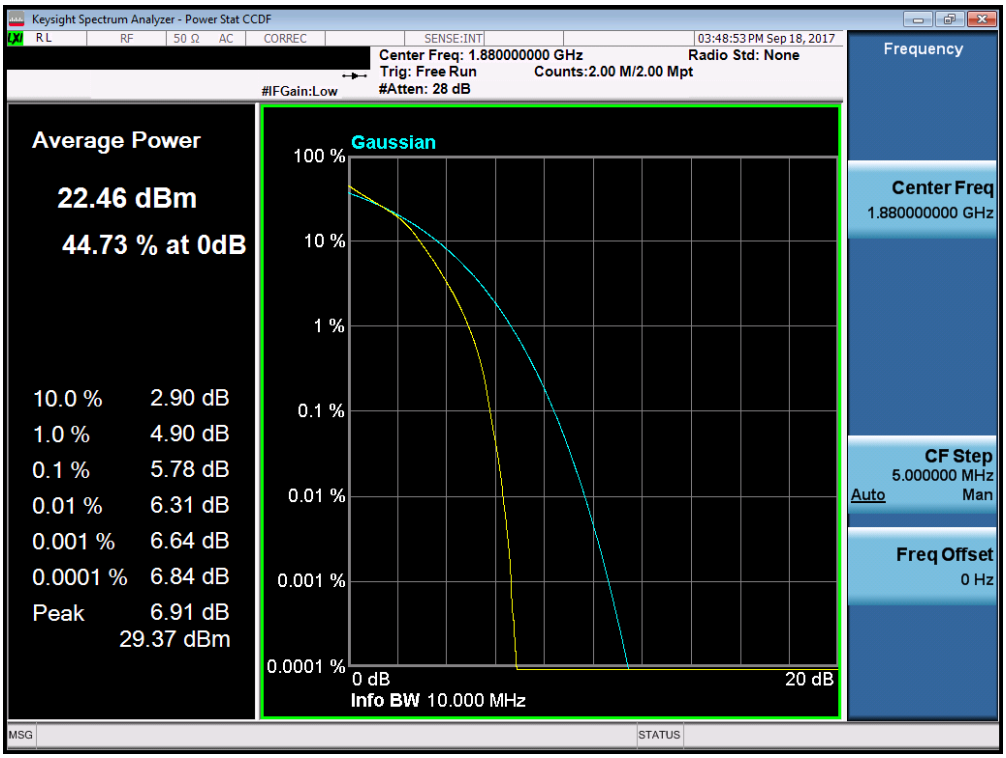


Plot 7-192. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-193. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

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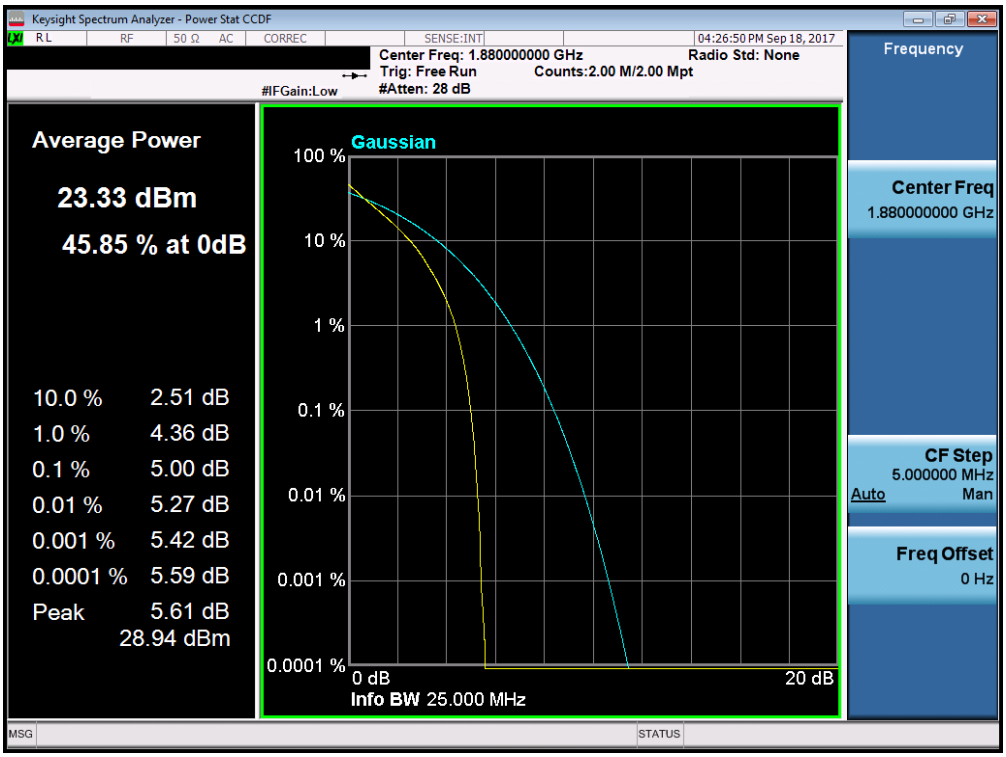
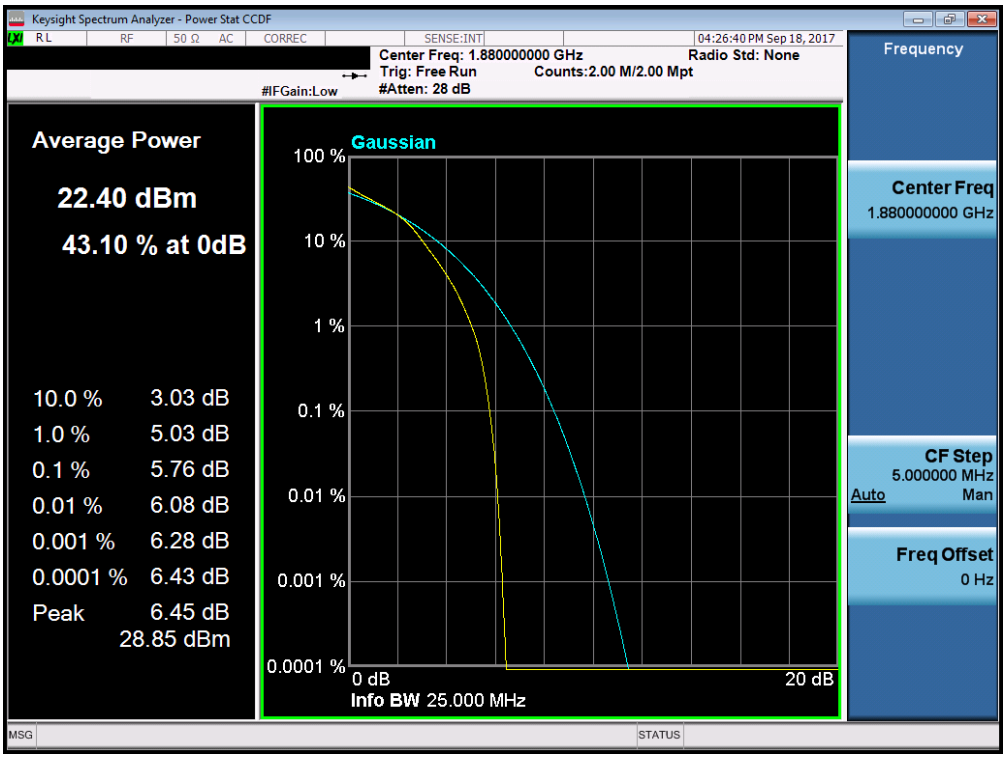


