7.4 Band Edge Emissions at Antenna Terminal

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

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 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
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.

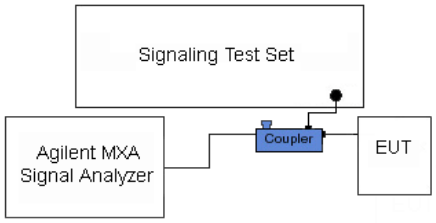


Figure 7-3. Test Instrument & Measurement Setup

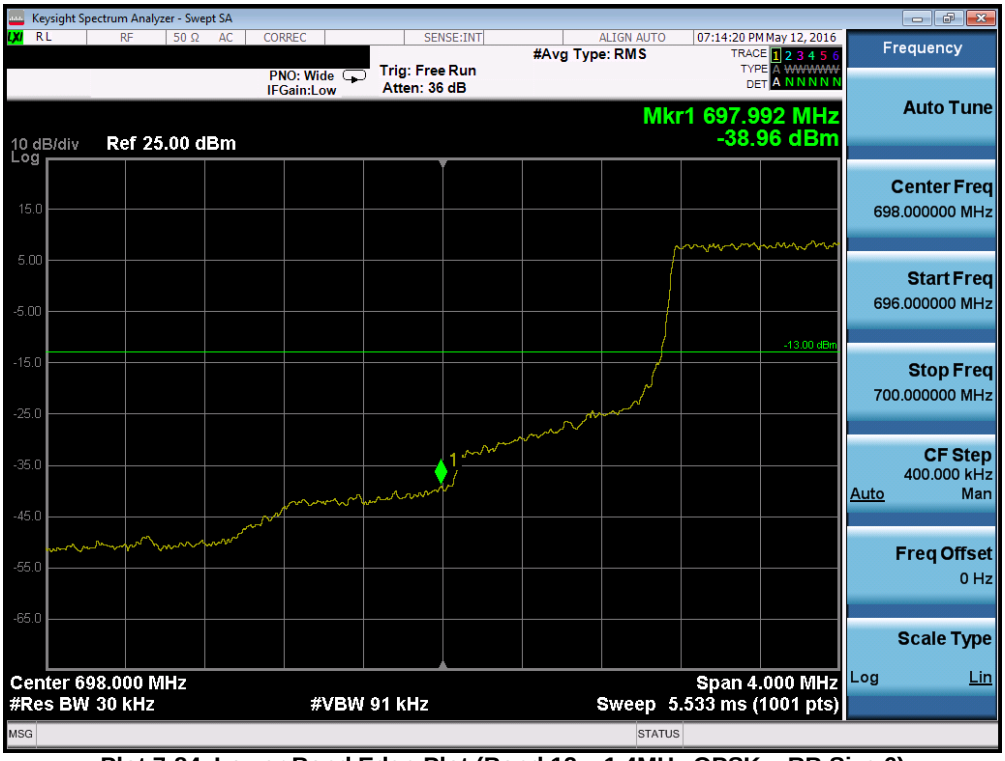
Test Notes

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.

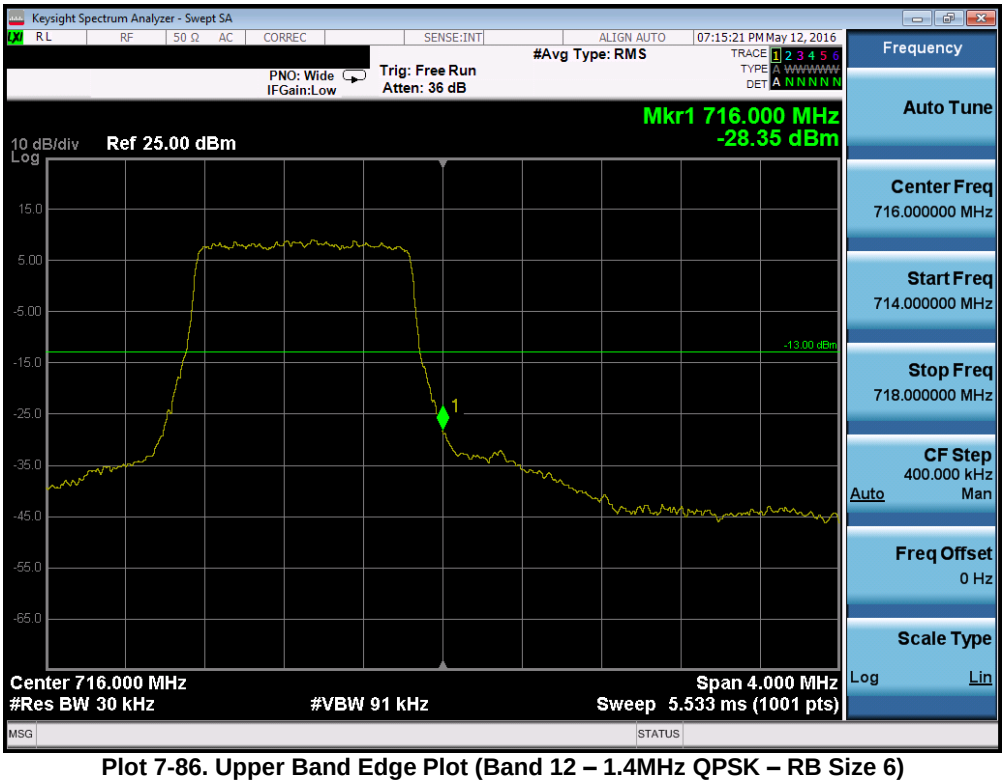
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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



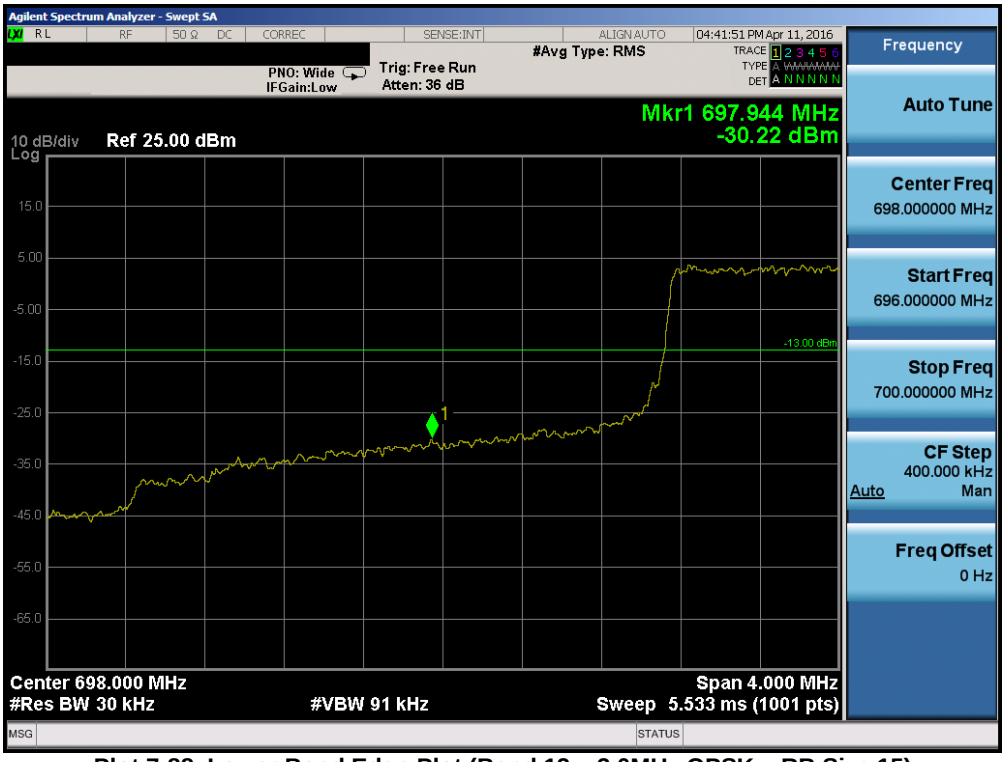
Plot 7-84. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

Plot 7-85. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



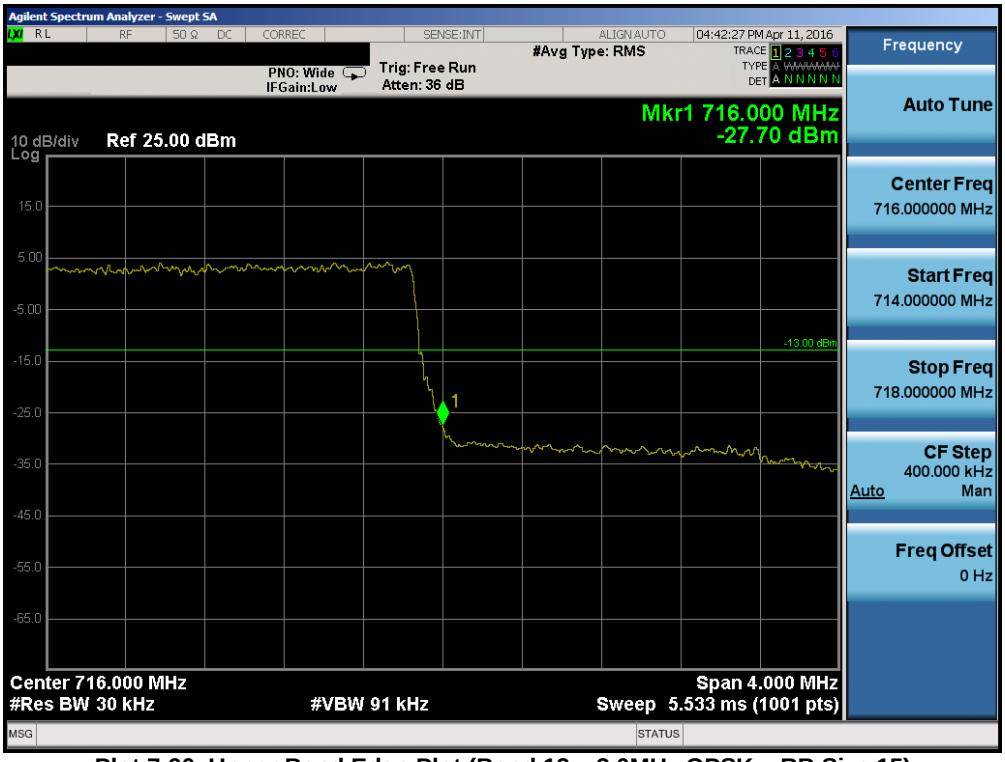
Plot 7-86. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

Plot 7-87. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-88. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

Plot 7-89. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

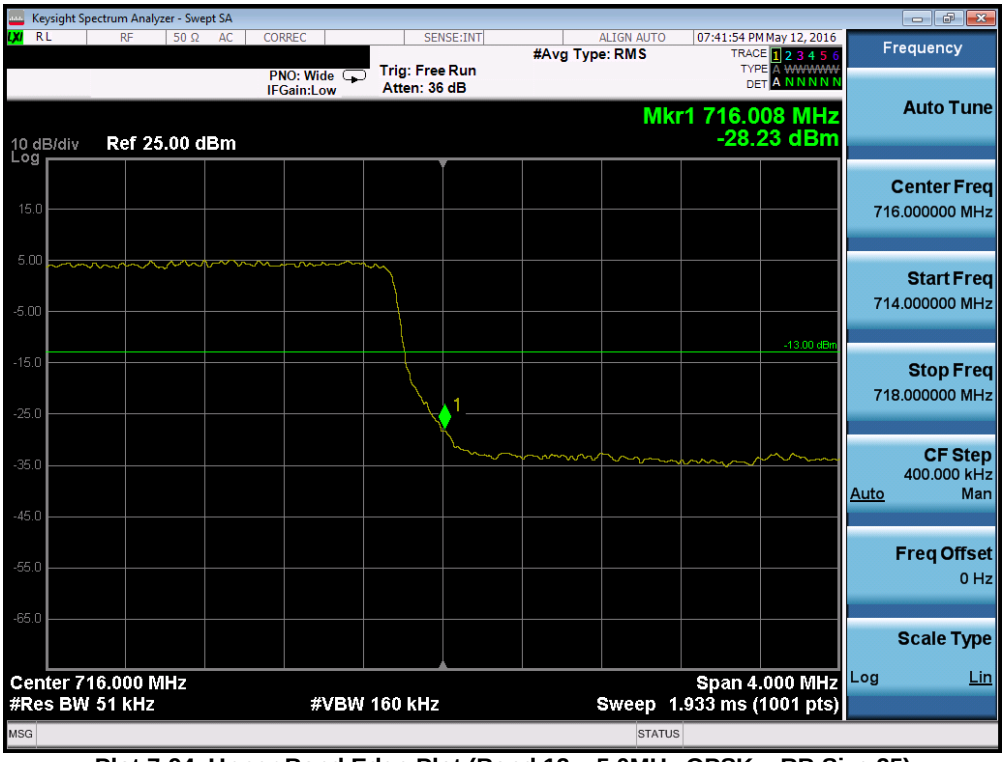


Plot 7-90. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

Plot 7-91. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

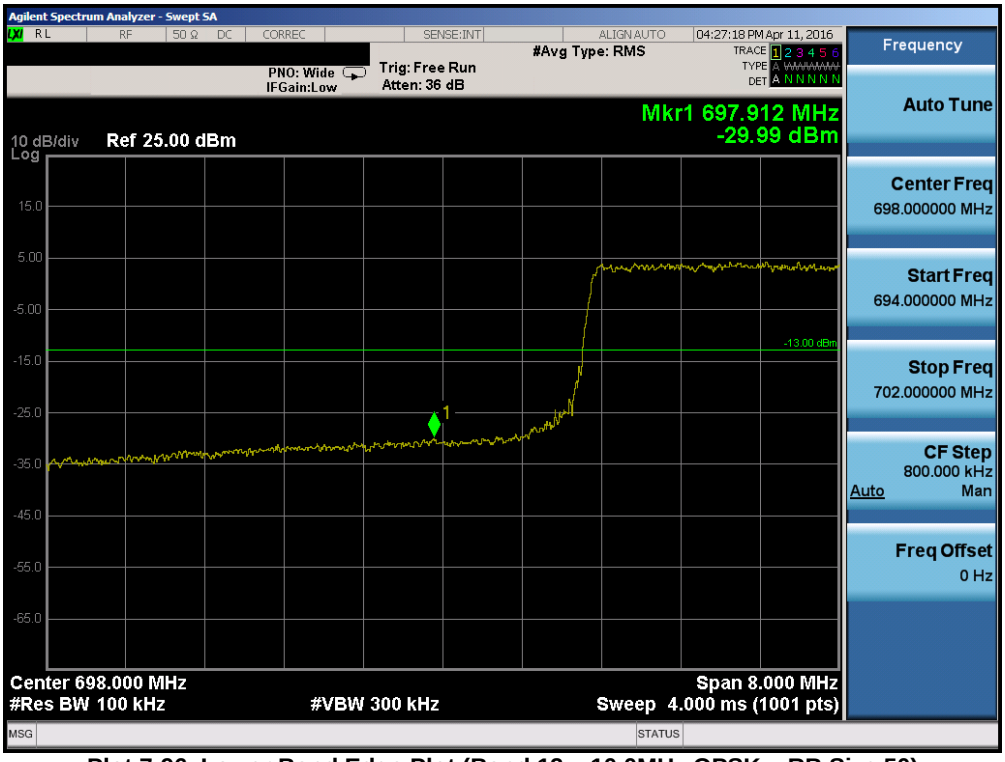
Plot 7-92. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

Plot 7-93. Lower Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-94. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

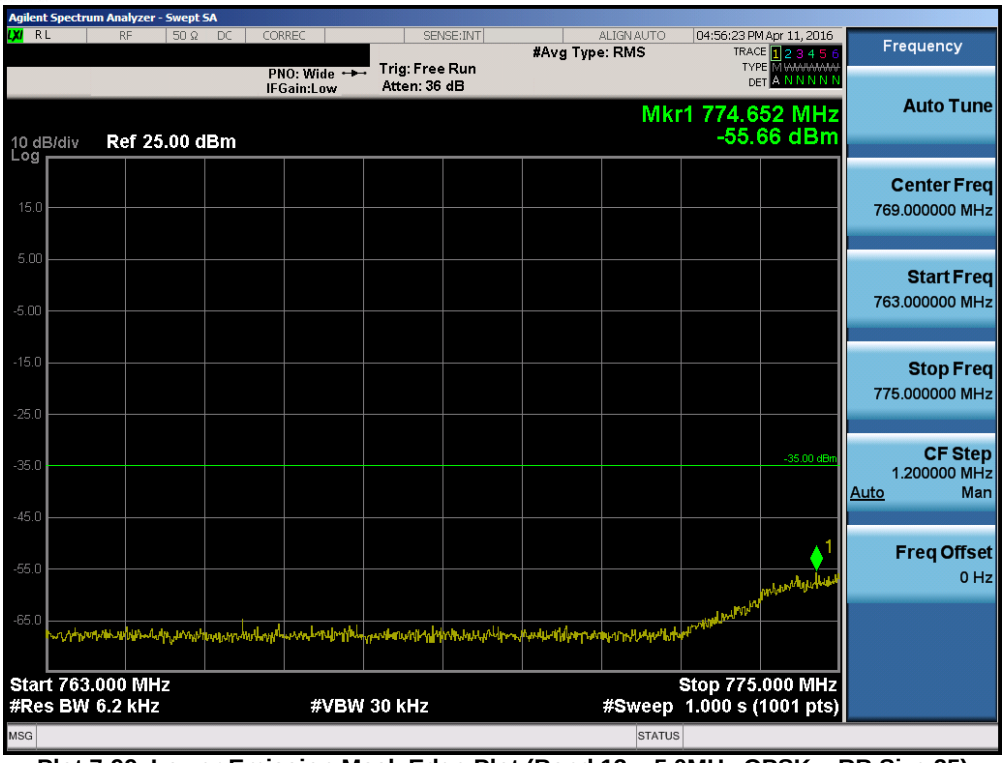
Plot 7-95. Upper Extended Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



