7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)

Test Overview

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

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

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

Test Procedure Used

KDB 971168 D01 v02r02 – 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.

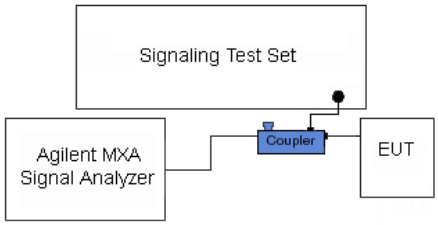


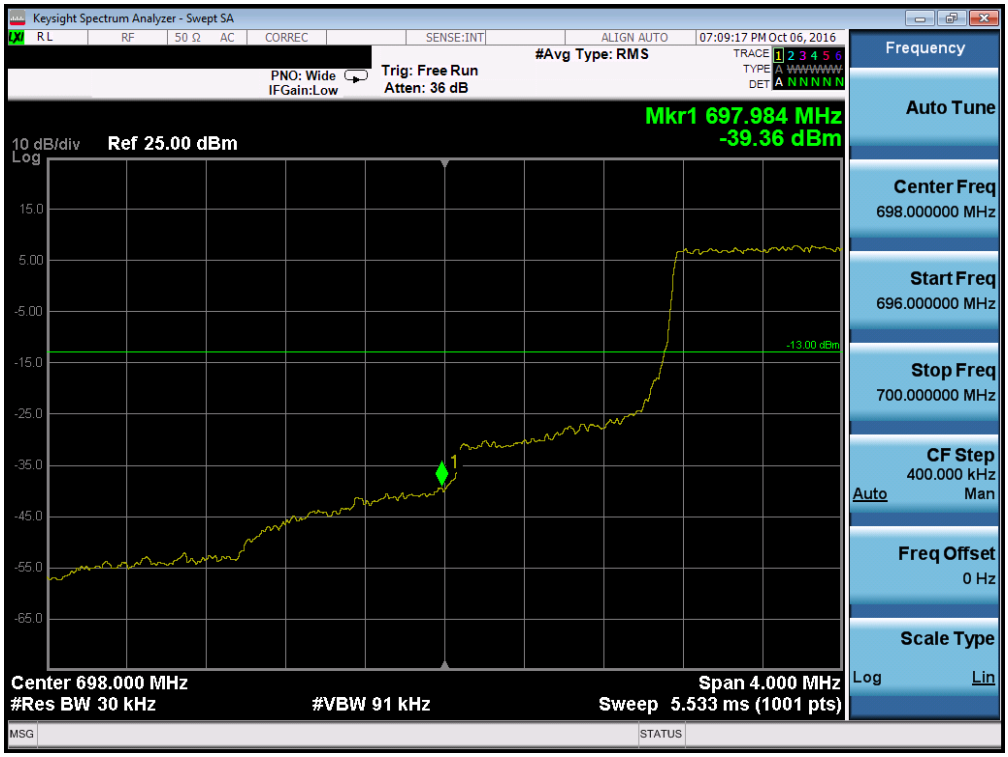
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

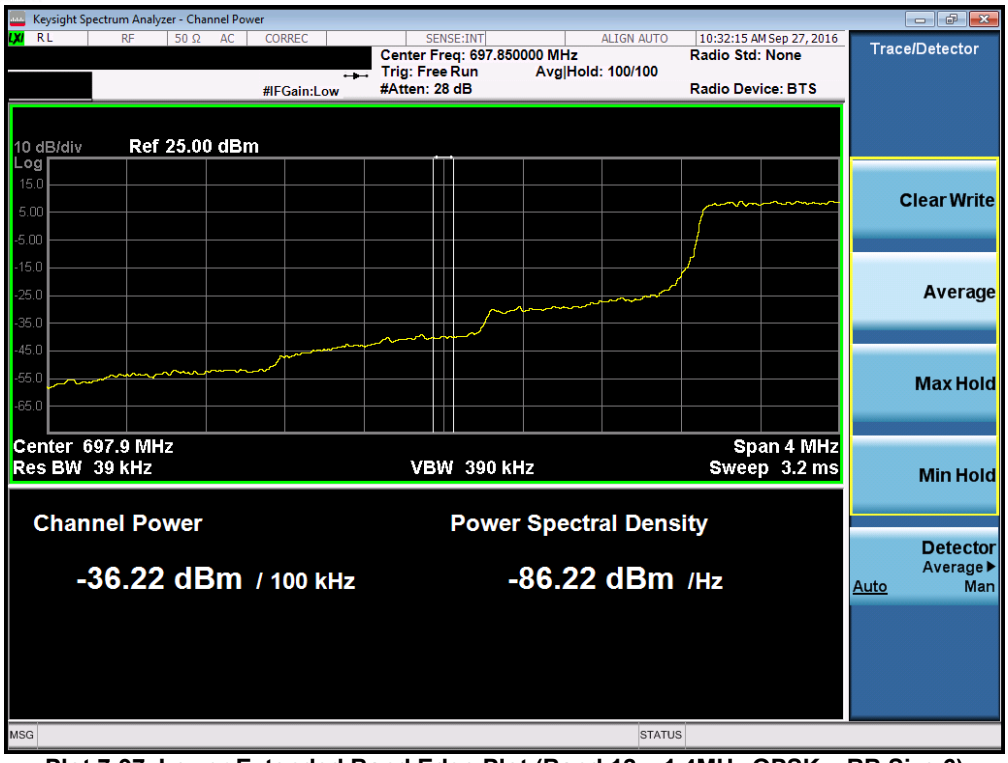
Per 22.917(b), 24.238(a), 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions 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.

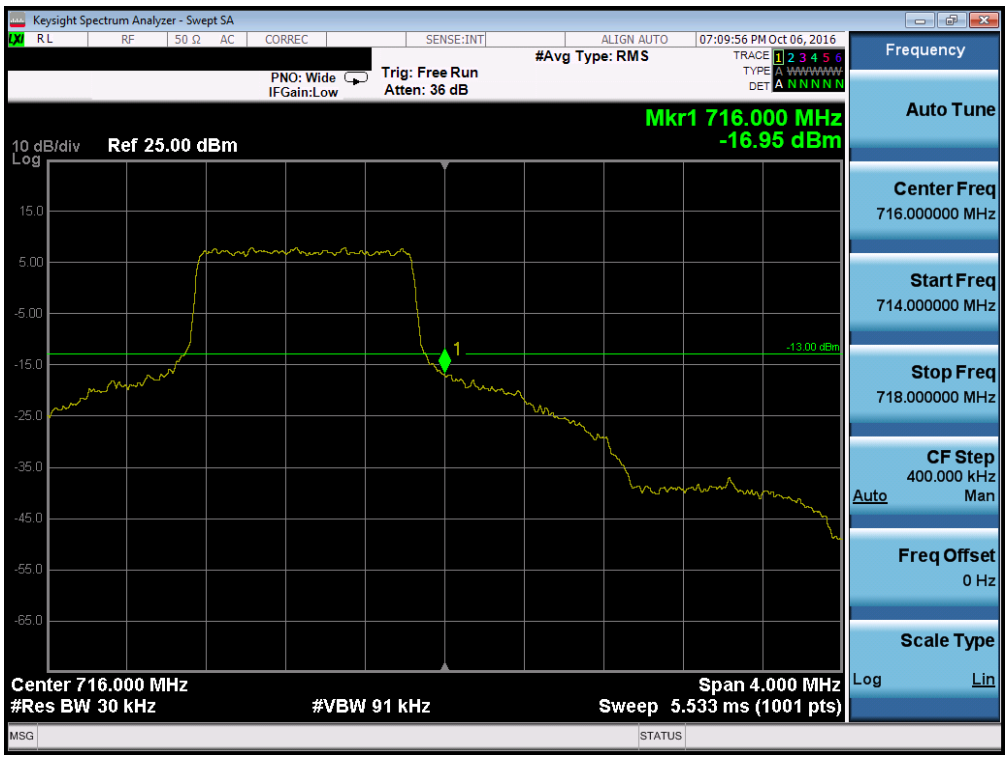
Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 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.



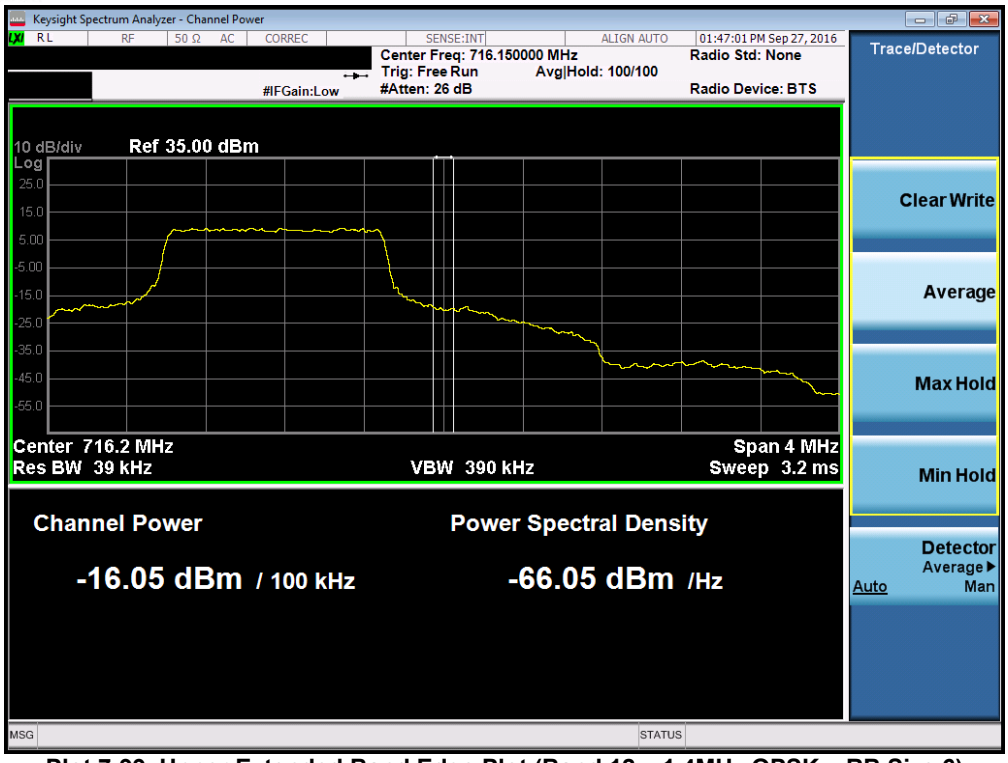
Plot 7-96. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



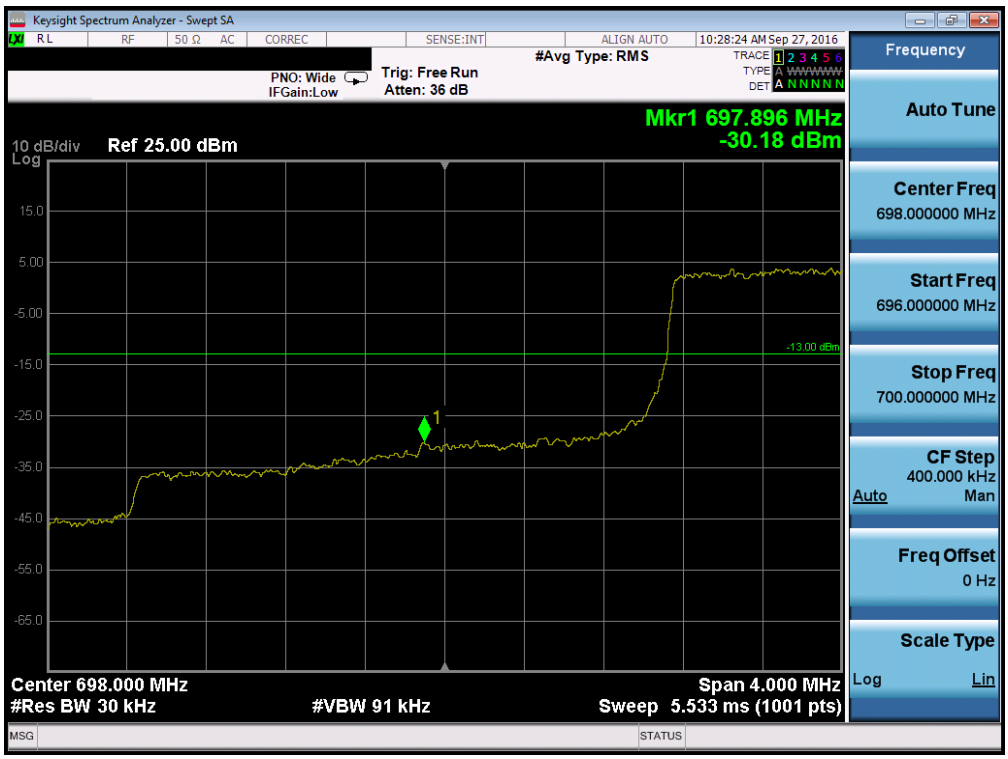
Plot 7-97. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-98. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



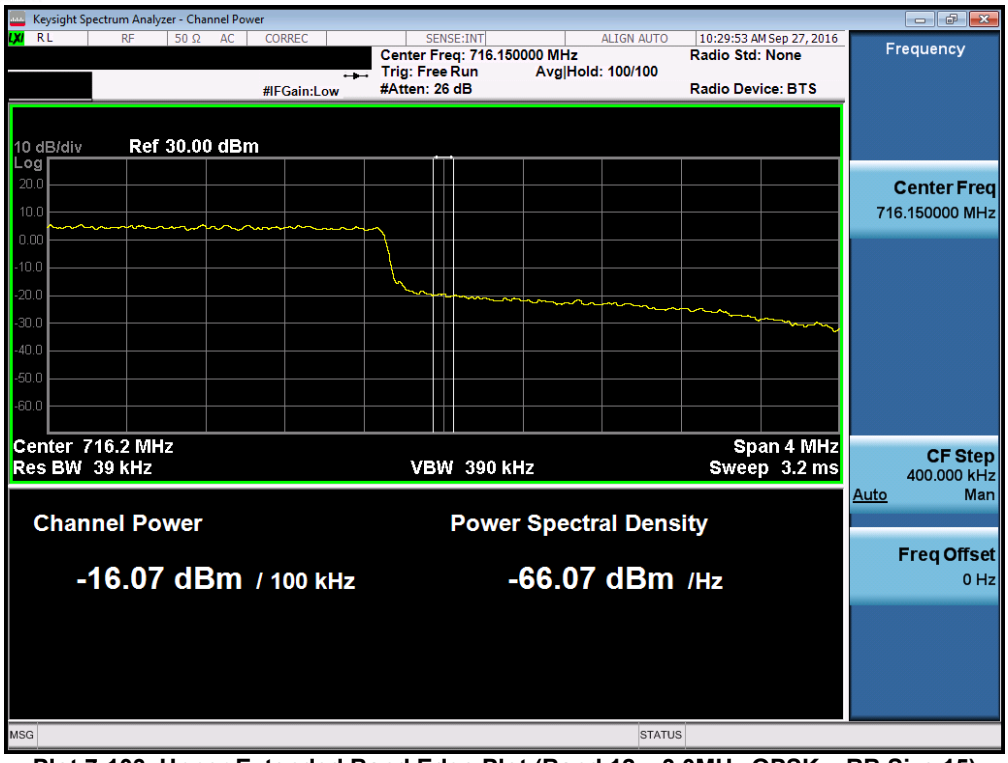
Plot 7-99. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



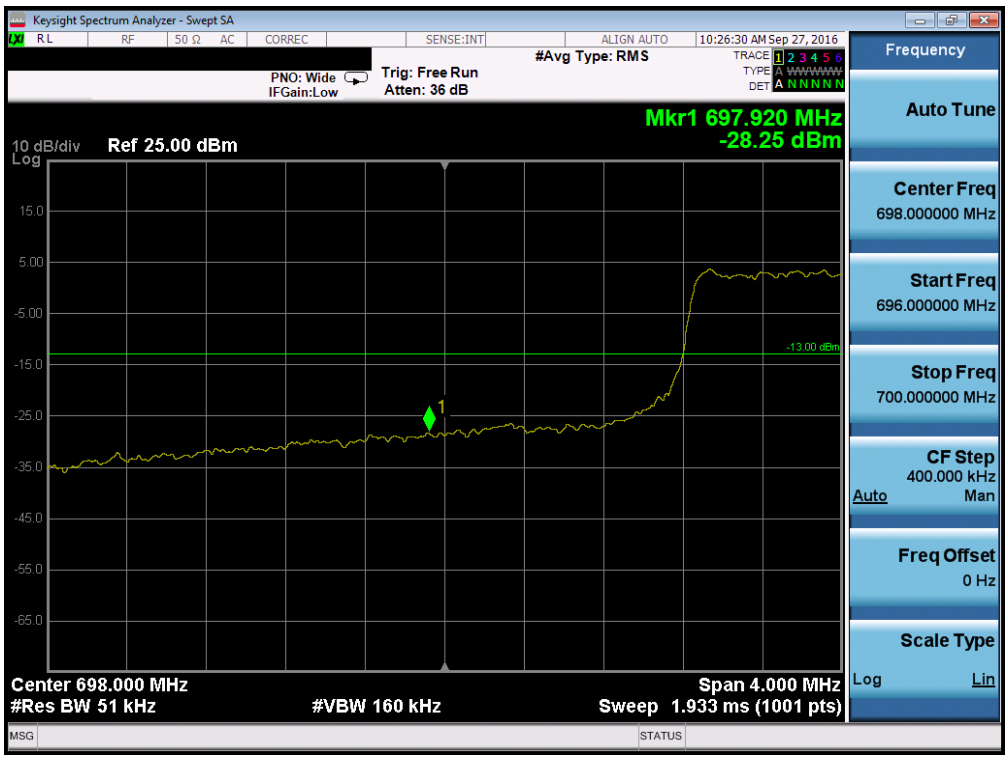
Plot 7-100. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

Plot 7-101. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

Plot 7-102. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

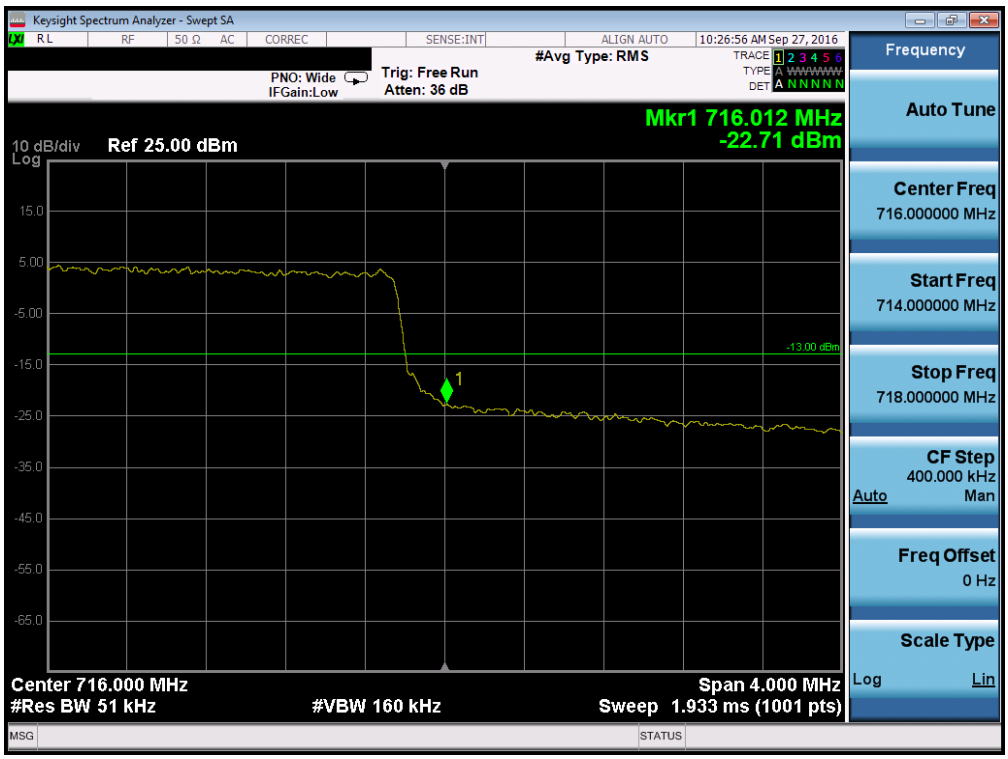


Plot 7-103. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



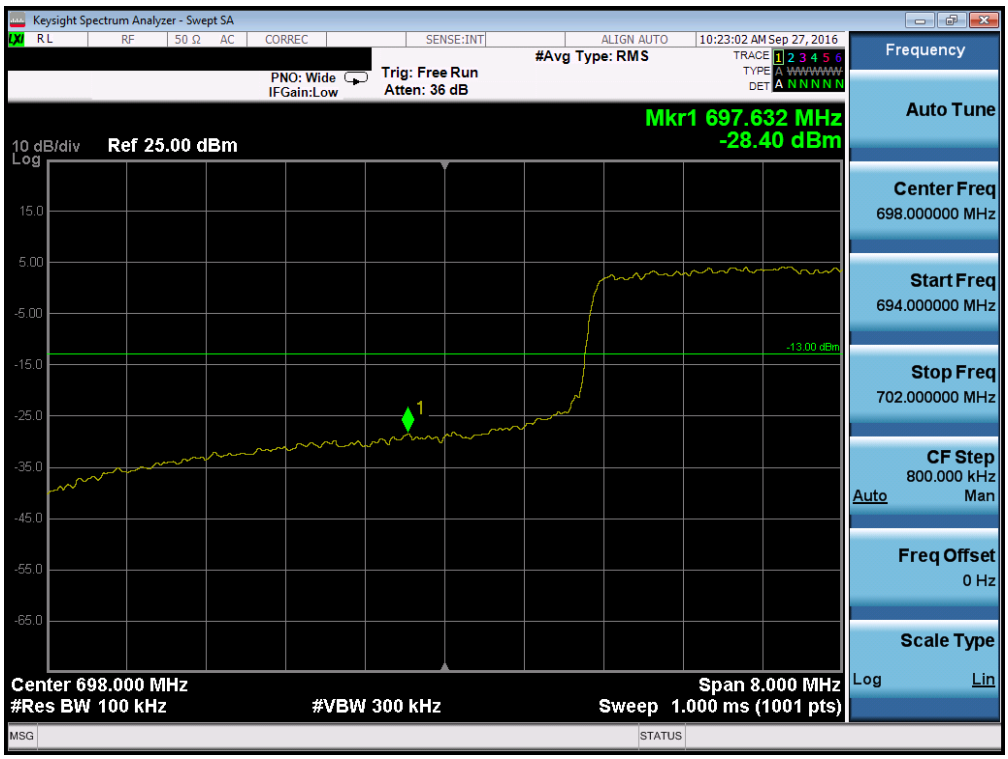
Plot 7-104. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

Plot 7-105. Lower Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-106. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

Plot 7-107. Upper Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-108. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

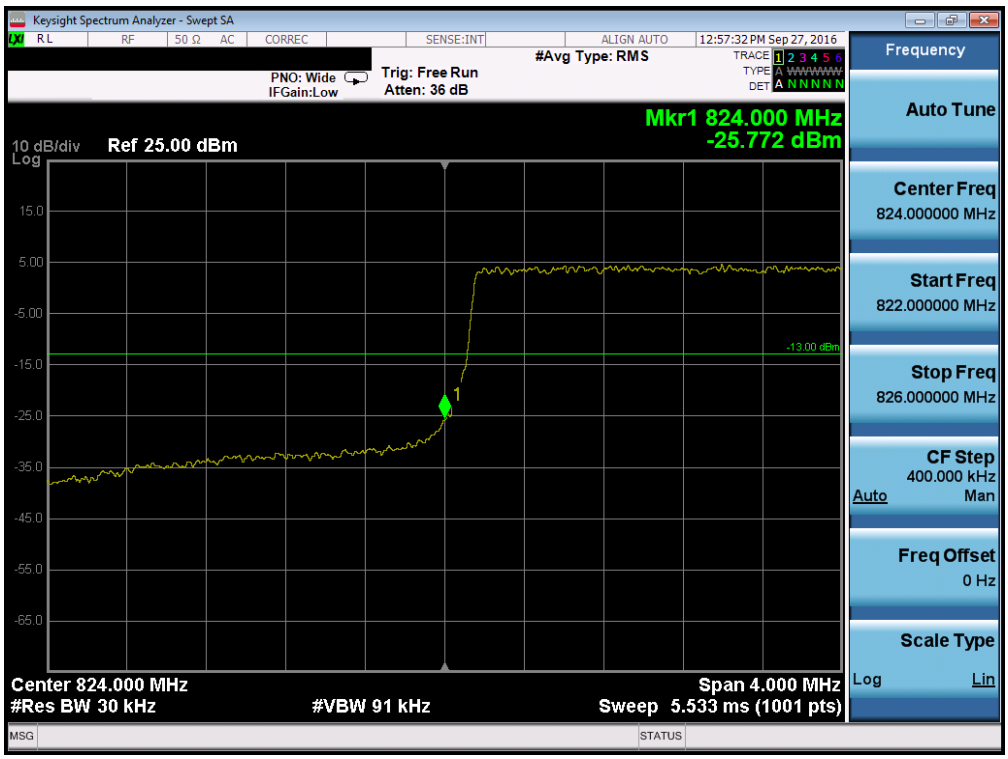
Plot 7-109. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

Plot 7-110. Lower Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

Plot 7-111. Lower Extended Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

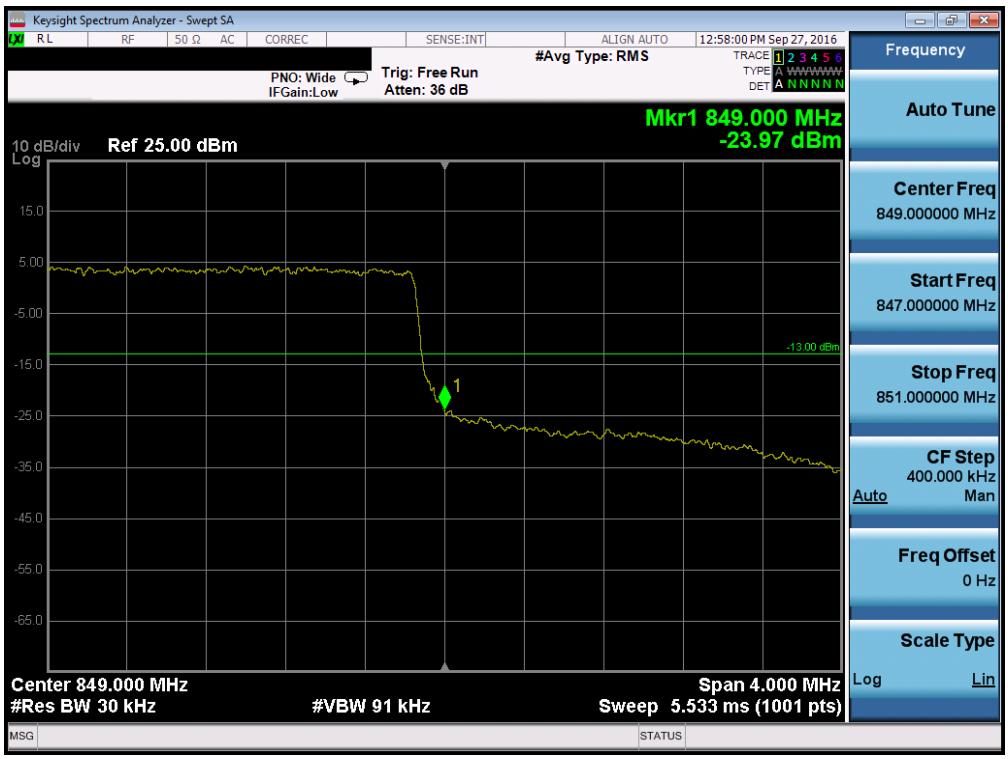
Plot 7-112. Upper Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)

Plot 7-113. Upper Extended Band Edge Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)



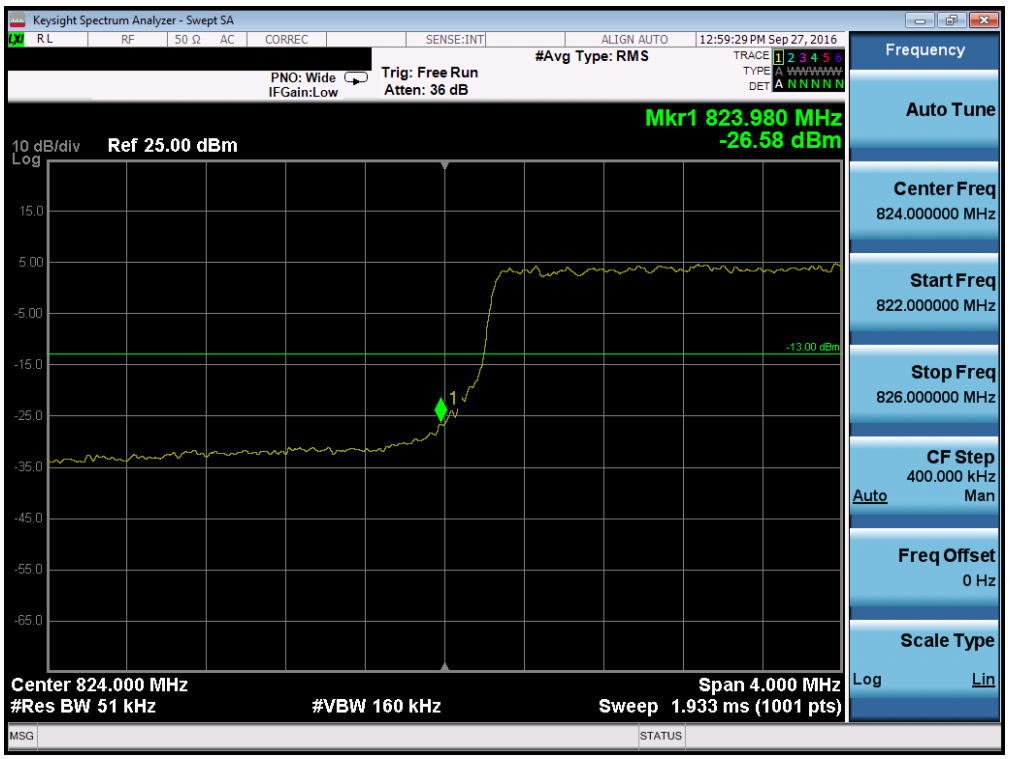
Plot 7-114. Lower Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

Plot 7-115. Lower Extended Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)



Plot 7-116. Upper Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

Plot 7-117. Upper Extended Band Edge Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