Plot 7-194. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-195. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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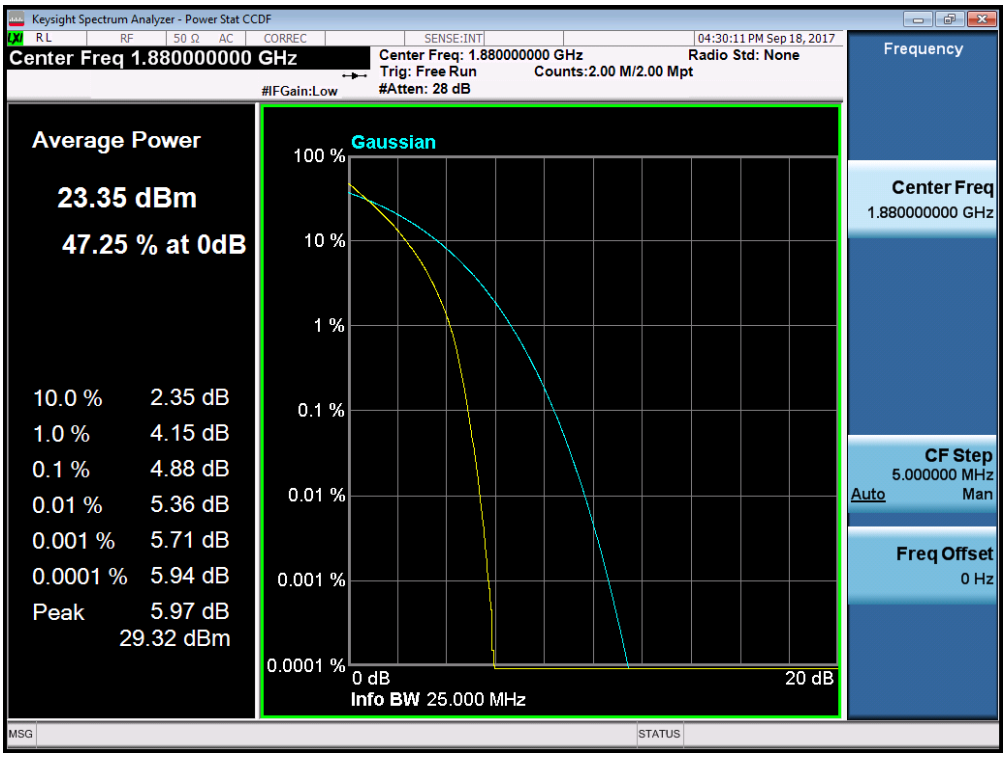
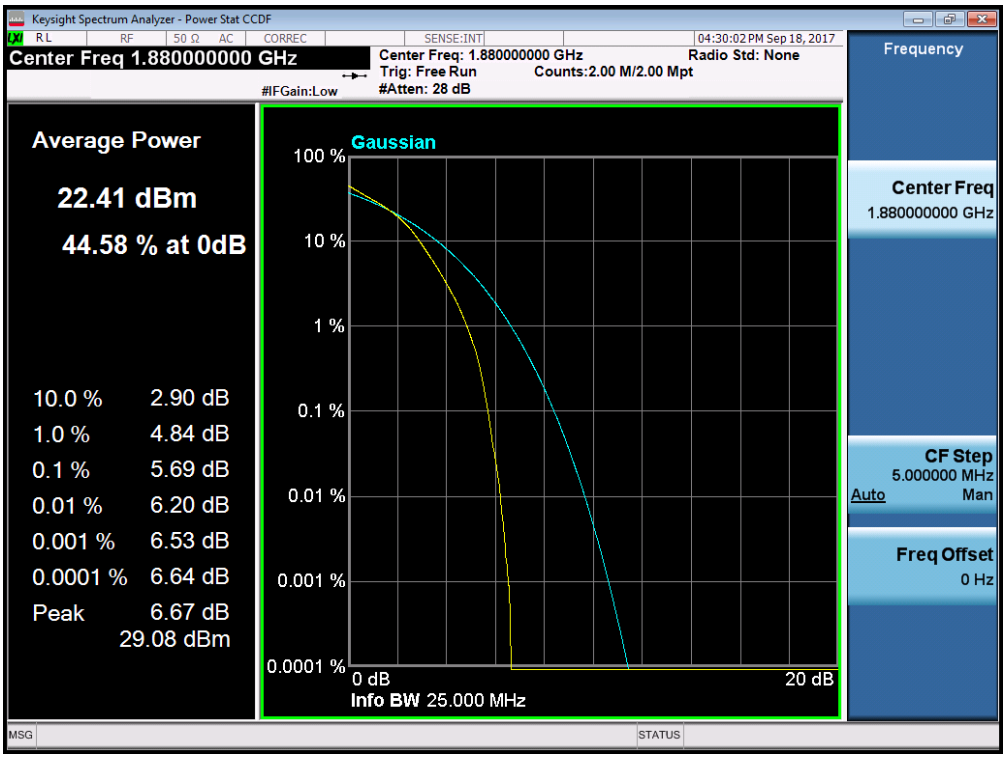


Plot 7-196. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-197. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

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7.6 Radiated Power (ERP/EIRP)