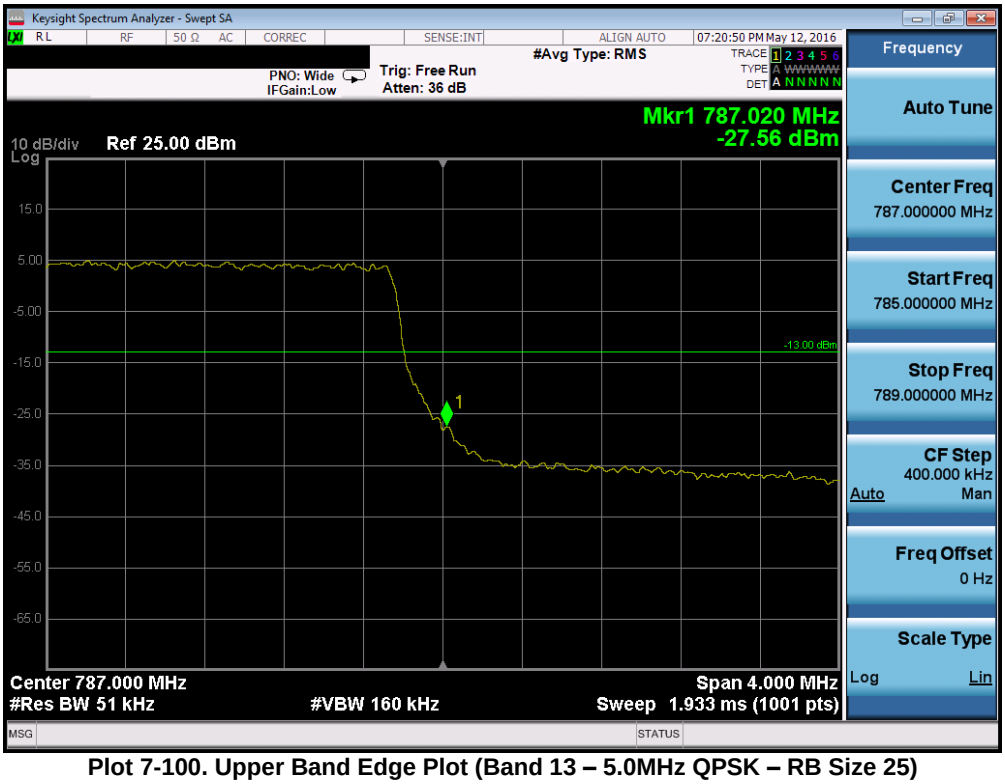
Plot 7-96. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

Plot 7-97. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

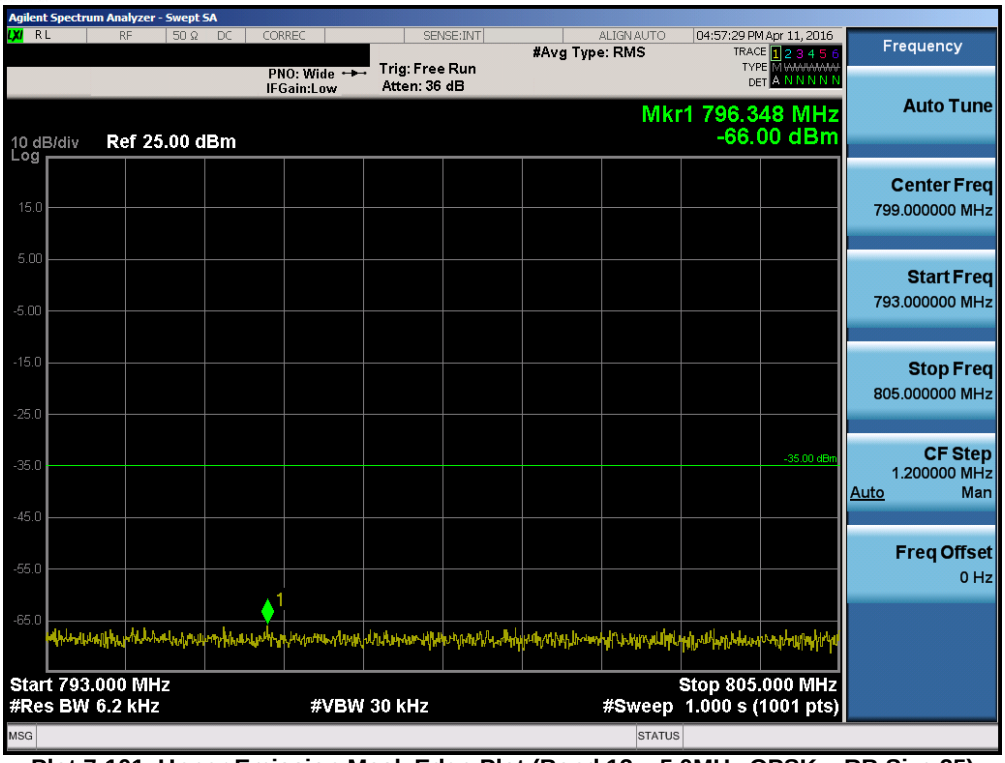
Plot 7-98. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



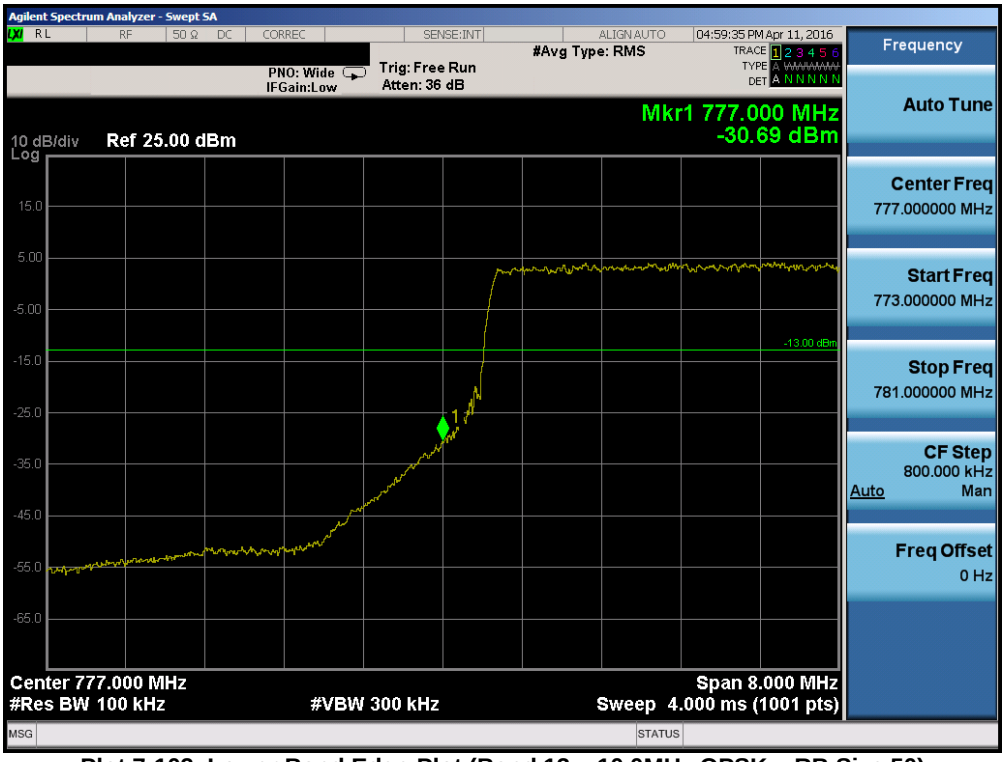
Plot 7-99. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



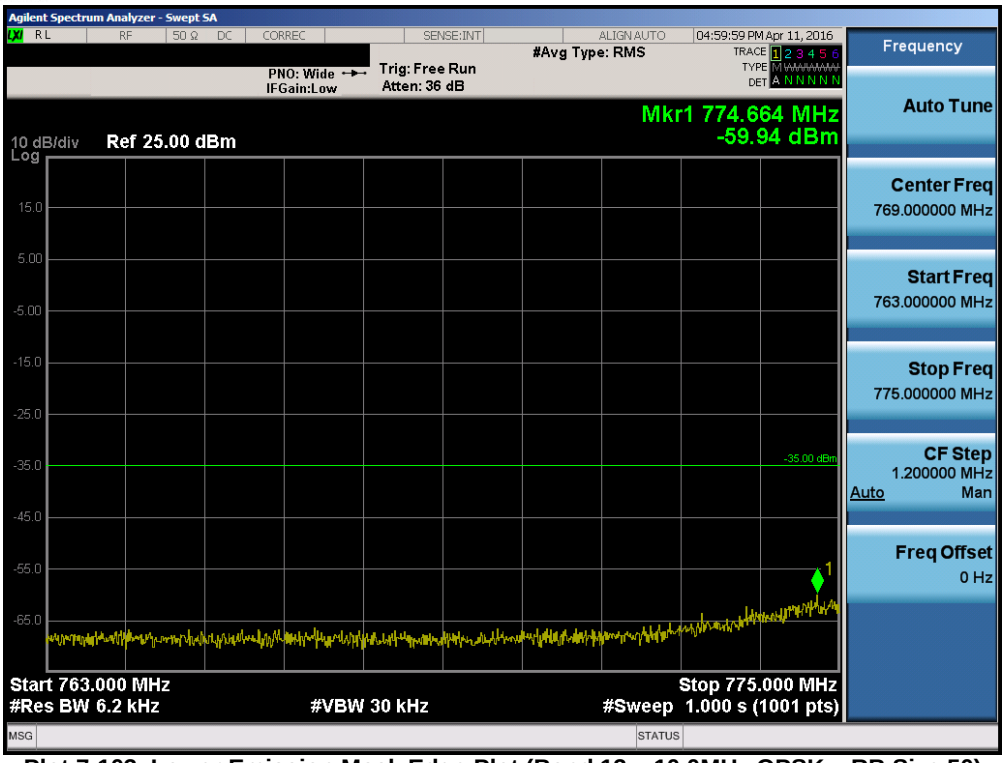
Plot 7-100. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