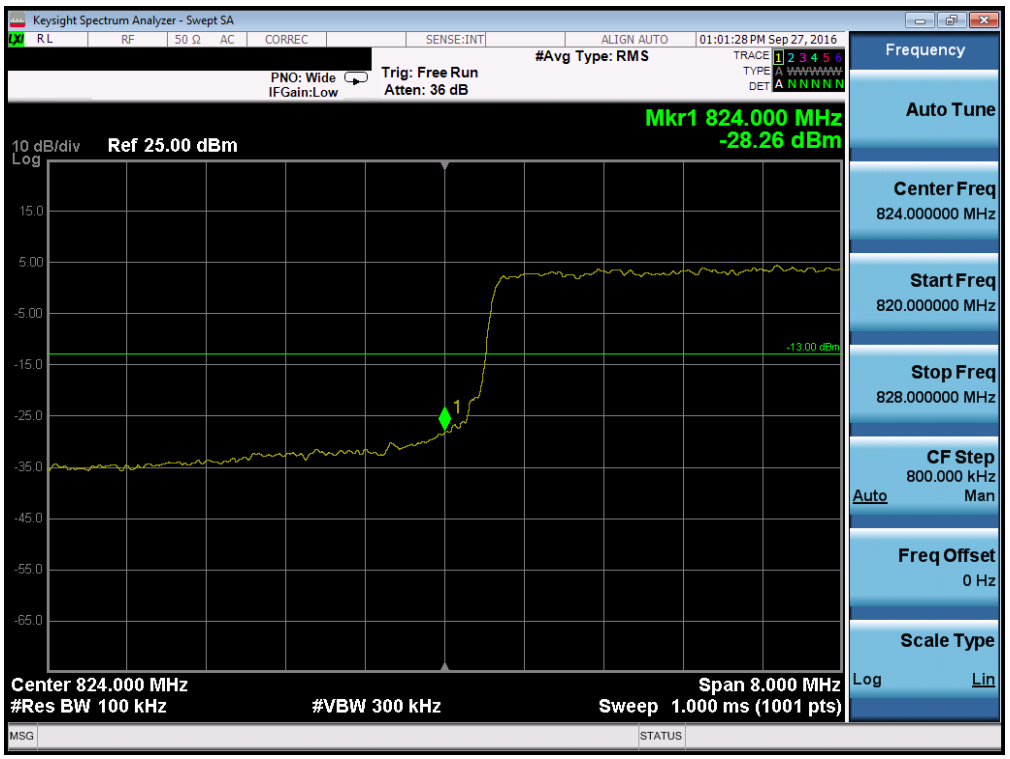


Plot 7-118. Lower Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

Plot 7-119. Lower Extended Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

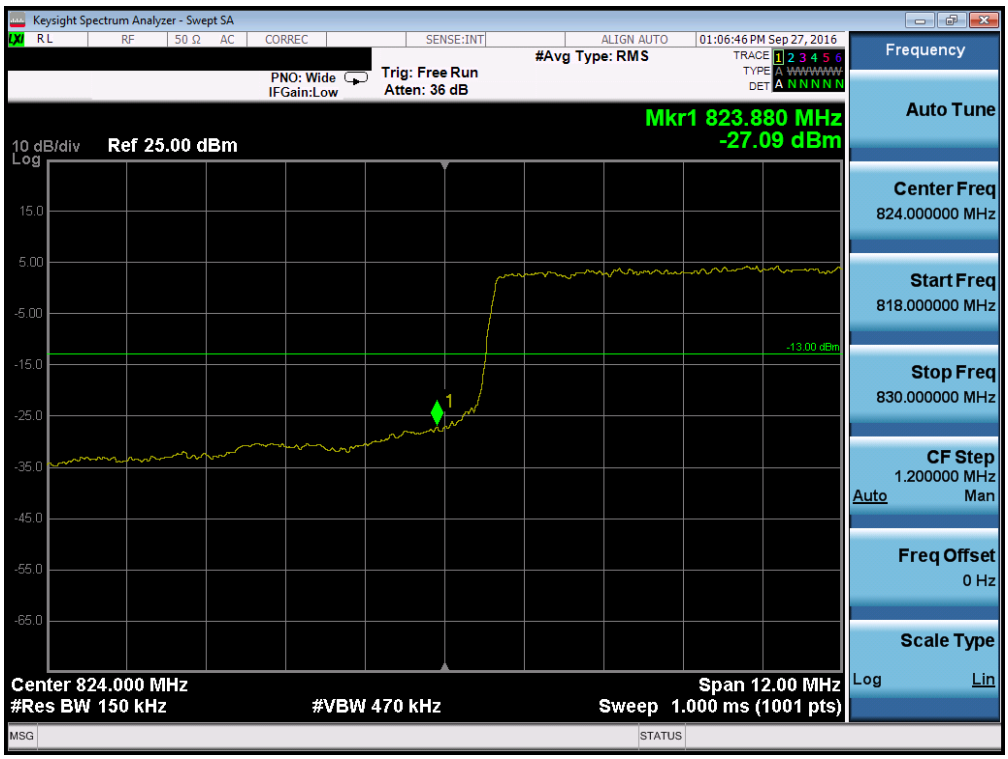
Plot 7-120. Upper Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

Plot 7-121. Upper Extended Band Edge Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)



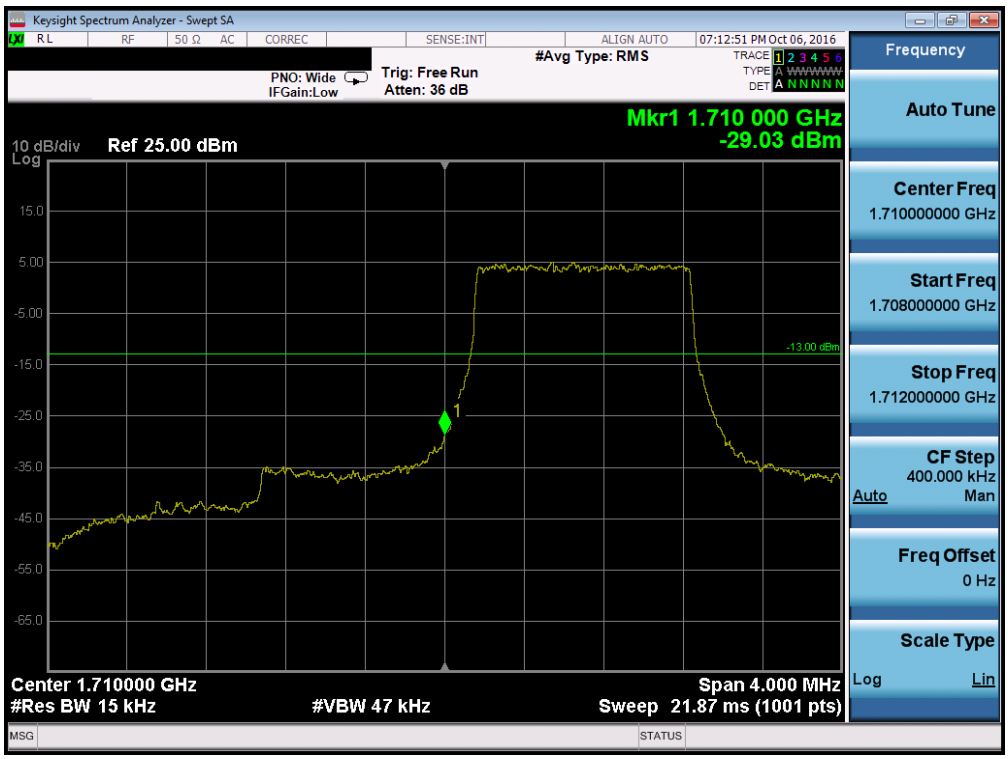
Plot 7-122. Lower Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

Plot 7-123. Upper Band Edge Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

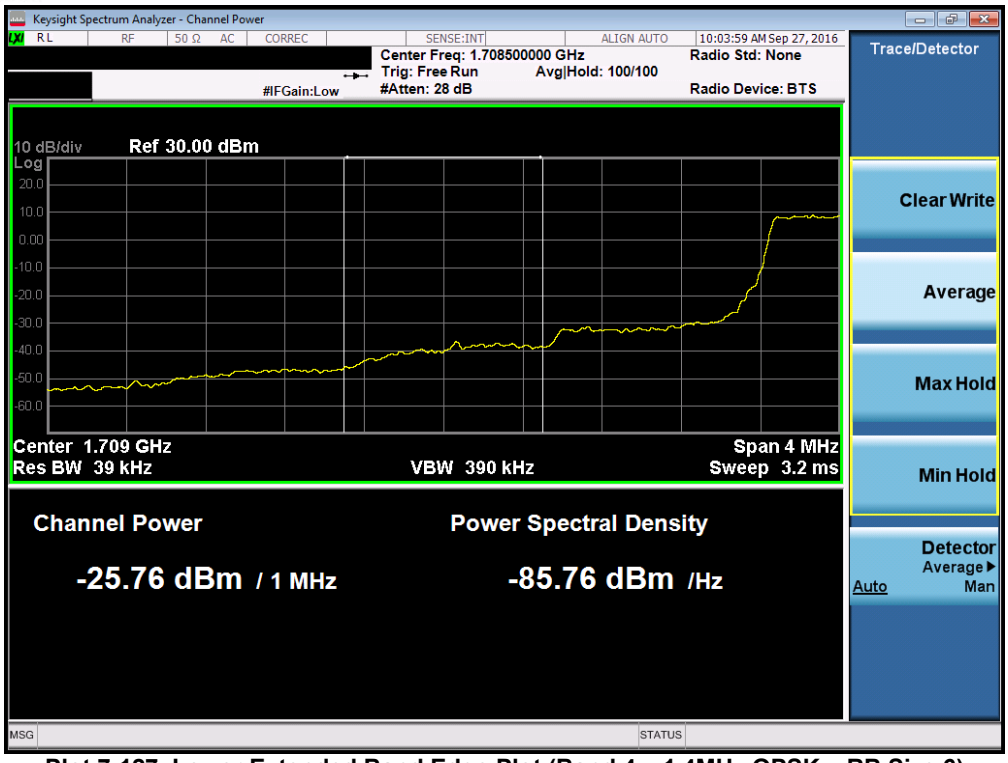


Plot 7-124. Lower Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)

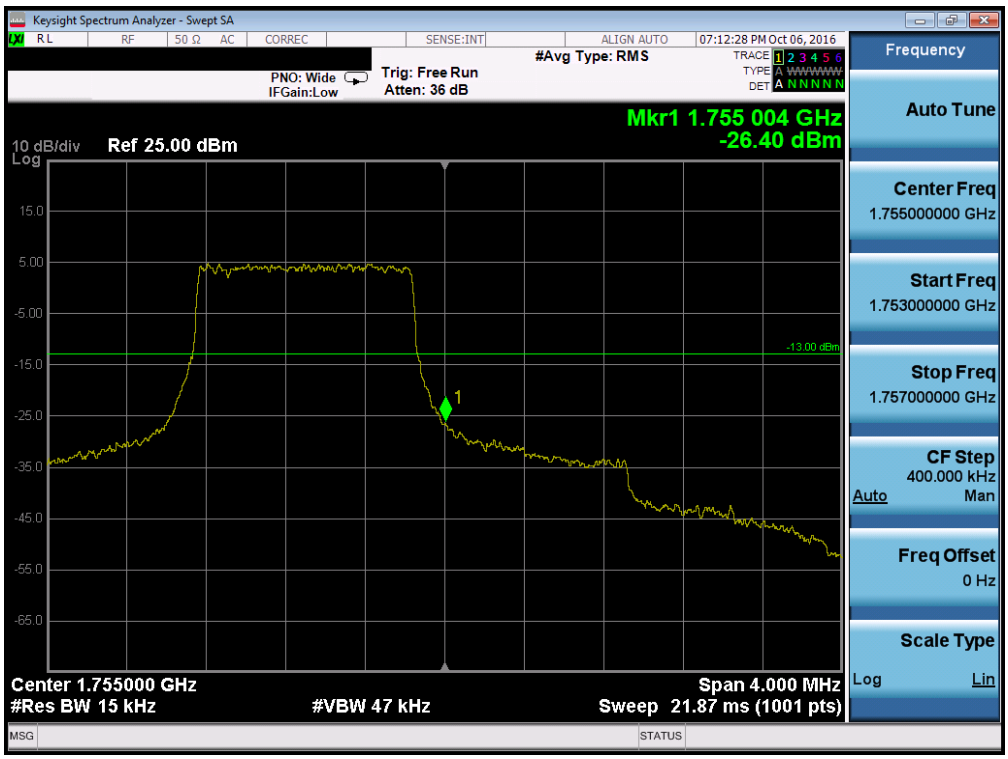
Plot 7-125. Upper Band Edge Plot (Band 26 – 15.0MHz QPSK – RB Size 75)



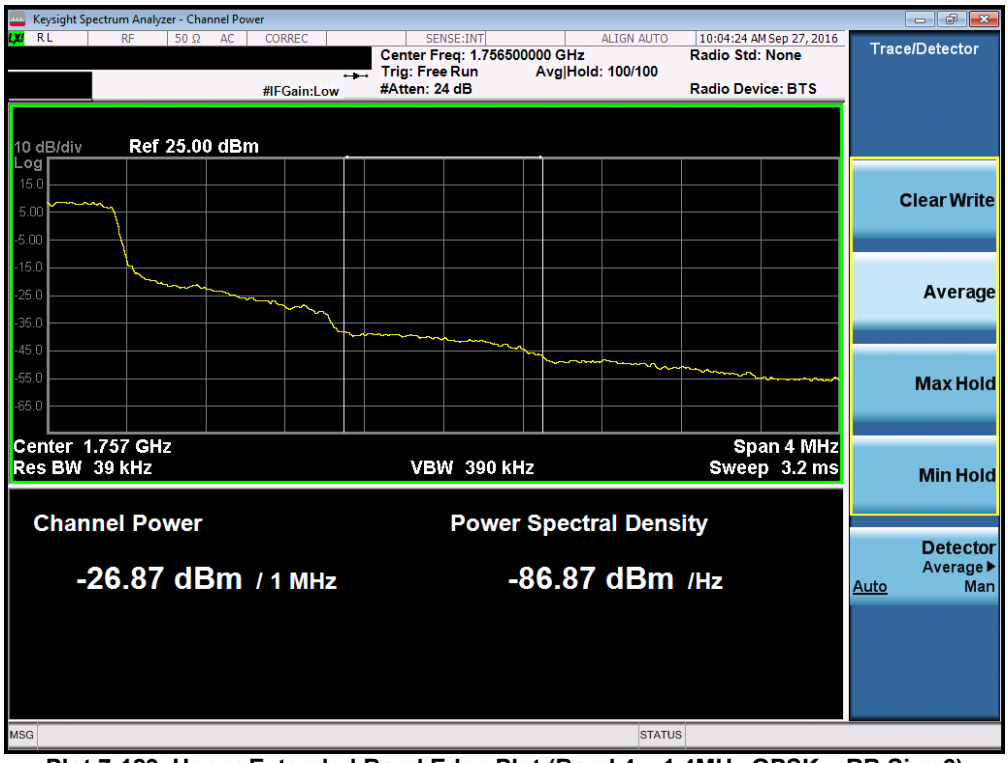
Plot 7-126. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



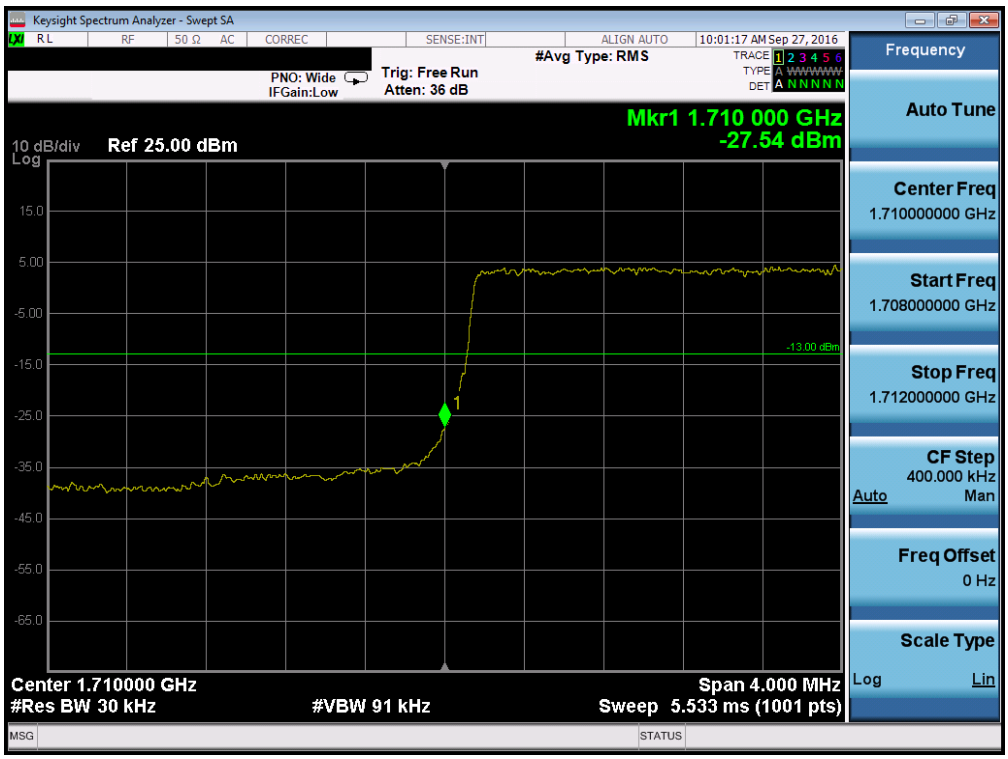
Plot 7-127. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



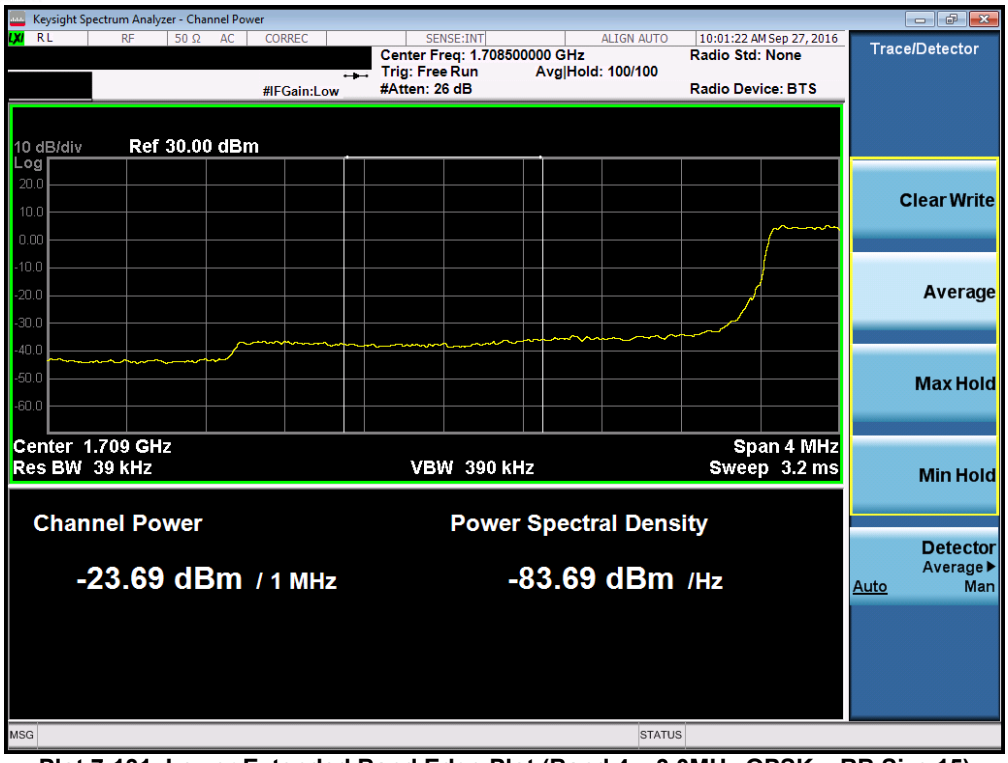
Plot 7-128. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



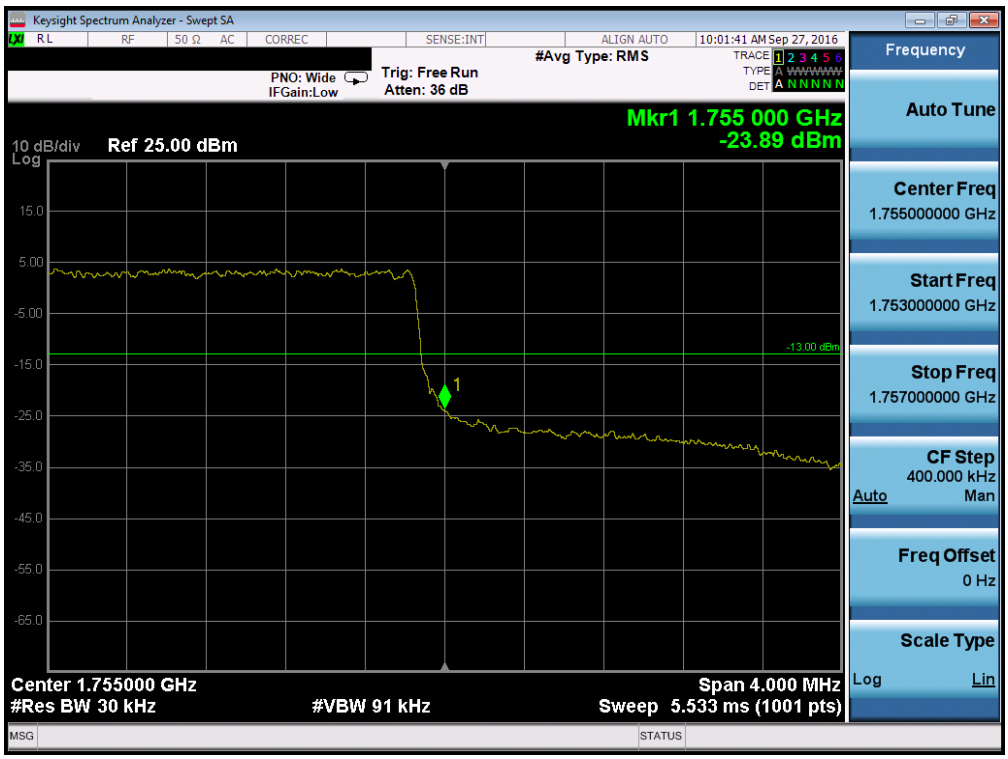
Plot 7-129. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



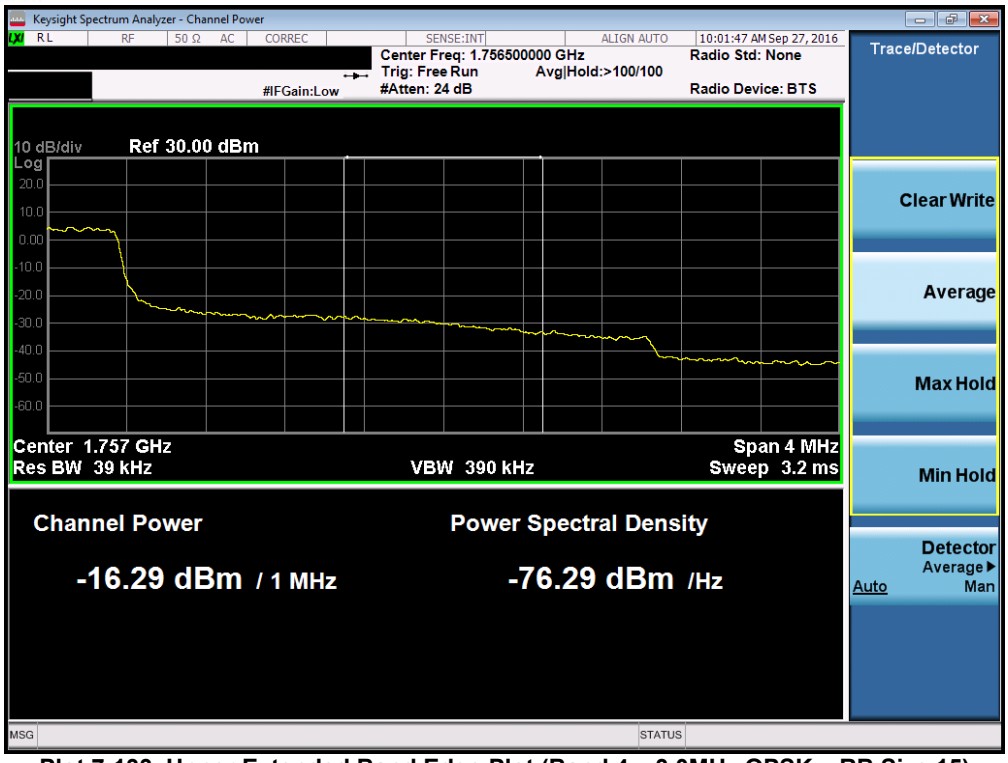
Plot 7-130. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



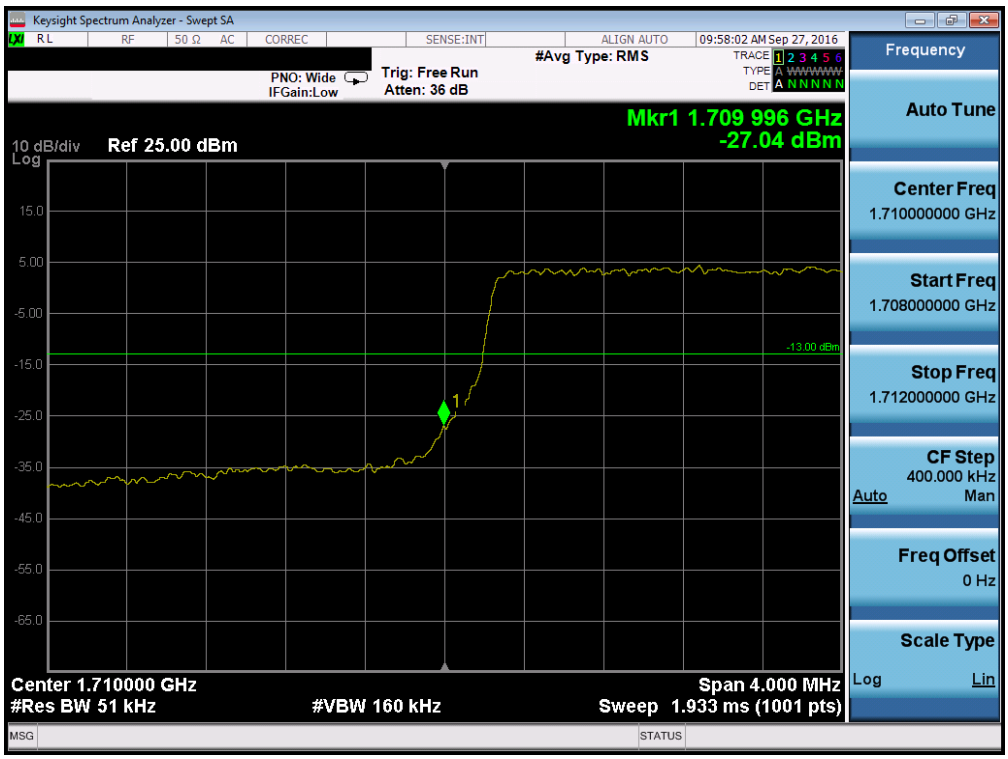
Plot 7-131. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



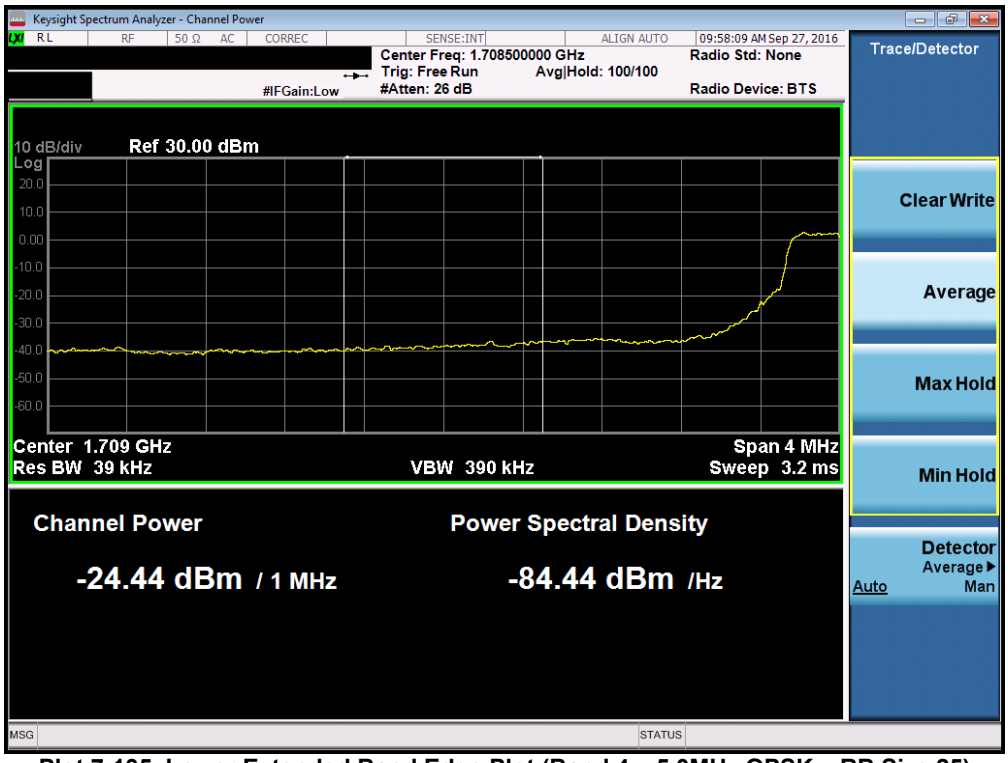
Plot 7-132. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 7-133. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