§22.913(a)(2) §24.232(c.2) §27.50(h)(2) §27.50(c)(10) §27.50(d)(4) §27.50(a)(3) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – 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 ≥ 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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

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

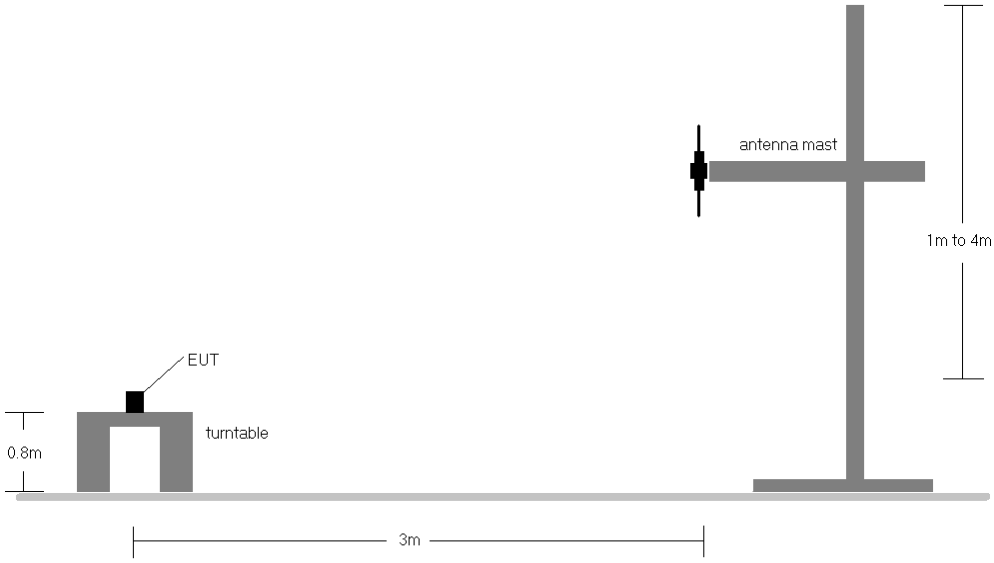

Figure 7-5. Radiated Test Setup <1GHz

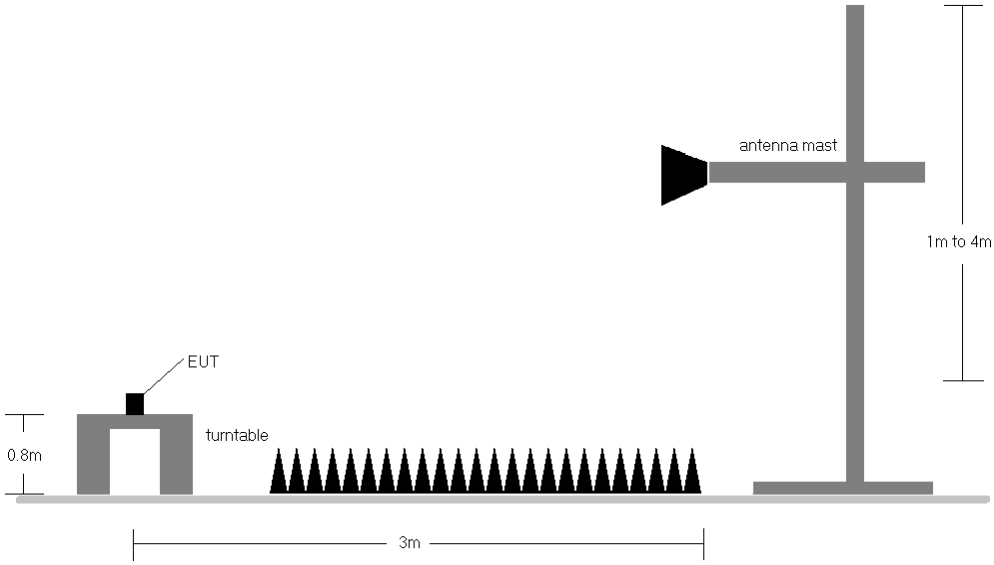

Figure 7-6. Radiated Test Setup >1GHz

Test Notes

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

2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	286	278	3 / 2	16.71	2.48	17.04	34.77	-17.73	19.19	36.99	-17.80
707.50	1.4	QPSK	H	267	264	3 / 2	18.16	2.56	18.57	34.77	-16.20	20.72	36.99	-16.27
715.30	1.4	QPSK	H	270	268	3 / 2	17.49	2.60	17.94	34.77	-16.84	20.09	36.99	-16.90
699.70	1.4	16-QAM	H	286	278	3 / 2	15.46	2.48	15.79	34.77	-18.98	17.94	36.99	-19.05
707.50	1.4	16-QAM	H	267	264	3 / 2	16.71	2.56	17.12	34.77	-17.65	19.27	36.99	-17.72
715.30	1.4	16-QAM	H	270	268	3 / 2	16.65	2.60	17.10	34.77	-17.68	19.25	36.99	-17.74
700.50	3	QPSK	H	291	265	1 / 14	17.36	2.48	17.69	34.77	-17.08	19.84	36.99	-17.15
707.50	3	QPSK	H	268	267	1 / 14	18.09	2.56	18.50	34.77	-16.27	20.65	36.99	-16.34
714.50	3	QPSK	H	271	271	1 / 14	17.44	2.60	17.89	34.77	-16.88	20.04	36.99	-16.95
700.50	3	16-QAM	H	291	265	1 / 14	15.91	2.48	16.24	34.77	-18.53	18.39	36.99	-18.60
707.50	3	16-QAM	H	268	267	1 / 14	17.31	2.56	17.72	34.77	-17.05	19.87	36.99	-17.12
714.50	3	16-QAM	H	271	271	1 / 14	16.61	2.60	17.06	34.77	-17.71	19.21	36.99	-17.78
701.50	5	QPSK	H	267	268	1 / 24	18.03	2.49	18.37	34.77	-16.40	20.52	36.99	-16.47
707.50	5	QPSK	H	269	267	1 / 24	18.01	2.56	18.42	34.77	-16.35	20.57	36.99	-16.42
713.50	5	QPSK	H	270	267	1 / 0	18.25	2.60	18.70	34.77	-16.07	20.85	36.99	-16.14
701.50	5	16-QAM	H	267	268	1 / 24	15.67	2.49	16.01	34.77	-18.76	18.16	36.99	-18.83
707.50	5	16-QAM	H	269	267	1 / 24	16.71	2.56	17.12	34.77	-17.65	19.27	36.99	-17.72
713.50	5	16-QAM	H	270	267	1 / 0	16.61	2.60	17.06	34.77	-17.71	19.21	36.99	-17.78
704.00	10	QPSK	H	265	268	1 / 49	17.68	2.51	18.04	34.77	-16.73	20.19	36.99	-16.80
707.50	10	QPSK	H	262	256	1 / 49	17.11	2.56	17.52	34.77	-17.25	19.67	36.99	-17.32
711.00	10	QPSK	H	264	281	1 / 0	17.21	2.60	17.66	34.77	-17.12	19.81	36.99	-17.18
704.00	10	16-QAM	H	265	268	1 / 49	17.00	2.51	17.36	34.77	-17.41	19.51	36.99	-17.48
707.50	10	16-QAM	H	262	256	1 / 49	16.51	2.56	16.92	34.77	-17.85	19.07	36.99	-17.92
711.00	10	16-QAM	H	264	281	1 / 0	16.46	2.60	16.91	34.77	-17.87	19.06	36.99	-17.93
713.50	5	QPSK	V	235	281	1 / 24	10.33	2.60	10.78	34.77	-23.99	12.93	36.99	-24.06