Plot 7-101. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

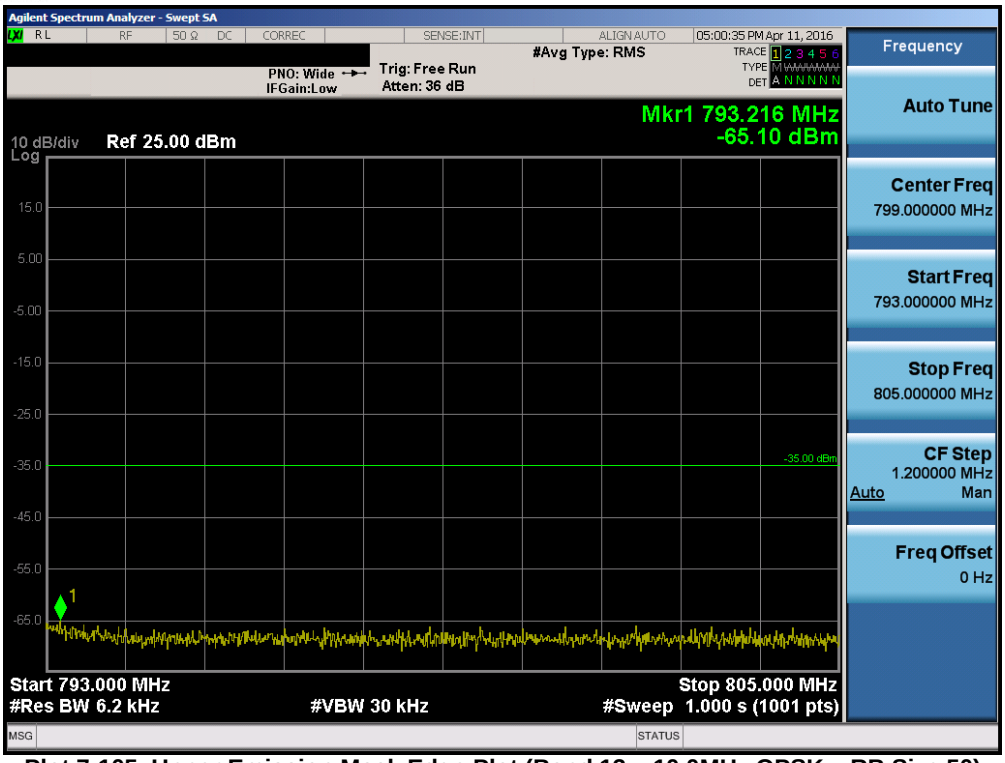


Plot 7-102. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

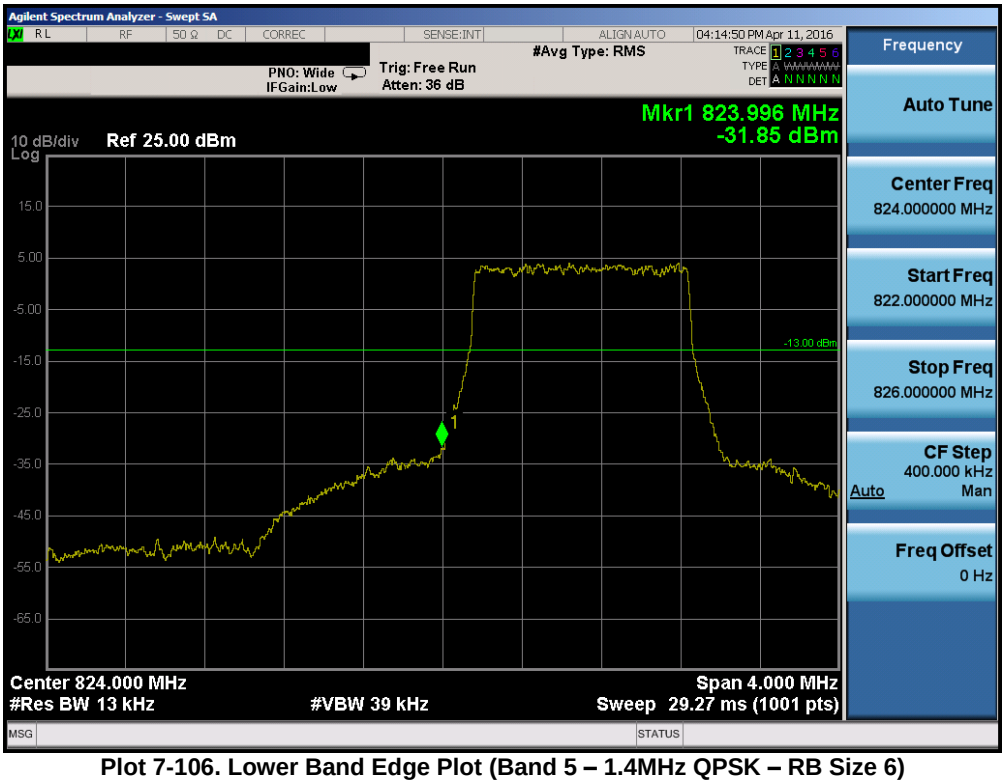


Plot 7-103. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

Plot 7-104. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



Plot 7-105. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

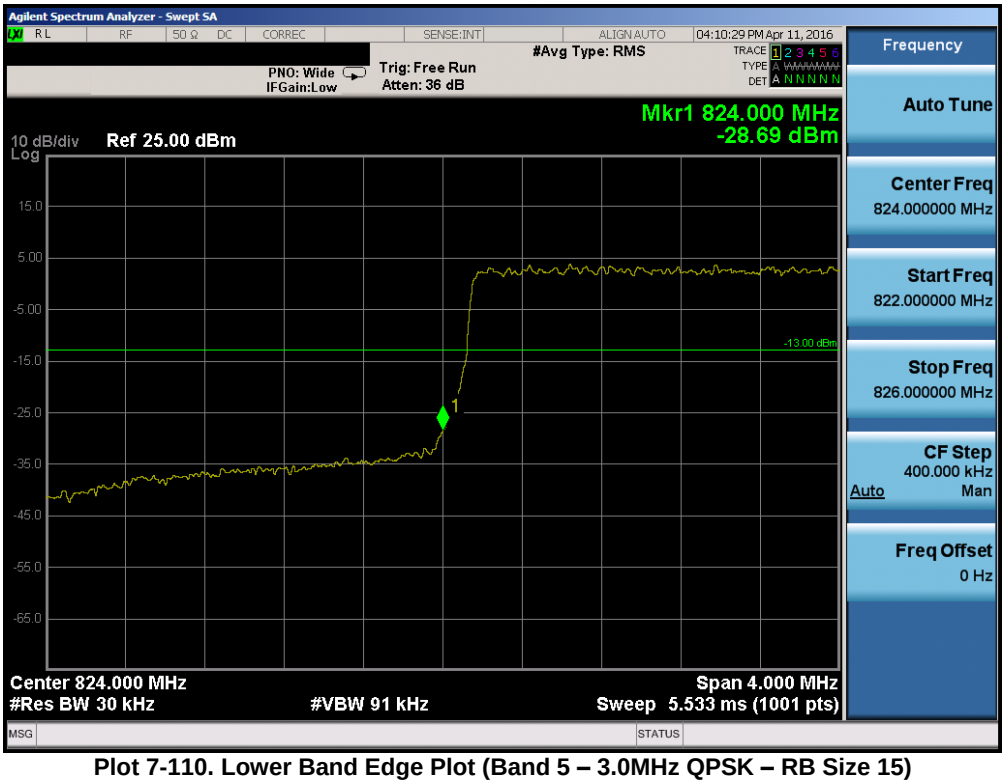


Plot 7-106. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

Plot 7-107. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

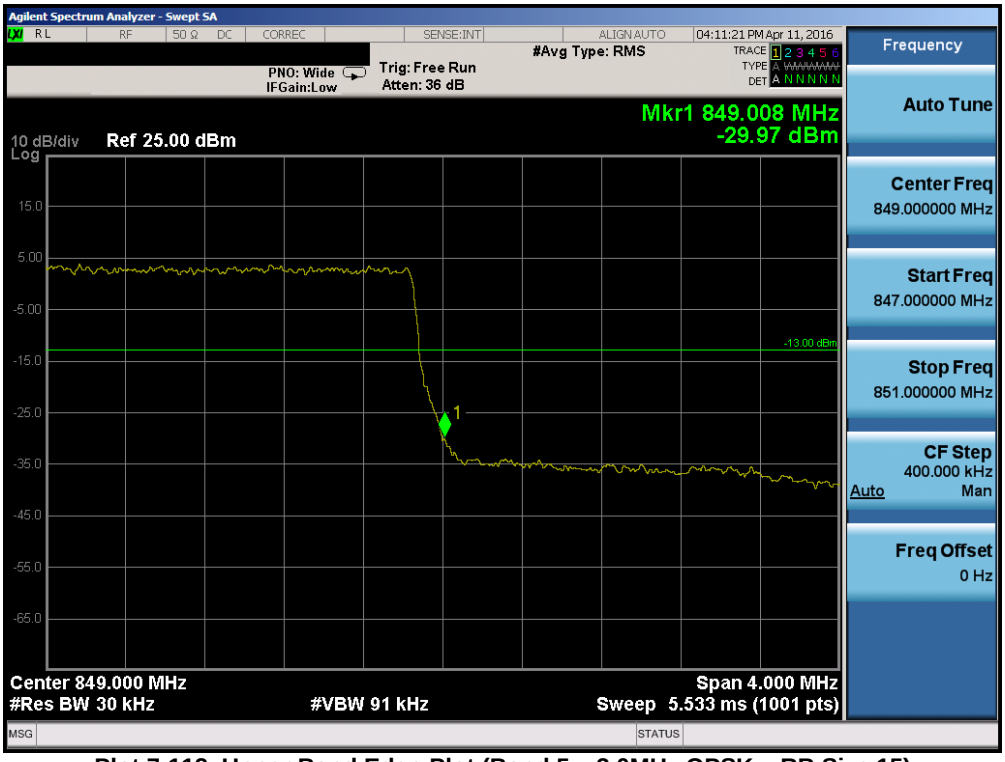
Plot 7-108. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

Plot 7-109. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



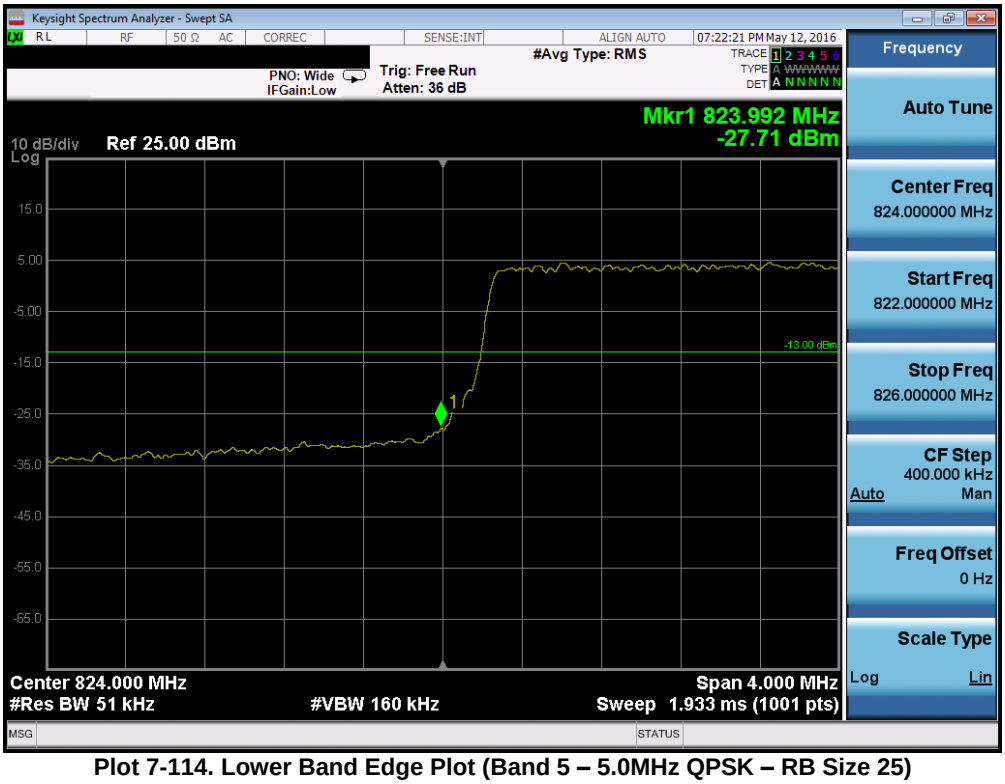
Plot 7-110. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

Plot 7-111. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



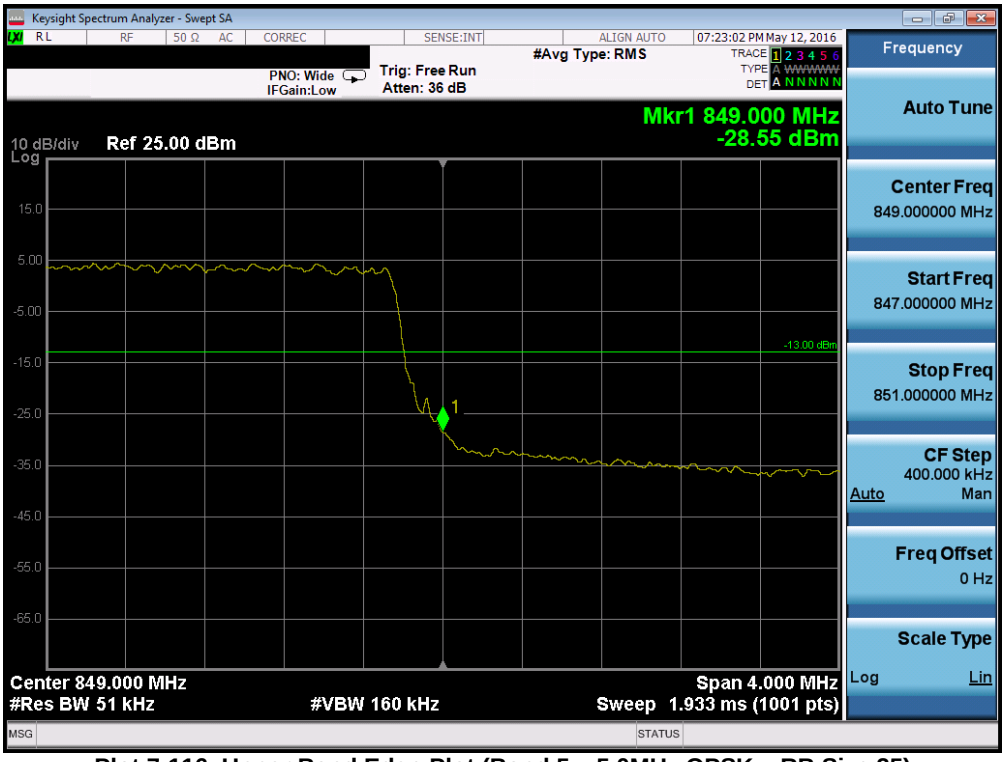
Plot 7-112. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

Plot 7-113. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)



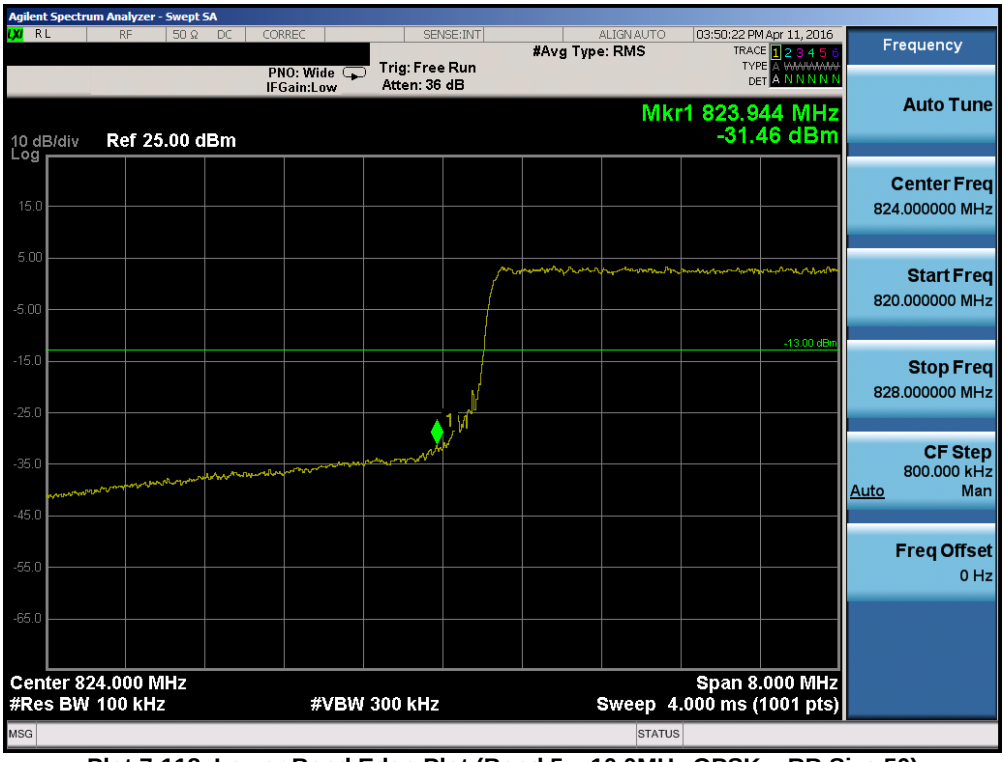
Plot 7-114. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

Plot 7-115. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



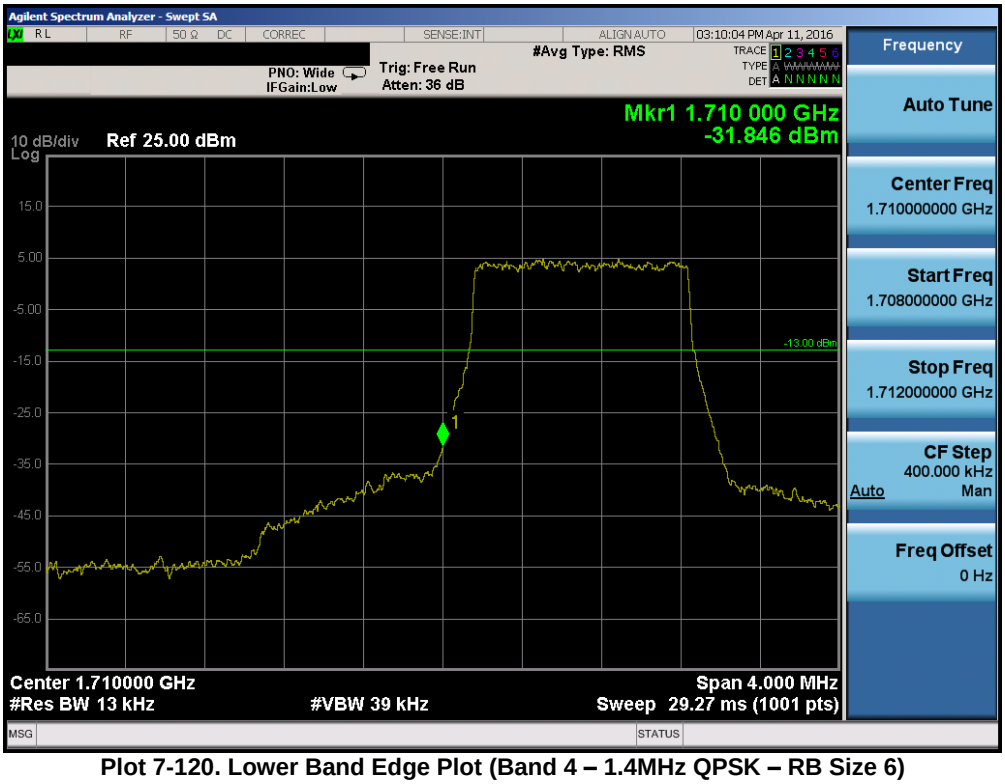
Plot 7-116. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