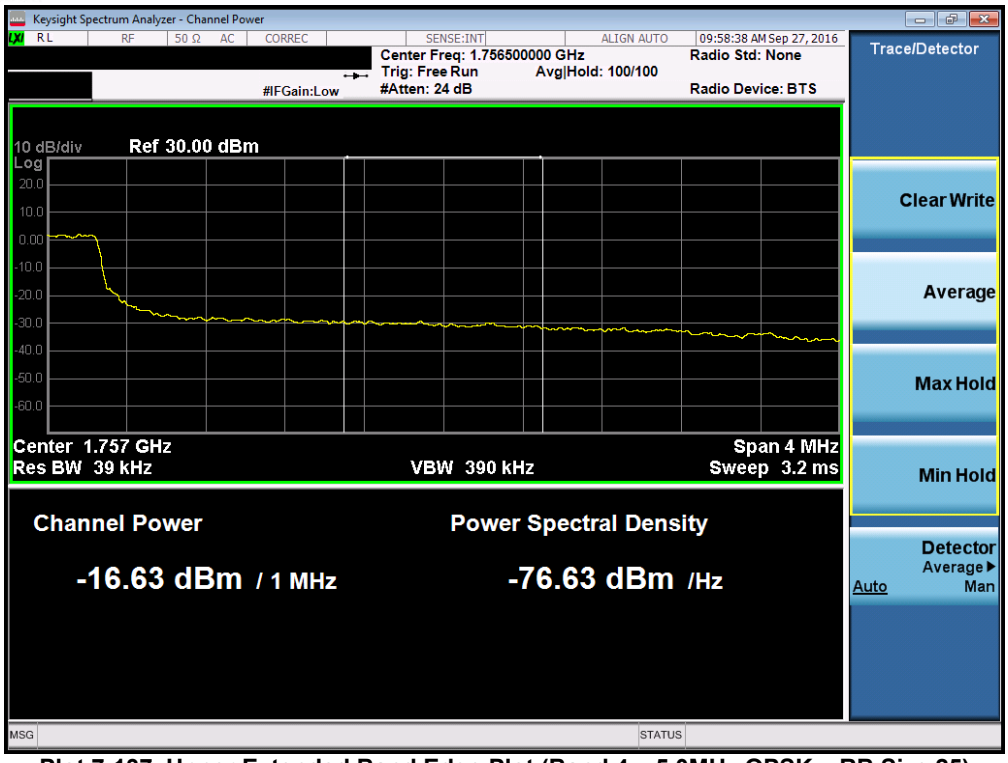


Plot 7-134. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

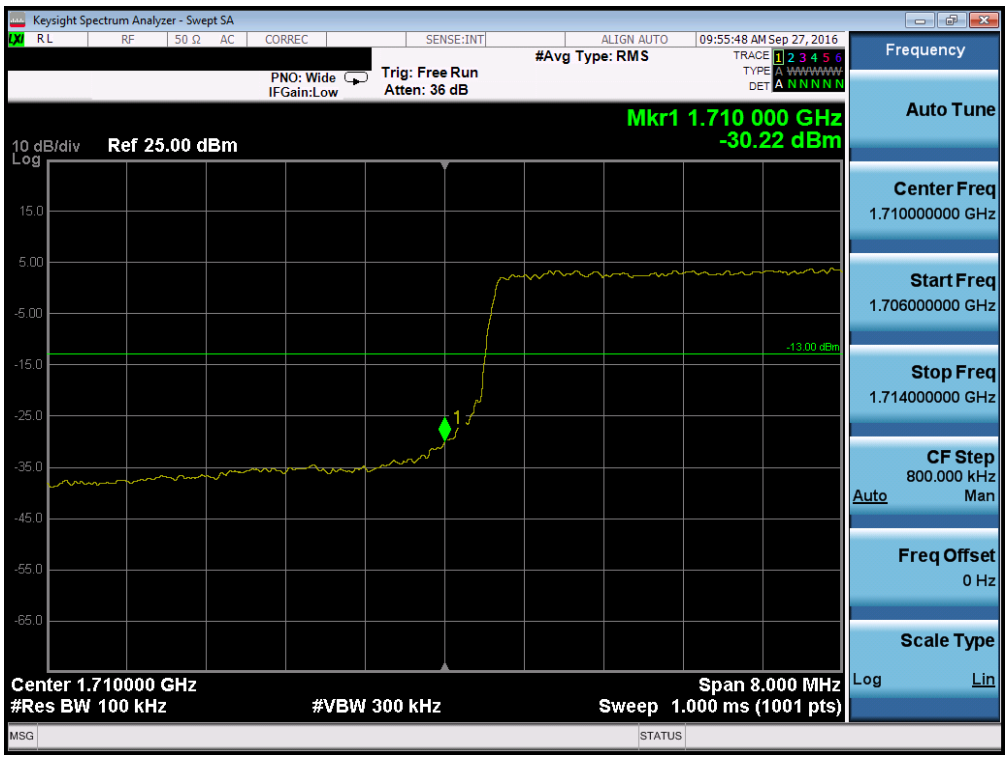


Plot 7-135. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

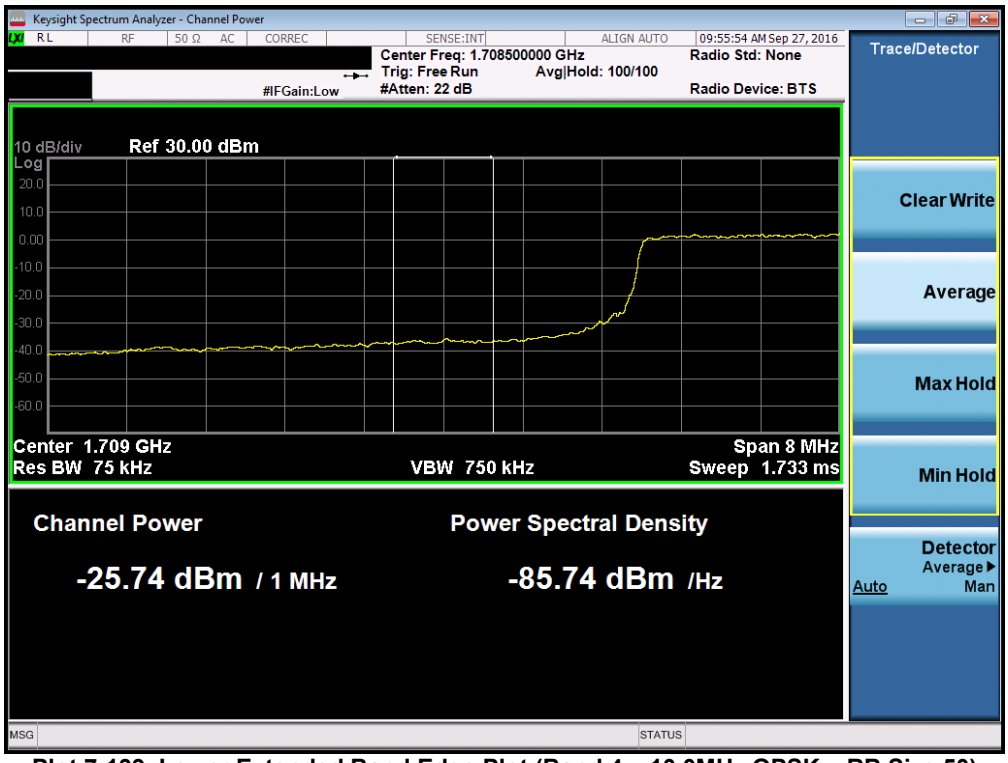
Plot 7-136. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



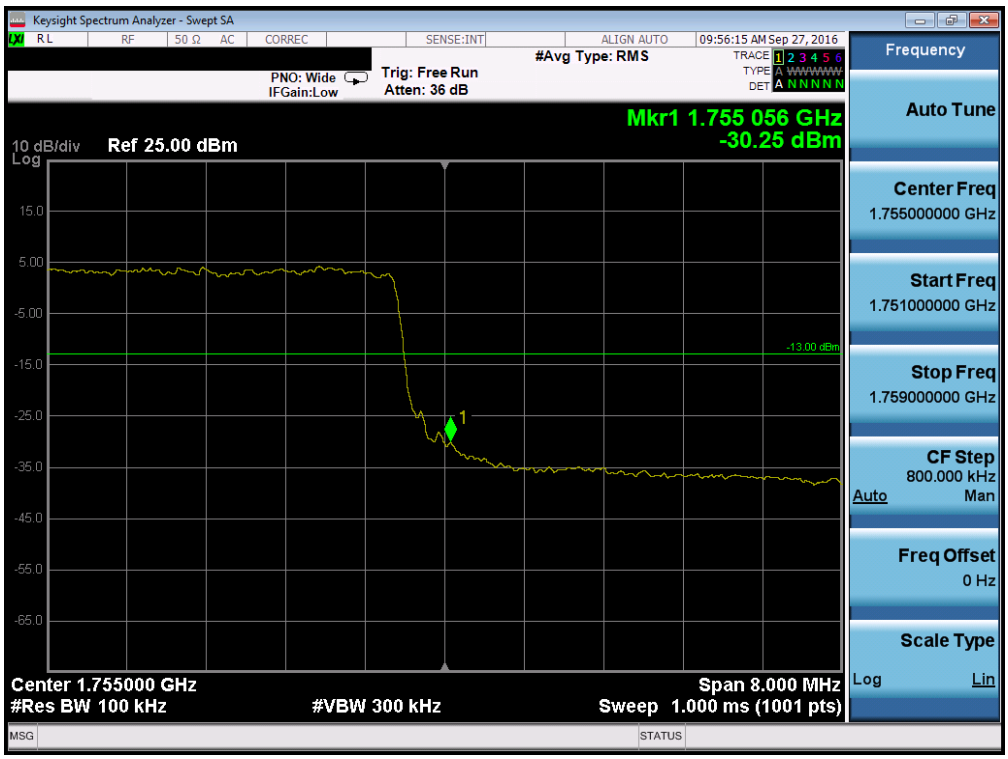
Plot 7-137. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



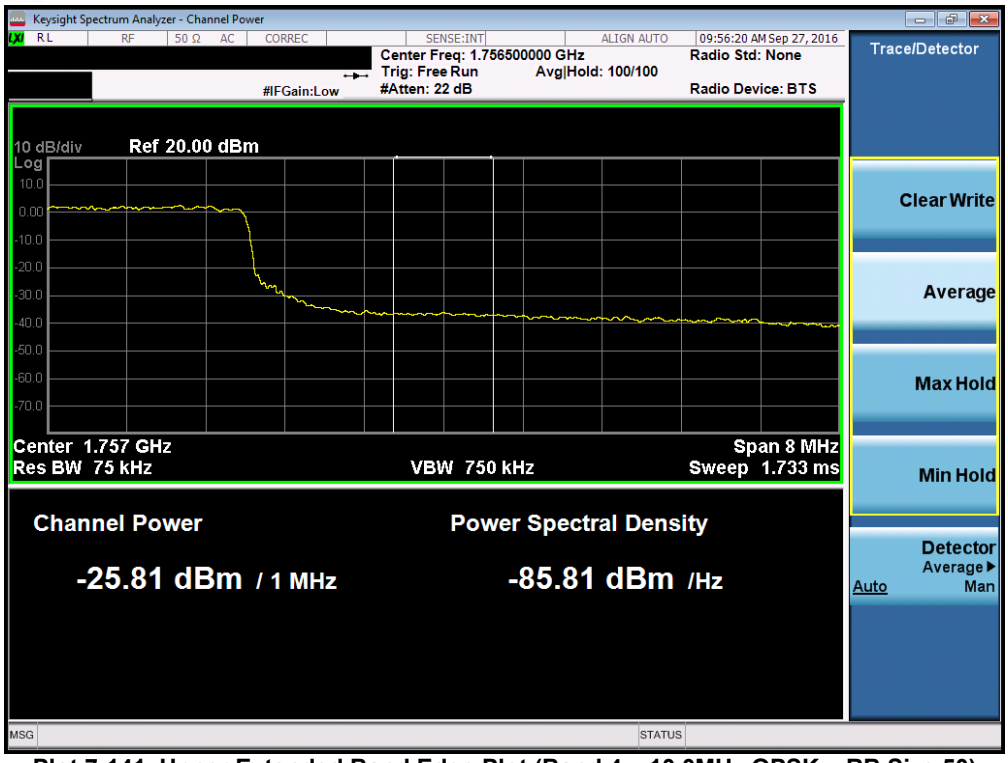
Plot 7-138. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



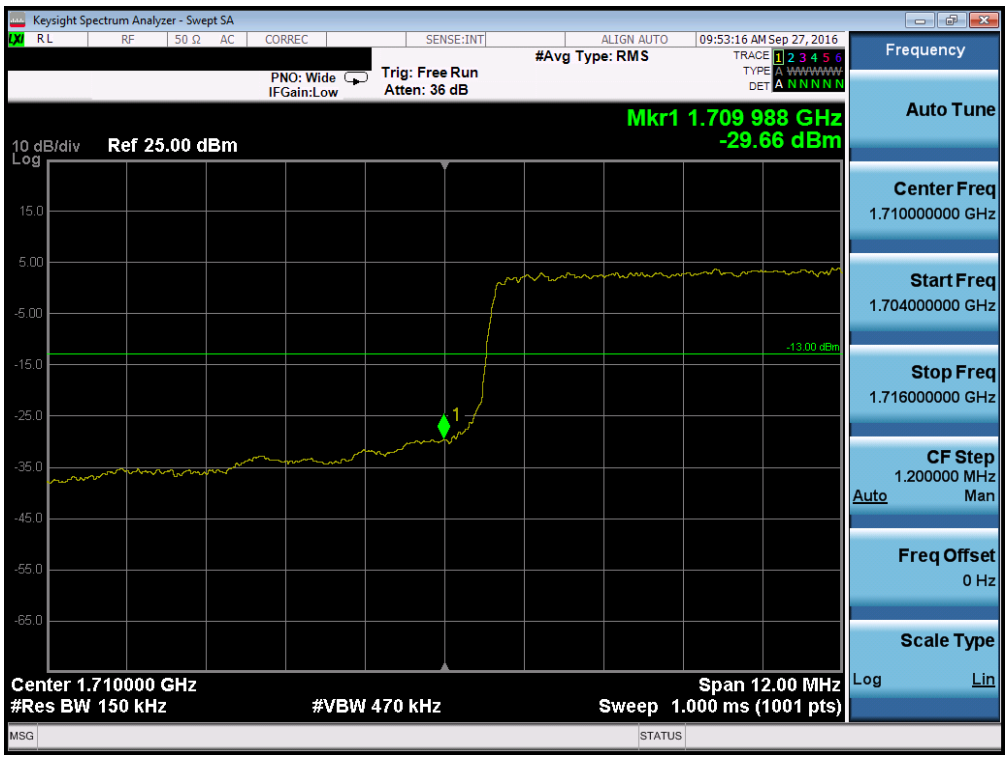
Plot 7-139. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



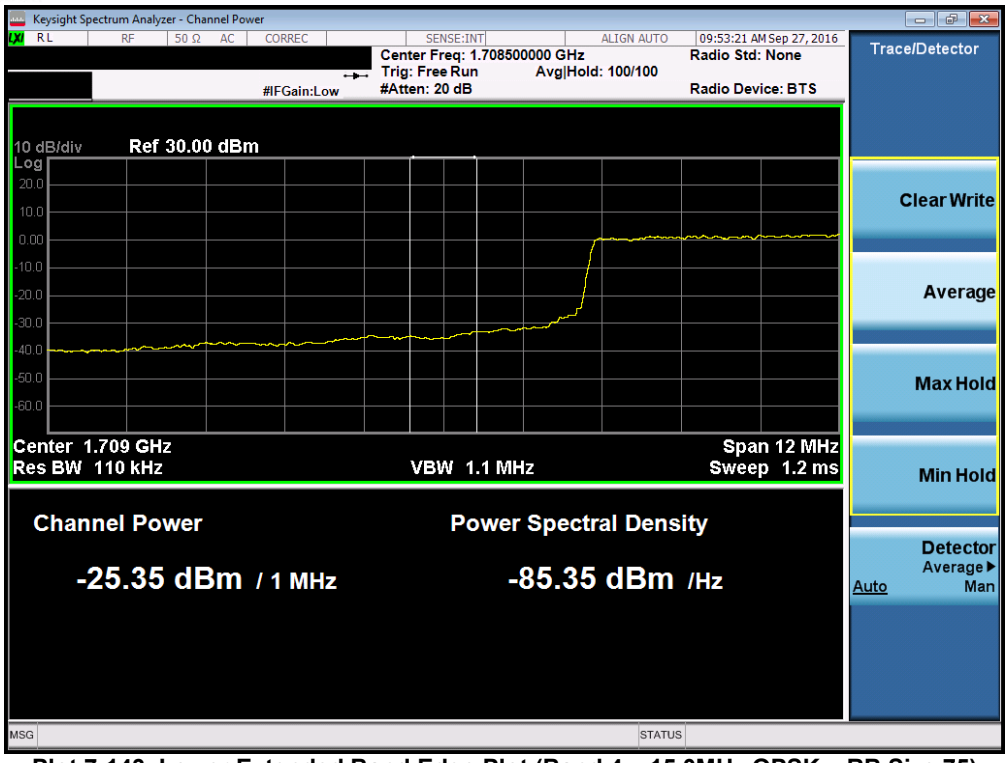
Plot 7-140. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



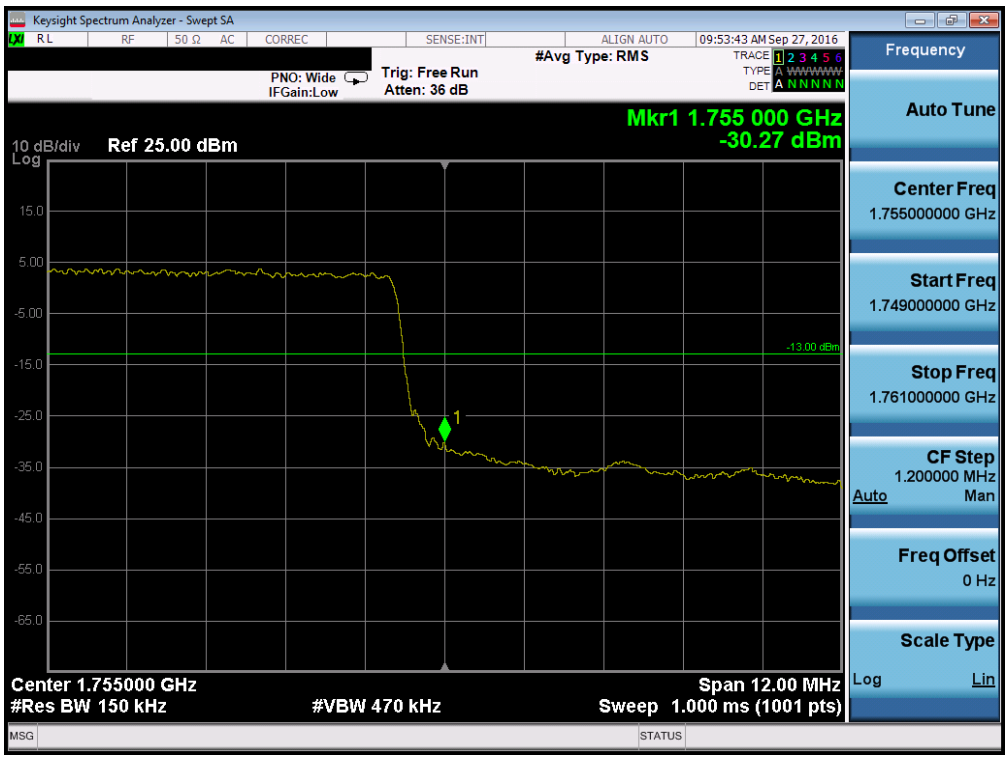
Plot 7-141. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



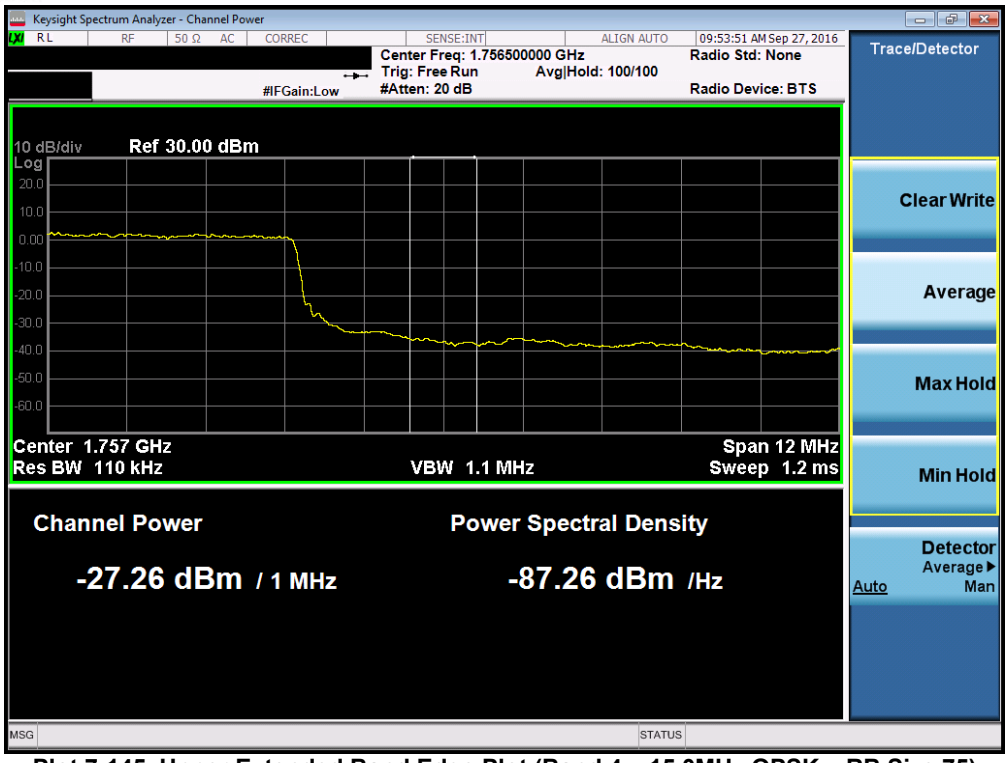
Plot 7-142. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



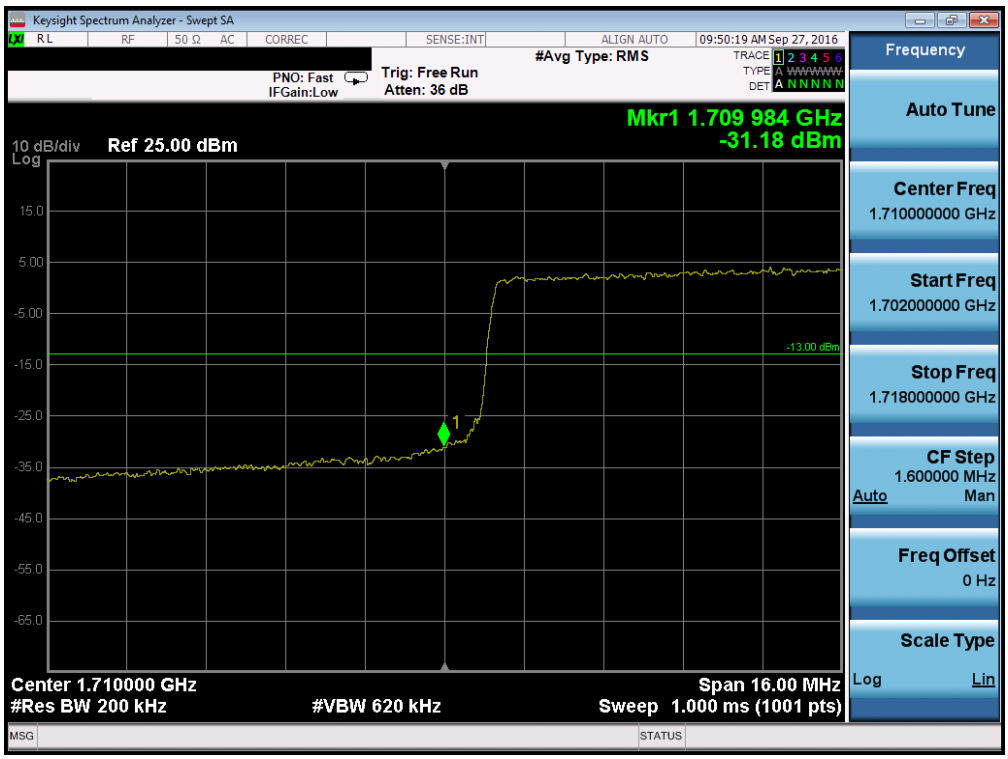
Plot 7-143. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



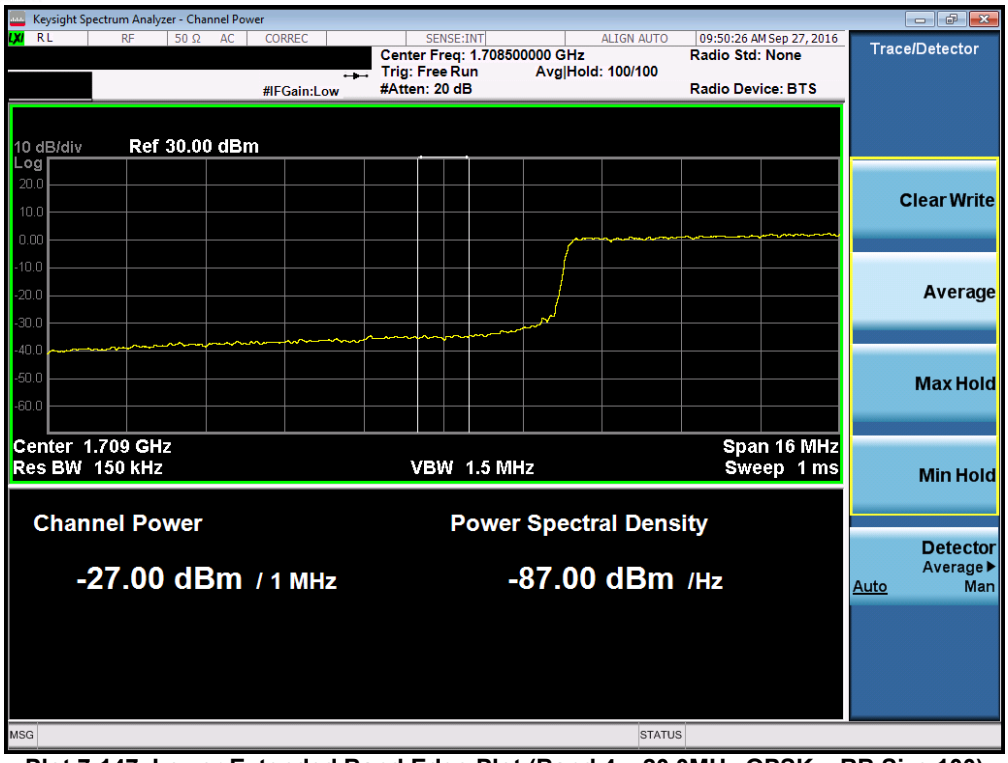
Plot 7-144. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



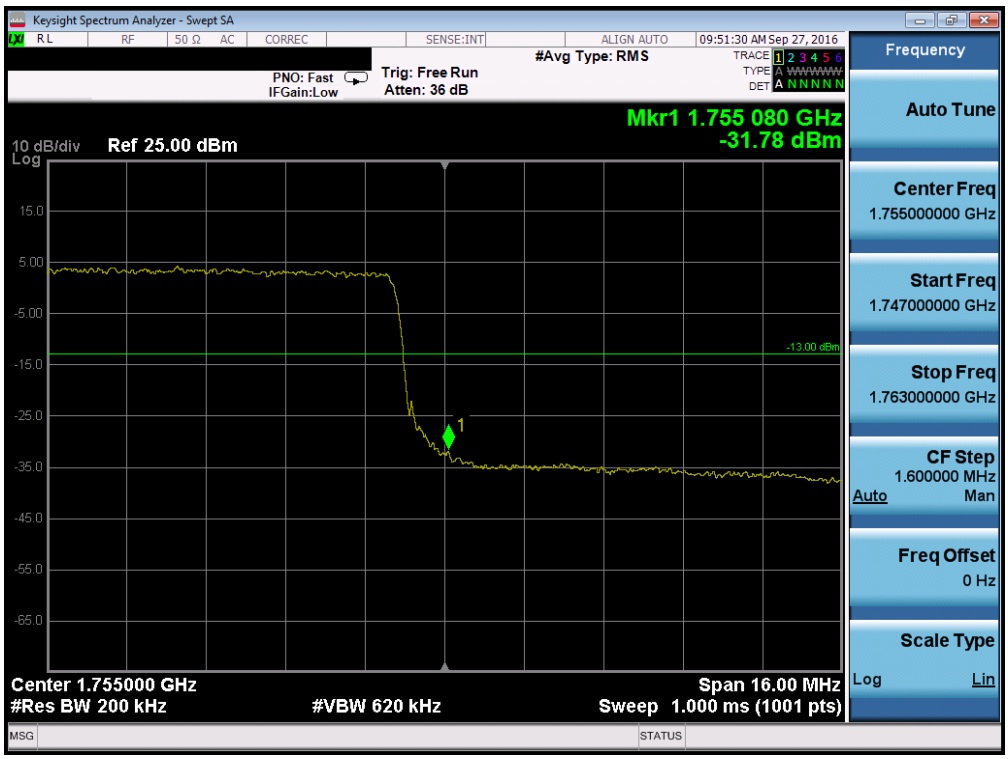
Plot 7-145. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



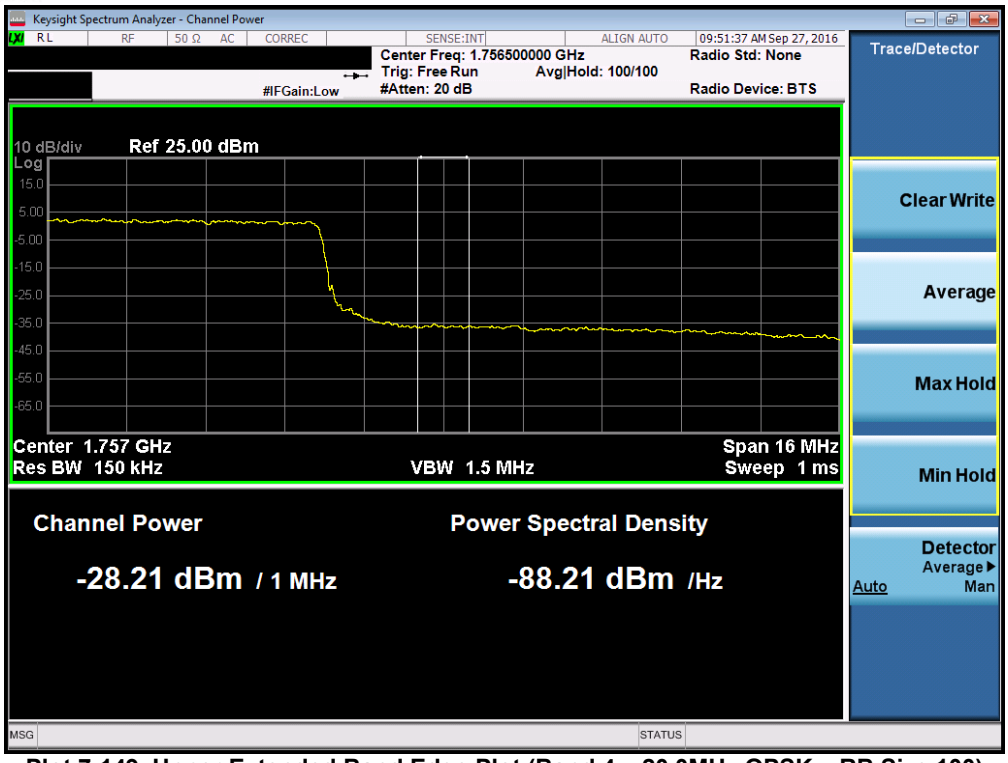
Plot 7-146. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



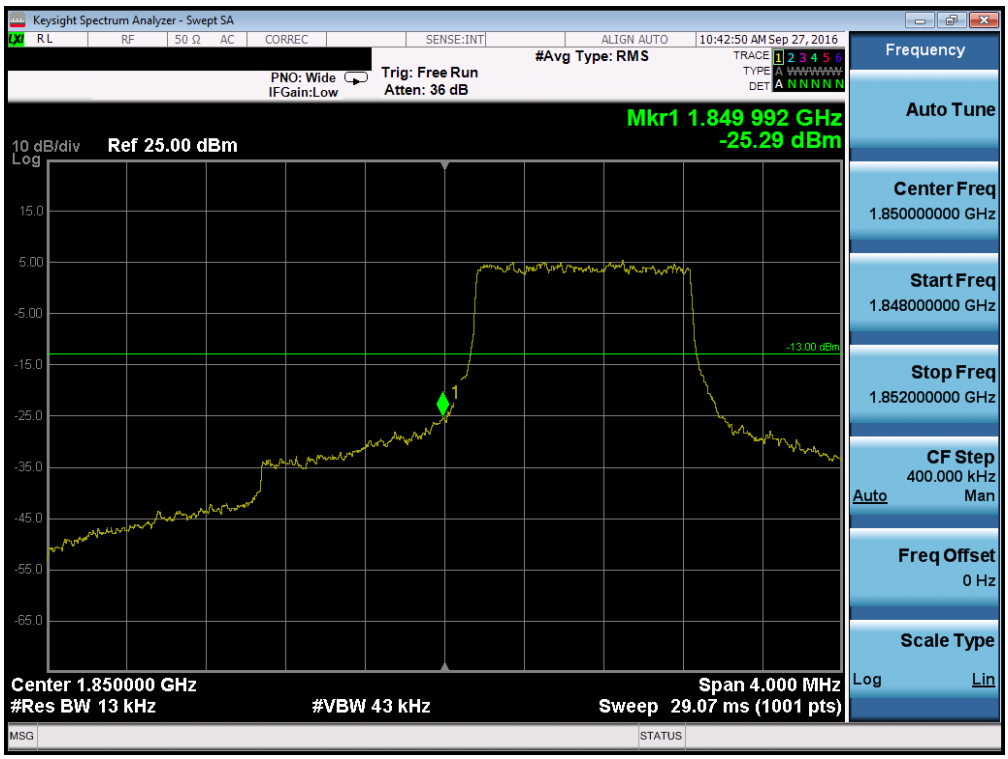
Plot 7-147. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