Table 7-198. ERP/EIRP 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 Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	222	290	1 / 0	17.43	5.51	20.79	38.45	-17.66	22.94	40.61	-17.67
836.50	1.4	QPSK	H	216	277	1 / 0	16.22	5.14	19.21	38.45	-19.24	21.36	40.61	-19.25
848.30	1.4	QPSK	H	362	295	1 / 0	15.24	4.68	17.77	38.45	-20.68	19.92	40.61	-20.69
824.70	1.4	16-QAM	H	222	290	1 / 0	16.07	5.51	19.43	38.45	-19.02	21.58	40.61	-19.03
836.50	1.4	16-QAM	H	216	277	1 / 0	14.77	5.14	17.76	38.45	-20.69	19.91	40.61	-20.70
848.30	1.4	16-QAM	H	362	295	1 / 0	14.27	4.68	16.80	38.45	-21.65	18.95	40.61	-21.66
825.50	3	QPSK	H	221	295	1 / 14	17.37	5.52	20.74	38.45	-17.71	22.89	40.61	-17.72
836.50	3	QPSK	H	216	277	1 / 0	16.42	5.14	19.41	38.45	-19.04	21.56	40.61	-19.05
847.50	3	QPSK	H	213	292	1 / 0	15.40	4.67	17.92	38.45	-20.53	20.07	40.61	-20.53
825.50	3	16-QAM	H	221	295	1 / 14	15.67	5.52	19.04	38.45	-19.41	21.19	40.61	-19.42
836.50	3	16-QAM	H	216	277	1 / 0	15.60	5.14	18.59	38.45	-19.86	20.74	40.61	-19.87
847.50	3	16-QAM	H	213	292	1 / 0	14.42	4.67	16.94	38.45	-21.51	19.09	40.61	-21.51
826.50	5	QPSK	H	219	284	1 / 0	17.32	5.51	20.68	38.45	-17.77	22.83	40.61	-17.77
836.50	5	QPSK	H	211	283	1 / 0	16.44	5.14	19.43	38.45	-19.02	21.58	40.61	-19.03
846.50	5	QPSK	H	218	283	1 / 0	15.77	4.66	18.28	38.45	-20.17	20.43	40.61	-20.17
826.50	5	16-QAM	H	219	284	1 / 0	15.90	5.51	19.26	38.45	-19.19	21.41	40.61	-19.19
836.50	5	16-QAM	H	211	283	1 / 0	15.14	5.14	18.13	38.45	-20.32	20.28	40.61	-20.33
846.50	5	16-QAM	H	218	283	1 / 0	14.21	4.66	16.72	38.45	-21.73	18.87	40.61	-21.73
829.00	10	QPSK	H	220	297	1 / 0	17.21	5.49	20.55	38.45	-17.90	22.70	40.61	-17.91
836.50	10	QPSK	H	212	282	1 / 0	16.84	5.14	19.83	38.45	-18.62	21.98	40.61	-18.63
844.00	10	QPSK	H	214	293	1 / 0	16.27	4.70	18.82	38.45	-19.63	20.97	40.61	-19.63
829.00	10	16-QAM	H	220	297	1 / 0	15.57	5.49	18.91	38.45	-19.54	21.06	40.61	-19.55
836.50	10	16-QAM	H	212	282	1 / 0	16.11	5.14	19.10	38.45	-19.35	21.25	40.61	-19.36
844.00	10	16-QAM	H	214	293	1 / 0	15.25	4.70	17.80	38.45	-20.65	19.95	40.61	-20.65
824.70	1	QPSK	V	145	248	1 / 0	10.76	5.51	14.12	38.45	-24.33	16.27	40.61	-24.34

Table 7-199. ERP/EIRP 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 Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	351	3 / 2	21.40	5.56	26.96	30.00	-3.04
1745.00	1.4	QPSK	H	150	351	3 / 2	21.48	5.32	26.80	30.00	-3.20
1779.30	1.4	QPSK	H	150	355	3 / 2	21.03	5.09	26.12	30.00	-3.88
1710.70	1.4	16-QAM	H	150	351	3 / 2	20.38	5.56	25.94	30.00	-4.06
1711.50	3	QPSK	H	150	356	1 / 14	21.40	5.55	26.95	30.00	-3.05
1745.00	3	QPSK	H	150	342	1 / 0	21.62	5.32	26.94	30.00	-3.06
1778.50	3	QPSK	H	150	348	1 / 14	20.59	5.10	25.69	30.00	-4.31
1745.00	3	16-QAM	H	150	342	1 / 14	20.80	5.32	26.12	30.00	-3.88
1712.50	5	QPSK	H	150	354	1 / 24	21.40	5.55	26.95	30.00	-3.05
1745.00	5	QPSK	H	150	357	1 / 0	21.47	5.32	26.79	30.00	-3.21
1777.50	5	QPSK	H	150	353	1 / 0	20.97	5.10	26.07	30.00	-3.93
1712.50	5	16-QAM	H	150	354	1 / 0	20.70	5.55	26.25	30.00	-3.75
1715.00	10	QPSK	H	150	353	1 / 49	21.40	5.53	26.93	30.00	-3.07
1745.00	10	QPSK	H	150	353	1 / 0	21.55	5.32	26.87	30.00	-3.13
1775.00	10	QPSK	H	150	353	1 / 0	21.40	5.12	26.52	30.00	-3.48
1715.00	10	16-QAM	H	150	353	1 / 49	20.41	5.53	25.94	30.00	-4.06
1717.50	15	QPSK	H	150	353	1 / 0	21.40	5.51	26.91	30.00	-3.09
1745.00	15	QPSK	H	150	346	1 / 0	21.20	5.32	26.52	30.00	-3.48
1772.50	15	QPSK	H	150	348	1 / 0	21.10	5.14	26.24	30.00	-3.76
1717.50	15	16-QAM	H	150	353	1 / 0	20.40	5.51	25.91	30.00	-4.09
1720.00	20	QPSK	H	150	350	1 / 99	21.48	5.49	26.97	30.00	-3.03
1745.00	20	QPSK	H	150	355	1 / 0	21.65	5.32	26.97	30.00	-3.03
1770.00	20	QPSK	H	150	354	1 / 0	21.42	5.15	26.57	30.00	-3.43
1745.00	20	16-QAM	H	150	355	1 / 0	20.86	5.32	26.18	30.00	-3.82
1720.00	20	QPSK	V	150	269	1 / 99	21.00	5.27	26.27	30.00	-3.73