Plot 7-117. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

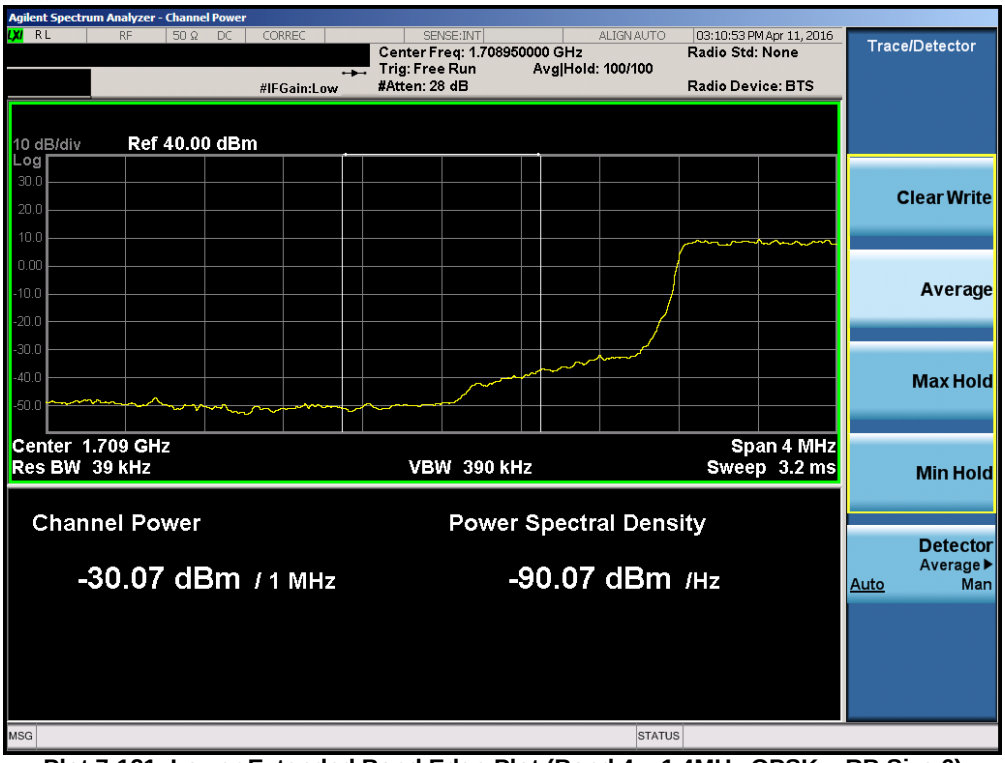


Plot 7-118. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

Plot 7-119. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

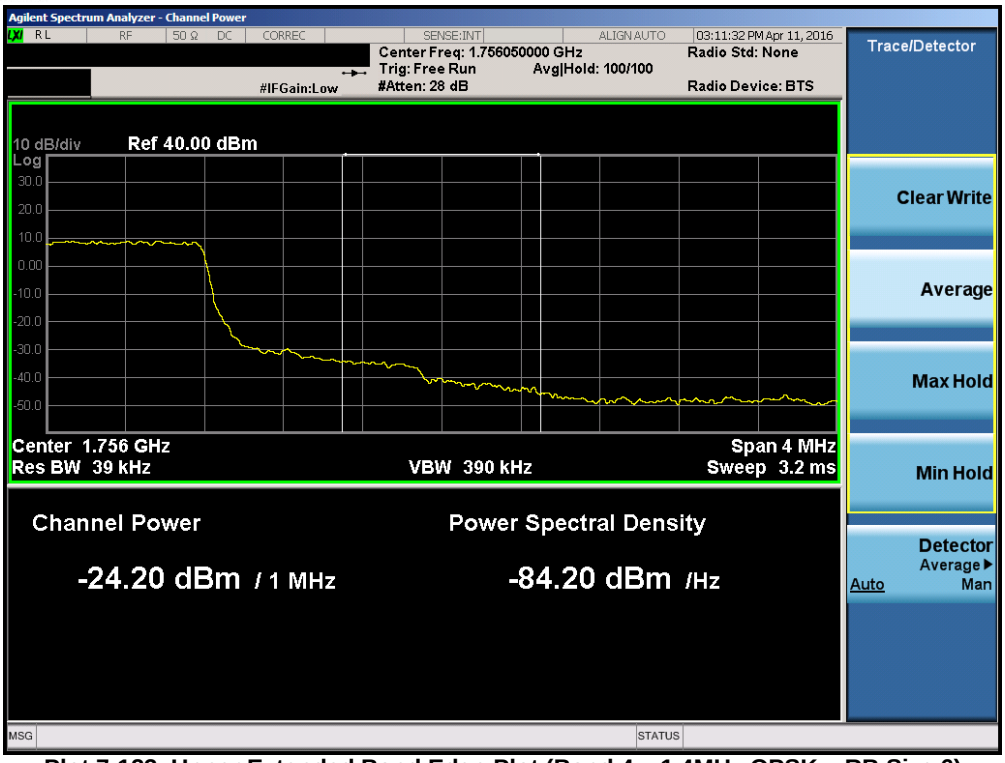


Plot 7-120. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

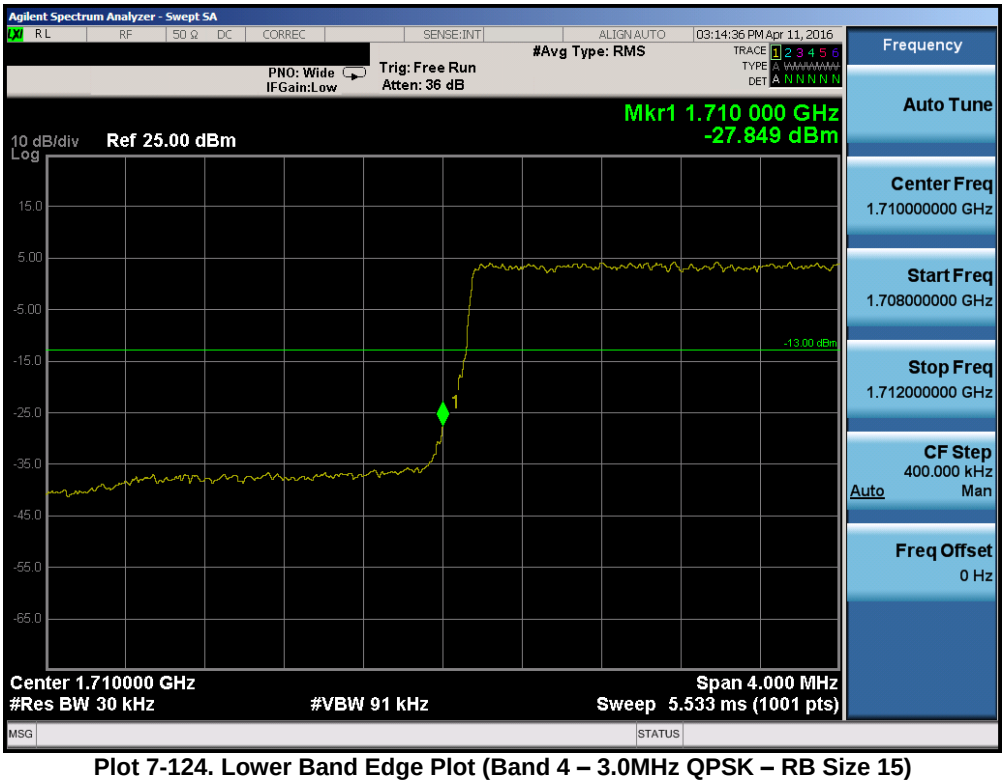


Plot 7-121. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

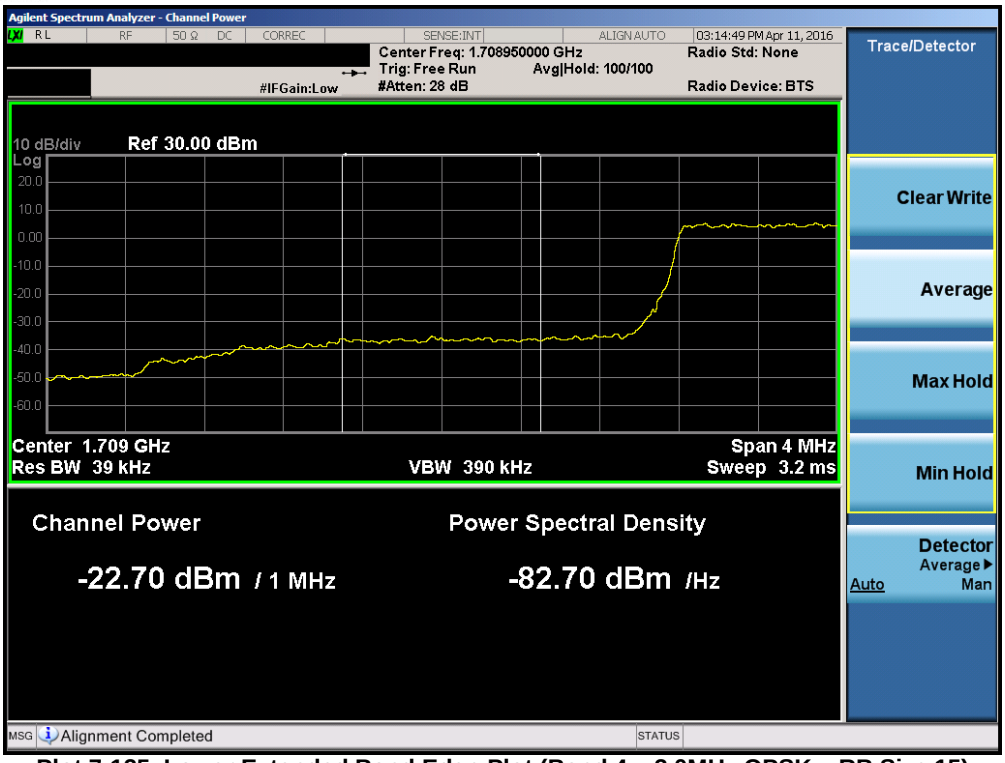
Plot 7-122. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



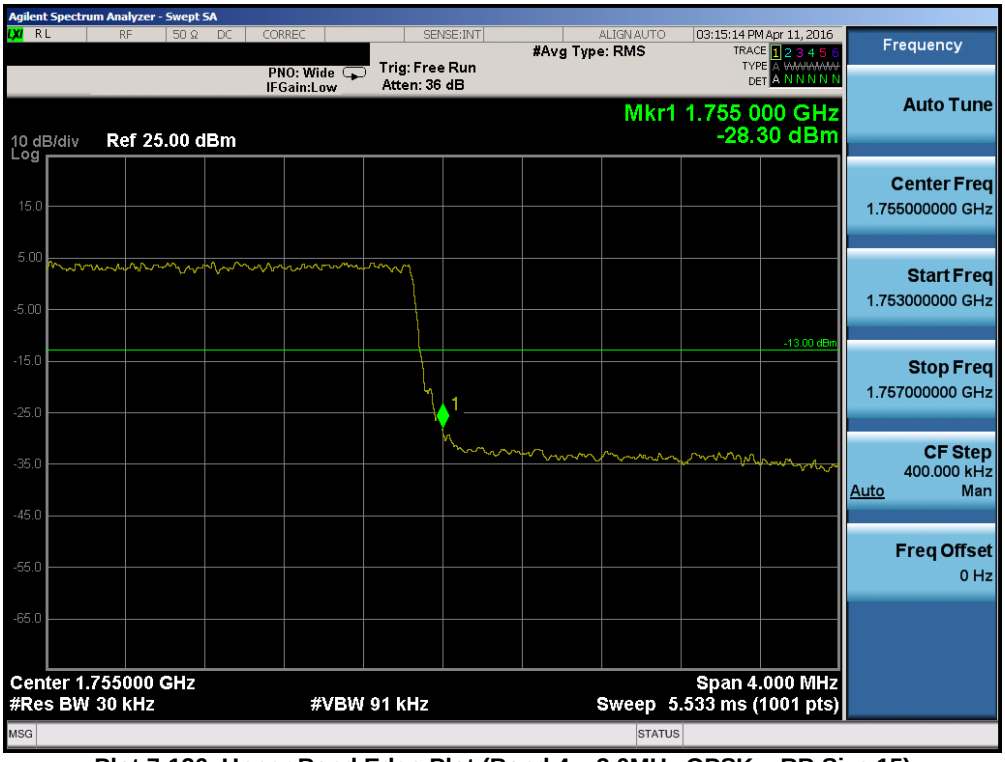
Plot 7-123. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



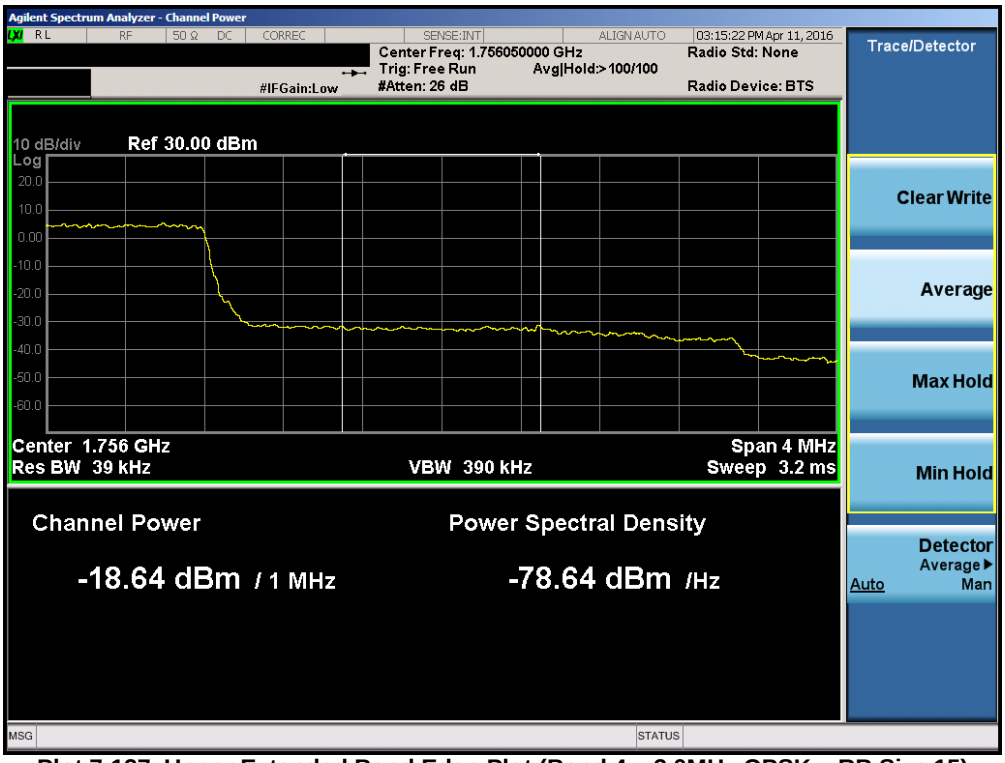
Plot 7-124. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



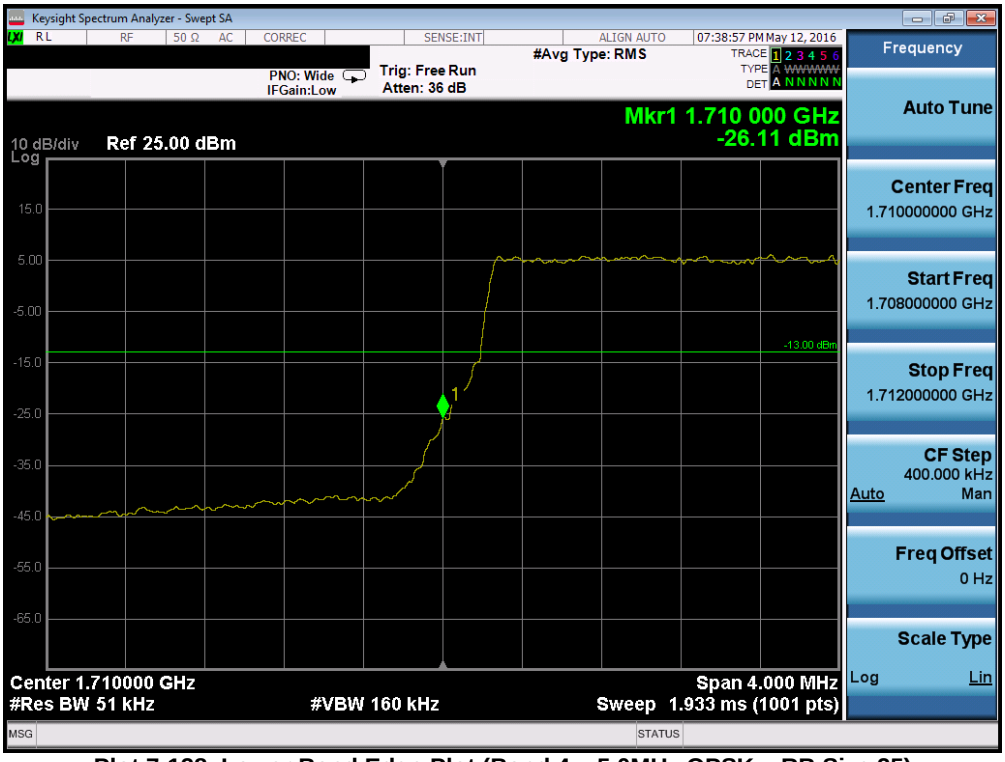
Plot 7-125. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



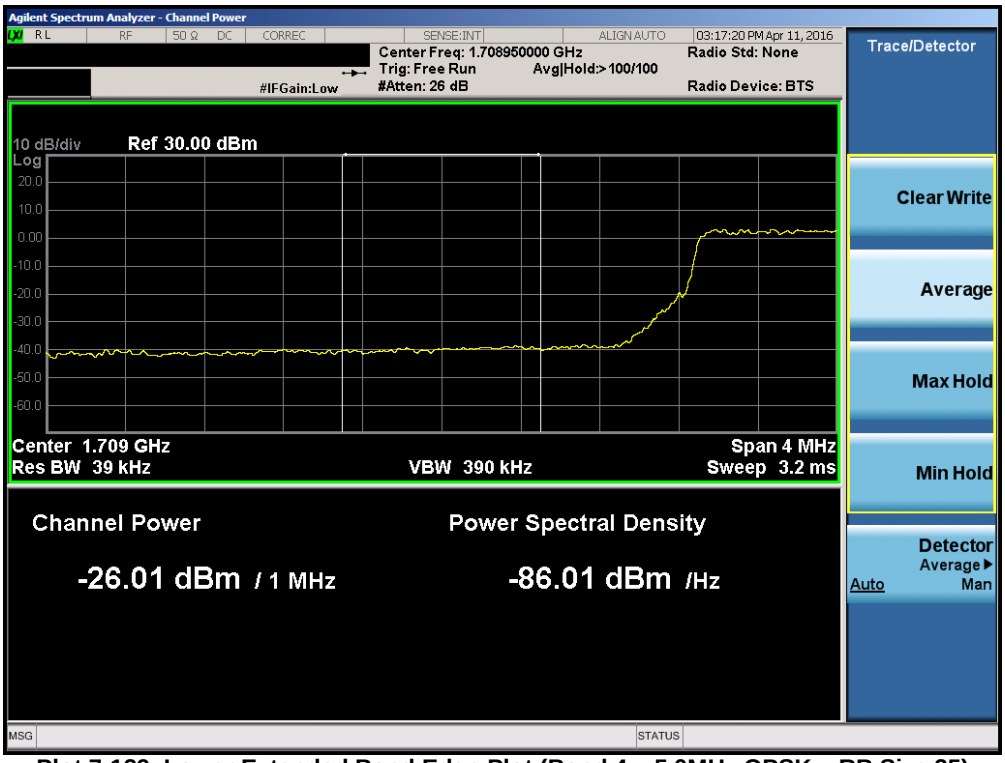
Plot 7-126. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