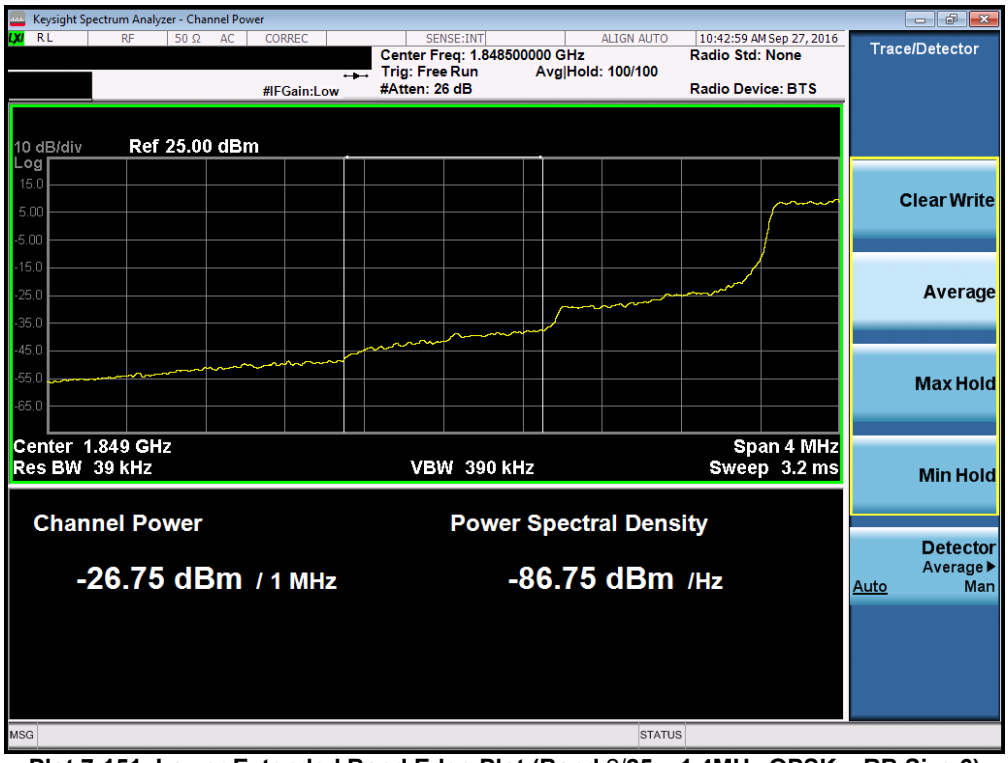
Plot 7-148. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



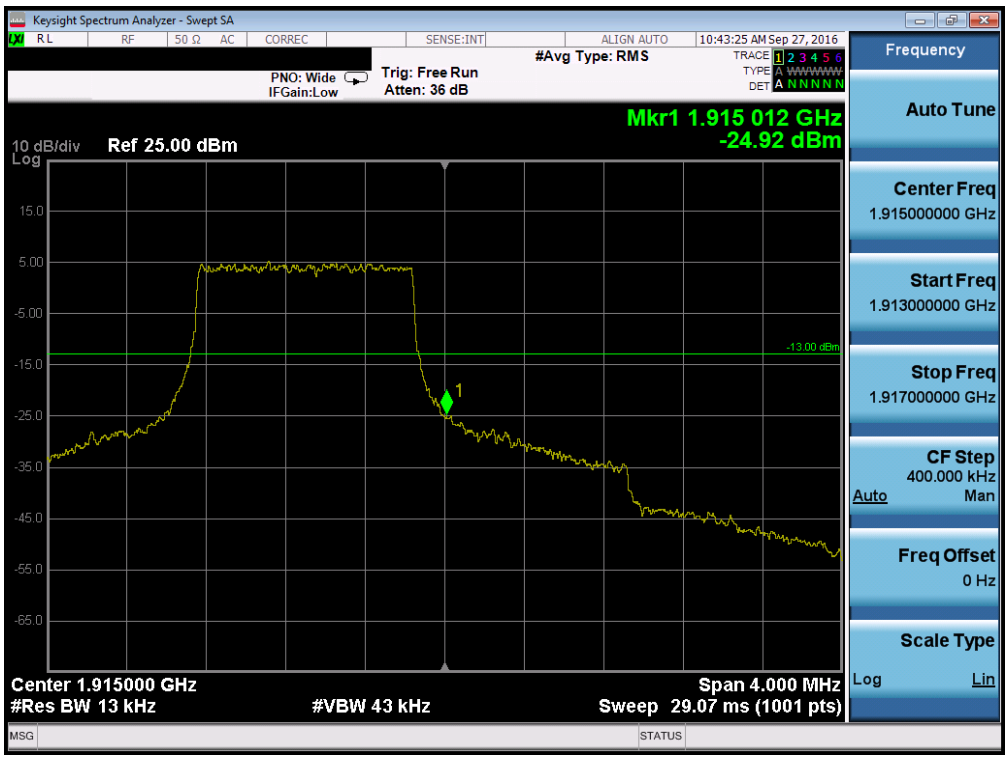
Plot 7-149. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



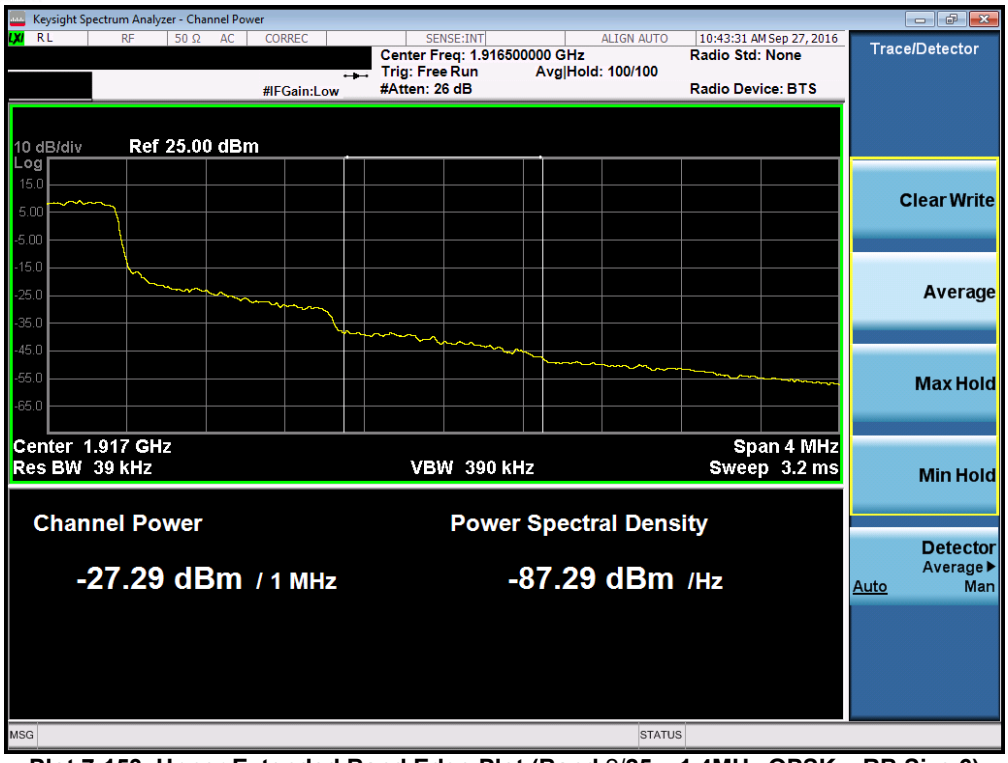
Plot 7-150. Lower Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



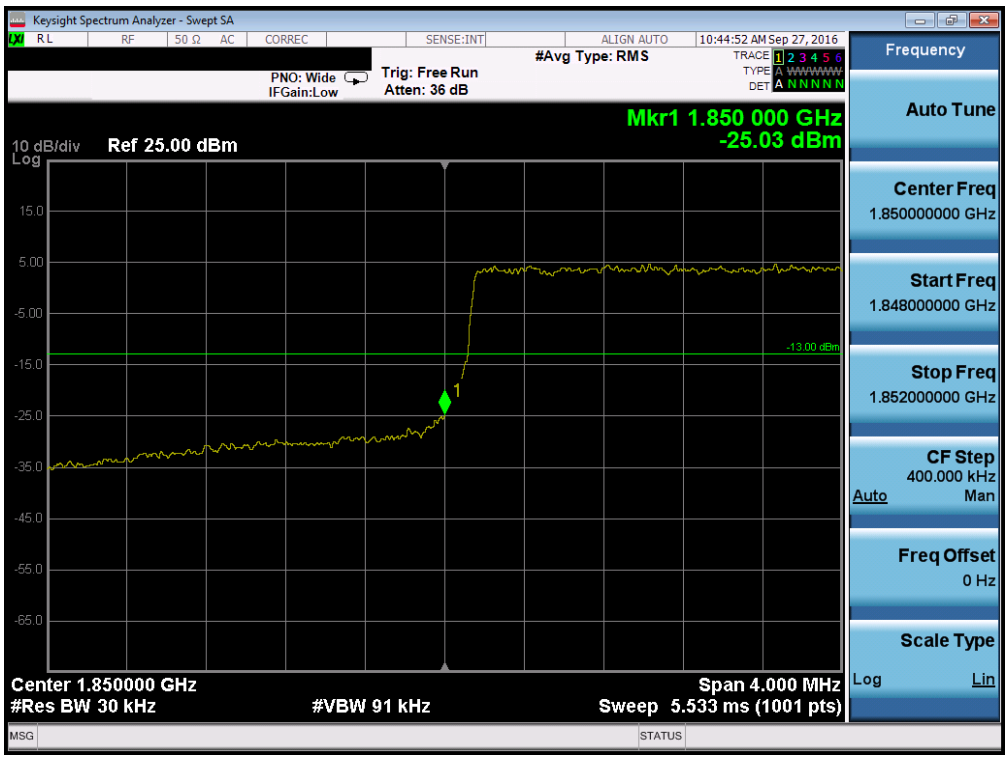
Plot 7-151. Lower Extended Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



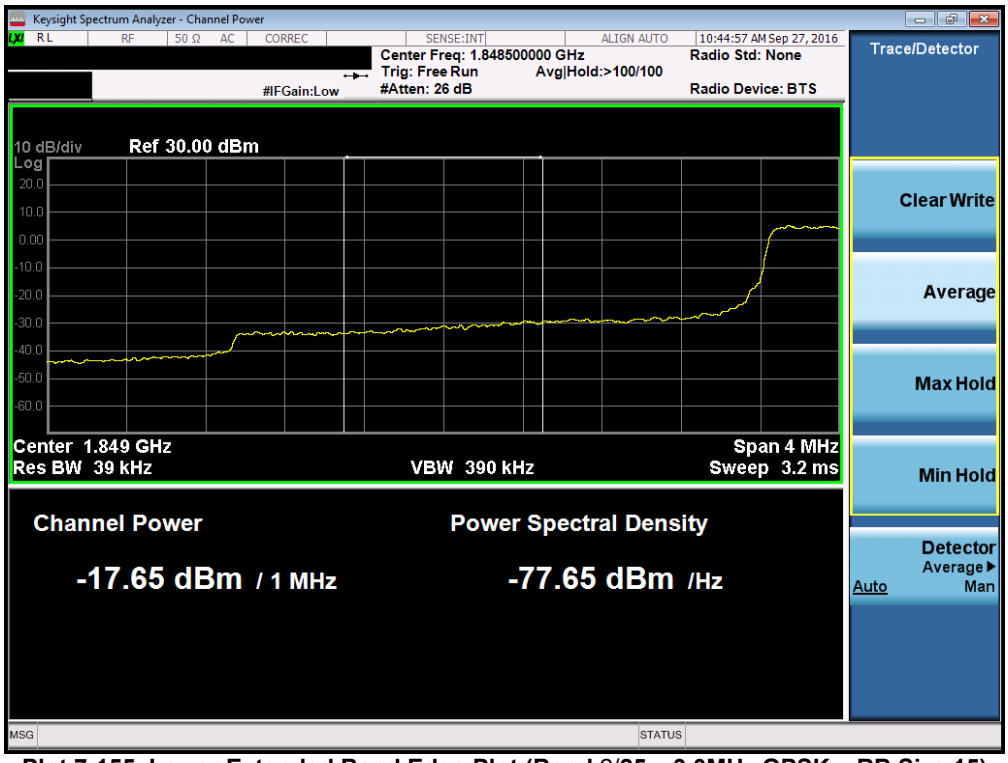
Plot 7-152. Upper Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



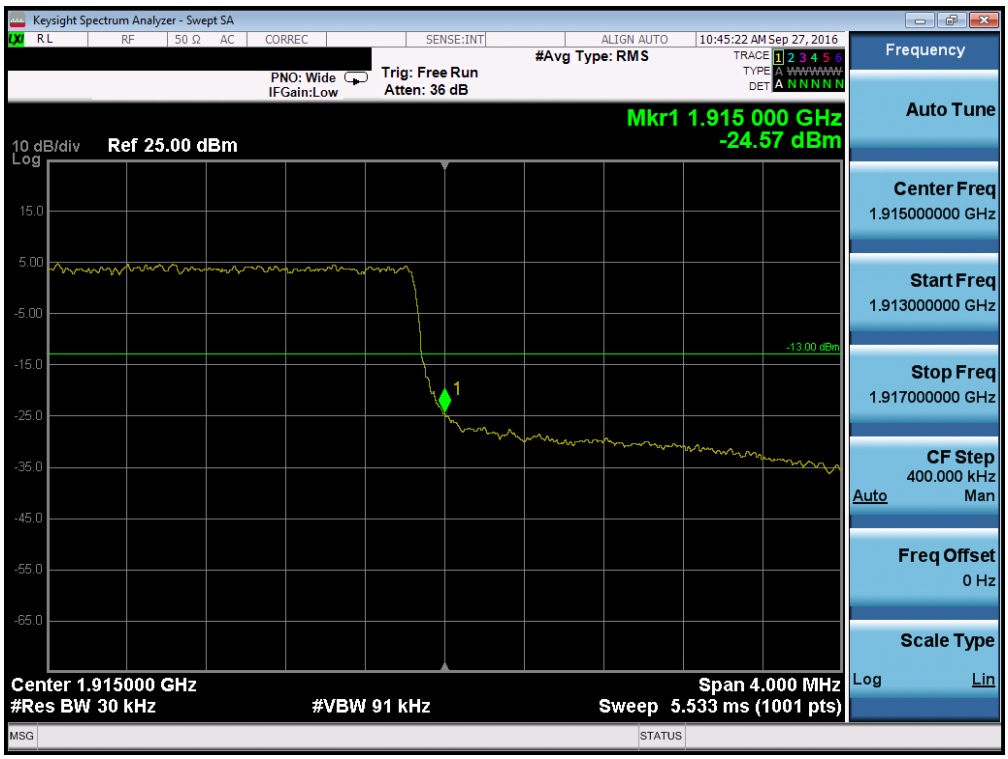
Plot 7-153. Upper Extended Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



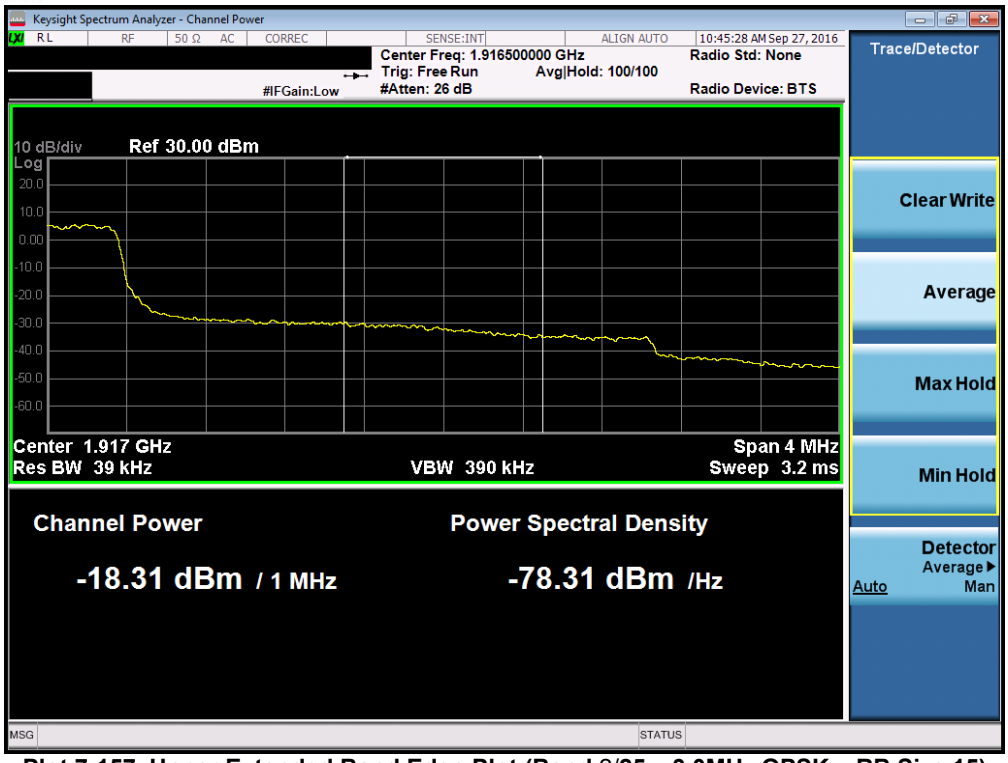
Plot 7-154. Lower Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



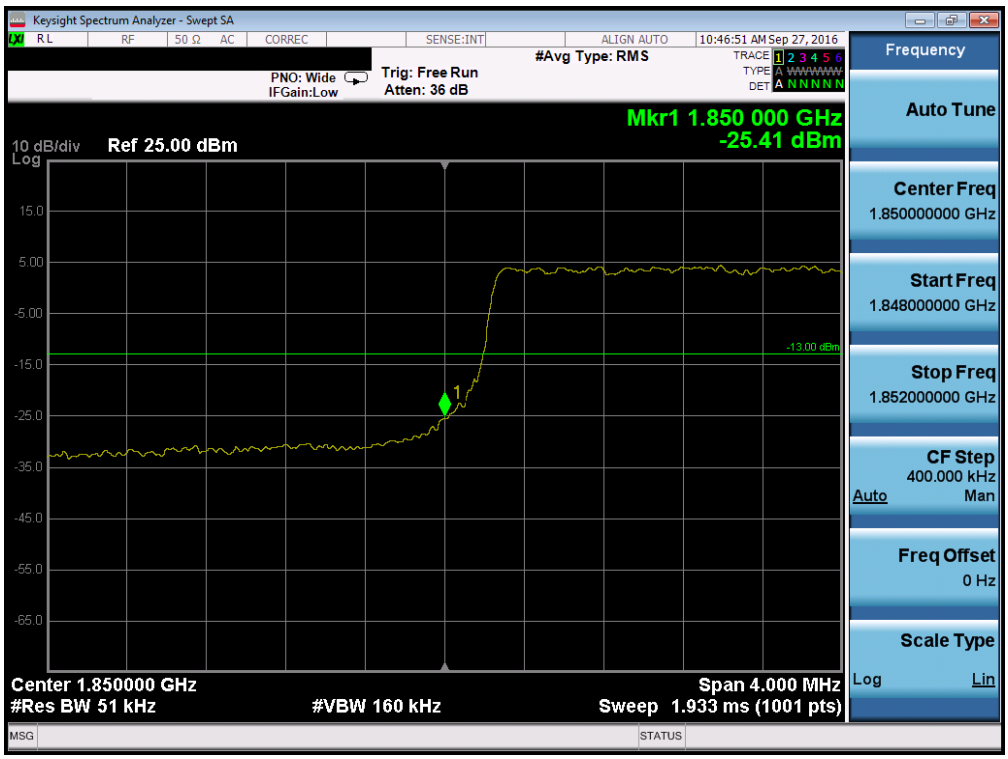
Plot 7-155. Lower Extended Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



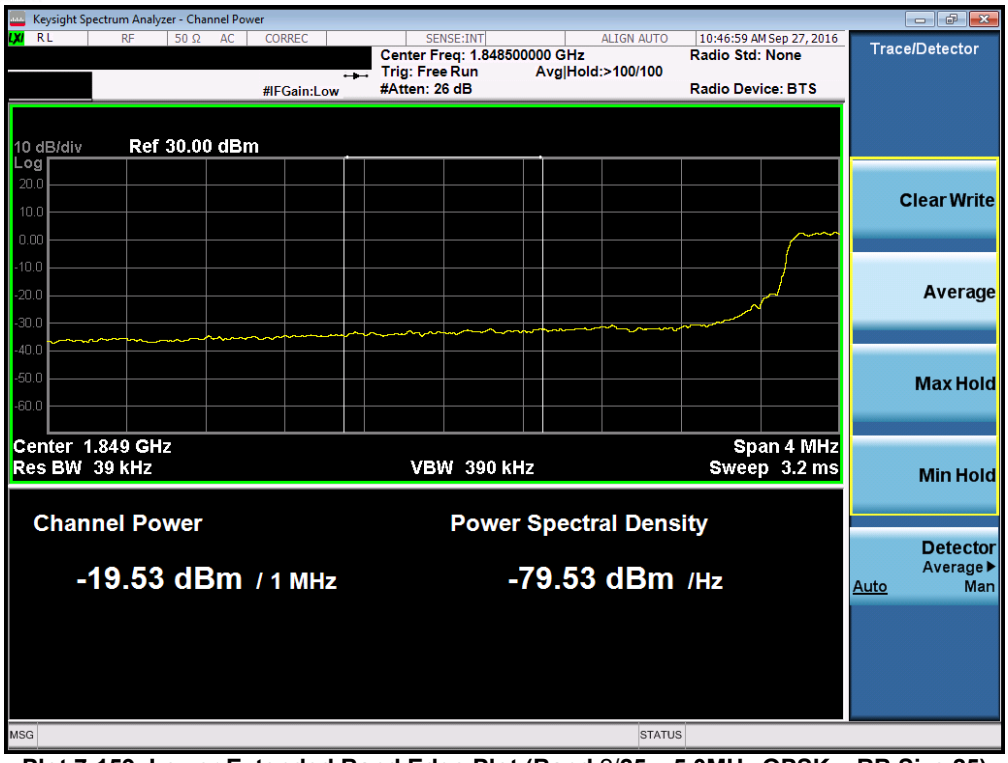
Plot 7-156. Upper Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



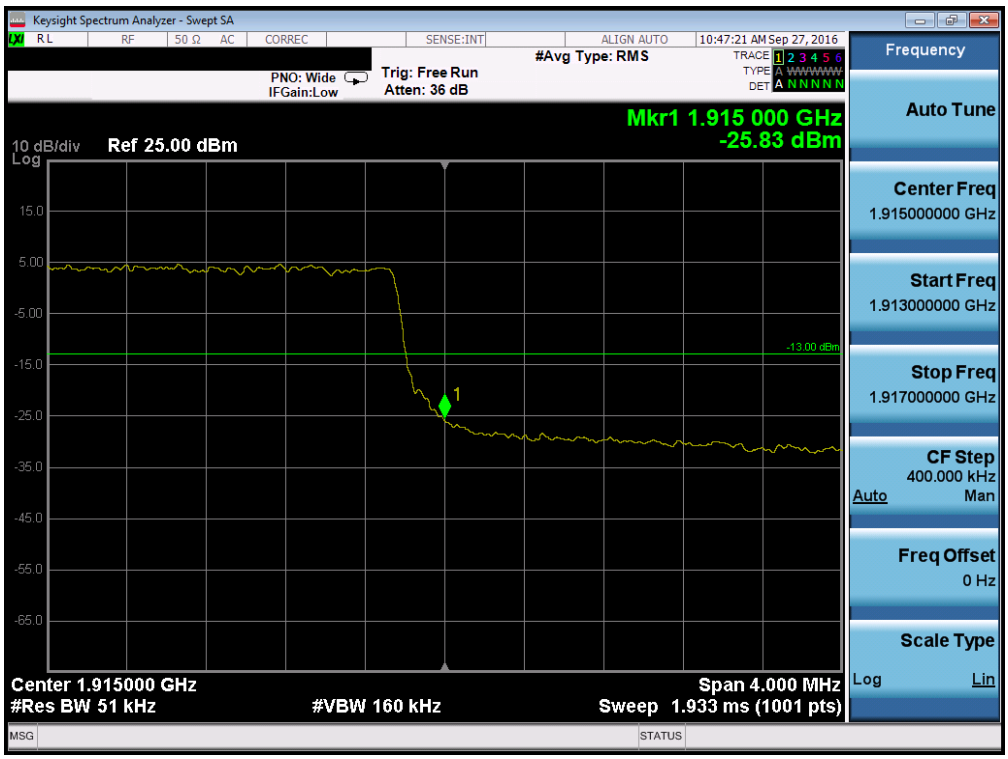
Plot 7-157. Upper Extended Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



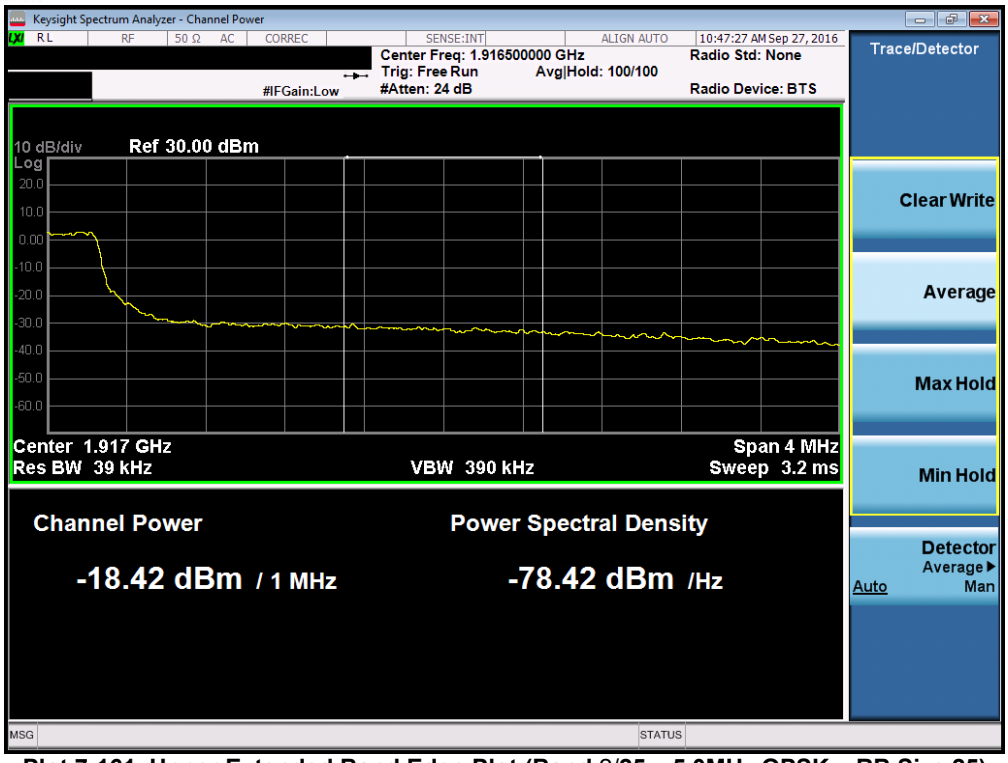
Plot 7-158. Lower Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



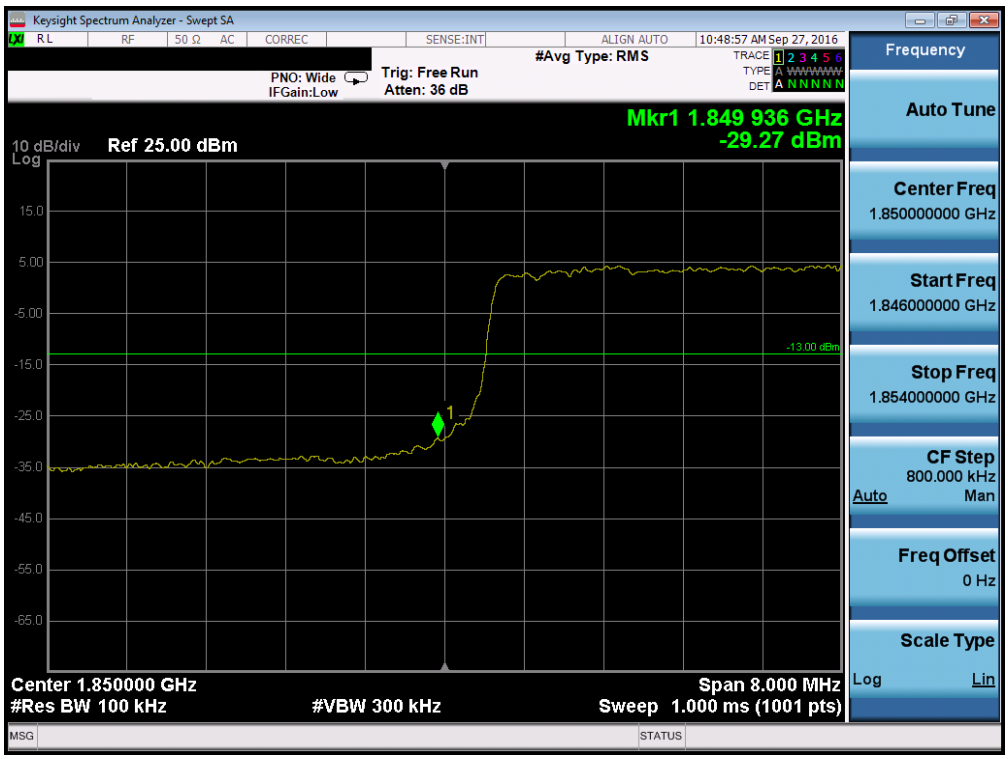
Plot 7-159. Lower Extended Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



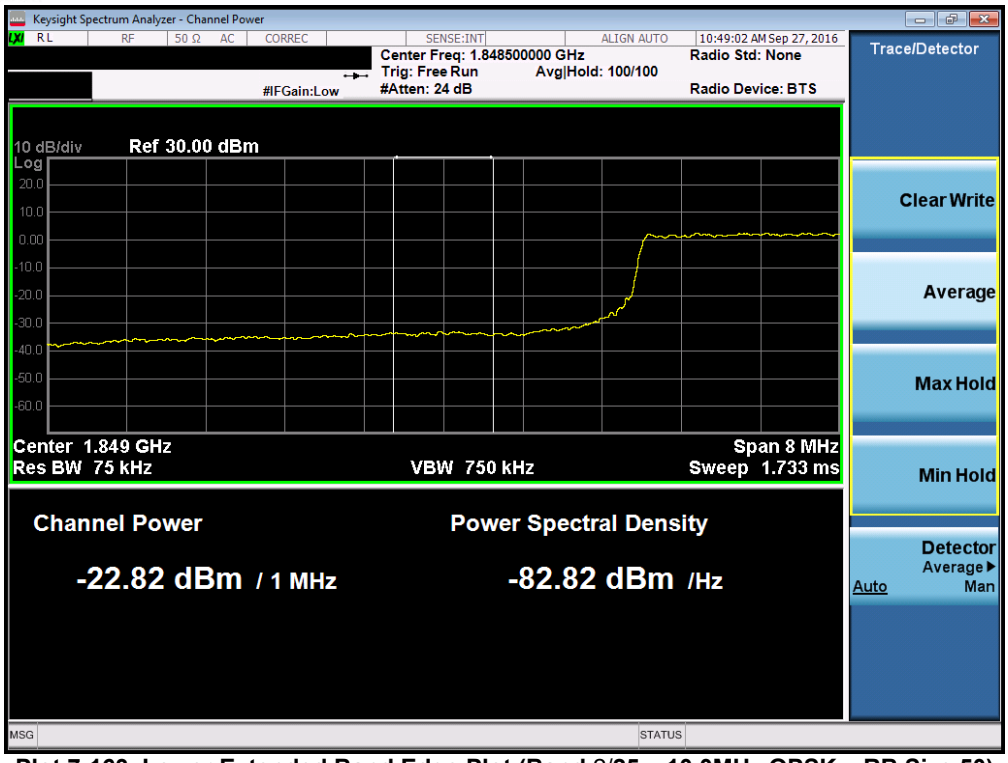
Plot 7-160. Upper Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