Table 7-200. EIRP Data (Band 66/4)

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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 Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	150	234	3 / 2	19.04	4.79	23.83	33.01	-9.18
1880.00	1.4	QPSK	V	150	265	3 / 2	20.76	4.84	25.60	33.01	-7.41
1909.30	1.4	QPSK	V	150	233	1 / 0	18.52	4.86	23.38	33.01	-9.63
1880.00	1.4	16-QAM	V	150	265	1 / 5	19.68	4.84	24.52	33.01	-8.49
1851.50	3	QPSK	V	150	269	1 / 14	20.78	4.79	25.57	33.01	-7.44
1880.00	3	QPSK	V	150	265	1 / 0	20.60	4.84	25.44	33.01	-7.57
1908.50	3	QPSK	V	150	268	1 / 0	21.09	4.86	25.95	33.01	-7.06
1851.50	3	16-QAM	V	150	269	1 / 0	20.00	4.79	24.79	33.01	-8.22
1852.50	5	QPSK	V	150	265	1 / 0	21.00	4.79	25.79	33.01	-7.22
1880.00	5	QPSK	V	150	273	1 / 0	20.48	4.84	25.32	33.01	-7.69
1907.50	5	QPSK	V	150	269	1 / 24	20.89	4.87	25.76	33.01	-7.25
1907.50	5	16-QAM	V	150	269	1 / 0	20.27	4.87	25.14	33.01	-7.87
1855.00	10	QPSK	V	150	265	1 / 0	21.08	4.80	25.88	33.01	-7.13
1880.00	10	QPSK	V	150	234	1 / 0	20.56	4.84	25.40	33.01	-7.61
1905.00	10	QPSK	V	150	236	1 / 49	20.38	4.87	25.25	33.01	-7.76
1855.00	10	16-QAM	V	150	265	1 / 0	20.56	4.80	25.36	33.01	-7.65
1857.50	15	QPSK	V	150	265	1 / 0	21.09	4.80	25.89	33.01	-7.12
1880.00	15	QPSK	V	150	256	1 / 0	20.17	4.84	25.01	33.01	-8.00
1902.50	15	QPSK	V	150	256	1 / 74	19.68	4.88	24.56	33.01	-8.45
1857.50	15	16-QAM	V	150	265	1 / 0	19.96	4.80	24.76	33.01	-8.25
1860.00	20	QPSK	V	150	258	1 / 0	21.25	4.81	26.06	33.01	-6.96
1880.00	20	QPSK	V	150	266	1 / 0	20.69	4.84	25.53	33.01	-7.48
1900.00	20	QPSK	V	150	264	1 / 99	20.80	4.88	25.68	33.01	-7.33
1860.00	20	16-QAM	V	150	258	1 / 0	19.97	4.81	24.78	33.01	-8.24
1860.00	20	QPSK	H	150	321	1 / 0	20.78	4.84	25.62	33.01	-7.39

Table 7-201. EIRP Data (Band 2)

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7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(a)(4) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – 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.

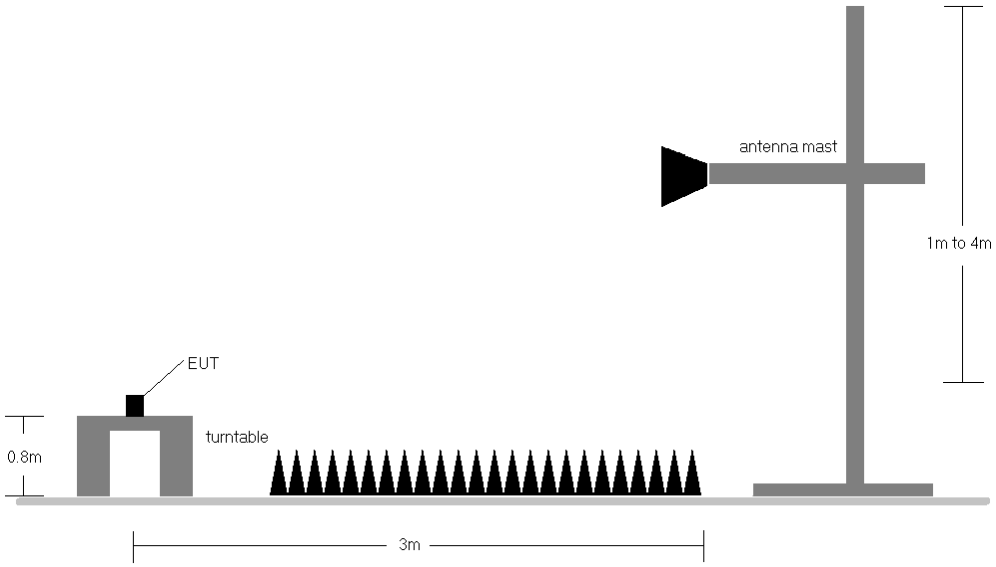

Figure 7-7. Test Instrument & Measurement Setup

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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OPERATING FREQUENCY:	701.50	MHz
CHANNEL:	23035	
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]
1403.00	H	156	30	-66.83	7.75	-59.08	-46.1
2104.50	H	132	19	-67.12	8.82	-58.30	-45.3
2806.00	H	-	-	-74.96	10.07	-64.89	-51.9