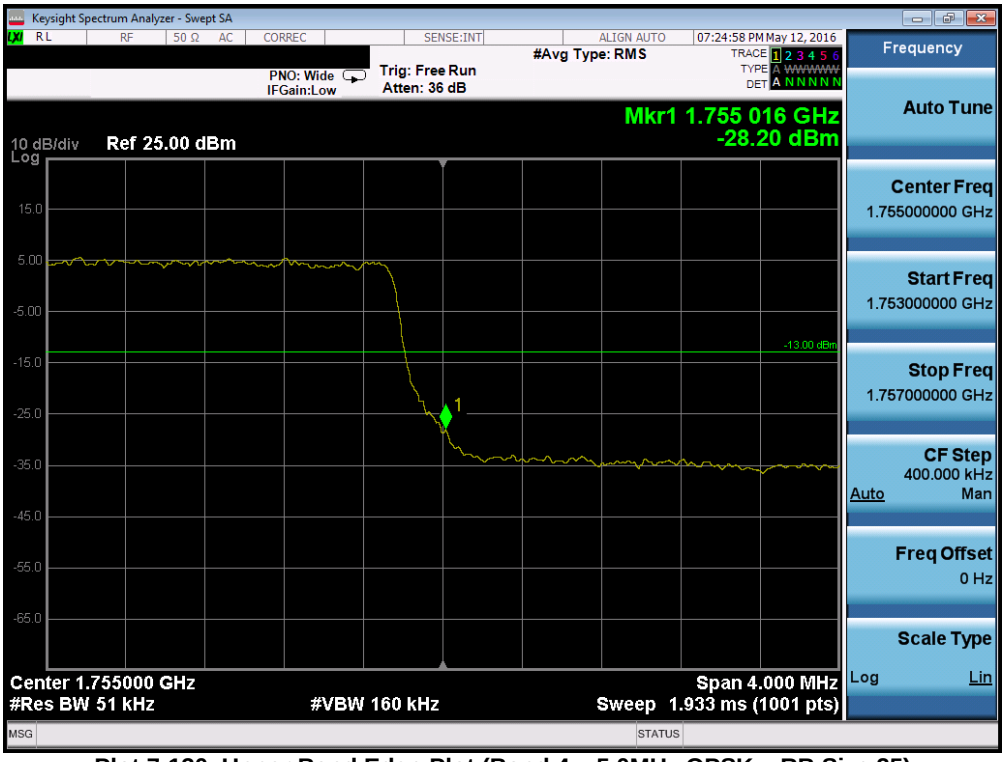
Plot 7-127. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



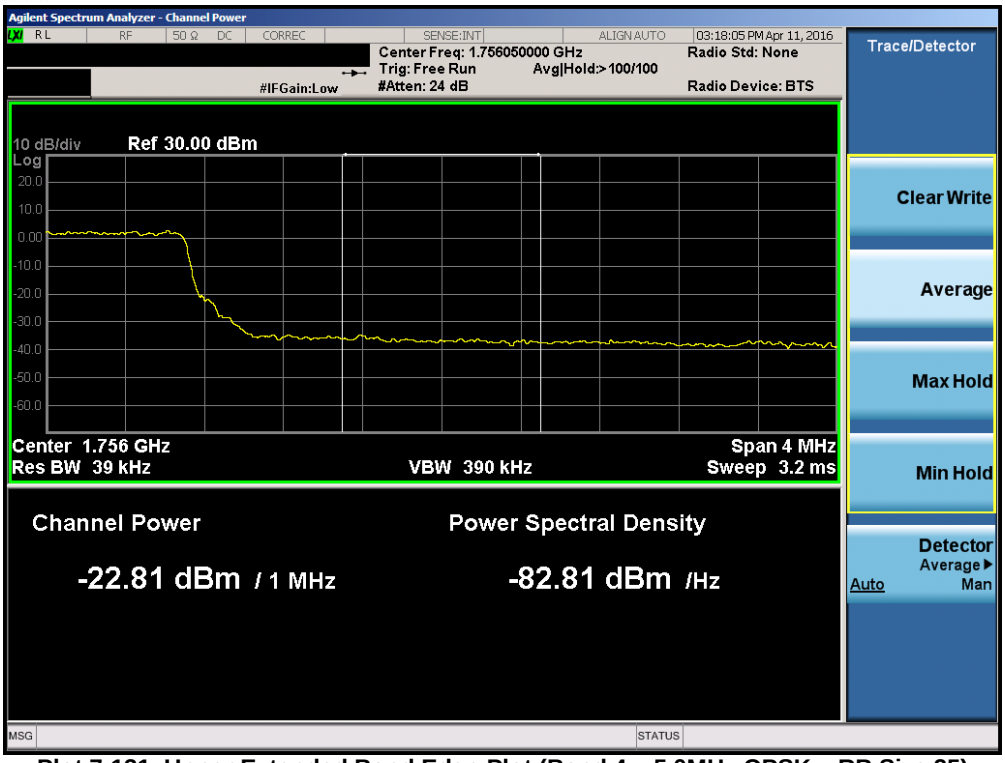
Plot 7-128. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



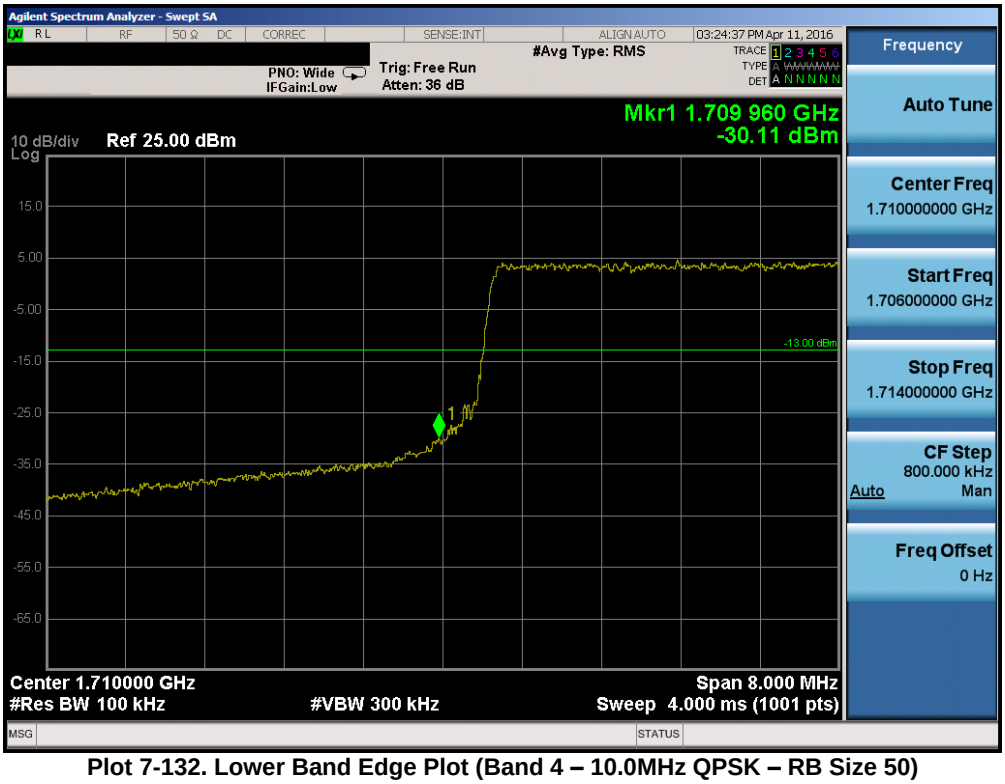
Plot 7-129. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



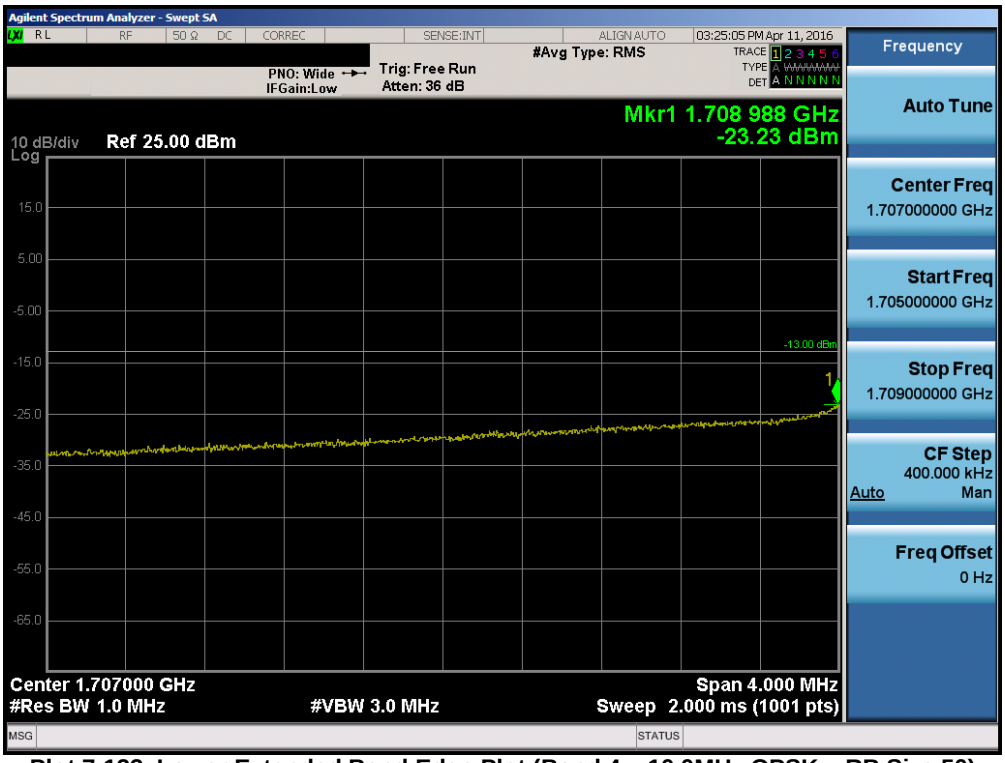
Plot 7-130. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



Plot 7-131. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

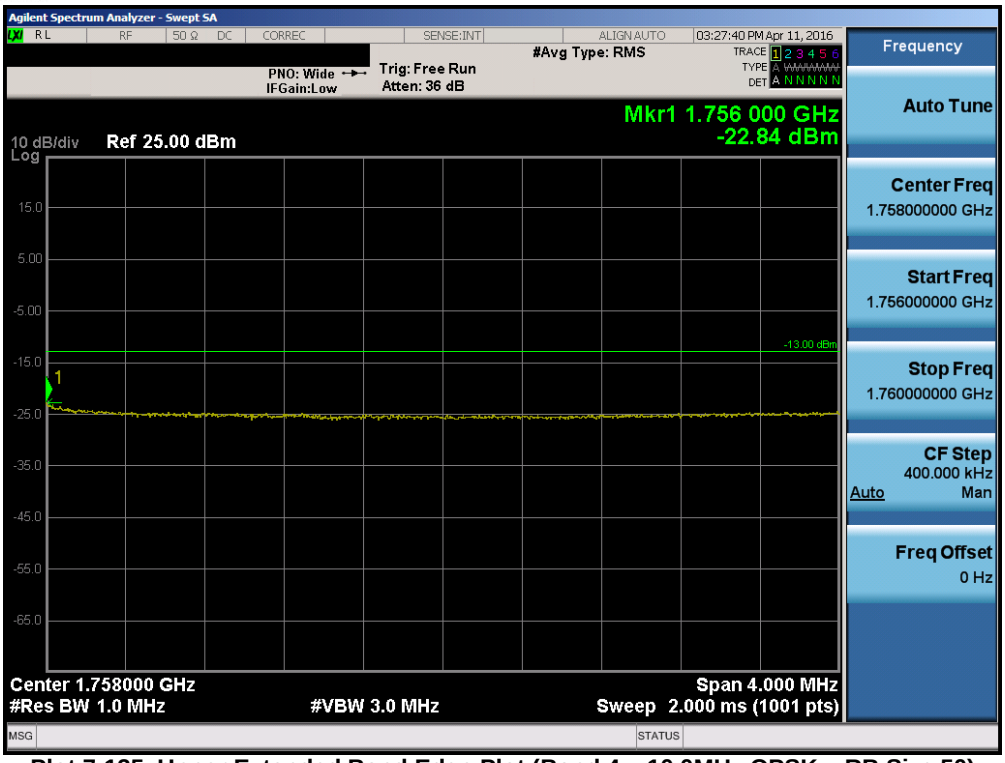


Plot 7-132. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



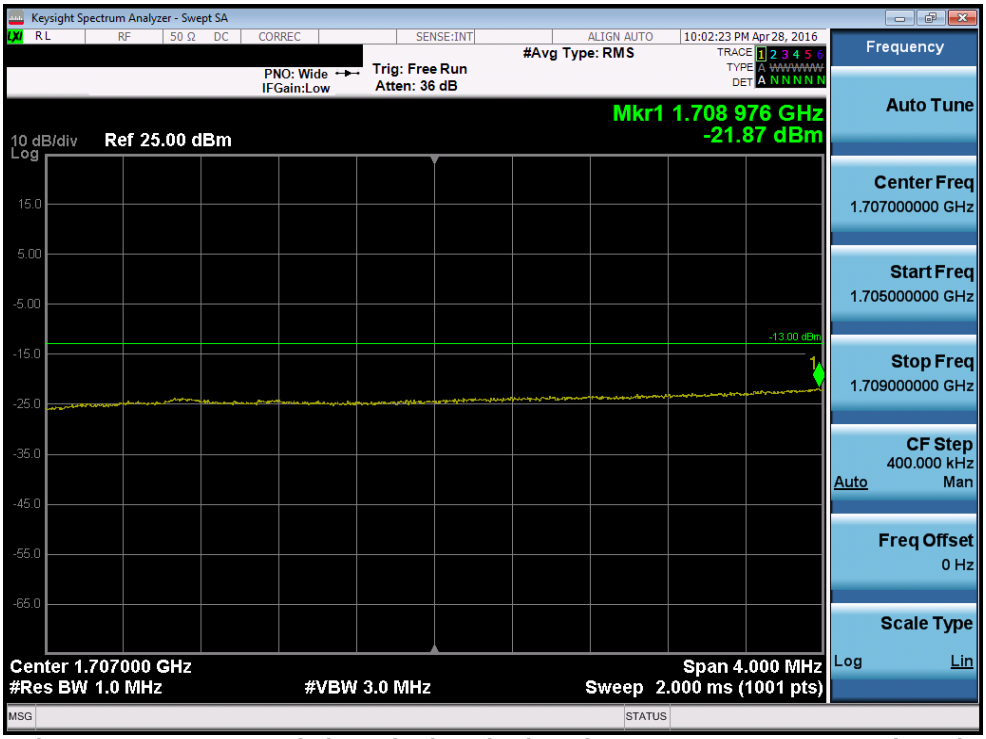
Plot 7-133. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

Plot 7-134. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

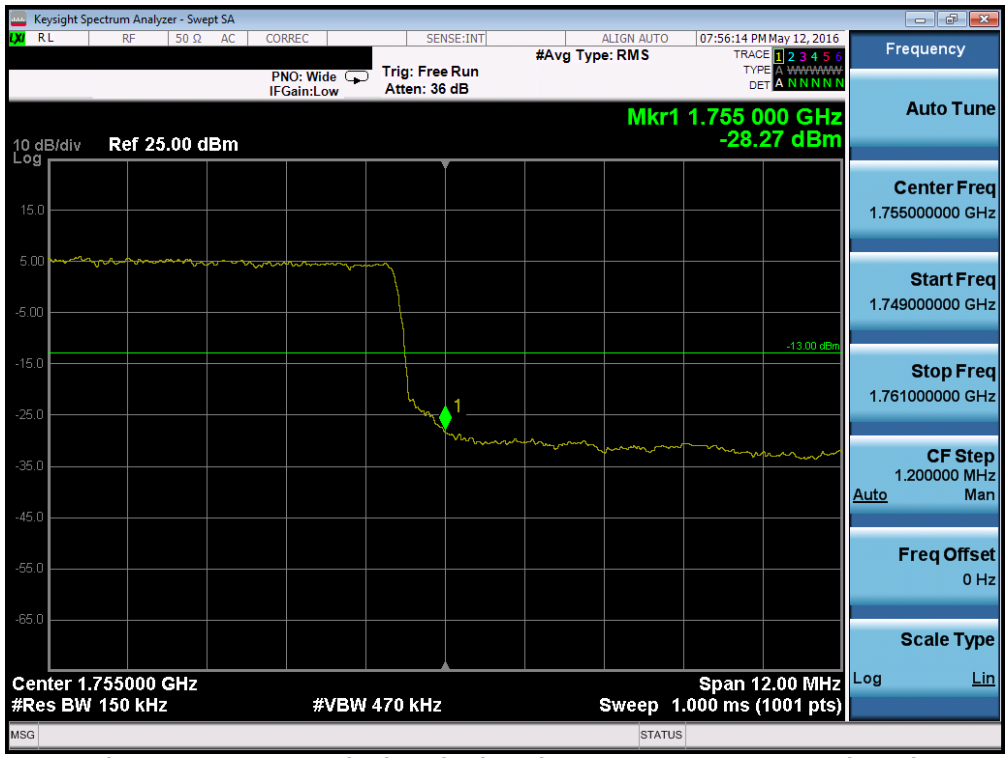


Plot 7-135. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

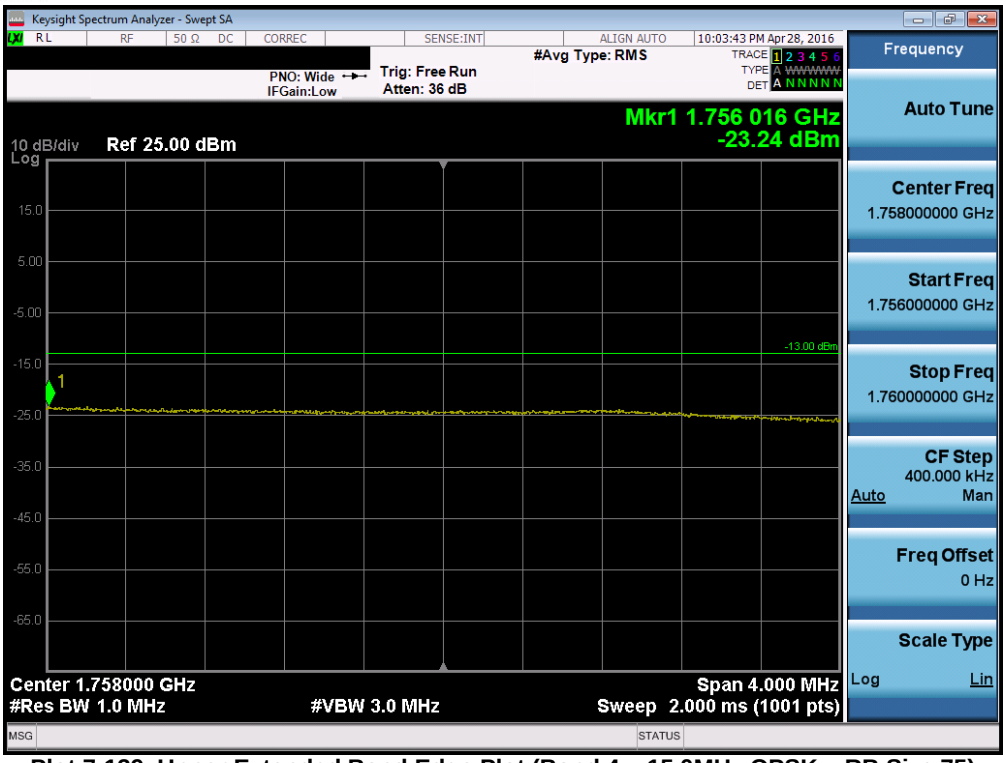
Plot 7-136. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