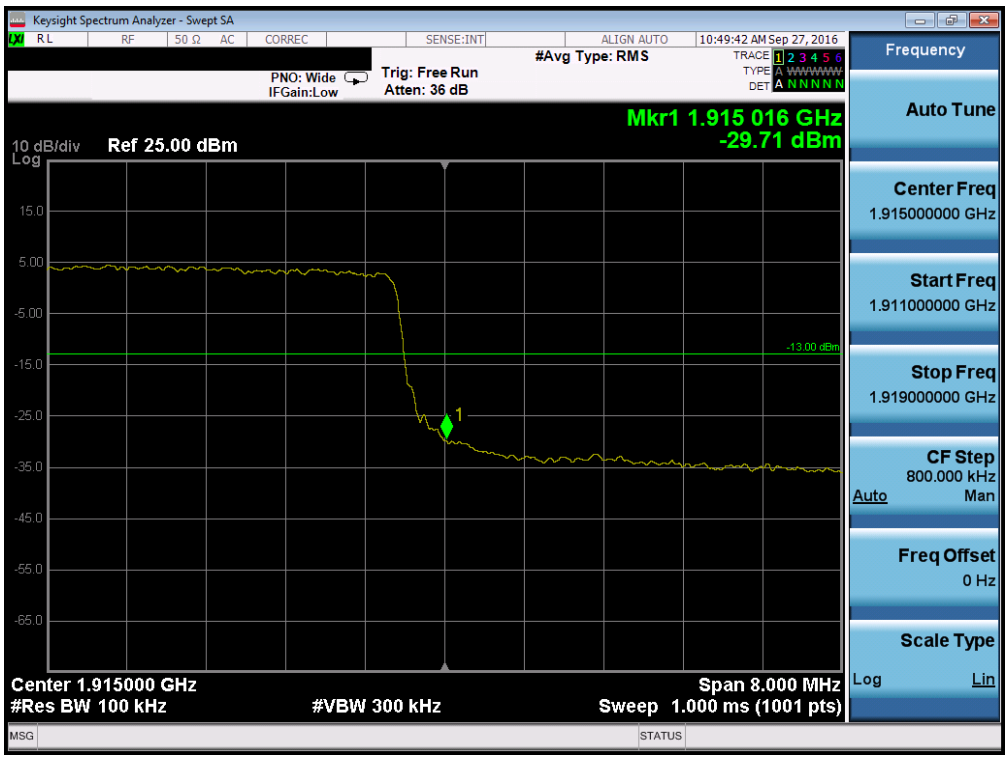
Plot 7-161. Upper Extended Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



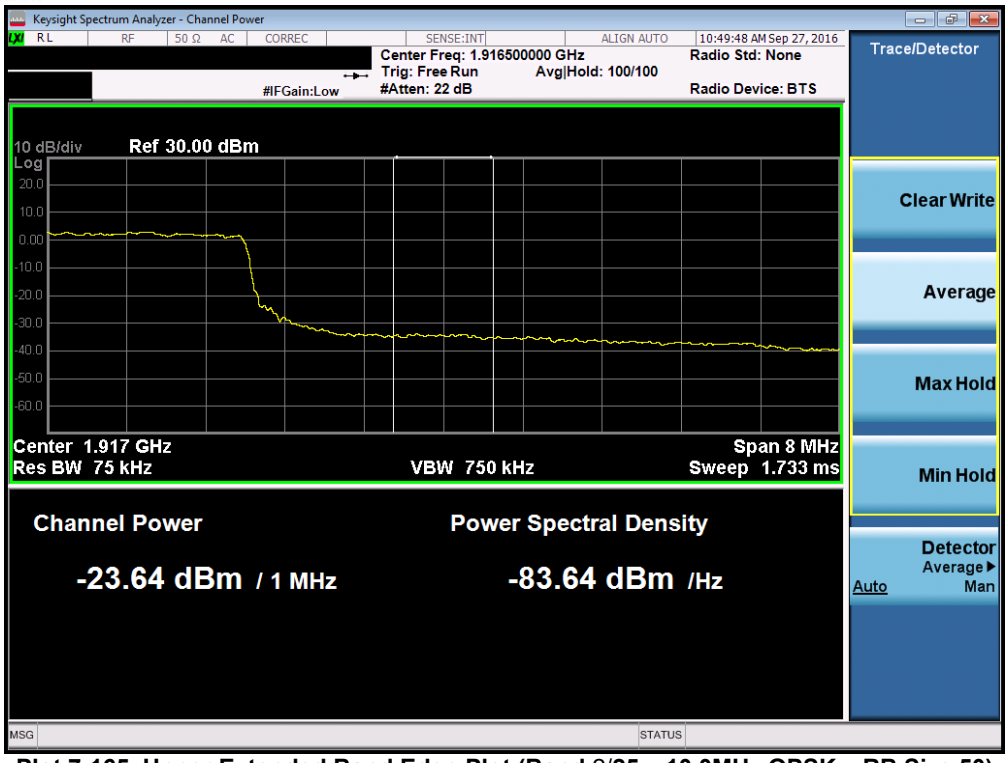
Plot 7-162. Lower Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



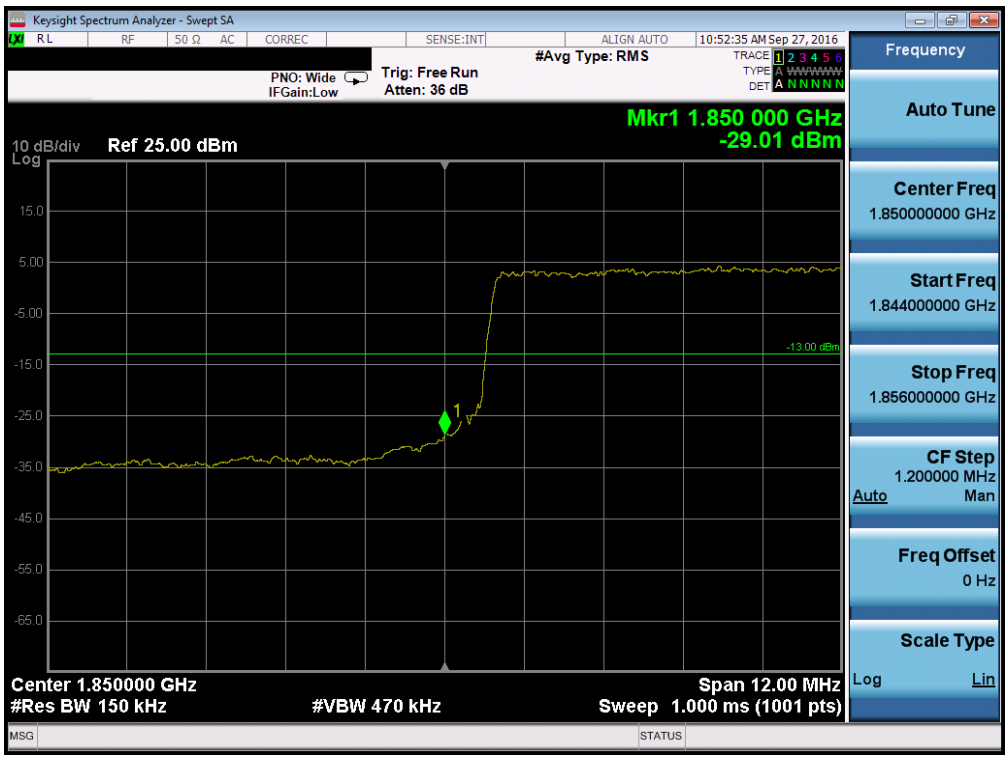
Plot 7-163. Lower Extended Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



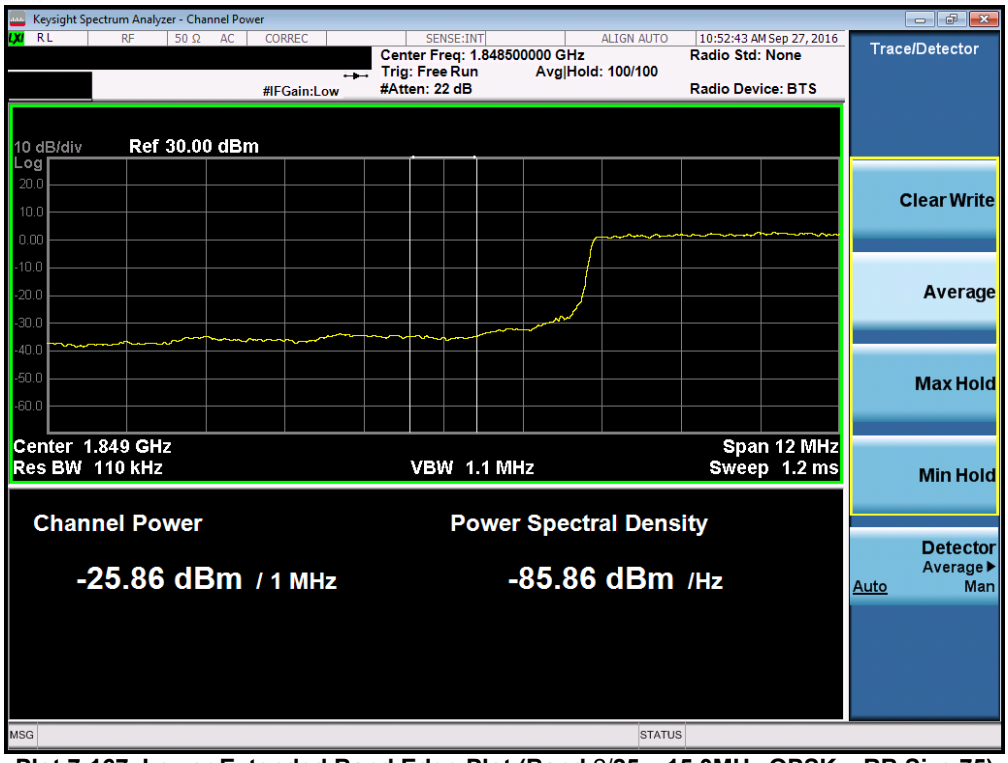
Plot 7-164. Upper Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



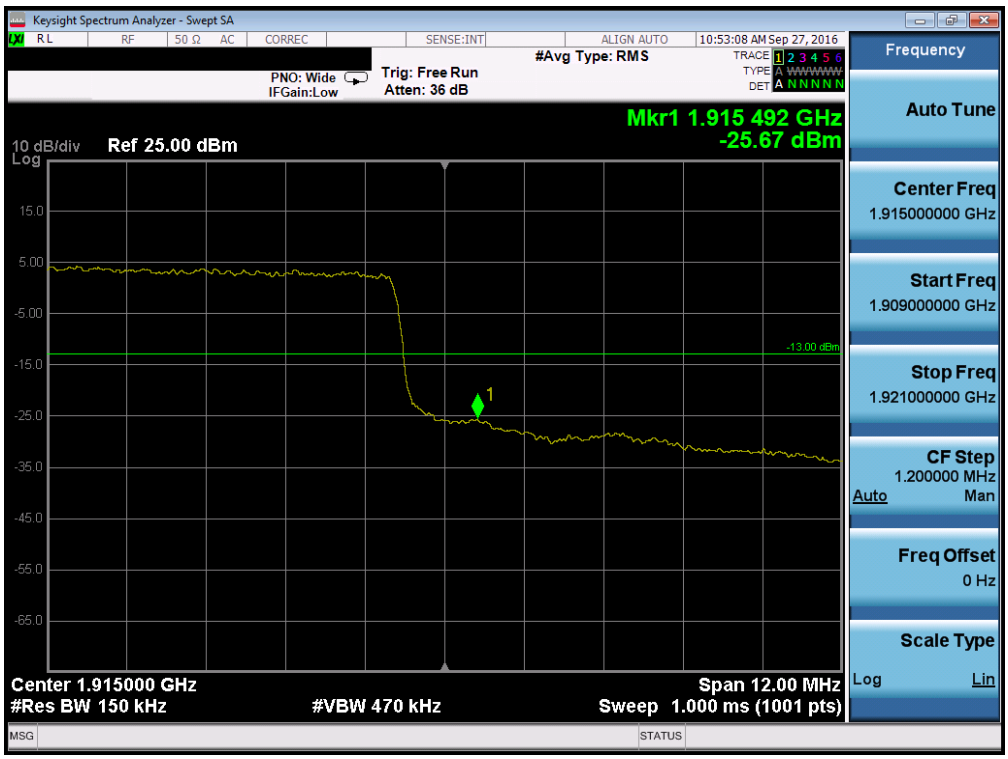
Plot 7-165. Upper Extended Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



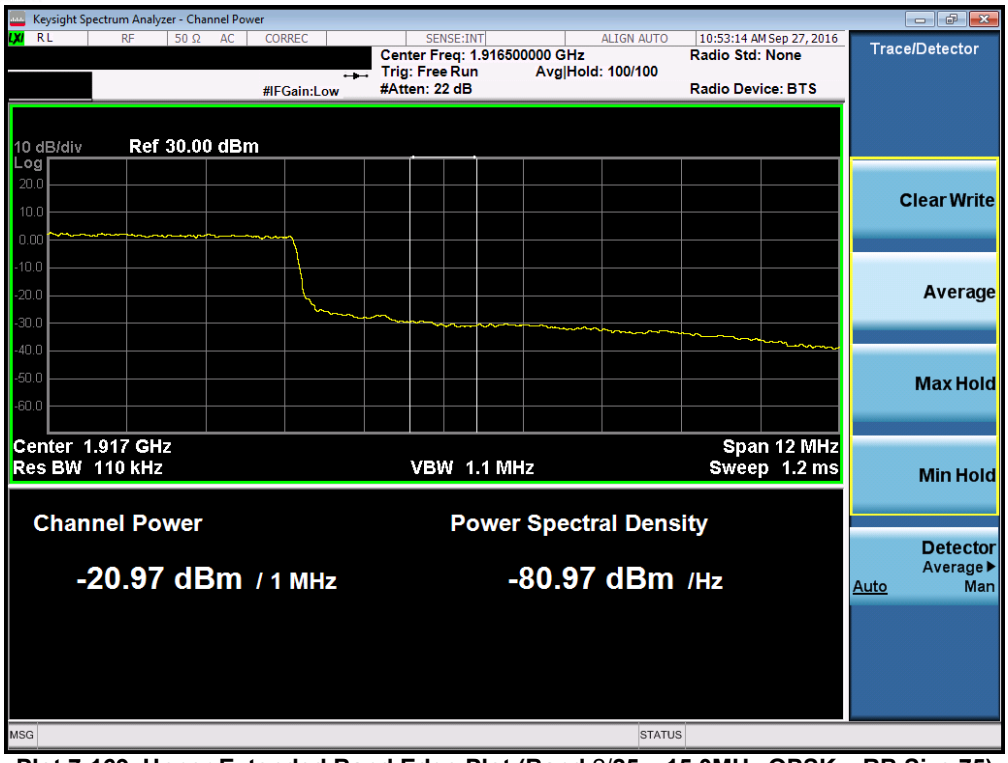
Plot 7-166. Lower Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



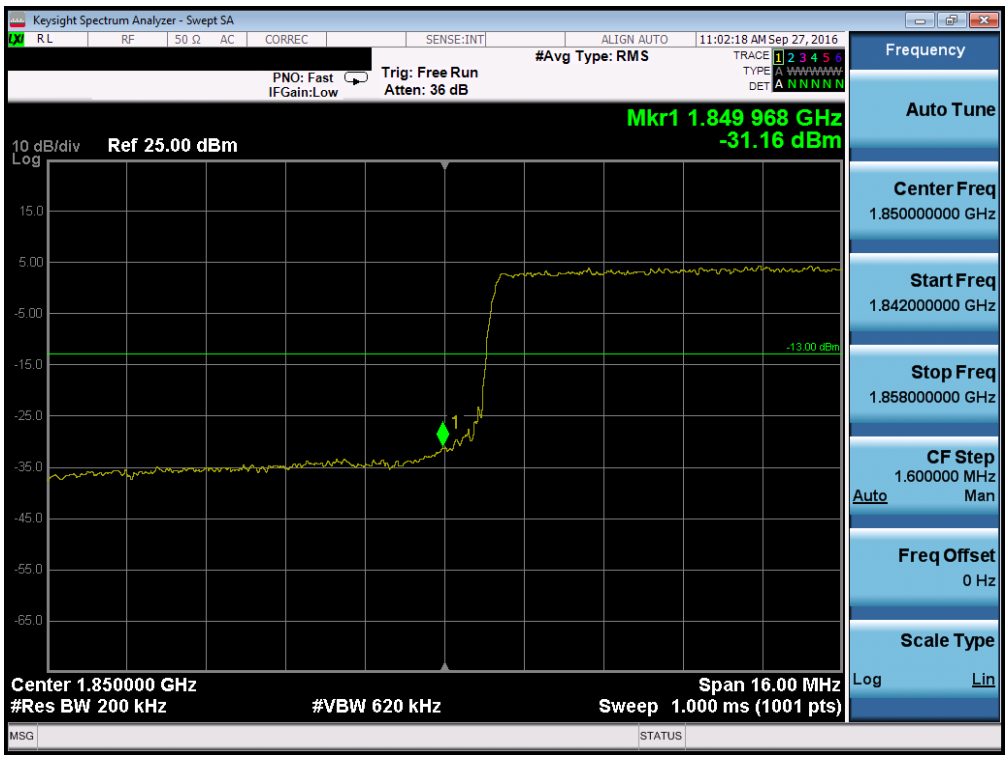
Plot 7-167. Lower Extended Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



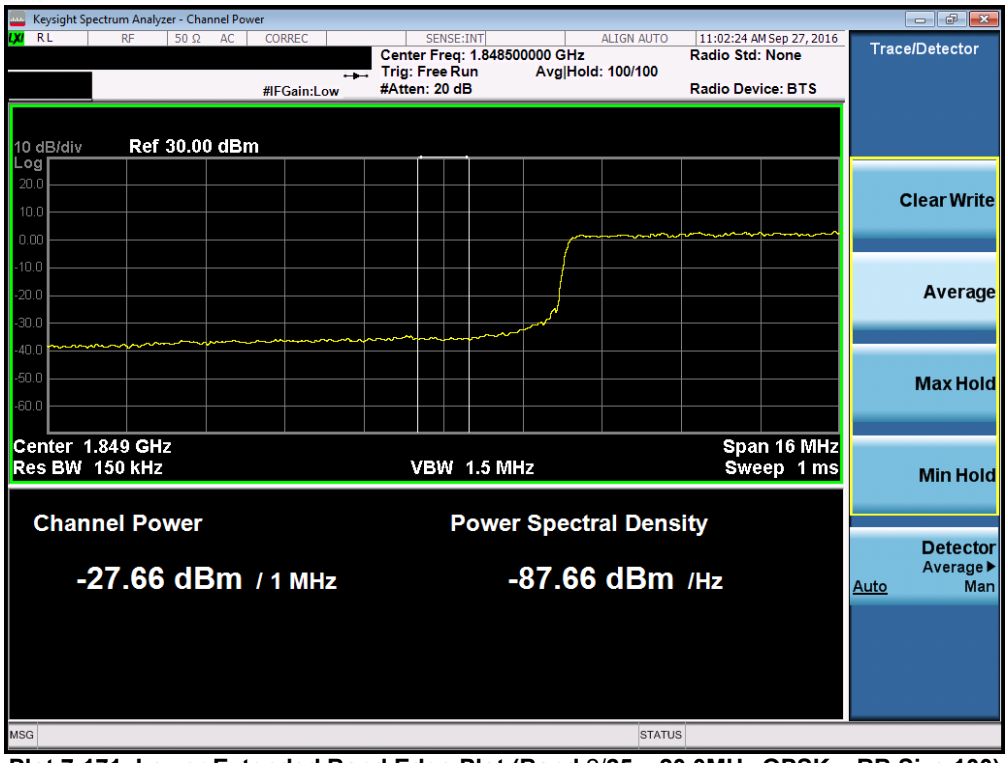
Plot 7-168. Upper Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



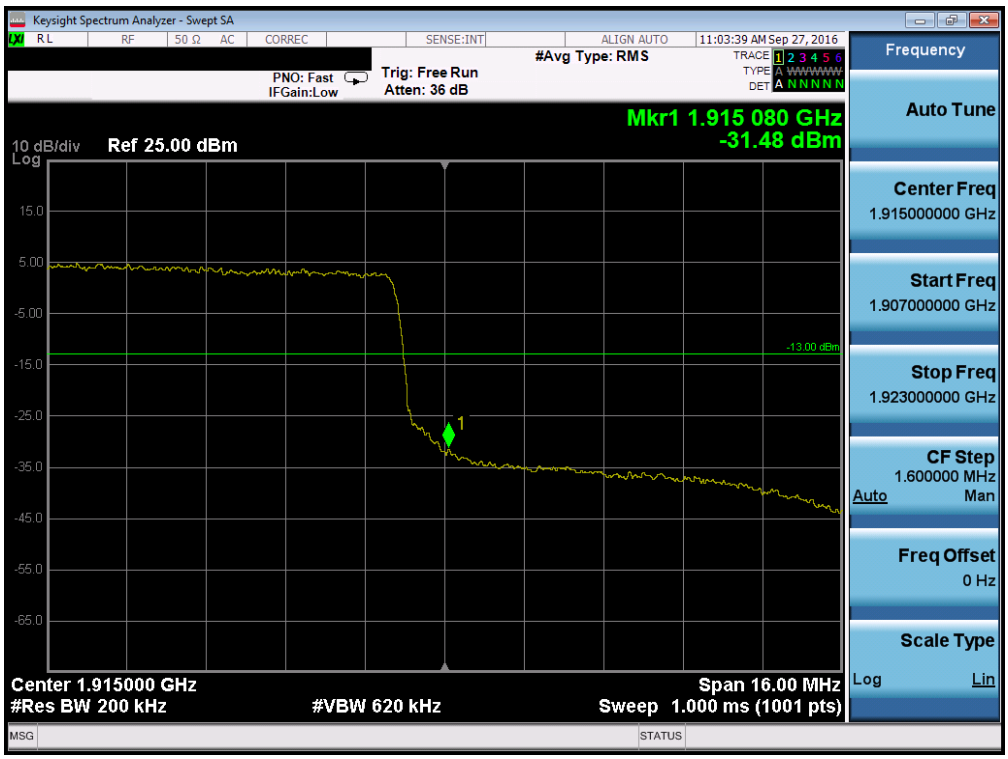
Plot 7-169. Upper Extended Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



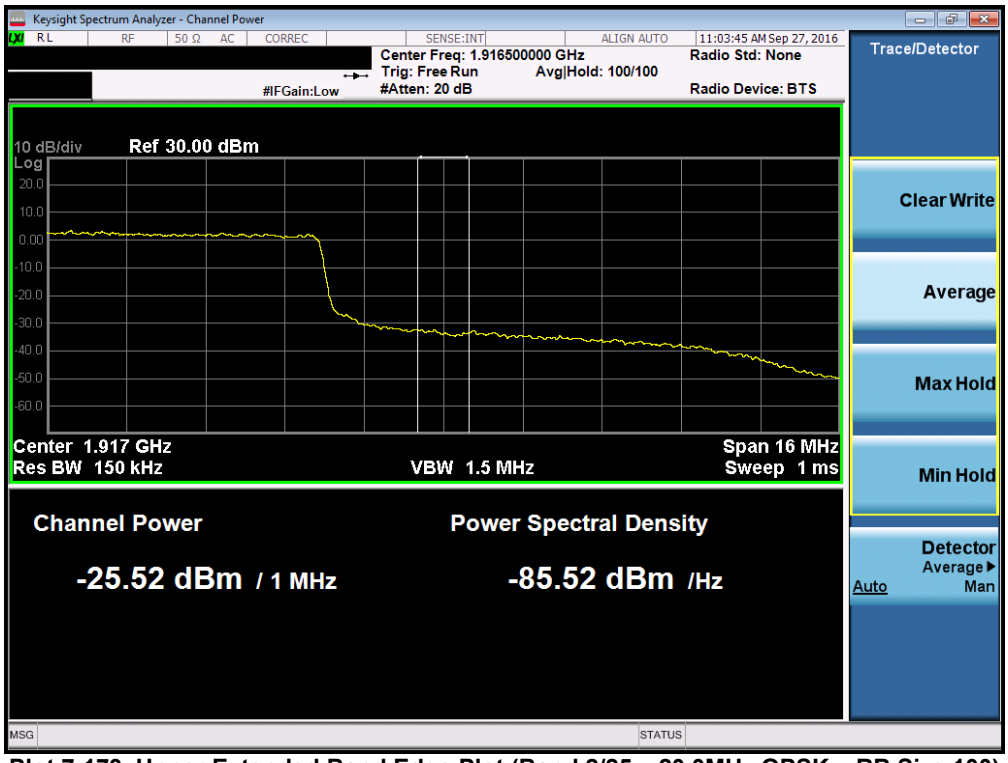
Plot 7-170. Lower Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



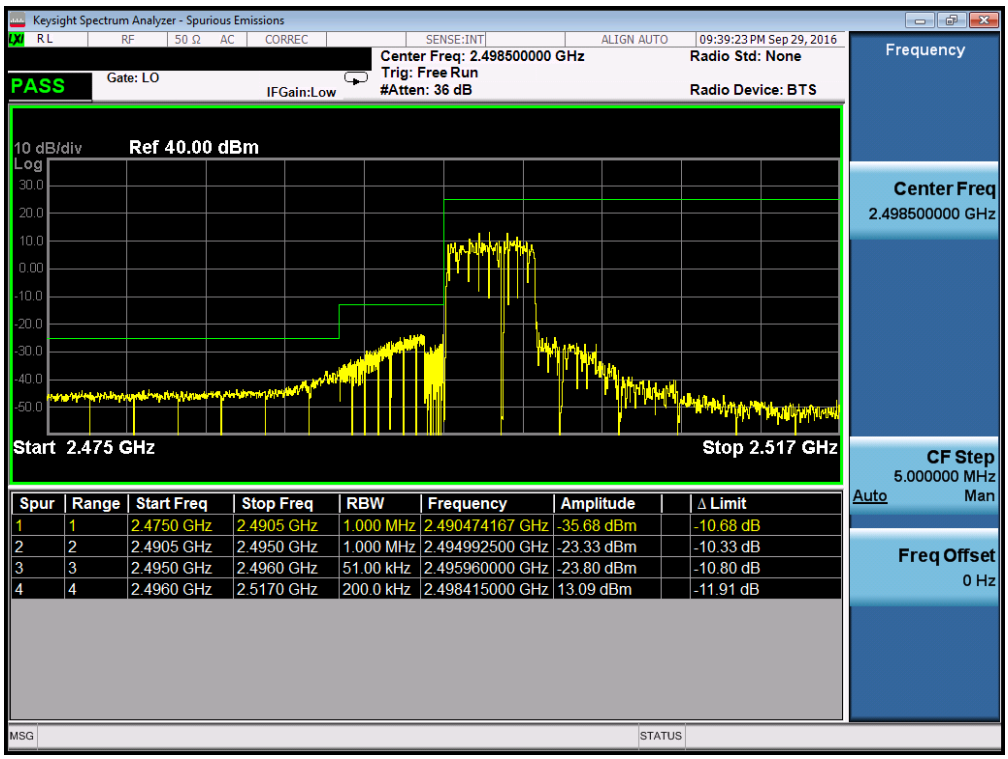
Plot 7-171. Lower Extended Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



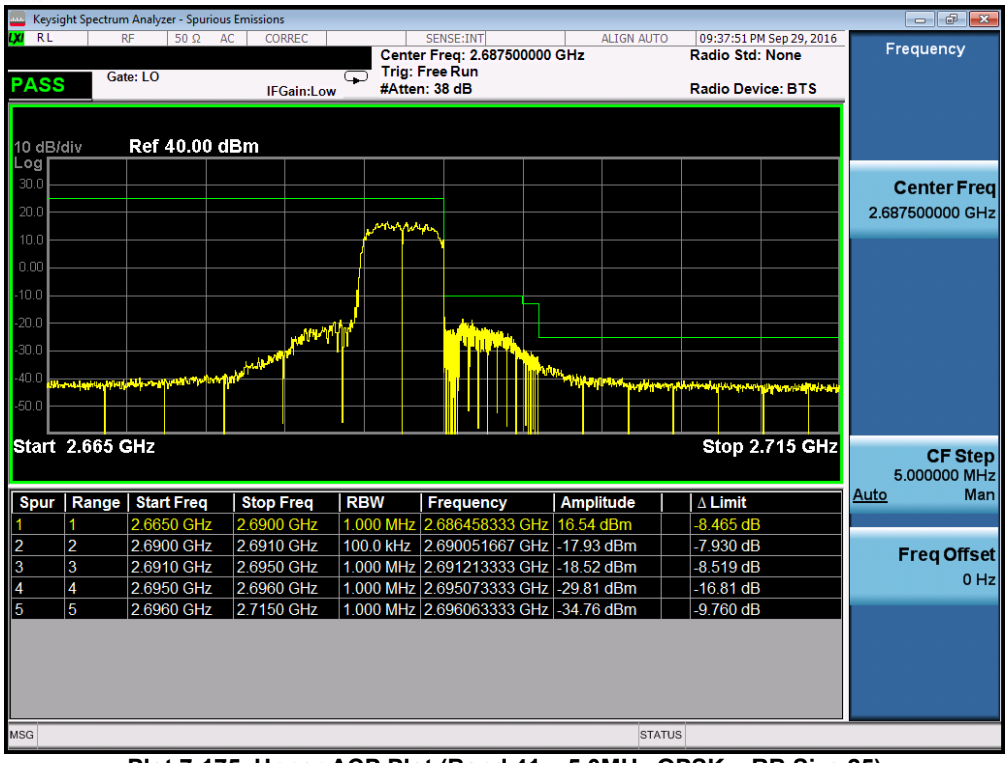
Plot 7-172. Upper Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



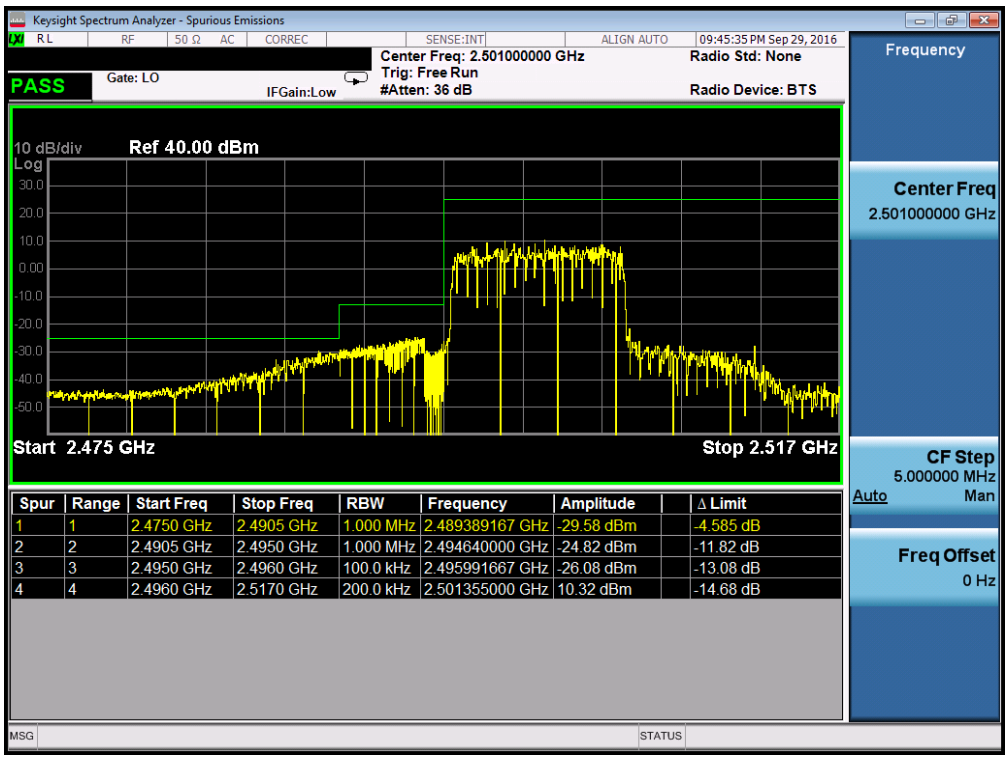
Plot 7-173. Upper Extended Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