Table 7-202. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz
CHANNEL:	23095	
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]
1415.00	H	157	29	-66.34	7.84	-58.49	-45.5
2122.50	H	128	32	-67.62	8.90	-58.73	-45.7
2830.00	H	-	-	-74.72	10.05	-64.67	-51.7

Table 7-203. Radiated Spurious Data (Band 12 – Mid Channel)

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OPERATING FREQUENCY:	713.50	MHz
CHANNEL:	23155	
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]
1427.00	H	110	14	-67.88	7.94	-59.94	-46.9
2140.50	H	277	23	-66.67	8.97	-57.70	-44.7
2854.00	H	-	-	-74.49	10.03	-64.46	-51.5

Table 7-204. Radiated Spurious Data (Band 12 – High Channel)

OPERATING FREQUENCY:	824.70	MHz
CHANNEL:	20407	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1649.40	H	124	25	-65.54	8.85	-56.69	-43.7
2474.10	H	136	13	-64.60	9.67	-54.93	-41.9
3298.80	H	-	-	-71.43	9.51	-61.91	-48.9

Table 7-205. Radiated Spurious Data (Band 5 – Low Channel)

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OPERATING FREQUENCY:	836.50	MHz
CHANNEL:	20525	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	122	25	-60.35	8.85	-51.51	-38.5
2509.50	H	248	34	-66.54	9.78	-56.76	-43.8
3346.00	H	-	-	-72.15	9.66	-62.49	-49.5

Table 7-206. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	848.30	MHz
CHANNEL:	20643	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1696.60	H	121	23	-62.85	8.85	-54.00	-41.0
2544.90	H	26	198	-66.61	9.75	-56.87	-43.9
3393.20	H	-	-	-71.90	9.82	-62.08	-49.1

Table 7-207. Radiated Spurious Data (Band 5 – High Channel)

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OPERATING FREQUENCY:	1720.00	MHz
CHANNEL:	132072	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	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]
3440.00	H	190	291	-57.63	9.88	-47.74	-34.7
5160.00	H	-	-	-68.73	10.75	-57.97	-45.0

Table 7-208. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
CHANNEL:	132322	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	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	H	186	339	-61.66	9.94	-51.72	-38.7
5235.00	H	-	-	-68.59	10.72	-57.86	-44.9

Table 7-209. Radiated Spurious Data (Band 66/4 – Mid Channel)

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OPERATING FREQUENCY:	1770.00	MHz
CHANNEL:	132572	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	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]
3540.00	H	181	337	-60.78	9.96	-50.82	-37.8
5310.00	H	-	-	-69.05	10.69	-58.36	-45.4

Table 7-210. Radiated Spurious Data (Band 66/4 – High Channel)

OPERATING FREQUENCY:	1860.00	MHz
CHANNEL:	18700	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	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]
3720.00	H	180	174	-66.72	9.48	-57.23	-44.2
5580.00	H	-	-	-67.12	11.11	-56.01	-43.0

Table 7-211. Radiated Spurious Data (Band 2 – Low Channel)

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OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	18900	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	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	-	-	-67.84	9.39	-58.46	-45.5
5640.00	H	-	-	-67.14	11.22	-55.92	-42.9

Table 7-212. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1900.00	MHz
CHANNEL:	19100	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	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]
3800.00	H	203	193	-65.71	9.29	-56.42	-43.4
5700.00	H	-	-	-67.00	11.29	-55.72	-42.7

Table 7-213. Radiated Spurious Data (Band 2 – High Channel)

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7.8 Frequency Stability / Temperature Variation

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

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, RSS-132 and RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, RSS-130, RSS-139 and RSS-199, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-D-2010

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
§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,841	-159	-0.0000225
100 %		- 30	707,499,805	-195	-0.0000276
100 %		- 20	707,499,998	-2	-0.0000003
100 %		- 10	707,499,862	-138	-0.0000195
100 %		0	707,499,985	-15	-0.0000022
100 %		+ 10	707,499,828	-172	-0.0000243
100 %		+ 20	707,499,810	-190	-0.0000269
100 %		+ 30	707,499,854	-146	-0.0000206
100 %		+ 40	707,499,953	-47	-0.0000066
100 %		+ 50	707,499,831	-169	-0.0000239
BATT. ENDPOINT	3.45	+ 20	707,499,849	-151	-0.0000213

Table 7-214. 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

§2.1055 §27.54 RSS-130(4.3)