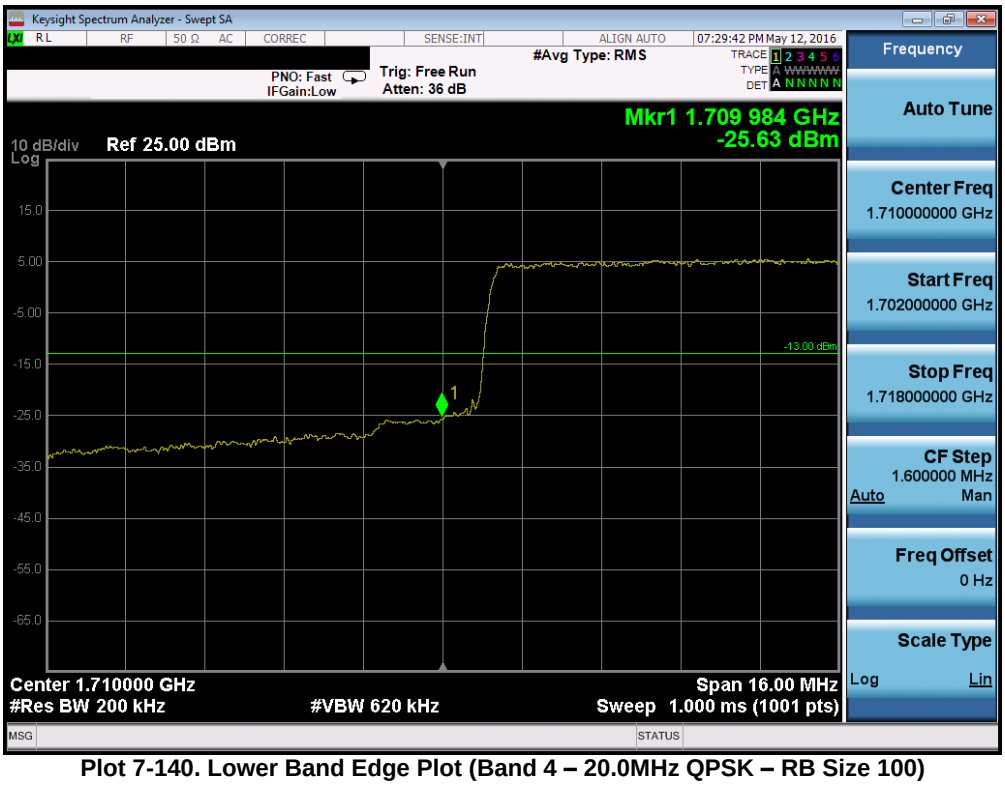
Plot 7-137. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



Plot 7-138. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

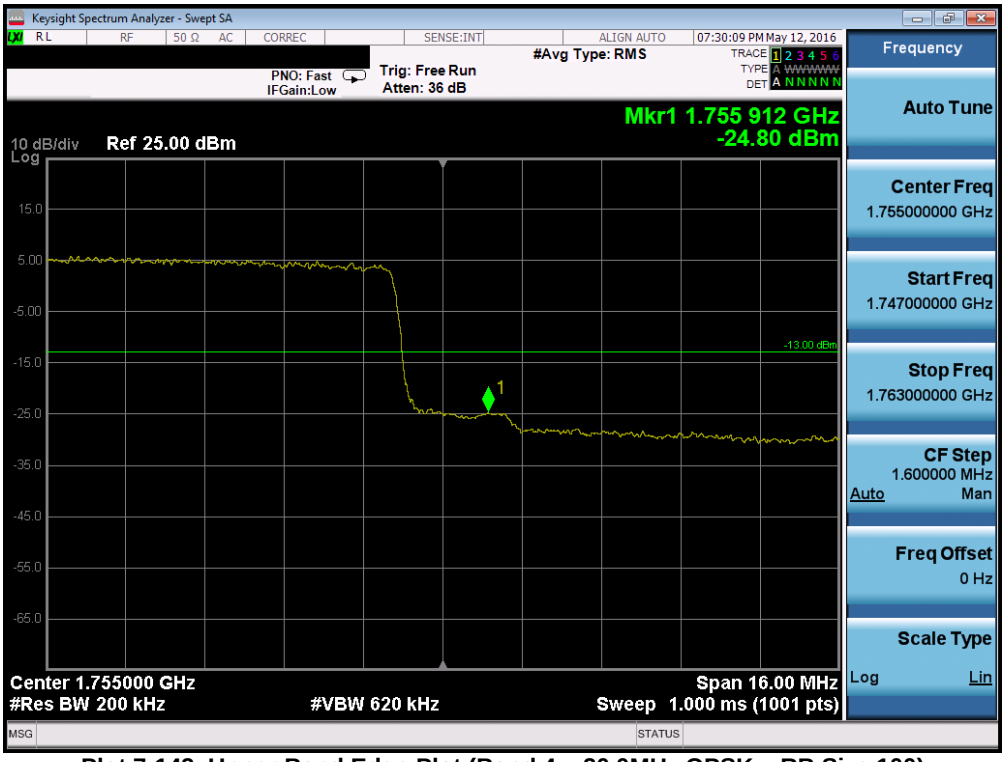


Plot 7-139. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

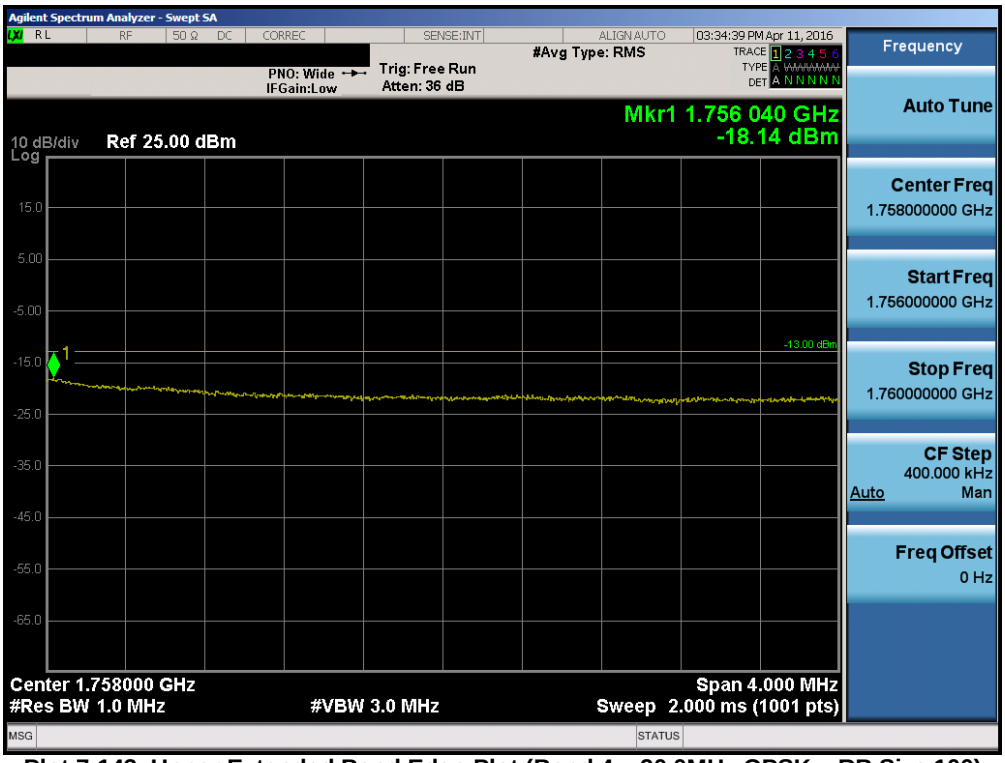


Plot 7-140. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

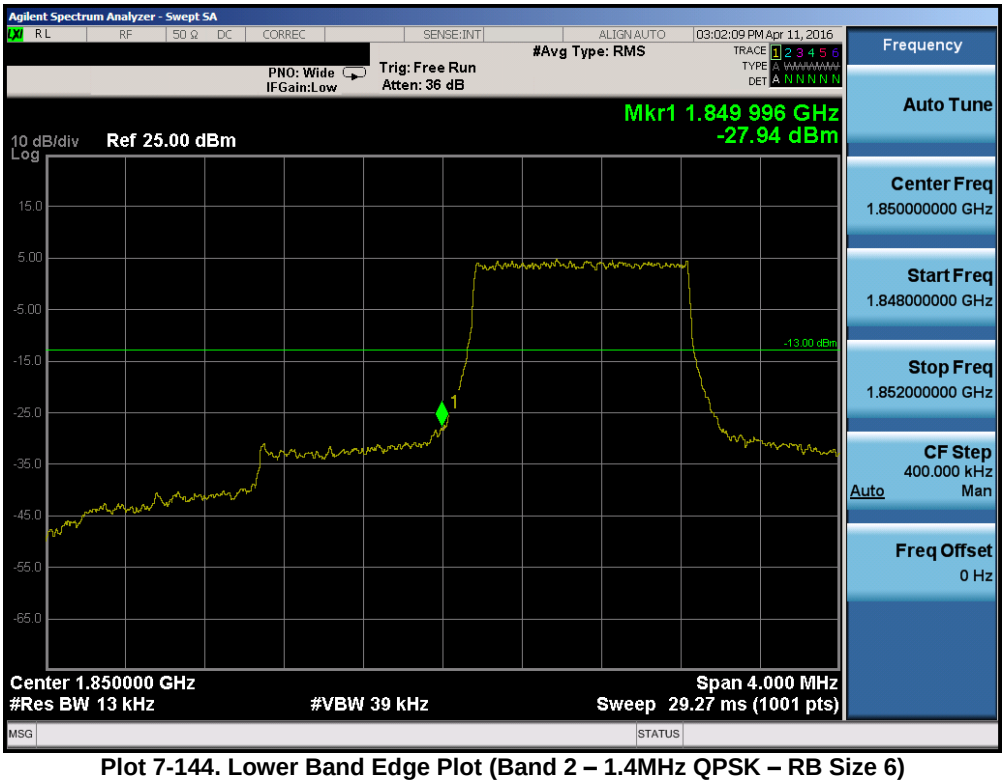
Plot 7-141. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



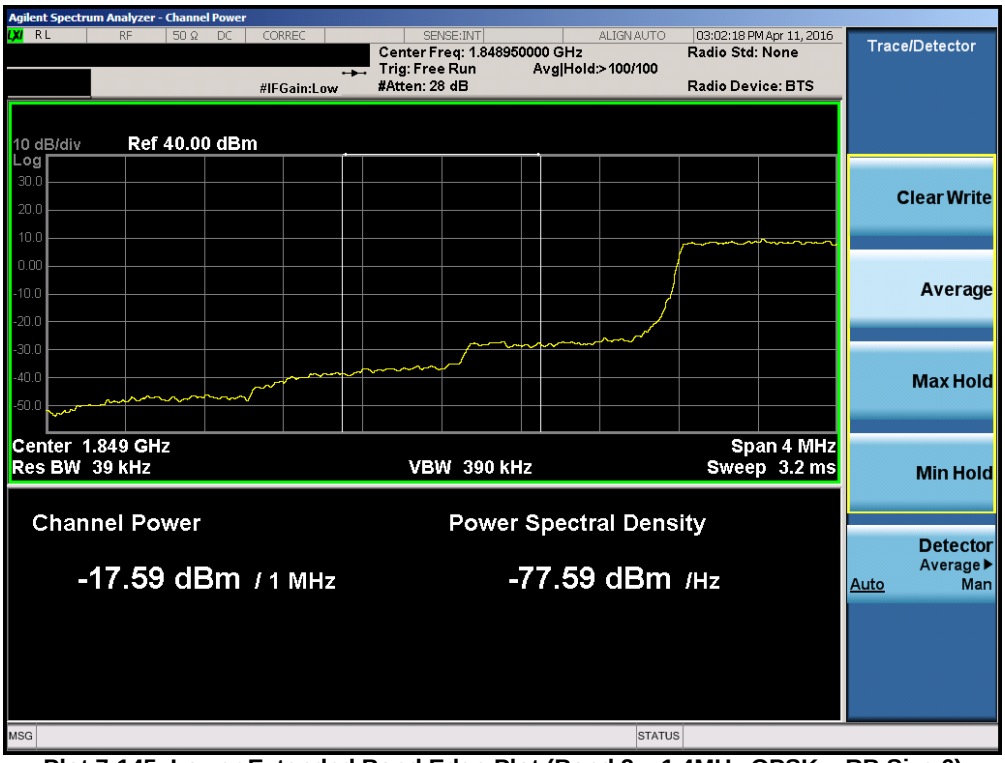
Plot 7-142. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-143. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