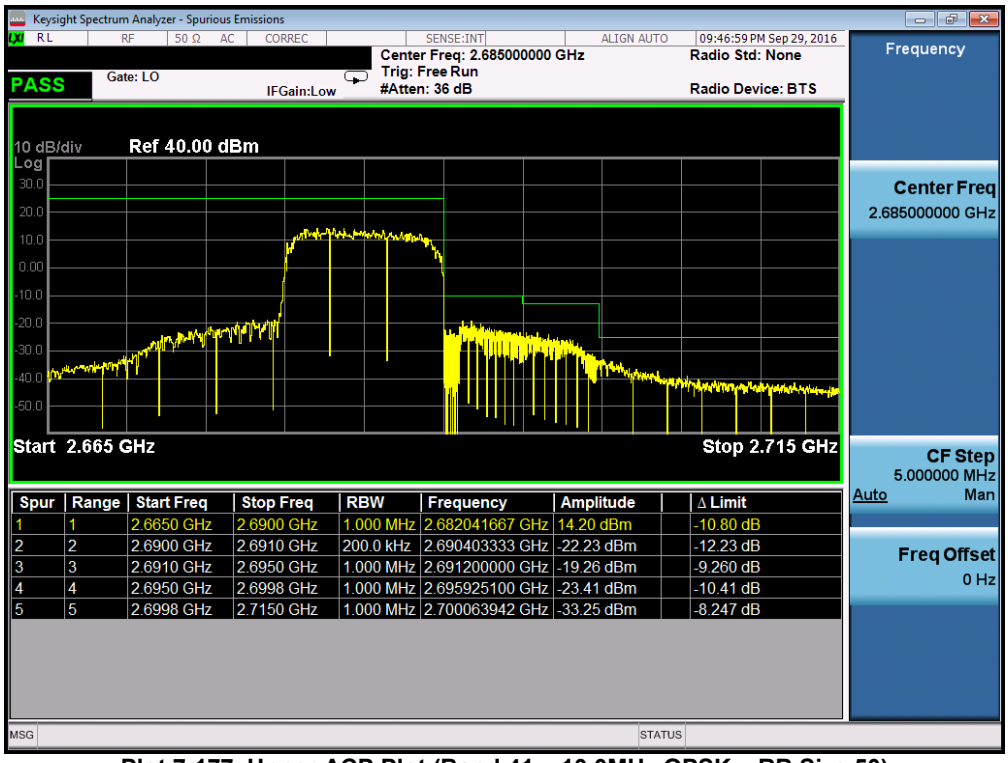
Plot 7-174. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



Plot 7-175. Upper ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

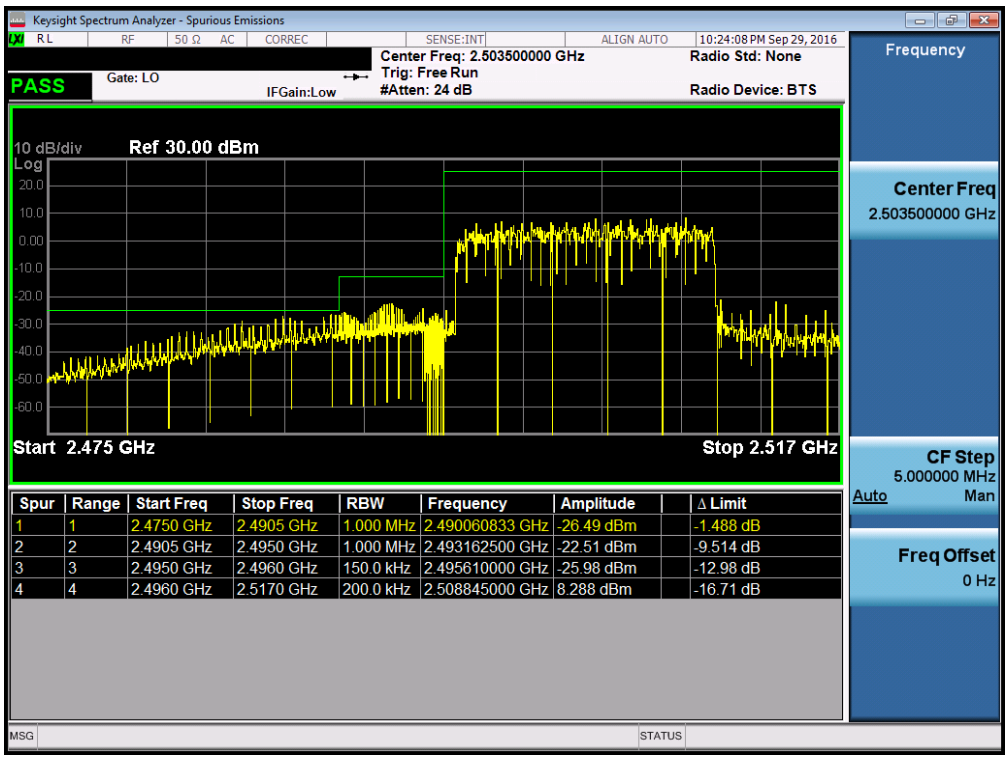


Plot 7-176. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



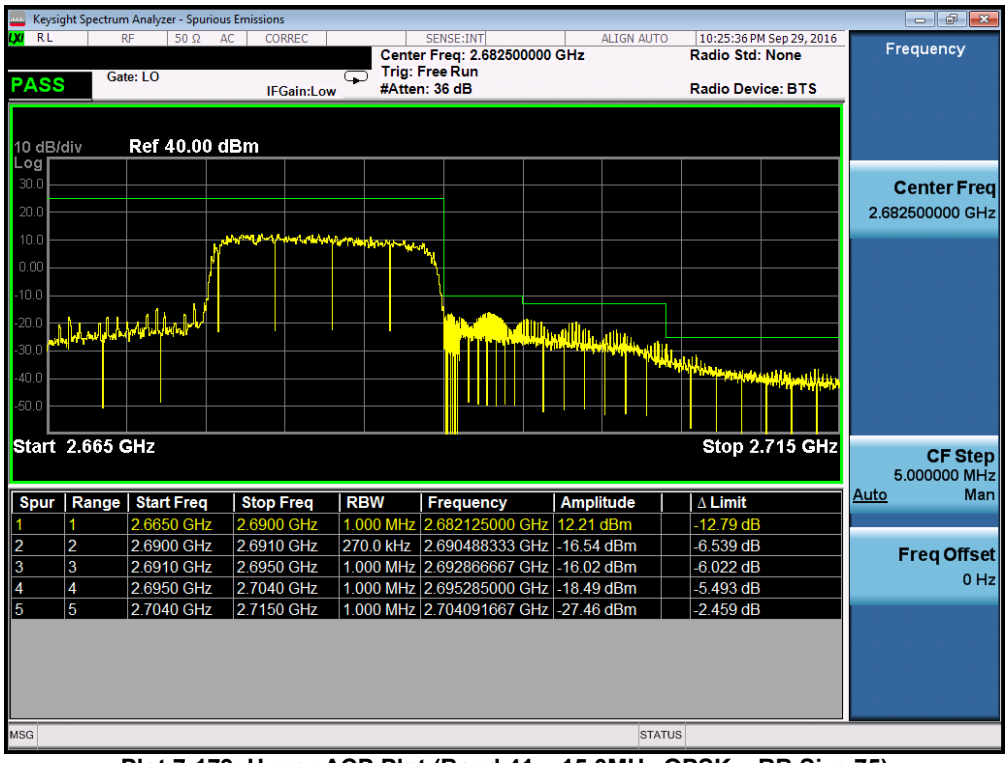
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.682041667 GHz	14.20 dBm	-10.80 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690403333 GHz	-22.23 dBm	-12.23 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691200000 GHz	-19.26 dBm	-9.260 dB
4	4	2.6950 GHz	2.6998 GHz	1.000 MHz	2.695925100 GHz	-23.41 dBm	-10.41 dB
5	5	2.6998 GHz	2.7150 GHz	1.000 MHz	2.700063942 GHz	-33.25 dBm	-8.247 dB

Plot 7-177. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



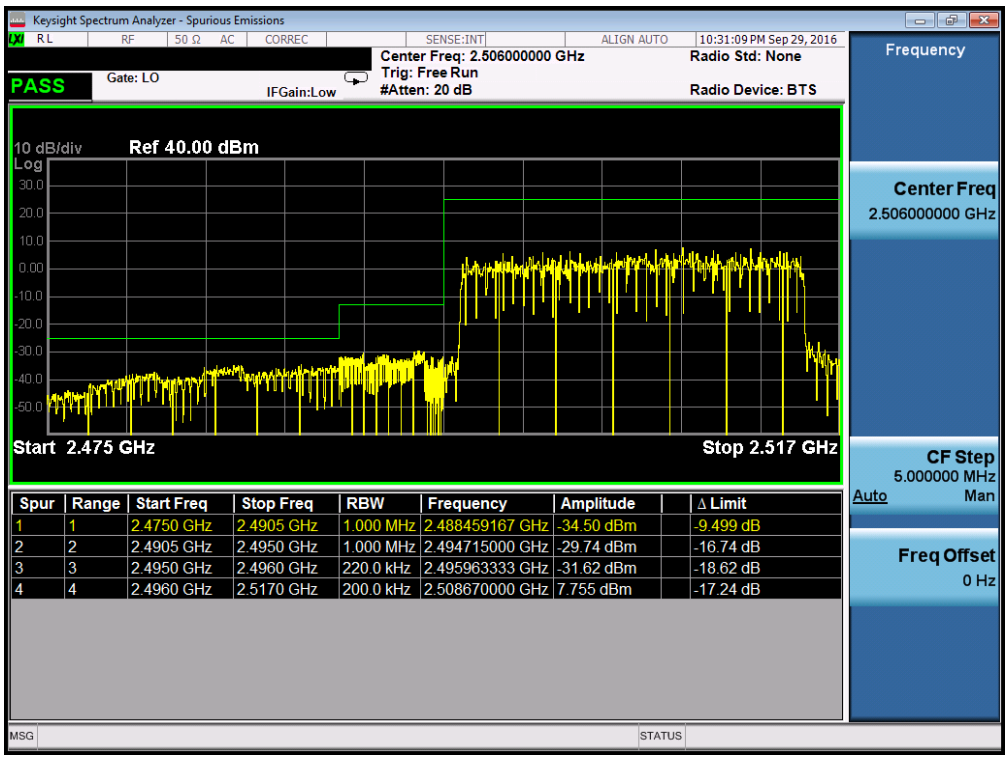
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490060833 GHz	-26.49 dBm	-1.488 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.493162500 GHz	-22.51 dBm	-9.514 dB
3	3	2.4950 GHz	2.4960 GHz	150.0 kHz	2.495610000 GHz	-25.98 dBm	-12.98 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.508845000 GHz	8.288 dBm	-16.71 dB

Plot 7-178. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



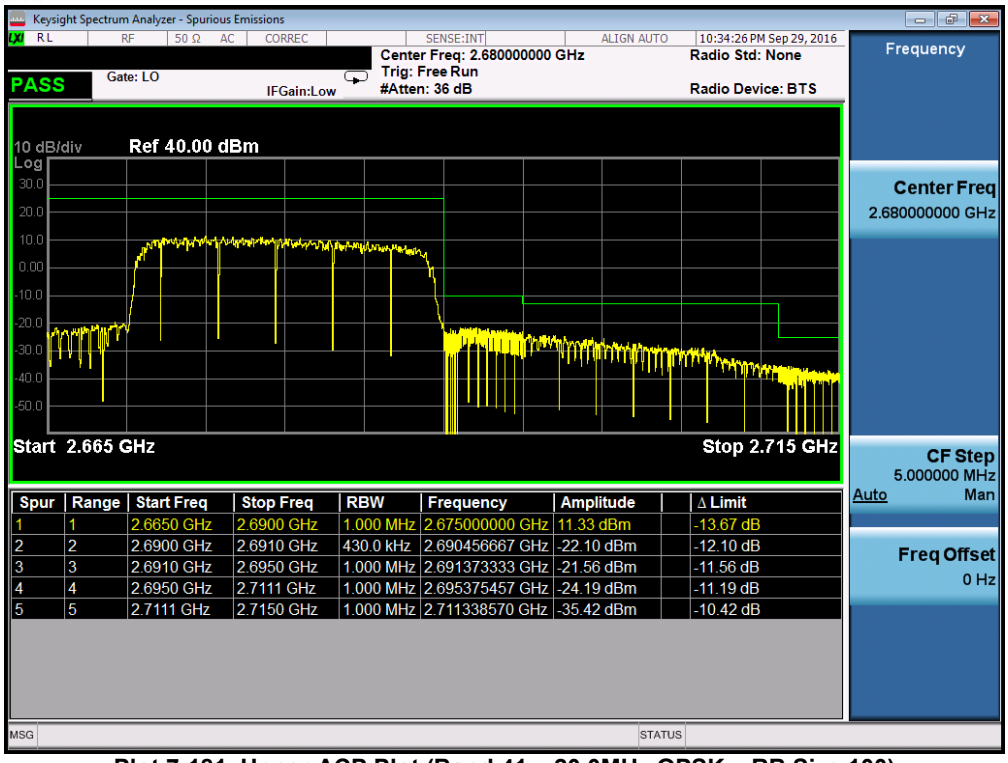
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.682125000 GHz	12.21 dBm	-12.79 dB
2	2	2.6900 GHz	2.6910 GHz	270.0 kHz	2.690488333 GHz	-16.54 dBm	-6.539 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692866667 GHz	-16.02 dBm	-6.022 dB
4	4	2.6950 GHz	2.7040 GHz	1.000 MHz	2.695285000 GHz	-18.49 dBm	-5.493 dB
5	5	2.7040 GHz	2.7150 GHz	1.000 MHz	2.704091667 GHz	-27.46 dBm	-2.459 dB

Plot 7-179. Upper ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.488459167 GHz	-34.50 dBm	-9.499 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494715000 GHz	-29.74 dBm	-16.74 dB
3	3	2.4950 GHz	2.4960 GHz	220.0 kHz	2.495963333 GHz	-31.62 dBm	-18.62 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.508670000 GHz	7.755 dBm	-17.24 dB

Plot 7-180. Lower ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.675000000 GHz	11.33 dBm	-13.67 dB
2	2	2.6900 GHz	2.6910 GHz	430.0 kHz	2.690456667 GHz	-22.10 dBm	-12.10 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691373333 GHz	-21.56 dBm	-11.56 dB
4	4	2.6950 GHz	2.7111 GHz	1.000 MHz	2.695375457 GHz	-24.19 dBm	-11.19 dB
5	5	2.7111 GHz	2.7150 GHz	1.000 MHz	2.711338570 GHz	-35.42 dBm	-10.42 dB

Plot 7-181. Upper ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

7.5 Peak-Average Ratio

§24.232(d)

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. 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.

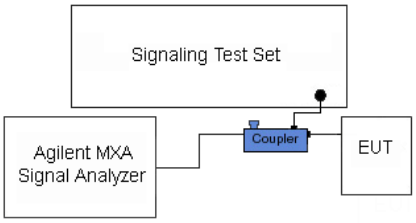
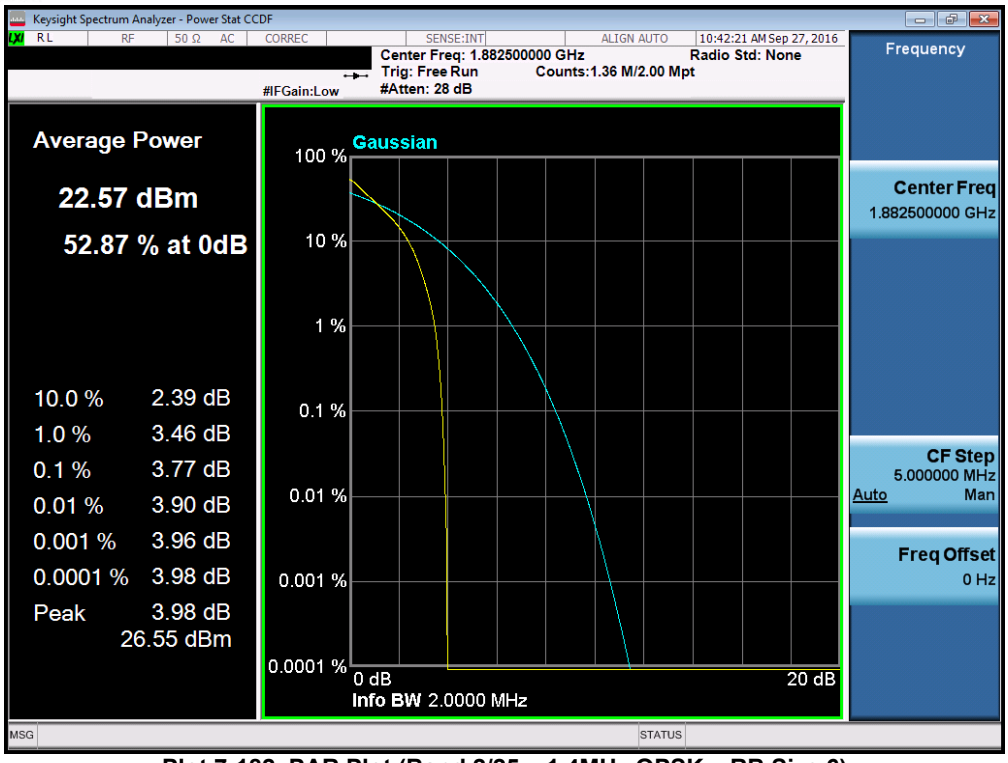


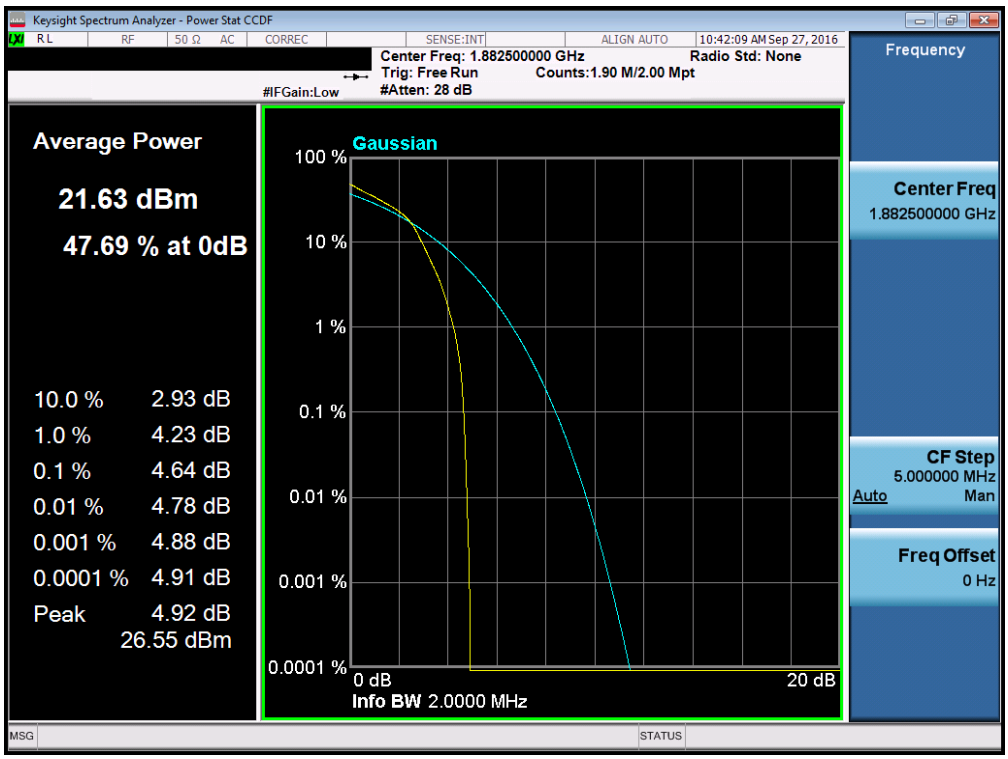
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

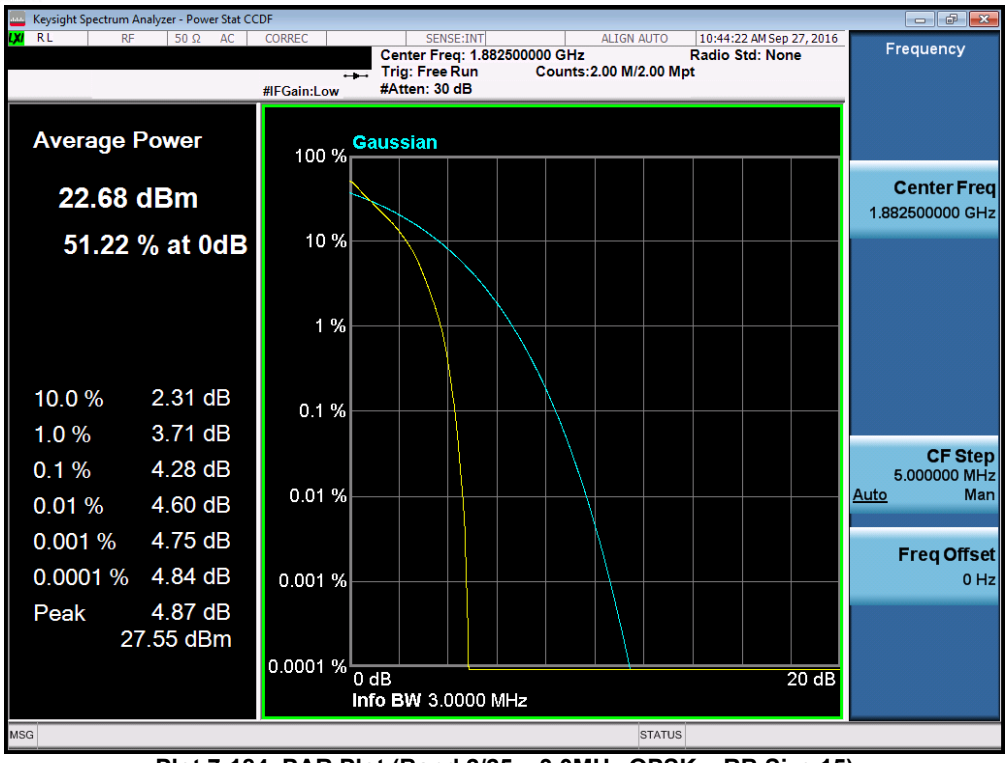
None.



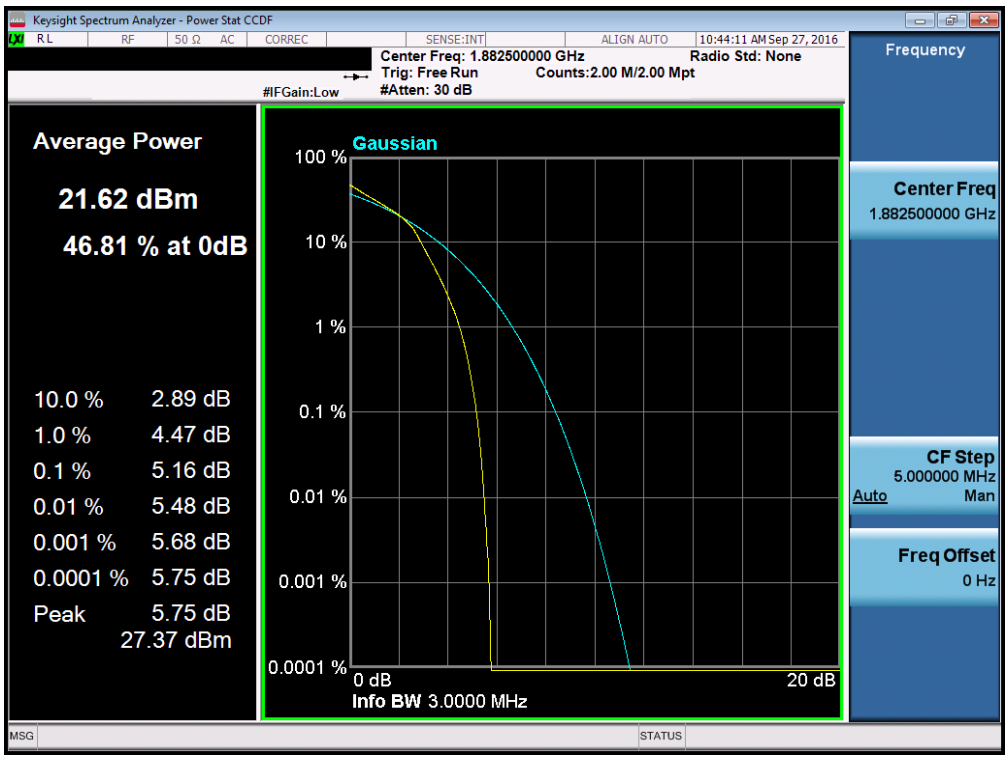
Plot 7-182. PAR Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



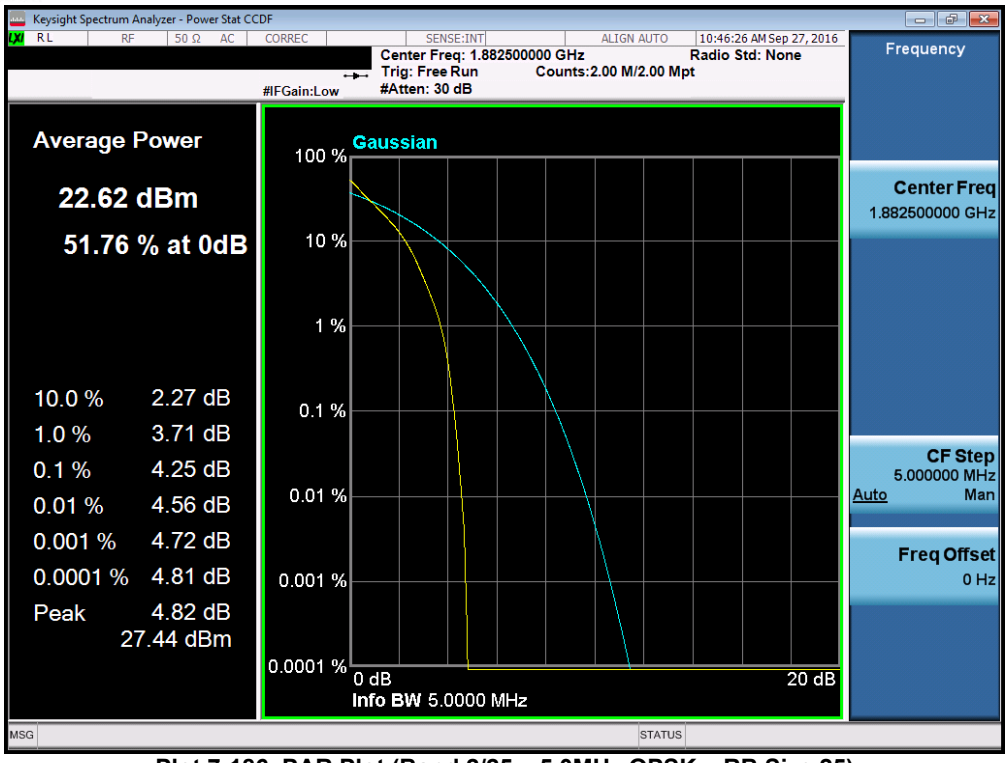
Plot 7-183. PAR Plot (Band 2/25 – 1.4MHz 16-QAM – RB Size 6)



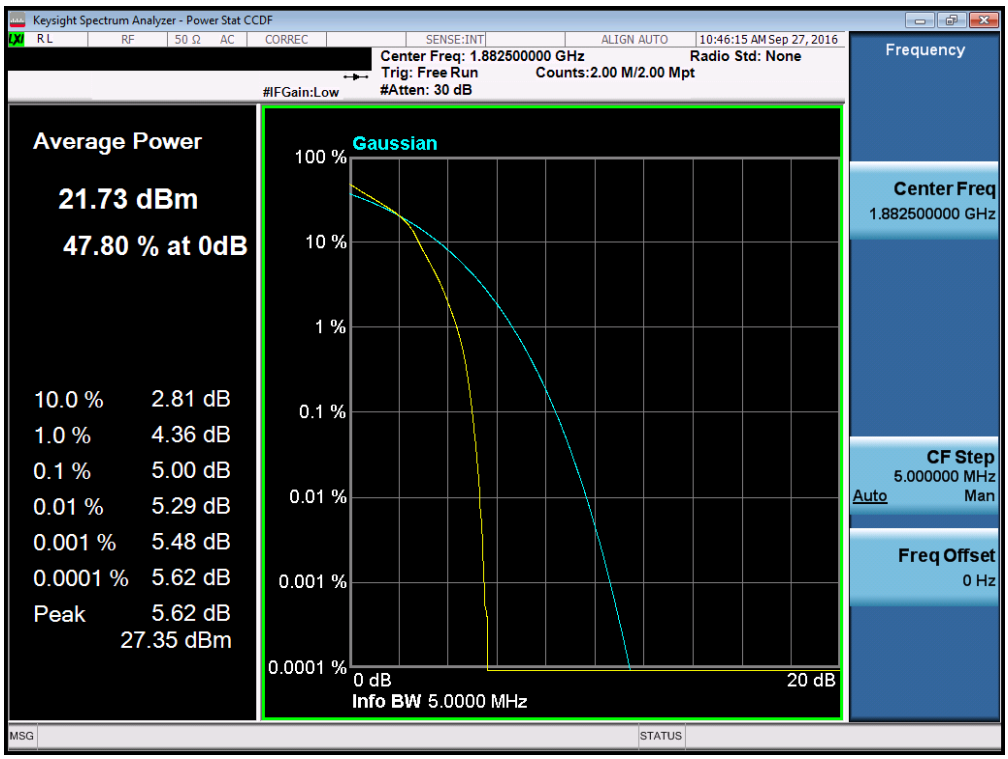
Plot 7-184. PAR Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



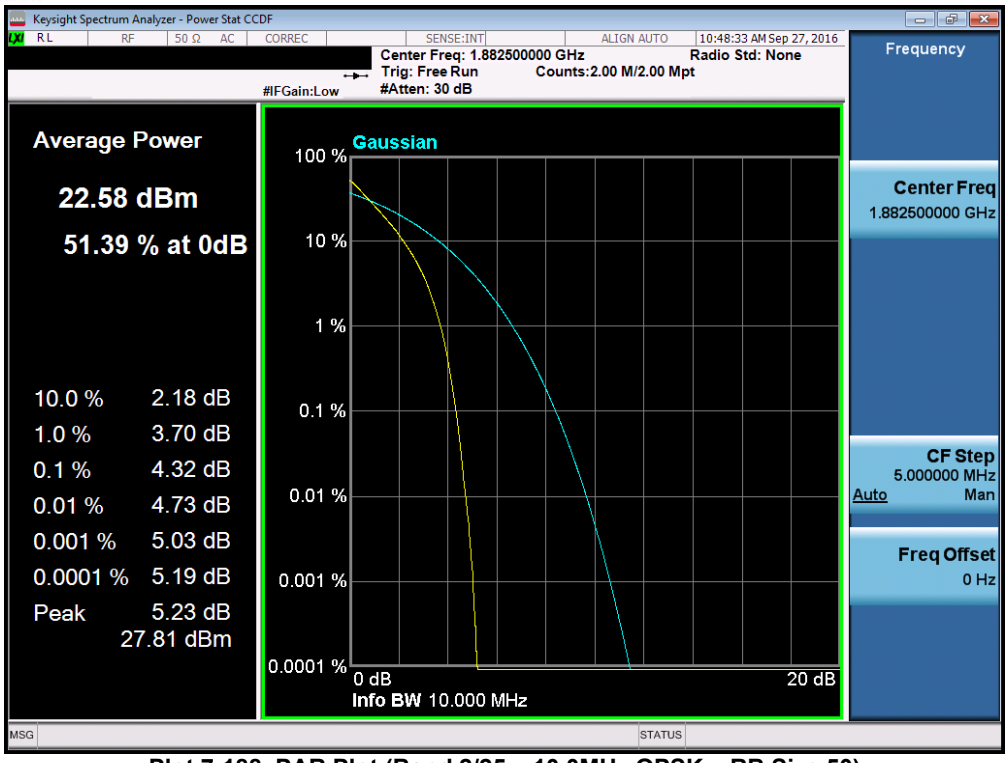
Plot 7-185. PAR Plot (Band 2/25 – 3.0MHz 16-QAM – RB Size 15)