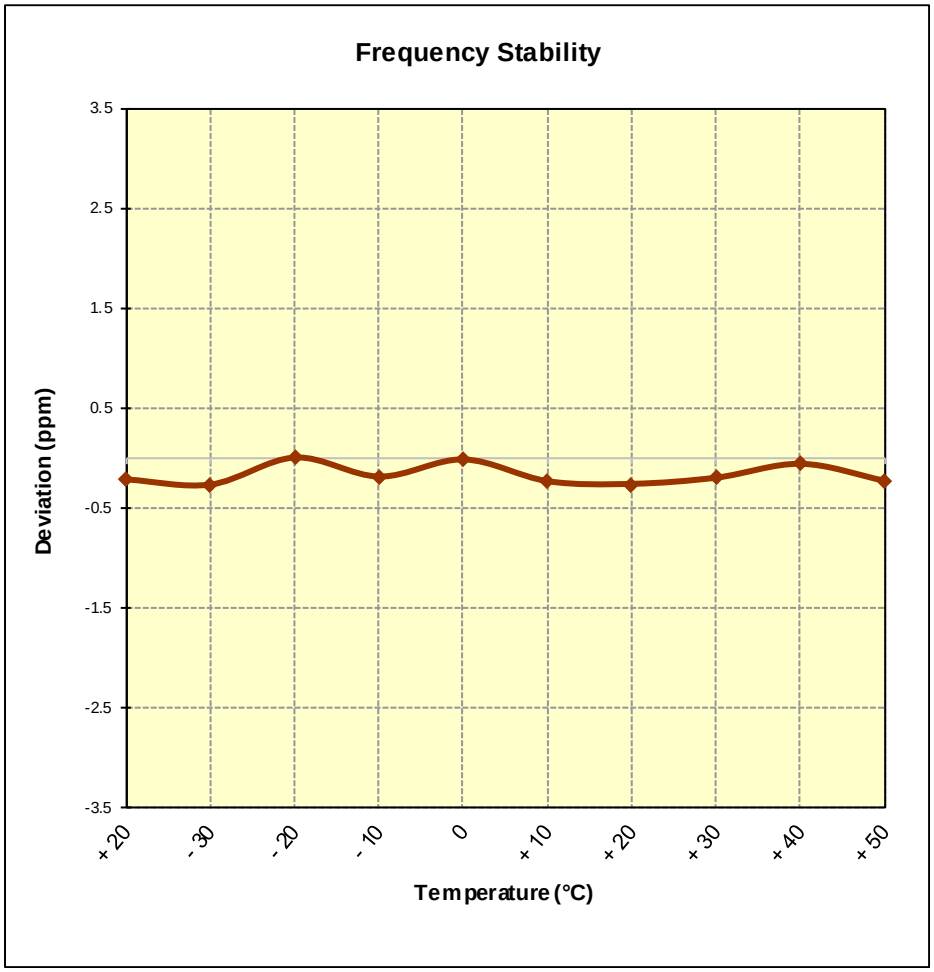

Figure 7-8. Frequency Stability Graph (Band 12)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY: 836,500,000 Hz

CHANNEL: 20525

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,499,877	-123	-0.0000148
100 %		- 30	836,499,863	-137	-0.0000164
100 %		- 20	836,499,955	-45	-0.0000054
100 %		- 10	836,499,820	-180	-0.0000215
100 %		0	836,499,827	-173	-0.0000207
100 %		+ 10	836,499,907	-93	-0.0000111
100 %		+ 20	836,499,916	-84	-0.0000101
100 %		+ 30	836,499,800	-200	-0.0000239
100 %		+ 40	836,499,975	-25	-0.0000029
100 %		+ 50	836,499,910	-90	-0.0000107
BATT. ENDPOINT	3.45	+ 20	836,499,882	-118	-0.0000141

Table 7-215. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

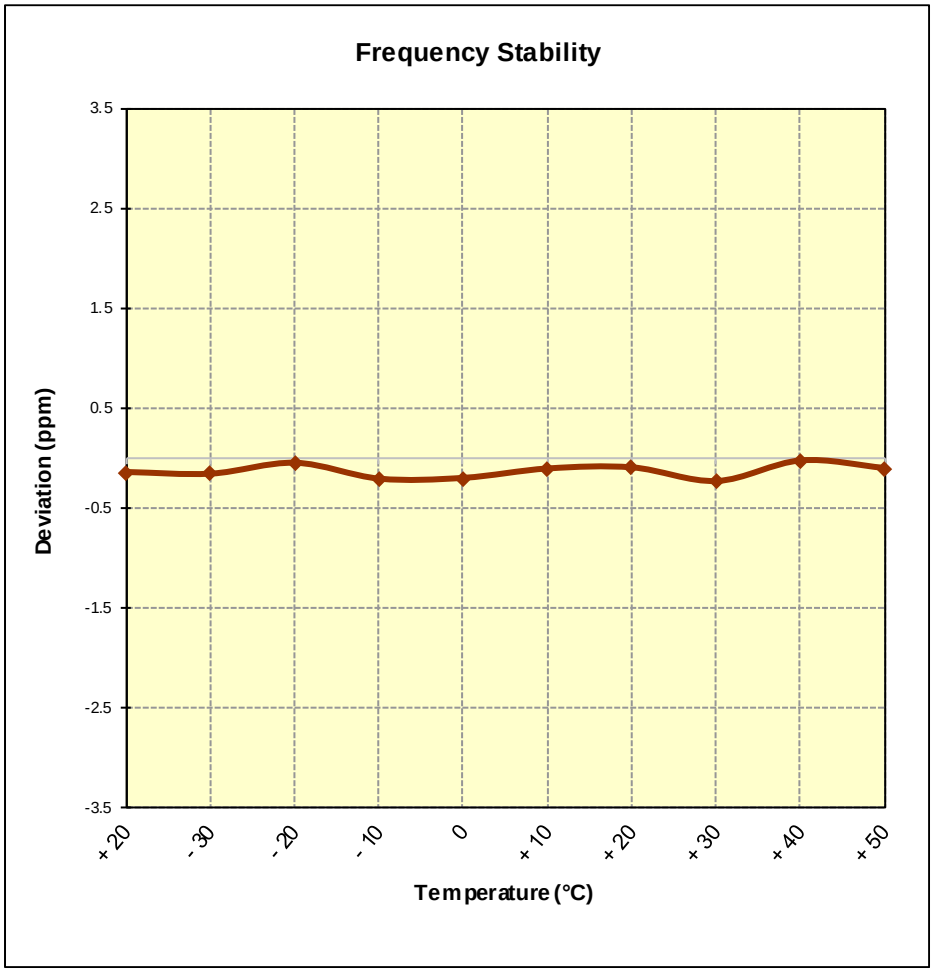

Figure 7-9. Frequency Stability Graph (Band 5)

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Band 66 Frequency Stability Measurements
§2.1055 §§27.54 RSS-139(6.4)

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,997	-3	-0.0000002
100 %		- 30	1,744,999,985	-15	-0.0000009
100 %		- 20	1,744,999,952	-48	-0.0000027
100 %		- 10	1,744,999,873	-127	-0.0000072
100 %		0	1,744,999,866	-134	-0.0000077
100 %		+ 10	1,744,999,812	-188	-0.0000108
100 %		+ 20	1,744,999,913	-87	-0.0000050
100 %		+ 30	1,744,999,921	-79	-0.0000045
100 %		+ 40	1,744,999,879	-121	-0.0000069
100 %		+ 50	1,744,999,801	-199	-0.0000114
BATT. ENDPOINT	3.45	+ 20	1,744,999,880	-120	-0.0000069

Table 7-216. Frequency Stability Data (Band 66)

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 66 Frequency Stability Measurements

§2.1055 §§27.54 RSS-139(6.4)