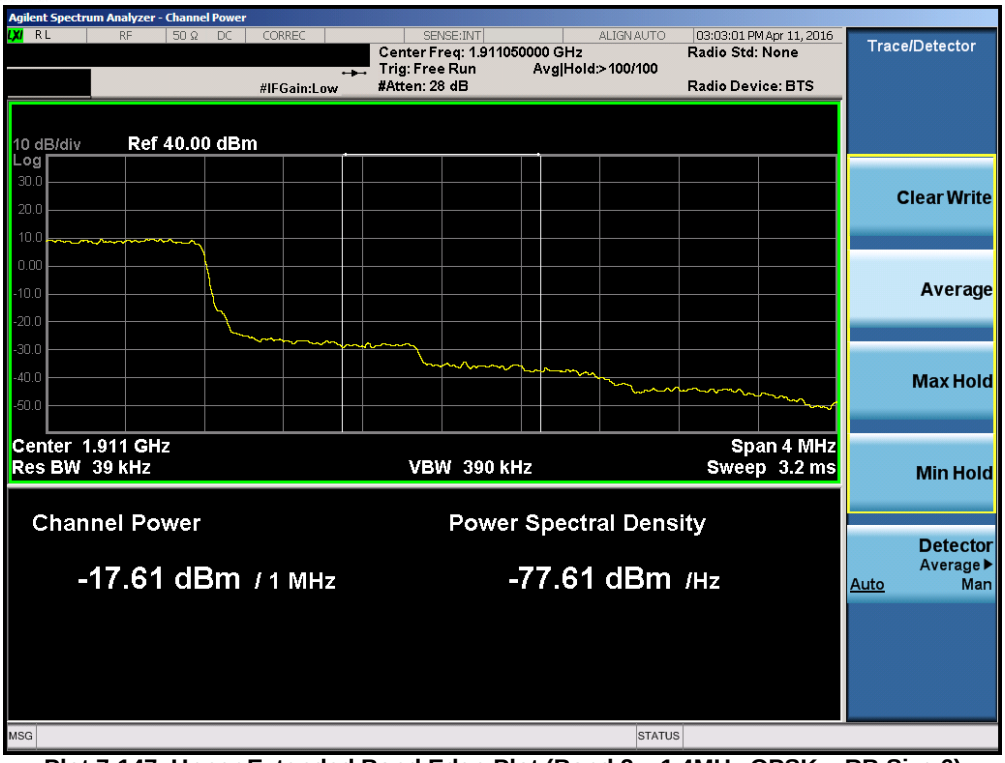


Plot 7-144. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

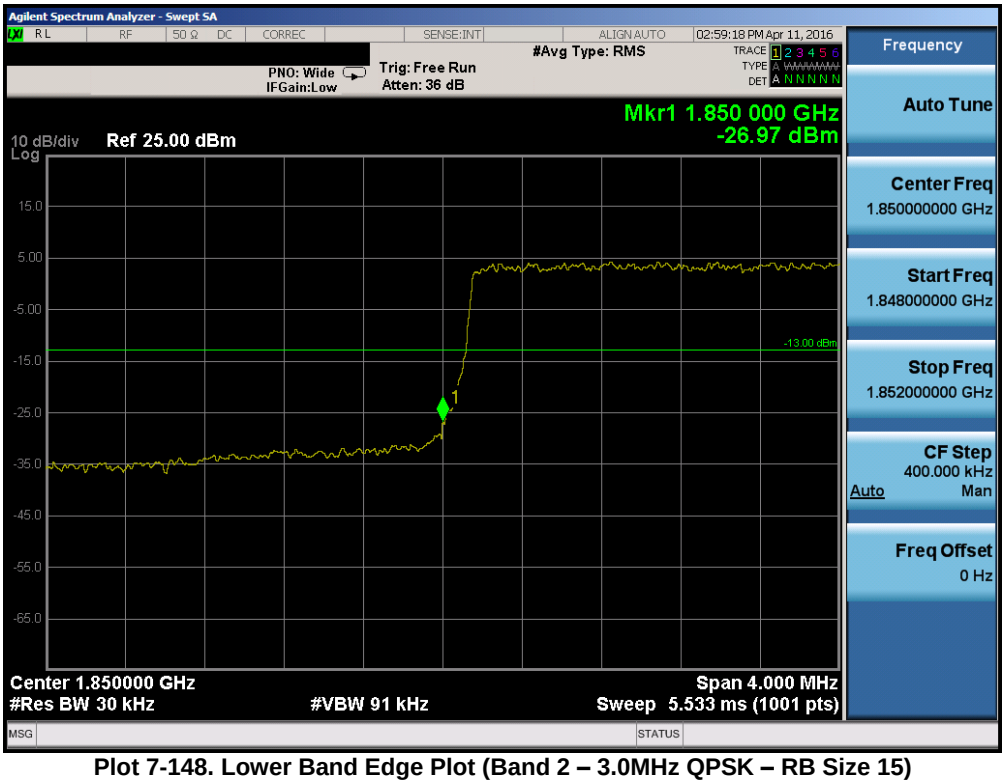


Plot 7-145. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

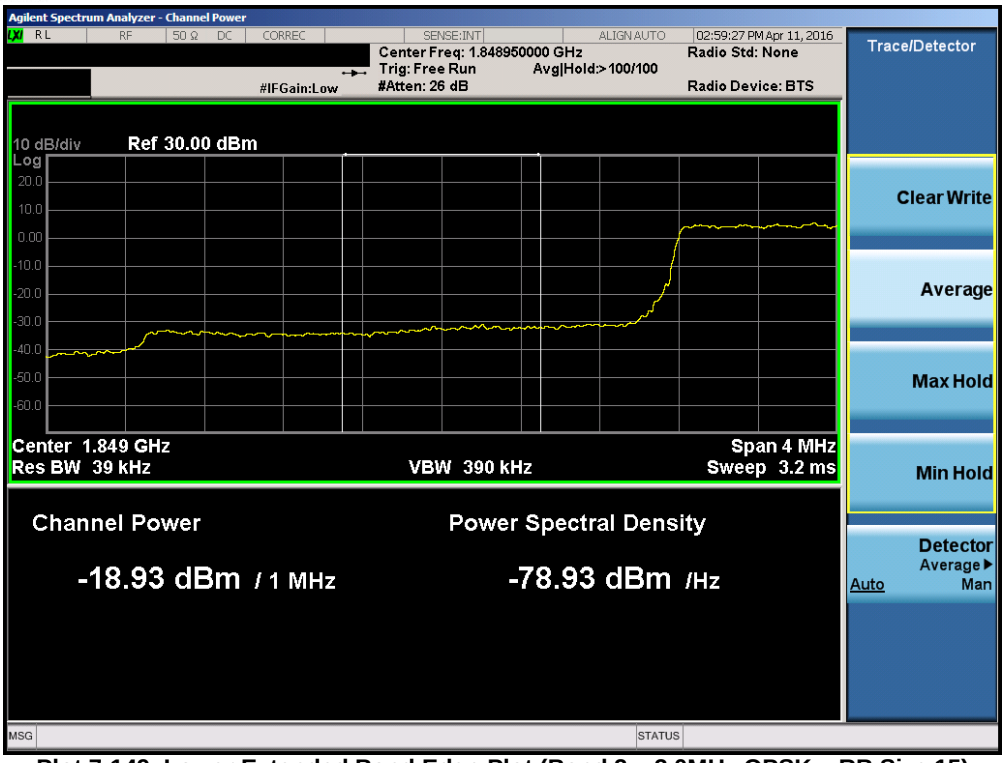
Plot 7-146. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



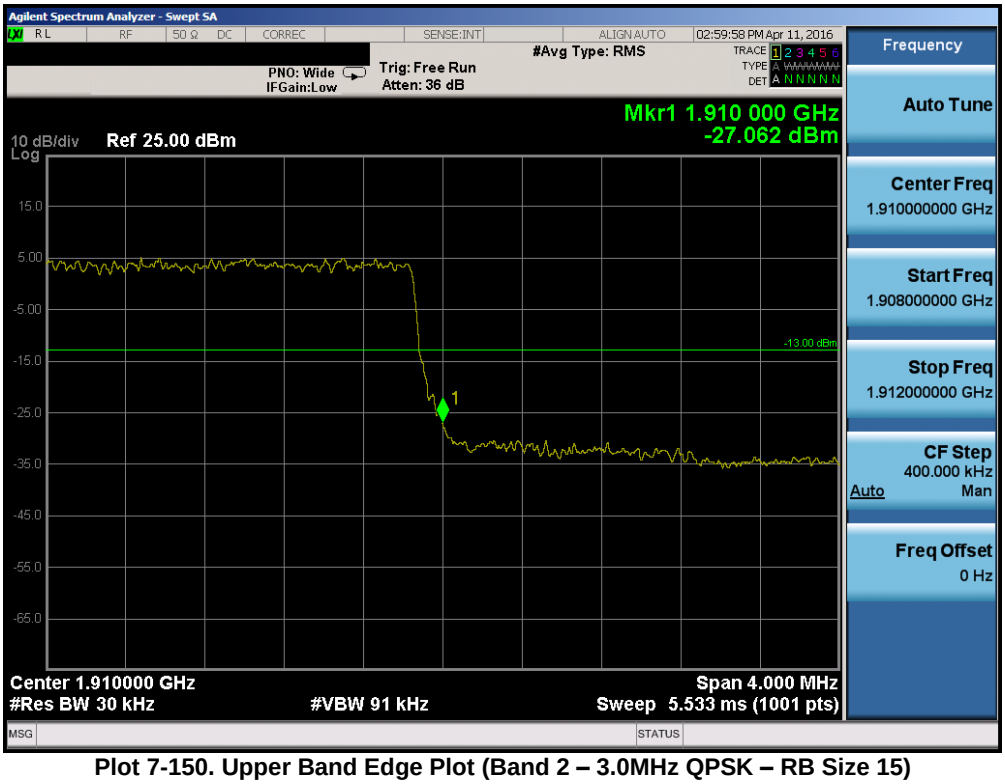
Plot 7-147. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



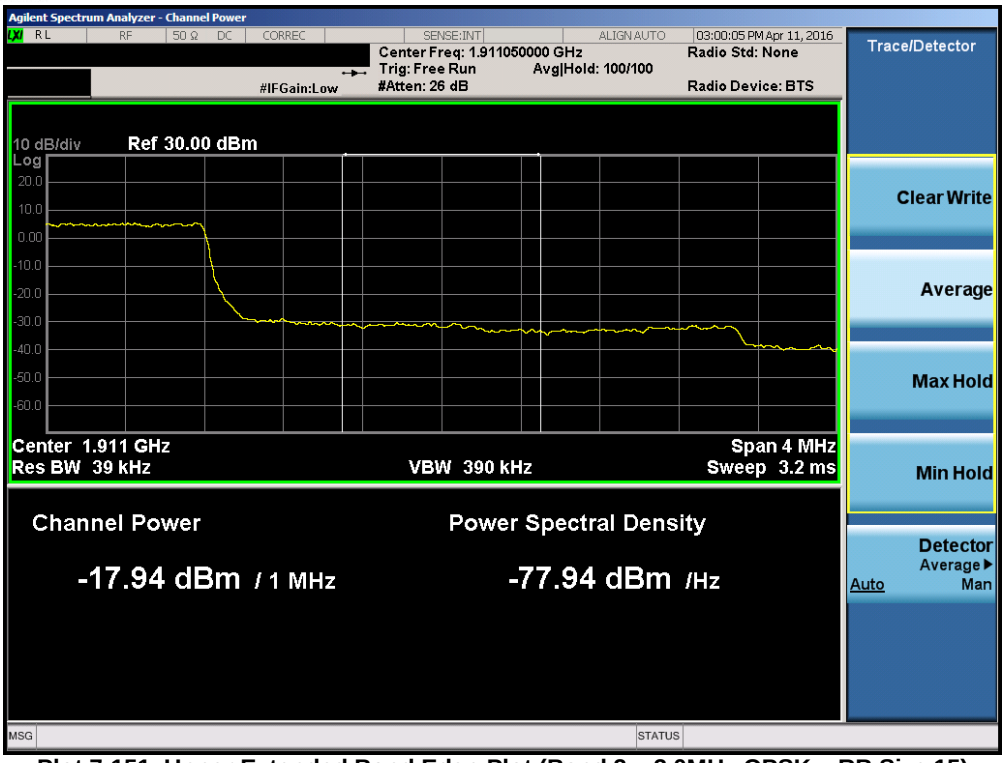
Plot 7-148. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



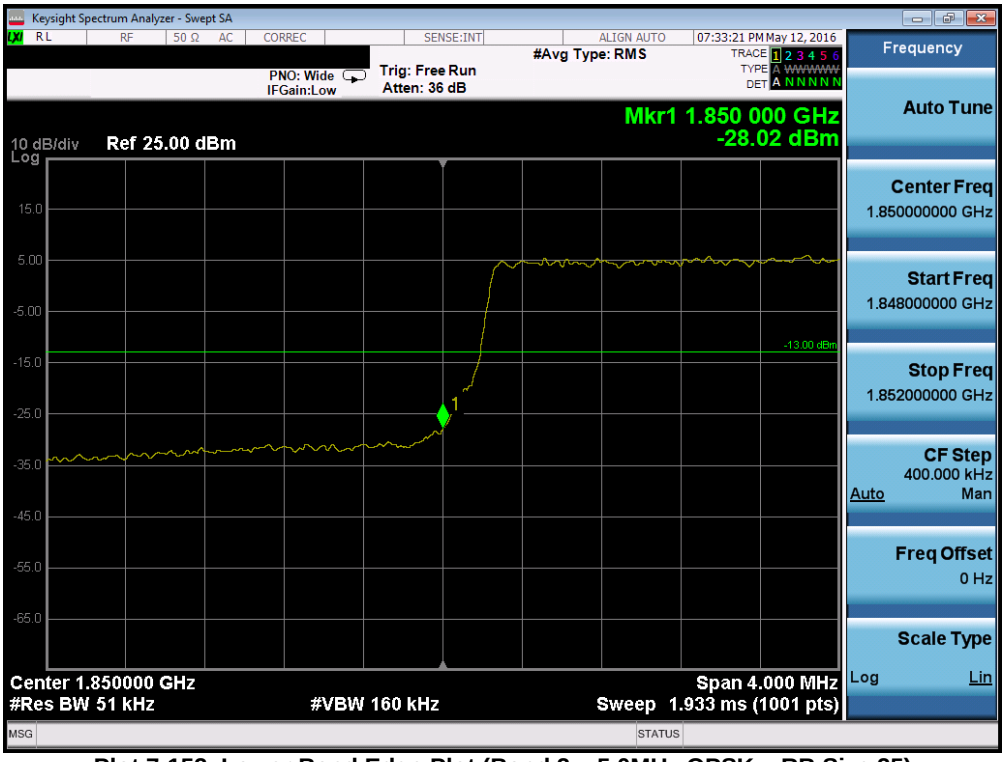
Plot 7-149. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



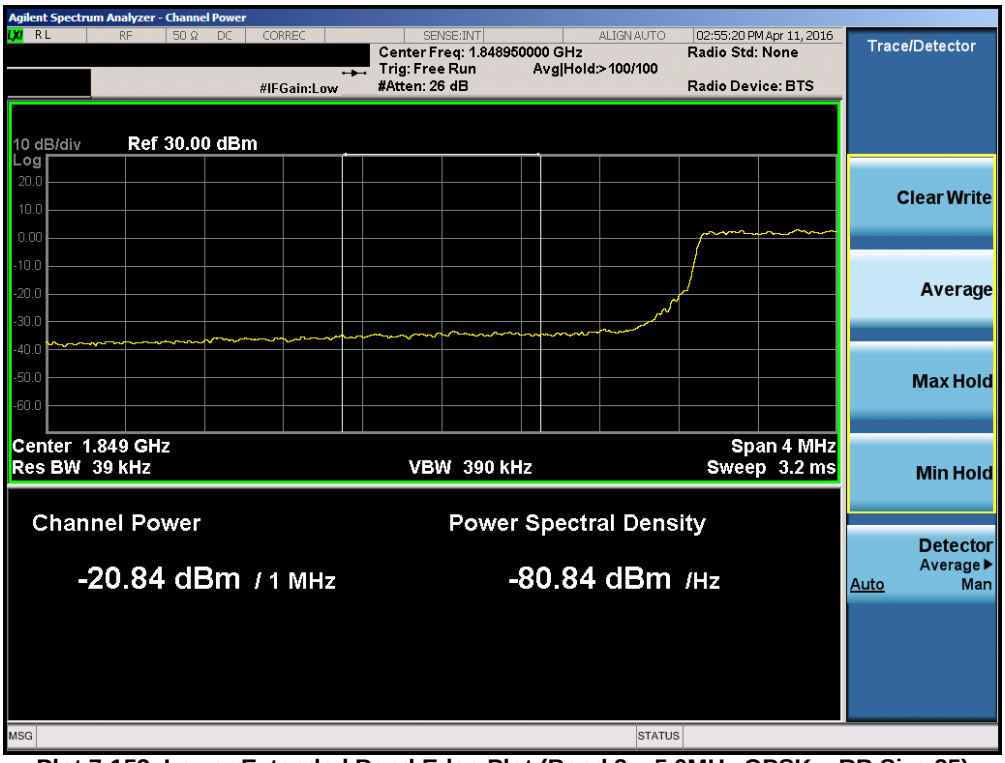
Plot 7-150. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



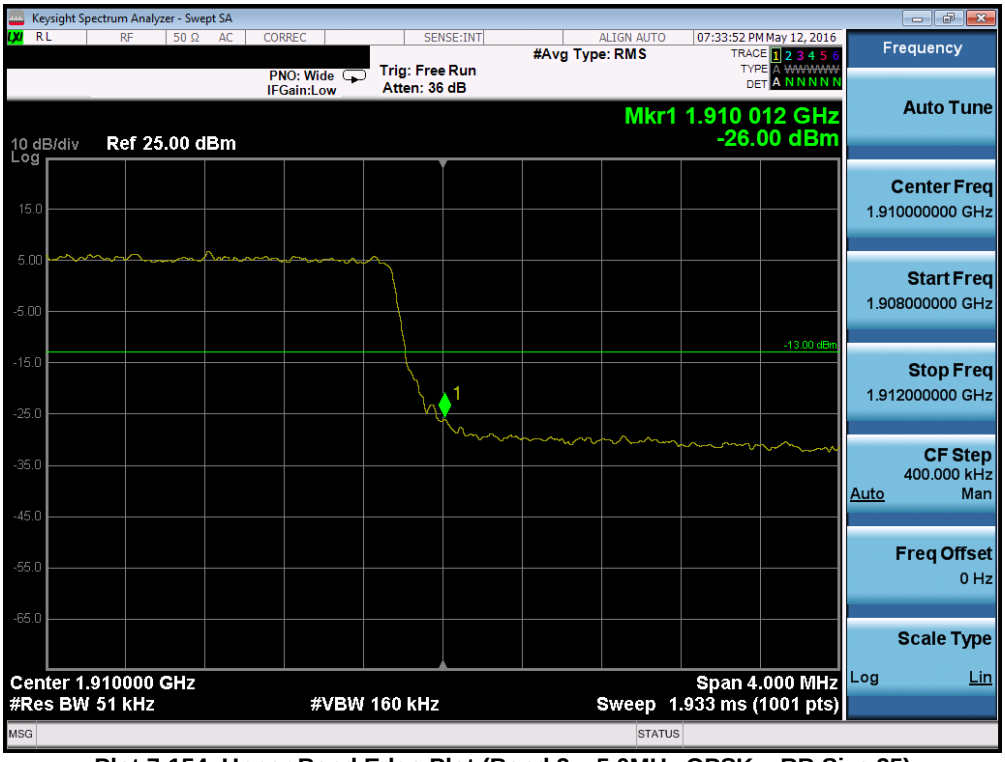
Plot 7-151. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