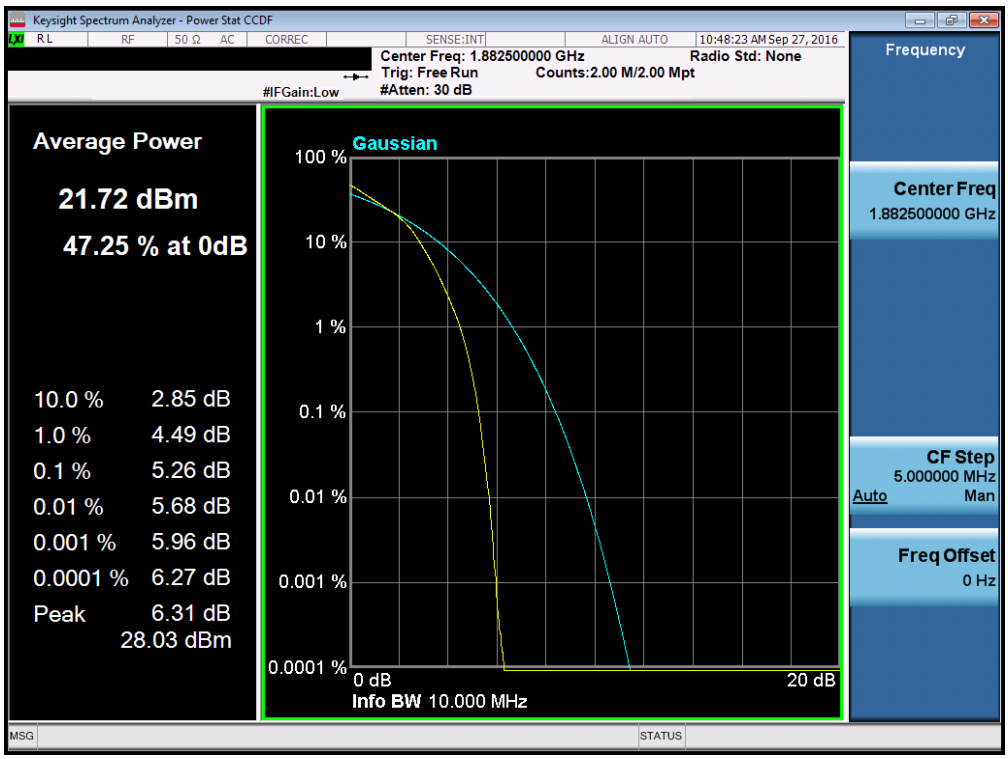
Plot 7-186. PAR Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



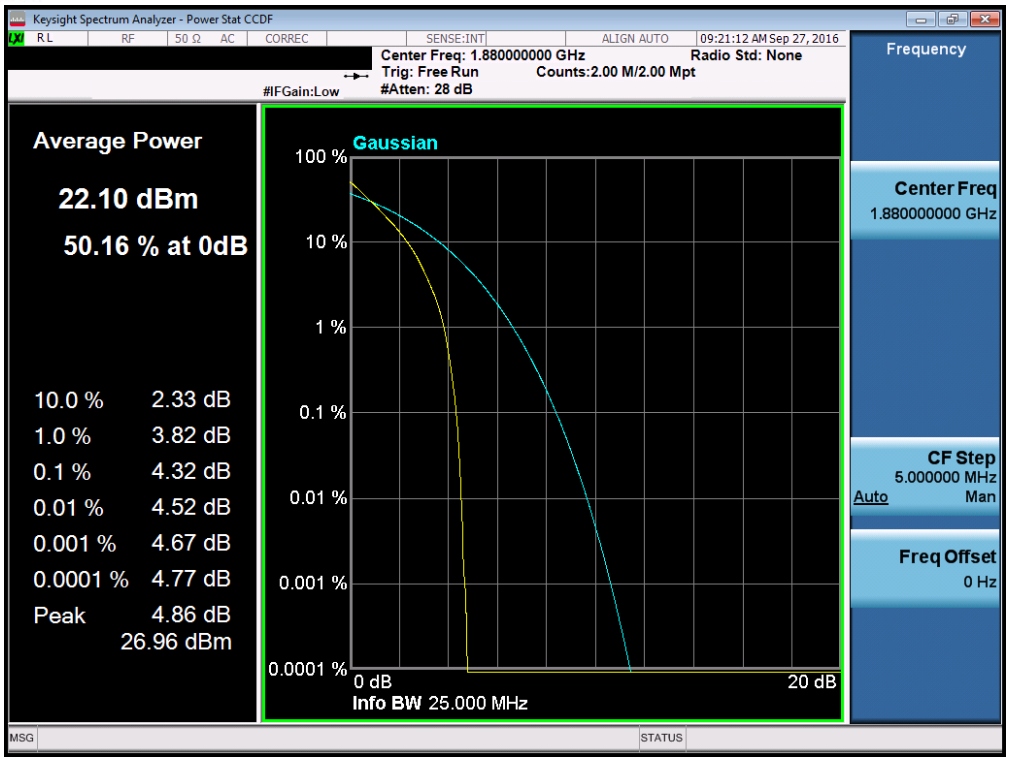
Plot 7-187. PAR Plot (Band 2/25 – 5.0MHz 16-QAM – RB Size 25)



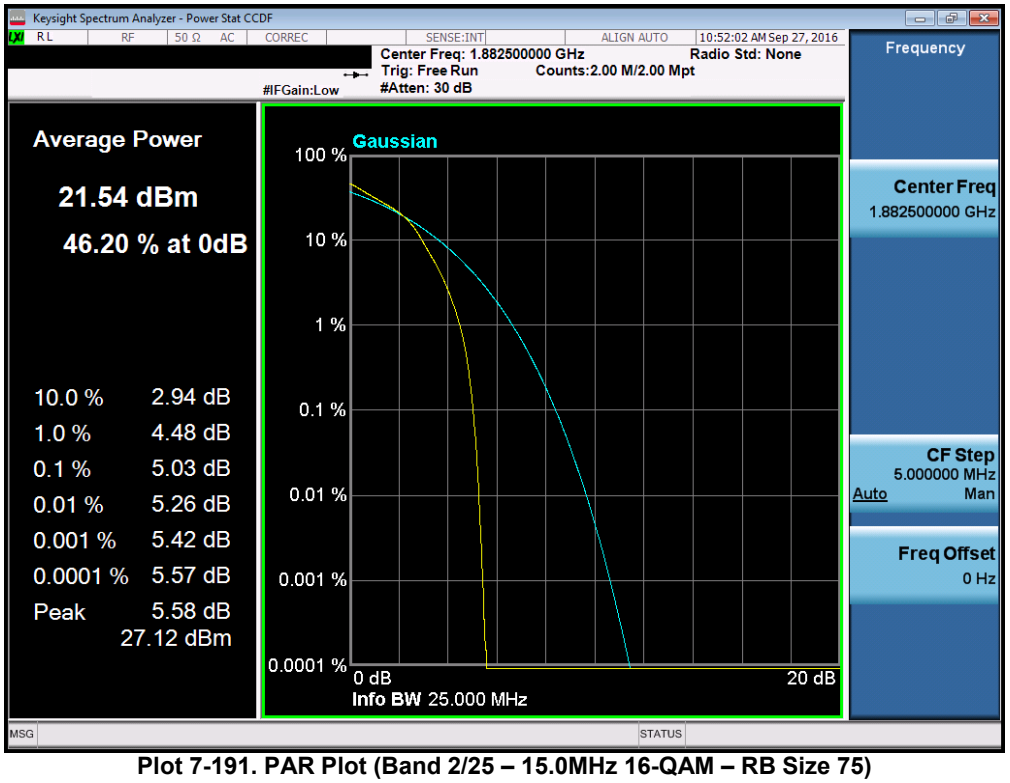
Plot 7-188. PAR Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



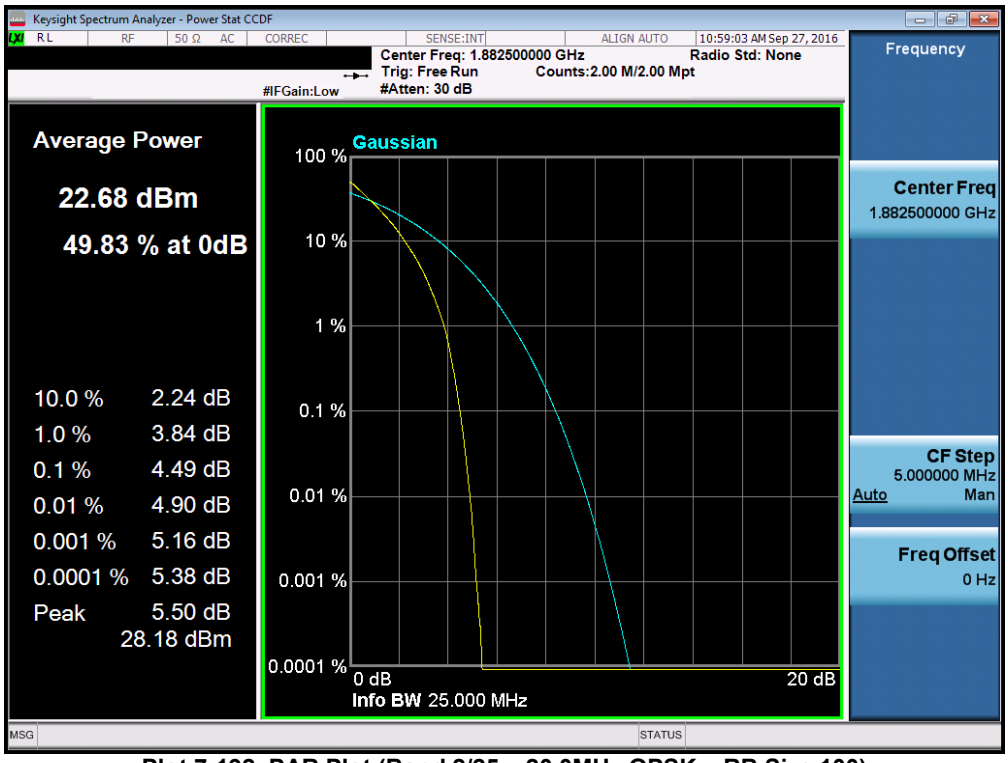
Plot 7-189. PAR Plot (Band 2/25 – 10.0MHz 16-QAM – RB Size 50)



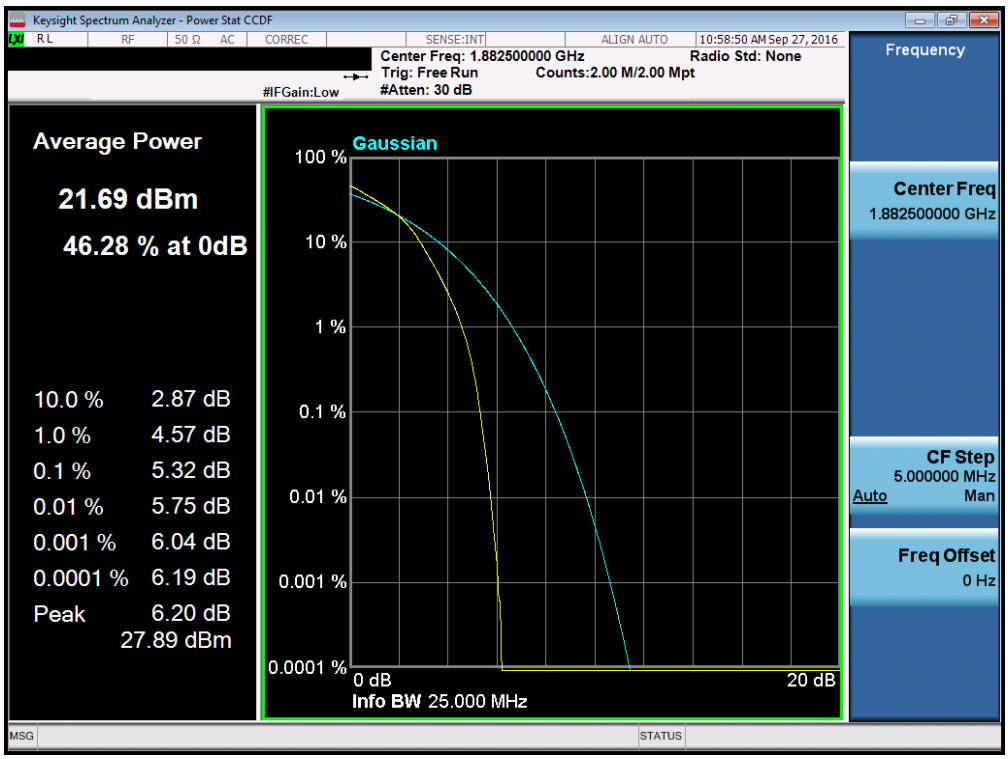
Plot 7-190. PAR Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



Plot 7-191. PAR Plot (Band 2/25 – 15.0MHz 16-QAM – RB Size 75)



Plot 7-192. PAR Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



Plot 7-193. PAR Plot (Band 2/25 – 20.0MHz 16-QAM – RB Size 100)

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)

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. 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

Test Setup

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

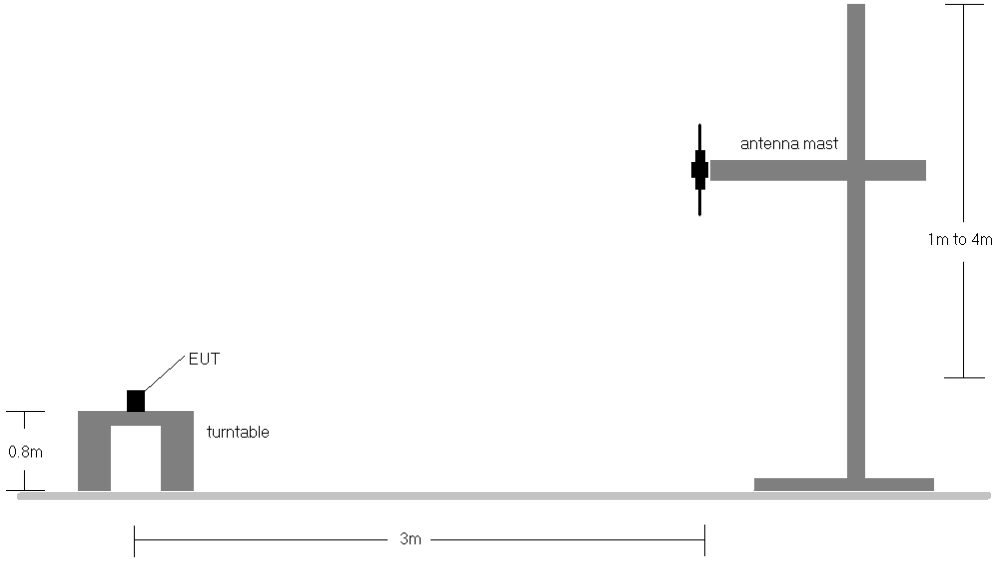


Figure 7-5. Radiated Test Setup <1GHz

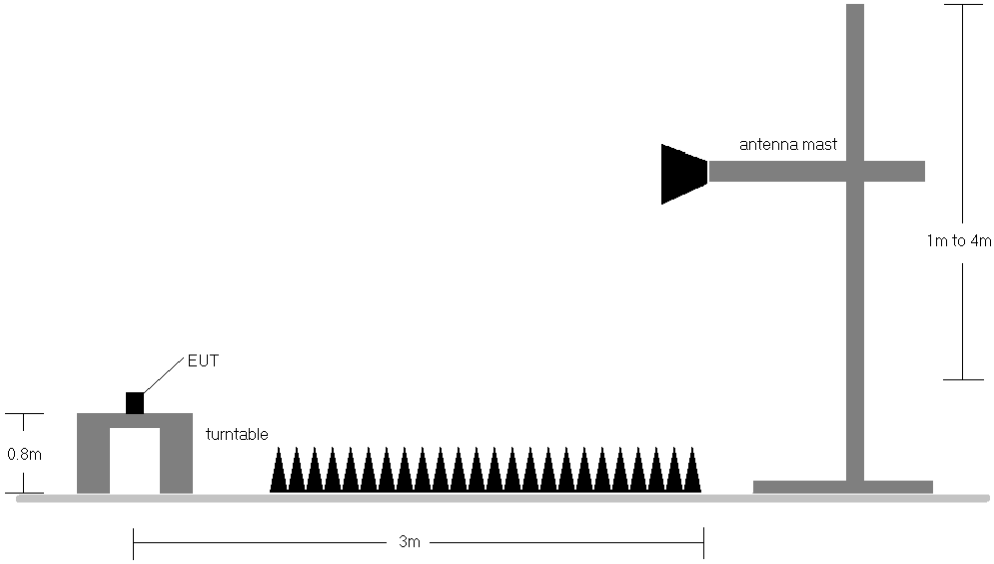


Figure 7-6. Radiated Test Setup >1GHz

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.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	294	247	1 / 0	14.77	2.10	16.87	34.77	-17.90
707.50	1.4	QPSK	H	294	249	1 / 0	14.30	2.31	16.61	34.77	-18.16
715.30	1.4	QPSK	H	294	250	1 / 0	13.22	2.52	15.74	34.77	-19.03
699.70	1.4	16-QAM	H	294	247	1 / 0	13.81	2.10	15.91	34.77	-18.86
707.50	1.4	16-QAM	H	294	249	1 / 0	13.31	2.31	15.62	34.77	-19.15
715.30	1.4	16-QAM	H	294	250	1 / 5	12.14	2.52	14.66	34.77	-20.11
700.50	3	QPSK	H	295	248	1 / 0	14.62	2.12	16.74	34.77	-18.03
707.50	3	QPSK	H	295	246	1 / 0	14.45	2.31	16.76	34.77	-18.01
714.50	3	QPSK	H	294	244	1 / 0	13.44	2.50	15.94	34.77	-18.83
700.50	3	16-QAM	H	295	248	1 / 0	13.72	2.12	15.84	34.77	-18.93
707.50	3	16-QAM	H	295	246	1 / 0	13.46	2.31	15.77	34.77	-19.00
714.50	3	16-QAM	H	294	244	1 / 0	12.46	2.50	14.96	34.77	-19.81
701.50	5	QPSK	H	293	254	1 / 0	14.86	2.15	17.01	34.77	-17.76
707.50	5	QPSK	H	296	236	1 / 0	14.10	2.31	16.41	34.77	-18.36
713.50	5	QPSK	H	297	243	1 / 0	13.49	2.48	15.97	34.77	-18.81
701.50	5	16-QAM	H	293	254	1 / 0	13.76	2.15	15.91	34.77	-18.86
707.50	5	16-QAM	H	296	236	1 / 0	13.14	2.31	15.45	34.77	-19.32
713.50	5	16-QAM	H	297	243	1 / 0	12.98	2.48	15.46	34.77	-19.32
704.00	10	QPSK	H	289	238	1 / 0	14.55	2.22	16.77	34.77	-18.01
707.50	10	QPSK	H	293	252	1 / 0	14.13	2.31	16.44	34.77	-18.33
711.00	10	QPSK	H	295	237	1 / 0	14.14	2.41	16.55	34.77	-18.22
704.00	10	16-QAM	H	289	238	1 / 0	13.60	2.22	15.82	34.77	-18.96
707.50	10	16-QAM	H	293	252	1 / 0	13.05	2.31	15.36	34.77	-19.41
711.00	10	16-QAM	H	295	237	1 / 0	12.98	2.41	15.39	34.77	-19.38
701.50	5	QPSK	V	274	1	1 / 0	6.05	2.34	8.39	34.77	-26.38

Table 7-2. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	240	12	1 / 0	17.33	5.01	22.34	38.45	-16.11
836.50	1.4	QPSK	H	251	0	3 / 2	16.44	5.16	21.60	38.45	-16.85
848.30	1.4	QPSK	H	226	0	1 / 5	15.46	5.30	20.76	38.45	-17.69
824.70	1.4	16-QAM	H	240	12	1 / 0	16.60	5.01	21.61	38.45	-16.84
836.50	1.4	16-QAM	H	251	0	1 / 5	15.42	5.16	20.58	38.45	-17.87
848.30	1.4	16-QAM	H	226	0	1 / 0	14.22	5.30	19.52	38.45	-18.93
825.50	3	QPSK	H	247	0	1 / 0	17.50	5.02	22.52	38.45	-15.93
836.50	3	QPSK	H	247	0	1 / 0	16.19	5.16	21.35	38.45	-17.10
847.50	3	QPSK	H	105	352	1 / 0	15.88	5.29	21.17	38.45	-17.28
825.50	3	16-QAM	H	247	0	1 / 0	16.22	5.02	21.24	38.45	-17.21
836.50	3	16-QAM	H	247	0	1 / 0	15.20	5.16	20.36	38.45	-18.09
847.50	3	16-QAM	H	105	352	1 / 14	14.75	5.29	20.04	38.45	-18.41
826.50	5	QPSK	H	246	241	1 / 0	17.41	5.03	22.44	38.45	-16.01
836.50	5	QPSK	H	245	353	1 / 0	16.22	5.16	21.38	38.45	-17.07
846.50	5	QPSK	H	110	355	1 / 0	15.37	5.28	20.65	38.45	-17.80
826.50	5	16-QAM	H	246	241	1 / 0	16.01	5.03	21.04	38.45	-17.41
836.50	5	16-QAM	H	245	353	1 / 0	15.50	5.16	20.66	38.45	-17.79
846.50	5	16-QAM	H	110	355	1 / 0	14.92	5.28	20.20	38.45	-18.25
829.00	10	QPSK	H	248	0	1 / 0	17.22	5.06	22.28	38.45	-16.17
836.50	10	QPSK	H	247	0	1 / 0	16.74	5.16	21.90	38.45	-16.55
844.00	10	QPSK	H	254	31	1 / 0	15.65	5.25	20.90	38.45	-17.55
829.00	10	16-QAM	H	248	0	1 / 49	15.98	5.06	21.04	38.45	-17.41
836.50	10	16-QAM	H	247	0	1 / 0	16.12	5.16	21.28	38.45	-17.17
844.00	10	16-QAM	H	254	31	1 / 0	14.67	5.25	19.92	38.45	-18.53
825.50	3	QPSK	V	159	163	1 / 0	16.92	4.95	21.87	38.45	-16.58

Table 7-3. ERP Data (Band 5/26)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
831.50	15	QPSK	H	360	209	1 / 74	16.11	5.10	21.21	38.45	-17.25
836.50	15	QPSK	H	359	207	1 / 74	16.15	5.16	21.31	38.45	-17.14
841.50	15	QPSK	H	360	209	1 / 74	17.72	5.22	22.94	38.45	-15.51
831.50	15	16-QAM	H	360	209	1 / 74	15.28	5.10	20.38	38.45	-18.08
836.50	15	16-QAM	H	359	207	1 / 74	15.40	5.16	20.56	38.45	-17.89
841.50	15	16-QAM	H	360	209	1 / 74	17.13	5.22	22.35	38.45	-16.10
841.50	15	QPSK	V	156	225	1 / 74	15.02	5.02	20.04	38.45	-18.41
821.50	15	QPSK	H	223	340	1 / 74	14.19	4.97	19.16	38.45	-19.29
821.50	15	16-QAM	H	223	340	1 / 74	13.22	4.97	18.19	38.45	-20.26

Table 7-4. ERP Data (Band 26)

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	238	109	3 / 2	11.92	9.66	21.58	30.00	-8.42
1732.50	1.4	QPSK	H	176	104	3 / 2	12.75	9.61	22.36	30.00	-7.64
1754.30	1.4	QPSK	H	223	105	3 / 2	13.37	9.57	22.94	30.00	-7.06
1710.70	1.4	16-QAM	H	238	109	3 / 2	11.00	9.66	20.66	30.00	-9.34
1732.50	1.4	16-QAM	H	176	104	3 / 2	11.98	9.61	21.59	30.00	-8.41
1754.30	1.4	16-QAM	H	223	105	3 / 2	12.47	9.57	22.04	30.00	-7.96
1711.50	3	QPSK	H	238	106	1 / 14	11.90	9.65	21.55	30.00	-8.45
1732.50	3	QPSK	H	177	106	1 / 14	12.89	9.61	22.50	30.00	-7.50
1753.50	3	QPSK	H	166	102	1 / 0	12.90	9.57	22.47	30.00	-7.53
1711.50	3	16-QAM	H	238	106	1 / 14	11.03	9.65	20.68	30.00	-9.32
1732.50	3	16-QAM	H	177	106	1 / 14	11.67	9.61	21.28	30.00	-8.72
1753.50	3	16-QAM	H	166	102	1 / 0	12.22	9.57	21.79	30.00	-8.21
1712.50	5	QPSK	H	239	110	1 / 24	11.82	9.65	21.47	30.00	-8.53
1732.50	5	QPSK	H	172	106	1 / 0	12.81	9.61	22.42	30.00	-7.58
1752.50	5	QPSK	H	123	100	1 / 24	12.66	9.57	22.23	30.00	-7.77
1712.50	5	16-QAM	H	239	110	1 / 24	10.72	9.65	20.37	30.00	-9.63
1732.50	5	16-QAM	H	172	106	1 / 0	11.89	9.61	21.50	30.00	-8.50
1752.50	5	16-QAM	H	123	100	1 / 24	11.75	9.57	21.32	30.00	-8.68
1715.00	10	QPSK	H	237	108	1 / 49	11.71	9.65	21.36	30.00	-8.64
1732.50	10	QPSK	H	172	112	1 / 0	12.22	9.61	21.83	30.00	-8.17
1750.00	10	QPSK	H	223	123	1 / 49	12.76	9.58	22.34	30.00	-7.66
1715.00	10	16-QAM	H	237	108	1 / 49	10.77	9.65	20.42	30.00	-9.58
1732.50	10	16-QAM	H	172	112	1 / 0	11.09	9.61	20.70	30.00	-9.30
1750.00	10	16-QAM	H	223	123	1 / 49	11.82	9.58	21.40	30.00	-8.60
1717.50	15	QPSK	H	310	112	1 / 74	11.73	9.64	21.37	30.00	-8.63
1732.50	15	QPSK	H	299	108	1 / 74	11.91	9.61	21.52	30.00	-8.48
1747.50	15	QPSK	H	302	101	1 / 0	12.93	9.58	22.51	30.00	-7.49
1717.50	15	16-QAM	H	310	112	1 / 74	10.78	9.64	20.42	30.00	-9.58
1732.50	15	16-QAM	H	299	108	1 / 74	11.00	9.61	20.61	30.00	-9.39
1747.50	15	16-QAM	H	302	101	1 / 0	12.36	9.58	21.94	30.00	-8.06
1720.00	20	QPSK	H	300	113	1 / 99	12.15	9.64	21.79	30.00	-8.21
1732.50	20	QPSK	H	302	108	1 / 99	13.06	9.61	22.67	30.00	-7.33
1745.00	20	QPSK	H	109	110	1 / 99	13.26	9.59	22.85	30.00	-7.15
1720.00	20	16-QAM	H	300	113	1 / 99	11.24	9.64	20.88	30.00	-9.12
1732.50	20	16-QAM	H	302	108	1 / 99	12.10	9.61	21.71	30.00	-8.29
1745.00	20	16-QAM	H	109	110	1 / 99	12.56	9.59	22.15	30.00	-7.85
1754.30	1.4	QPSK	V	105	86	50 / 25	10.80	9.39	20.19	30.00	-9.81

Table 7-5. EIRP Data (Band 4)

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	H	266	295	3 / 2	14.55	9.35	23.90	33.01	-9.11
1882.50	1.4	QPSK	H	250	299	3 / 2	13.26	9.27	22.53	33.01	-10.48
1914.30	1.4	QPSK	H	249	304	3 / 2	13.13	9.26	22.39	33.01	-10.62
1850.70	1.4	16-QAM	H	266	295	3 / 2	13.62	9.35	22.97	33.01	-10.04
1882.50	1.4	16-QAM	H	250	299	3 / 2	12.45	9.27	21.72	33.01	-11.29
1914.30	1.4	16-QAM	H	249	304	3 / 2	12.32	9.26	21.58	33.01	-11.43
1851.50	3	QPSK	H	257	299	1 / 0	14.37	9.35	23.72	33.01	-9.29
1882.50	3	QPSK	H	250	297	1 / 0	13.38	9.27	22.65	33.01	-10.36
1913.50	3	QPSK	H	249	305	1 / 0	13.52	9.26	22.78	33.01	-10.23
1851.50	3	16-QAM	H	257	299	1 / 0	13.45	9.35	22.80	33.01	-10.21
1882.50	3	16-QAM	H	250	297	1 / 0	12.75	9.27	22.02	33.01	-10.99
1913.50	3	16-QAM	H	249	305	1 / 0	12.41	9.26	21.67	33.01	-11.34
1852.50	5	QPSK	H	255	302	1 / 0	14.45	9.34	23.79	33.01	-9.22
1882.50	5	QPSK	H	250	301	1 / 0	13.39	9.27	22.66	33.01	-10.35
1912.50	5	QPSK	H	246	296	1 / 0	13.08	9.26	22.34	33.01	-10.67
1852.50	5	16-QAM	H	255	302	1 / 0	13.31	9.34	22.65	33.01	-10.36
1882.50	5	16-QAM	H	250	301	1 / 0	12.51	9.27	21.78	33.01	-11.23
1912.50	5	16-QAM	H	246	296	1 / 0	12.14	9.26	21.40	33.01	-11.61
1855.00	10	QPSK	H	257	300	1 / 0	14.27	9.34	23.61	33.01	-9.40
1882.50	10	QPSK	H	262	309	1 / 0	13.30	9.27	22.57	33.01	-10.44
1910.00	10	QPSK	H	245	296	1 / 0	12.76	9.25	22.01	33.01	-11.00
1855.00	10	16-QAM	H	257	300	1 / 0	13.82	9.34	23.16	33.01	-9.85
1882.50	10	16-QAM	H	262	309	1 / 0	12.63	9.27	21.90	33.01	-11.11
1910.00	10	16-QAM	H	245	296	1 / 0	11.89	9.25	21.14	33.01	-11.87
1857.50	15	QPSK	H	258	126	1 / 0	13.33	9.33	22.66	33.01	-10.35
1882.50	15	QPSK	H	250	125	1 / 0	12.47	9.27	21.74	33.01	-11.27
1907.50	15	QPSK	H	253	115	1 / 0	11.89	9.24	21.13	33.01	-11.88
1857.50	15	16-QAM	H	258	126	1 / 0	12.47	9.33	21.80	33.01	-11.21
1882.50	15	16-QAM	H	250	125	1 / 0	11.34	9.27	20.61	33.01	-12.40
1907.50	15	16-QAM	H	253	115	1 / 0	11.10	9.24	20.34	33.01	-12.67
1860.00	20	QPSK	H	335	114	1 / 99	12.11	9.32	21.43	33.01	-11.58
1882.50	20	QPSK	H	254	301	1 / 99	12.77	9.27	22.04	33.01	-10.97
1905.00	20	QPSK	H	321	119	1 / 99	13.44	9.24	22.68	33.01	-10.33
1860.00	20	16-QAM	H	335	114	1 / 99	11.41	9.32	20.73	33.01	-12.28
1882.50	20	16-QAM	H	254	301	1 / 99	11.79	9.27	21.06	33.01	-11.95
1905.00	20	16-QAM	H	321	119	1 / 99	12.94	9.24	22.18	33.01	-10.83
1850.70	1.4	QPSK	V	118	263	1 / 0	10.63	9.21	19.84	33.01	-13.17

Table 7-6. EIRP Data (Band 2/25)

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]
2498.50	5	QPSK	H	100	311	1 / 0	15.32	8.60	23.92	33.01	-9.09
2593.00	5	QPSK	H	122	320	1 / 24	14.96	8.53	23.49	33.01	-9.52
2687.50	5	QPSK	H	100	317	1 / 0	14.93	8.79	23.72	33.01	-9.29
2498.50	5	16-QAM	H	100	311	1 / 0	14.36	8.60	22.96	33.01	-10.05
2593.00	5	16-QAM	H	122	320	1 / 24	13.46	8.53	21.99	33.01	-11.02
2687.50	5	16-QAM	H	100	317	1 / 0	13.57	8.79	22.36	33.01	-10.65
2501.00	10	QPSK	H	100	299	1 / 49	15.49	8.60	24.09	33.01	-8.92
2593.00	10	QPSK	H	101	320	1 / 49	13.94	8.53	22.47	33.01	-10.54
2685.00	10	QPSK	H	100	318	1 / 49	14.36	8.78	23.14	33.01	-9.87
2501.00	10	16-QAM	H	100	299	1 / 49	14.90	8.60	23.50	33.01	-9.51
2593.00	10	16-QAM	H	101	320	1 / 49	12.53	8.53	21.06	33.01	-11.95
2685.00	10	16-QAM	H	100	318	1 / 49	13.78	8.78	22.56	33.01	-10.45
2503.50	15	QPSK	H	100	301	1 / 74	15.11	8.59	23.70	33.01	-9.31
2593.00	15	QPSK	H	100	307	1 / 0	14.22	8.53	22.75	33.01	-10.26
2682.50	15	QPSK	H	100	318	1 / 74	14.09	8.77	22.86	33.01	-10.15
2503.50	15	16-QAM	H	100	301	1 / 74	13.89	8.59	22.48	33.01	-10.53
2593.00	15	16-QAM	H	100	307	1 / 0	13.60	8.53	22.13	33.01	-10.88
2682.50	15	16-QAM	H	100	318	1 / 74	13.05	8.77	21.82	33.01	-11.19
2506.00	20	QPSK	H	100	304	1 / 99	15.66	8.59	24.25	33.01	-8.76
2593.00	20	QPSK	H	100	300	1 / 0	14.28	8.53	22.81	33.01	-10.20
2680.00	20	QPSK	H	100	318	1 / 99	14.48	8.77	23.25	33.01	-9.76
2506.00	20	16-QAM	H	100	304	1 / 99	14.69	8.59	23.28	33.01	-9.73
2593.00	20	16-QAM	H	100	300	1 / 0	13.49	8.53	22.02	33.01	-10.99
2680.00	20	16-QAM	H	100	318	1 / 99	13.53	8.77	22.30	33.01	-10.71
2506.00	20	QPSK	V	103	274	1 / 99	13.70	8.52	22.22	33.01	-10.79

Table 7-7. EIRP Data (Band 41)

7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-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 peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 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

Test Setup

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

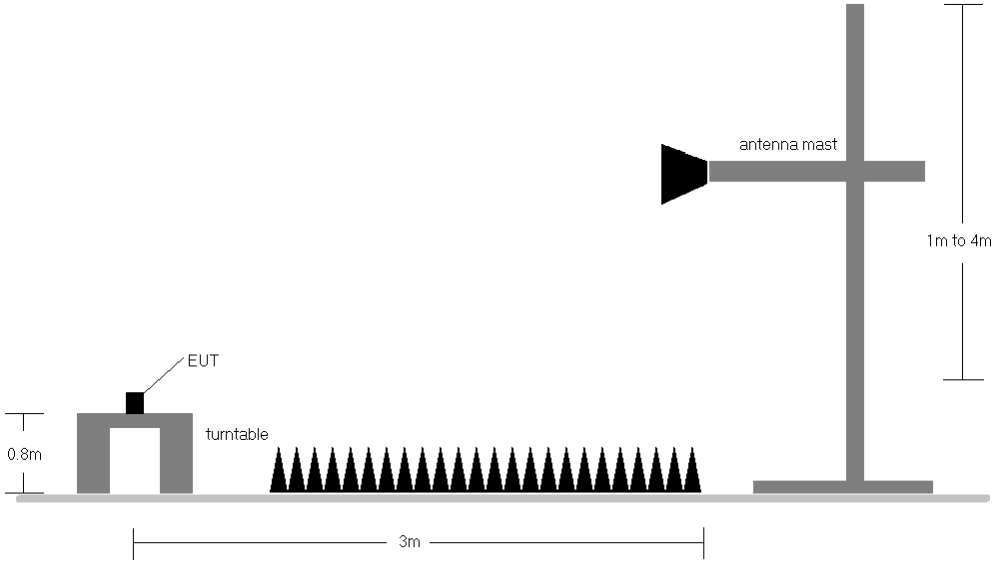


Figure 7-7. Test Instrument & Measurement Setup

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.