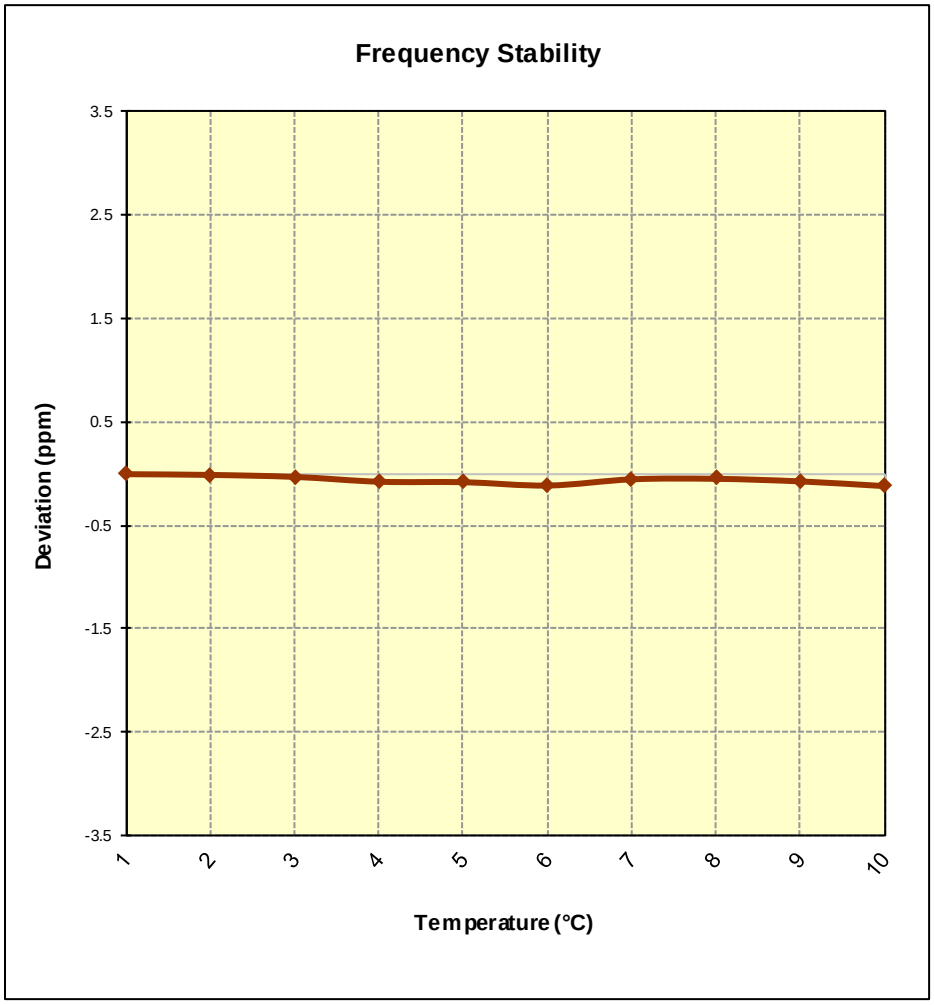

Figure 7-10. Frequency Stability Graph (Band 66)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,968	-32	-0.0000017
100 %		- 30	1,879,999,997	-3	-0.0000001
100 %		- 20	1,879,999,964	-36	-0.0000019
100 %		- 10	1,879,999,851	-149	-0.0000079
100 %		0	1,879,999,801	-199	-0.0000106
100 %		+ 10	1,879,999,963	-37	-0.0000019
100 %		+ 20	1,879,999,976	-24	-0.0000013
100 %		+ 30	1,879,999,829	-171	-0.0000091
100 %		+ 40	1,879,999,846	-154	-0.0000082
100 %		+ 50	1,879,999,943	-57	-0.0000030
BATT. ENDPOINT	3.45	+ 20	1,879,999,958	-42	-0.0000023

Table 7-217. Frequency Stability Data (Band 2)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

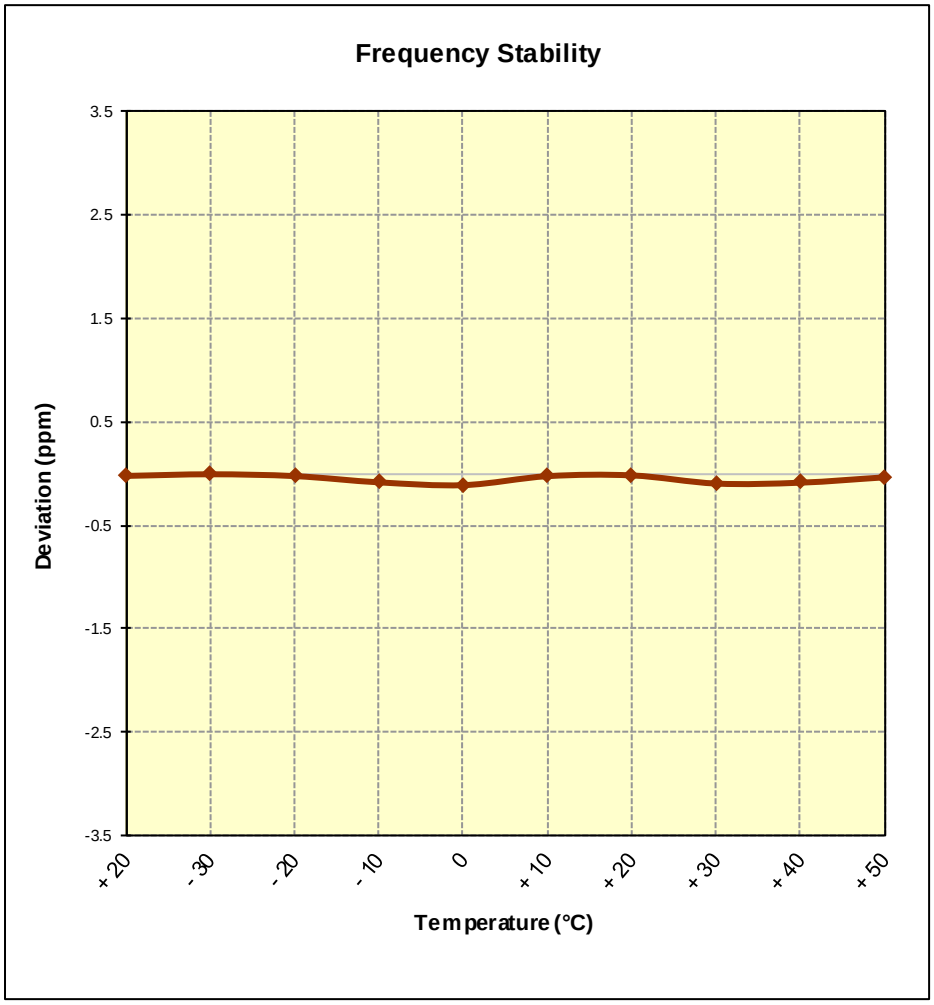

Figure 7-11. Frequency Stability Graph (Band 2)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFX210MA** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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