OPERATING FREQUENCY:	701.50	MHz		
CHANNEL:	23035			
MEASURED OUTPUT POWER:	17.01	dBm	=	0.050 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.01	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	H	164	95	-42.68	2.39	-40.29	57.3
2104.50	H	219	120	-56.40	3.46	-52.95	70.0
2806.00	H	210	115	-61.99	4.76	-57.23	74.2
3507.50	H	176	210	-51.91	6.22	-45.69	62.7
4209.00	H	-	-	-65.69	7.23	-58.46	75.5

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

OPERATING FREQUENCY:	707.50	MHz		
CHANNEL:	23095			
MEASURED OUTPUT POWER:	16.41	dBm	=	0.044 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	29.41	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	106	76	-44.98	2.54	-42.44	58.8
2122.50	H	281	107	-48.02	3.42	-44.60	61.0
2830.00	H	176	111	-62.92	4.85	-58.07	74.5
3537.50	H	167	231	-59.13	6.26	-52.87	69.3
4245.00	H	-	-	-66.61	7.30	-59.31	75.7

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

OPERATING FREQUENCY:	713.50	MHz		
CHANNEL:	23155			
MEASURED OUTPUT POWER:	15.97	dBm	=	0.040 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	28.97	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	H	115	121	-45.99	2.70	-43.29	59.3
2140.50	H	256	135	-47.32	3.38	-43.94	59.9
2854.00	H	181	220	-62.77	4.95	-57.82	73.8
3567.50	H	132	123	-59.68	6.31	-53.38	69.3
4281.00	H	-	-	-66.13	7.36	-58.77	74.7

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

OPERATING FREQUENCY:	825.50	MHz		
CHANNEL:	20415			
MEASURED OUTPUT POWER:	22.52	dBm	=	0.179 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.52	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1651.00	H	100	297	-61.28	6.70	-54.59	77.1
2476.50	H	144	18	-64.83	7.53	-57.30	79.8

Table 7-11. Radiated Spurious Data (Band 5/26 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz			
CHANNEL:	20525				
MEASURED OUTPUT POWER:	21.35	dBm	=	0.136	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	3.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.35	dBc		

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	H	100	298	-62.11	6.70	-55.42	76.8
2509.50	H	100	298	-64.86	7.63	-57.23	78.6

Table 7-12. Radiated Spurious Data (Band 5/26 – Mid Channel)

OPERATING FREQUENCY:	847.50	MHz			
CHANNEL:	20635				
MEASURED OUTPUT POWER:	21.17	dBm	=	0.131	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	3.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.17	dBc		

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1695.00	H	100	325	-62.10	6.70	-55.40	76.6
2542.50	H	100	30	-68.92	7.60	-61.32	82.5

Table 7-13. Radiated Spurious Data (Band 5/26 – High Channel)

OPERATING FREQUENCY:	1710.70	MHz		
CHANNEL:	19957			
MEASURED OUTPUT POWER:	21.58	dBm	=	0.144 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.58	dBc	

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]	[dBc]
3421.40	H	120	94	-56.68	9.86	-46.81	68.4
5132.10	H	117	199	-55.74	10.76	-44.98	66.6
6842.80	H	119	170	-54.55	11.66	-42.89	64.5
8553.50	H	-	-	-58.22	11.06	-47.16	68.7

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

OPERATING FREQUENCY:	1732.50	MHz		
CHANNEL:	20175			
MEASURED OUTPUT POWER:	22.36	dBm	=	0.172 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.36	dBc	

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]	[dBc]
3465.00	H	116	93	-59.39	9.91	-49.48	71.8
5197.50	H	110	73	-61.69	10.75	-50.95	73.3
6930.00	H	110	163	-54.18	11.76	-42.42	64.8
8662.50	H	110	112	-56.63	11.00	-45.63	68.0
10395.00	H	-	-	-58.62	12.65	-45.98	68.3

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

OPERATING FREQUENCY:	1754.30	MHz		
CHANNEL:	20393			
MEASURED OUTPUT POWER:	22.94	dBm	=	0.197 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.94	dBc	

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]	[dBc]
3508.60	H	117	274	-53.96	9.95	-44.00	66.9
5262.90	H	110	247	-65.13	10.71	-54.42	77.4
7017.20	H	111	210	-57.81	11.82	-45.98	68.9
8771.50	H	-	-	-57.41	10.96	-46.45	69.4

Table 7-16. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY:	1850.70	MHz		
CHANNEL:	18607			
MEASURED OUTPUT POWER:	23.90	dBm	=	0.245 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.90	dBc	

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]	[dBc]
3701.40	H	110	150	-57.40	9.52	-47.88	71.8
5552.10	H	100	147	-55.65	11.03	-44.62	68.5

Table 7-17. Radiated Spurious Data (Band 2/25 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz		
CHANNEL:	18900			
MEASURED OUTPUT POWER:	22.53	dBm	=	0.179 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.53	dBc	

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]	[dBc]
3760.00	H	104	149	-53.71	9.39	-44.33	66.9
5640.00	H	100	148	-55.03	11.22	-43.81	66.3
7520.00	H	166	180	-56.02	11.10	-44.92	67.5

Table 7-18. Radiated Spurious Data (Band 2/25 – Mid Channel)

OPERATING FREQUENCY:	1909.30	MHz		
CHANNEL:	19193			
MEASURED OUTPUT POWER:	22.39	dBm	=	0.173 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.39	dBc	

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]	[dBc]
3818.60	H	100	150	-59.58	9.32	-50.26	72.7
5727.90	H	100	178	-53.70	11.35	-42.35	64.7

Table 7-19. Radiated Spurious Data (Band 2/25 – High Channel)

OPERATING FREQUENCY:	2506.00	MHz			
CHANNEL:	39750				
MEASURED OUTPUT POWER:	24.25	dBm	=	0.266	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	20.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W) =	49.25	dBc		

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]	[dBc]
5012.00	V	100	324	-54.06	10.20	-43.86	68.1
7518.00	V	115	183	-53.09	12.02	-41.06	65.3
10024.00	V	101	153	-53.42	12.90	-40.52	64.8
12530.00	V	-	-	-57.33	13.22	-44.12	68.4

Table 7-20. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz			
CHANNEL:	40620				
MEASURED OUTPUT POWER:	22.81	dBm	=	0.191	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	20.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W) =	47.81	dBc		

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]	[dBc]
5186.00	V	101	263	-54.43	10.32	-44.10	66.9
7779.00	V	100	169	-53.61	12.27	-41.34	64.2
10372.00	V	139	150	-52.70	13.07	-39.62	62.4
12965.00	V	-	-	-57.60	13.31	-44.29	67.1

Table 7-21. Radiated Spurious Data (Band 41 – Mid Channel)

OPERATING FREQUENCY:	2680.00	MHz		
CHANNEL:	41490			
MEASURED OUTPUT POWER:	23.25	dBm	=	0.211 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	20.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W) =	48.25	dBc	

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]	[dBc]
5360.00	V	-	-	-66.01	10.36	-55.65	78.9
8040.00	V	-	-	-64.17	12.51	-51.66	74.9
10720.00	V	-	-	-58.69	13.02	-45.67	68.9

Table 7-22. Radiated Spurious Data (Band 41 – High Channel)

7.8 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54

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

Test Procedure Used

ANSI/TIA-603-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

Band 12 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	707,499,981	-19	-0.0000027
100 %		- 30	707,499,595	-405	-0.0000572
100 %		- 20	707,500,071	71	0.0000100
100 %		- 10	707,500,000	0	0.0000000
100 %		0	707,500,047	47	0.0000066
100 %		+ 10	707,500,182	182	0.0000257
100 %		+ 20	707,500,098	98	0.0000139
100 %		+ 30	707,499,820	-180	-0.0000254
100 %		+ 40	707,499,840	-160	-0.0000226
100 %		+ 50	707,499,998	-2	-0.0000003
BATT. ENDPOINT	3.40	+ 20	707,500,324	324	0.0000458

Table 7-23. Frequency Stability Data (Band 12)

Band 12 Frequency Stability Measurements

§2.1055 §27.54

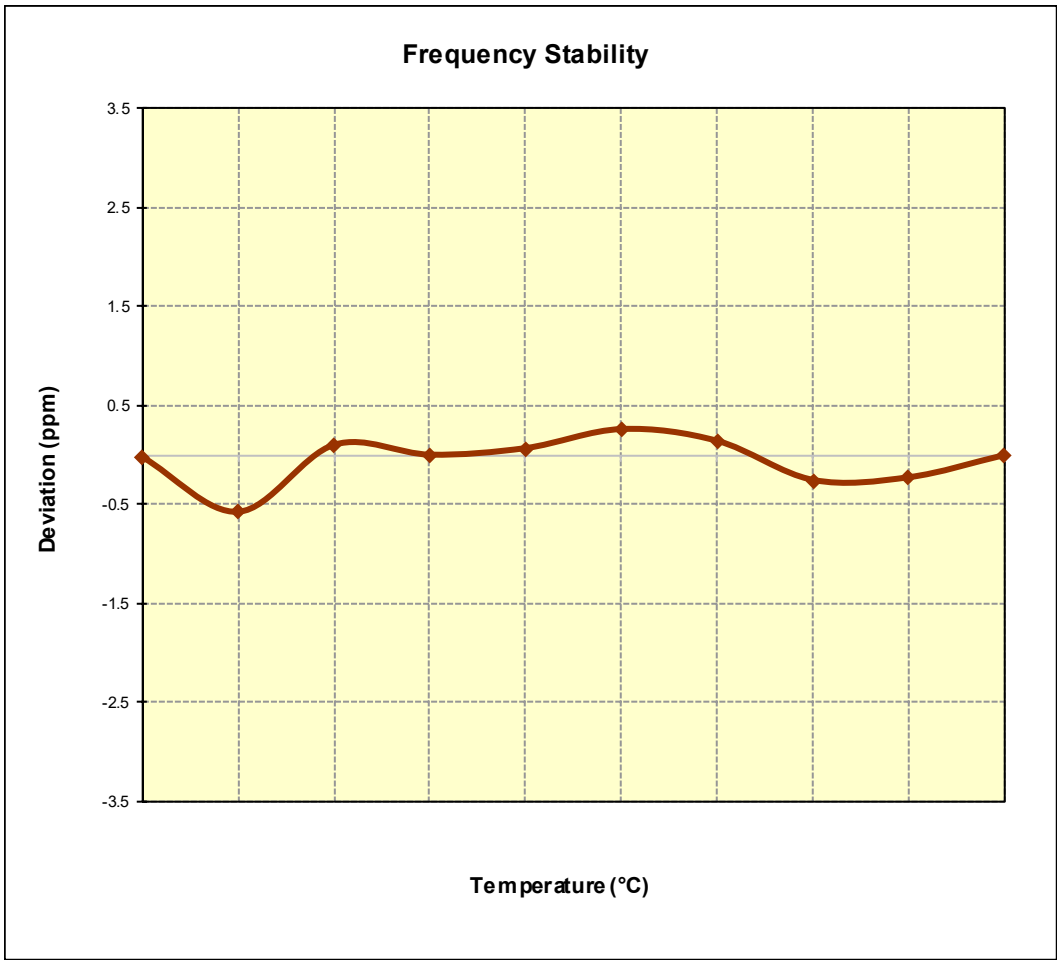


Figure 7-8. Frequency Stability Graph (Band 12)

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	831,500,245	245	0.0000295
100 %		- 30	831,499,988	-12	-0.0000014
100 %		- 20	831,499,978	-22	-0.0000026
100 %		- 10	831,500,067	67	0.0000081
100 %		0	831,500,257	257	0.0000309
100 %		+ 10	831,500,347	347	0.0000417
100 %		+ 20	831,499,797	-203	-0.0000244
100 %		+ 30	831,499,849	-151	-0.0000182
100 %		+ 40	831,500,269	269	0.0000324
100 %		+ 50	831,499,779	-221	-0.0000266
BATT. ENDPOINT	3.40	+ 20	831,499,929	-71	-0.0000085

Table 7-24. Frequency Stability Data (Band 5/26)

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355

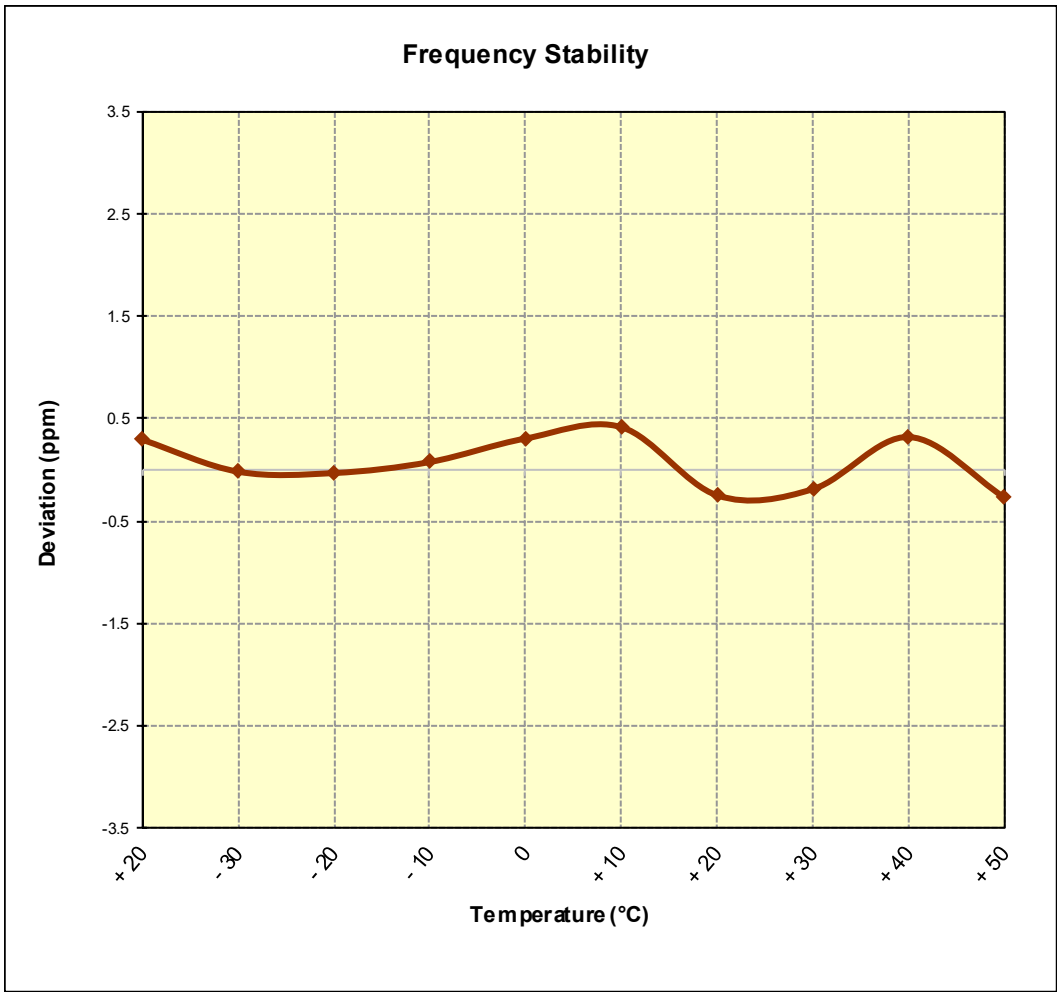


Figure 7-9. Frequency Stability Graph (Band 5/26)

Band 4 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY:	1,732,500,000	Hz
CHANNEL:	20175	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,500,223	223	0.0000129
100 %		- 30	1,732,500,006	6	0.0000003
100 %		- 20	1,732,499,917	-83	-0.0000048
100 %		- 10	1,732,500,134	134	0.0000077
100 %		0	1,732,499,954	-46	-0.0000027
100 %		+ 10	1,732,500,327	327	0.0000189
100 %		+ 20	1,732,499,644	-356	-0.0000205
100 %		+ 30	1,732,499,537	-463	-0.0000267
100 %		+ 40	1,732,500,057	57	0.0000033
100 %		+ 50	1,732,499,950	-50	-0.0000029
BATT. ENDPOINT	3.40	+ 20	1,732,499,889	-111	-0.0000064

Table 7-25. 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.

Band 4 Frequency Stability Measurements

§2.1055 §§27.54

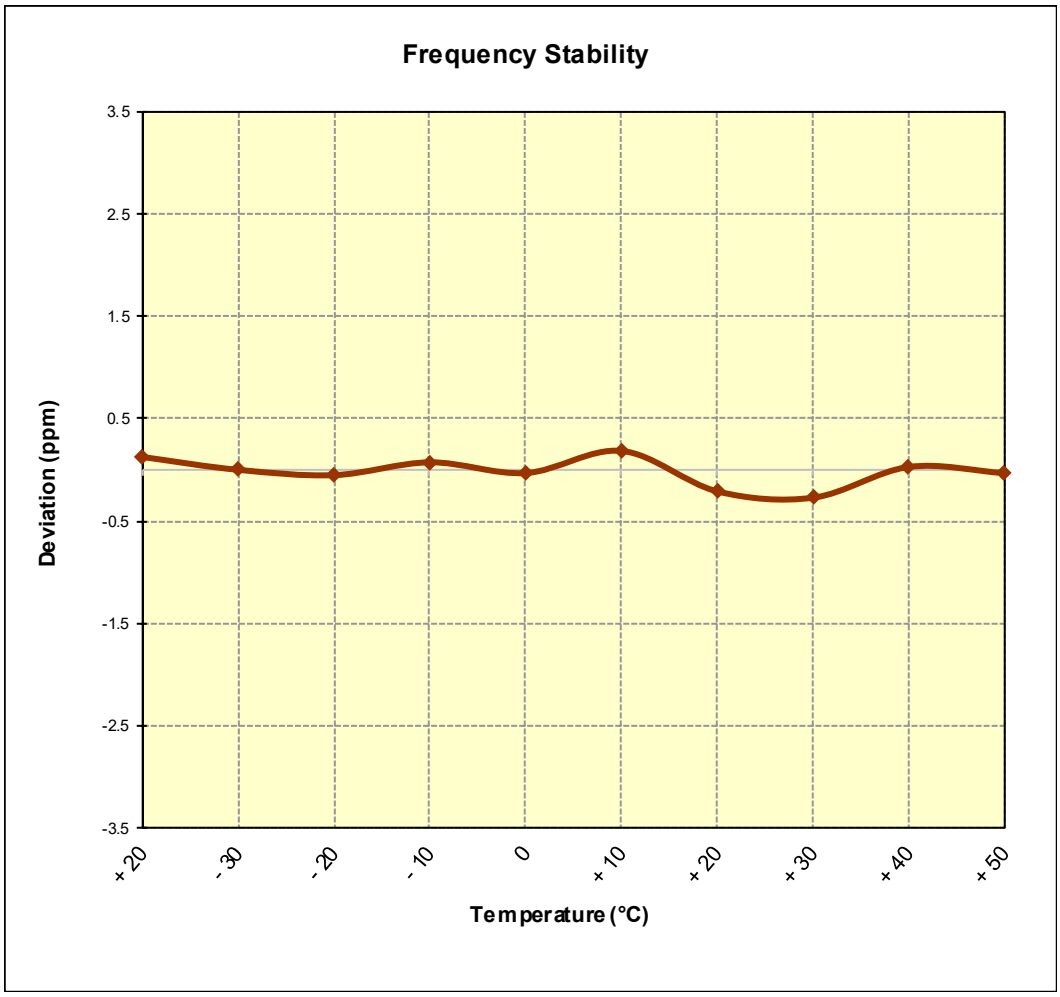


Figure 7-10. Frequency Stability Graph (Band 4)

Band 2/25 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,882,500,247	247	0.0000131
100 %		- 30	1,882,499,942	-58	-0.0000031
100 %		- 20	1,882,499,882	-118	-0.0000063
100 %		- 10	1,882,500,417	417	0.0000222
100 %		0	1,882,499,786	-214	-0.0000114
100 %		+ 10	1,882,499,673	-327	-0.0000174
100 %		+ 20	1,882,500,106	106	0.0000056
100 %		+ 30	1,882,500,046	46	0.0000024
100 %		+ 40	1,882,499,915	-85	-0.0000045
100 %		+ 50	1,882,500,025	25	0.0000013
BATT. ENDPOINT	3.40	+ 20	1,882,500,432	432	0.0000229

Table 7-26. Frequency Stability Data (Band 2/25)

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.

Band 2/25 Frequency Stability Measurements

§2.1055 §24.235

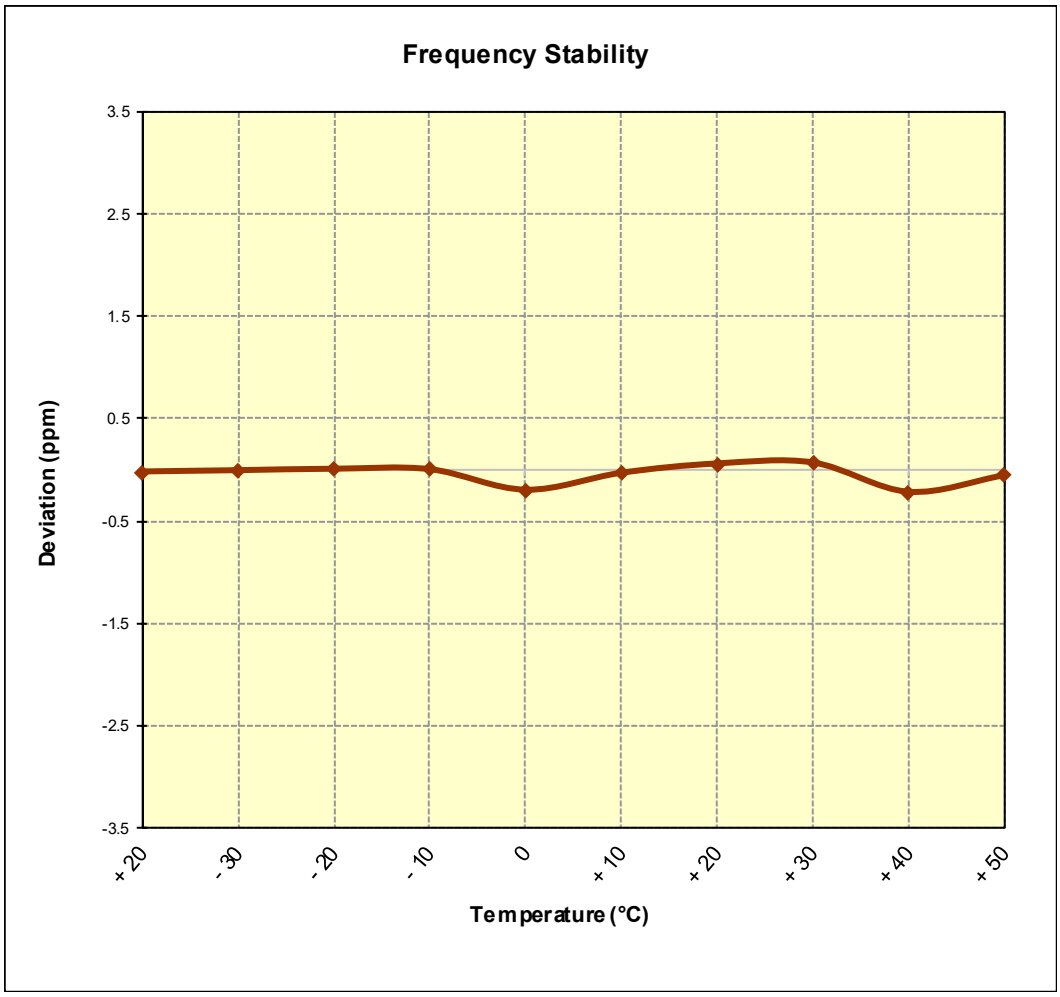


Figure 7-11. Frequency Stability Graph (Band 25)

Band 41 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	2,593,000,169	169	0.0000065
100 %		- 30	2,593,000,045	45	0.0000017
100 %		- 20	2,593,000,040	40	0.0000015
100 %		- 10	2,593,000,006	6	0.0000002
100 %		0	2,593,000,190	190	0.0000073
100 %		+ 10	2,592,999,914	-86	-0.0000033
100 %		+ 20	2,593,000,138	138	0.0000053
100 %		+ 30	2,592,999,900	-100	-0.0000039
100 %		+ 40	2,593,000,060	60	0.0000023
100 %		+ 50	2,592,999,806	-194	-0.0000075
BATT. ENDPOINT	3.40	+ 20	2,592,999,963	-37	-0.0000014

Table 7-27. 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.

Band 41 Frequency Stability Measurements

§2.1055 §27.54

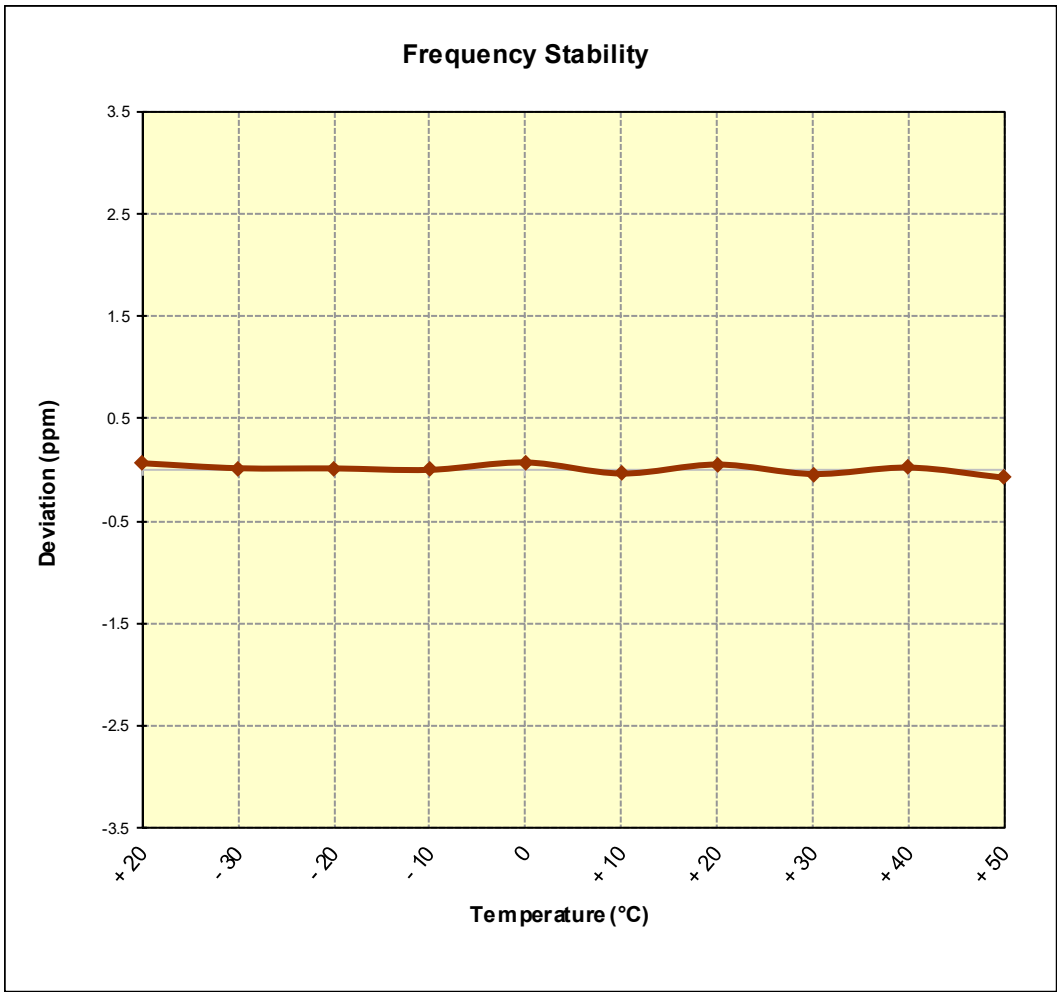


Figure 7-12. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMJ327P** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.