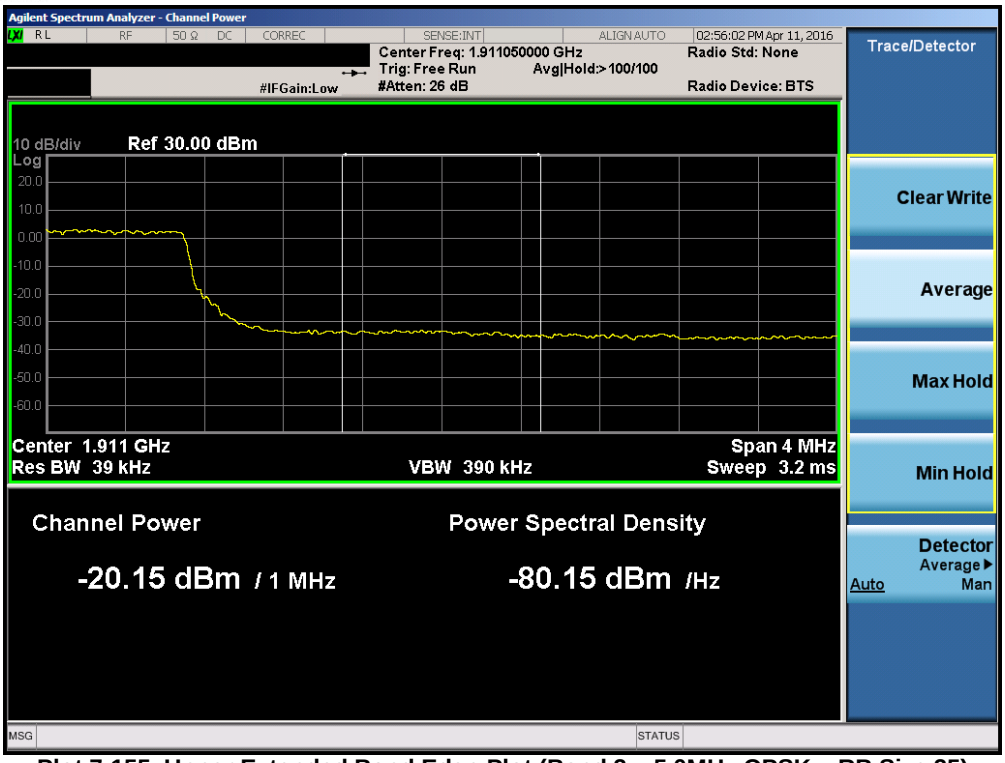
Plot 7-152. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



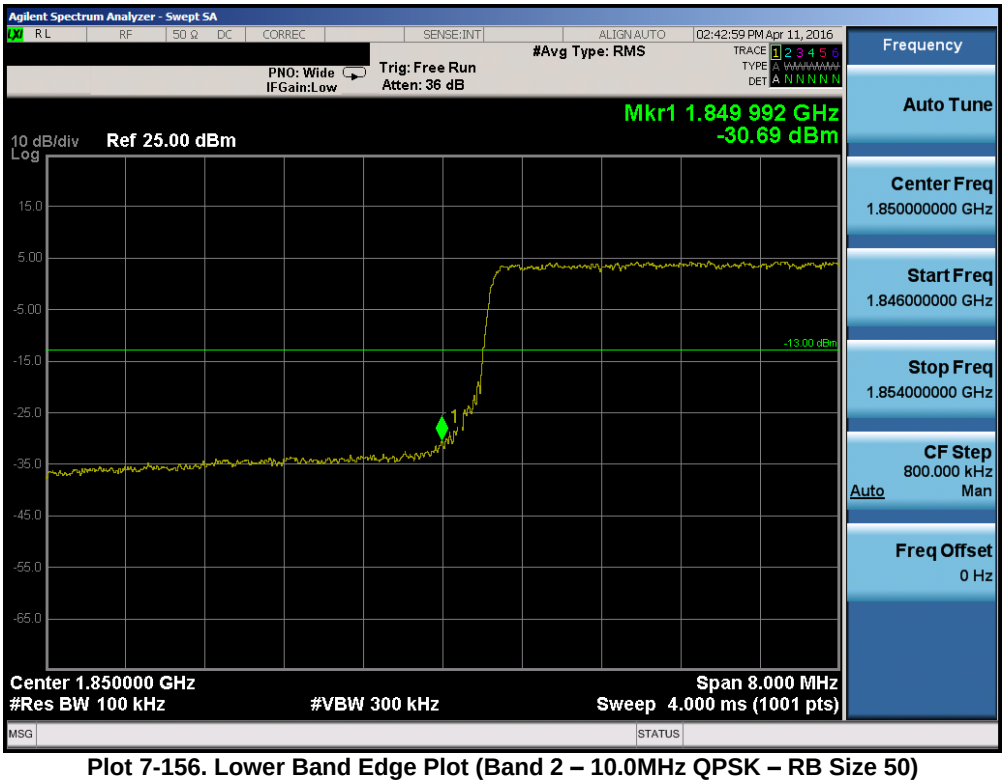
Plot 7-153. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



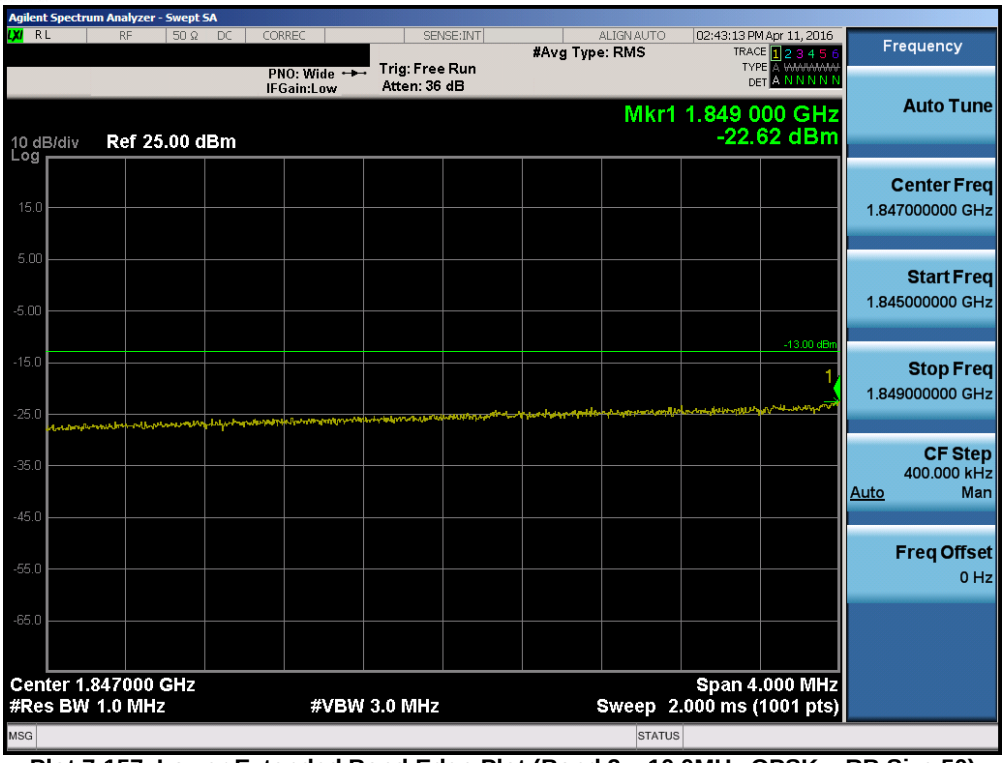
Plot 7-154. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



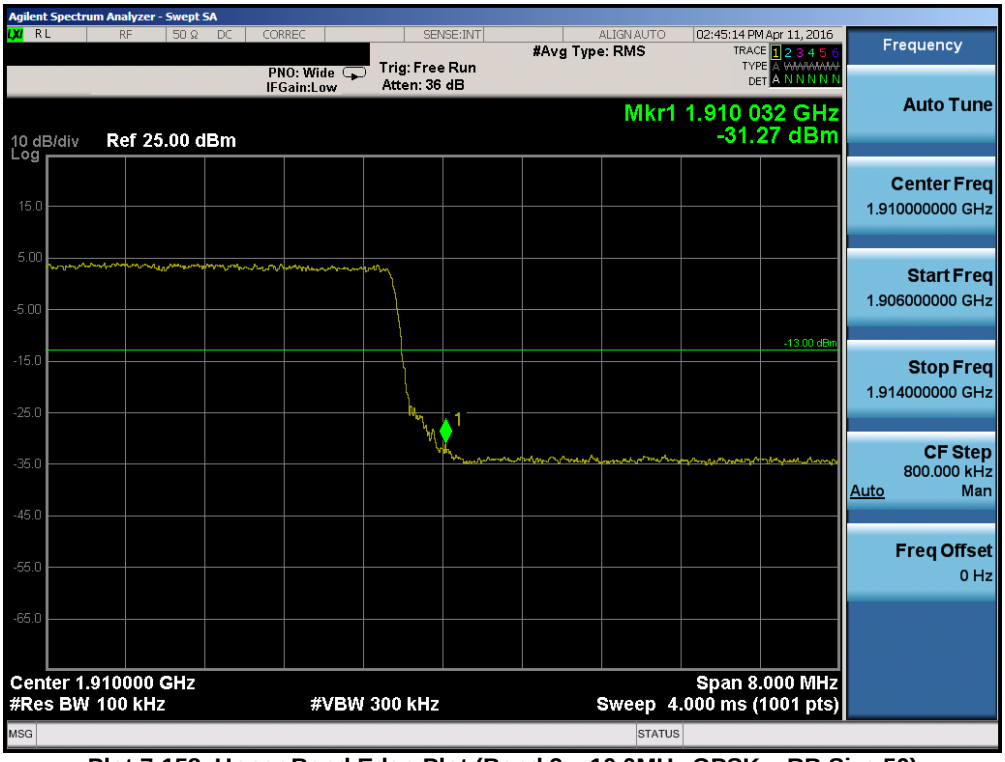
Plot 7-155. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



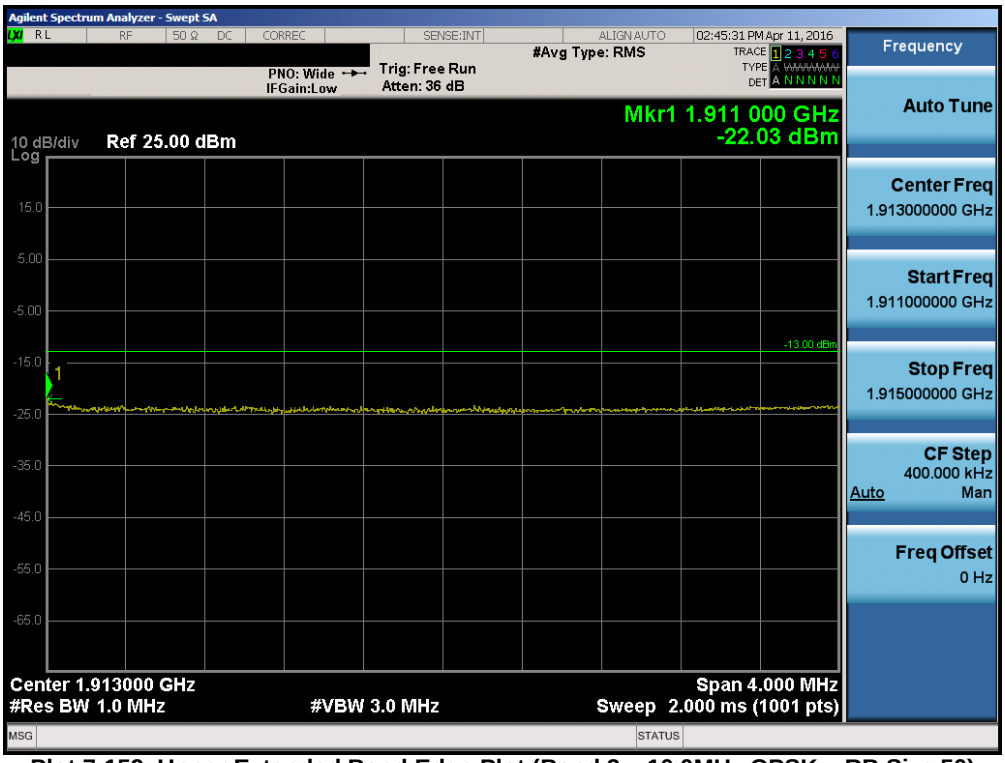
Plot 7-156. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



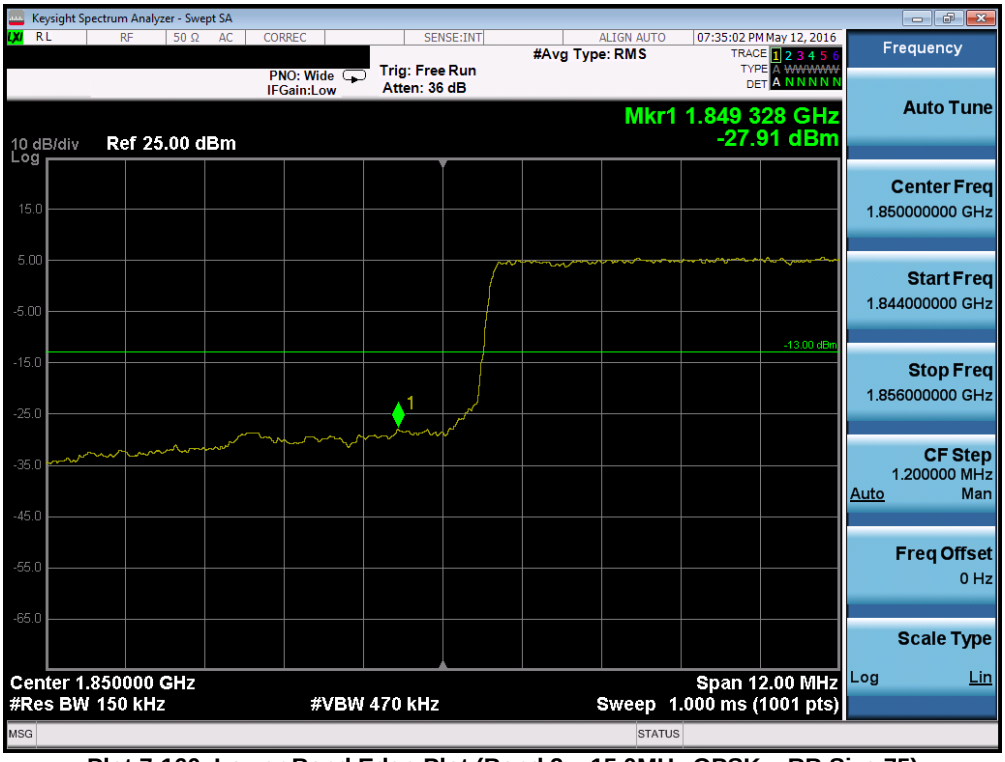
Plot 7-157. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



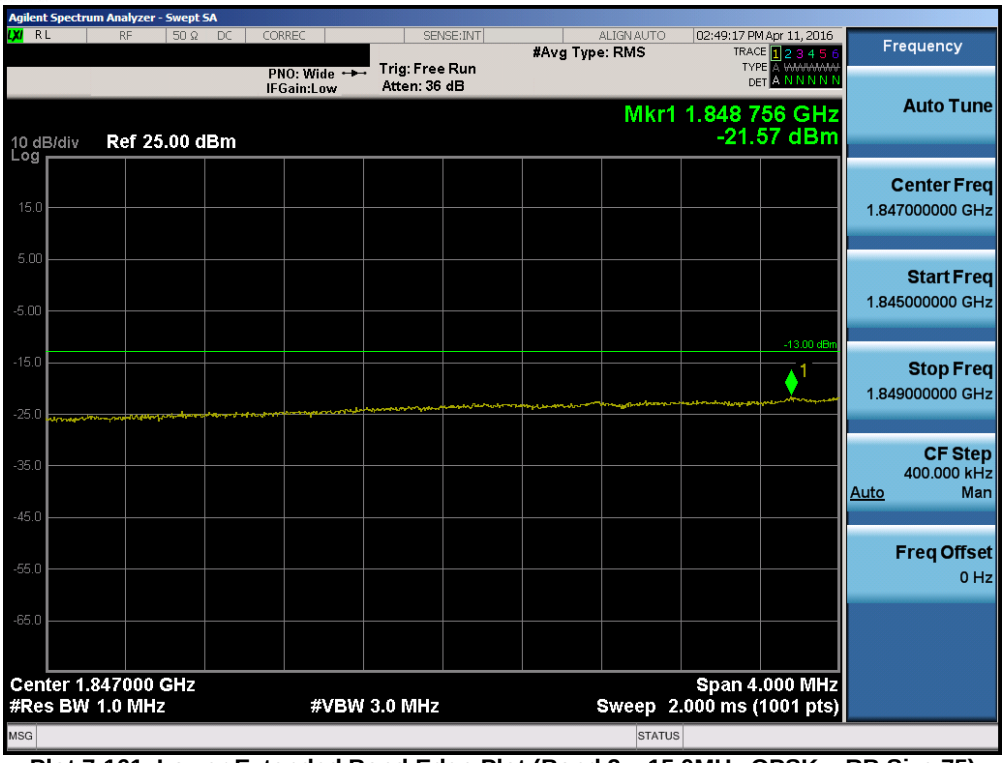
Plot 7-158. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



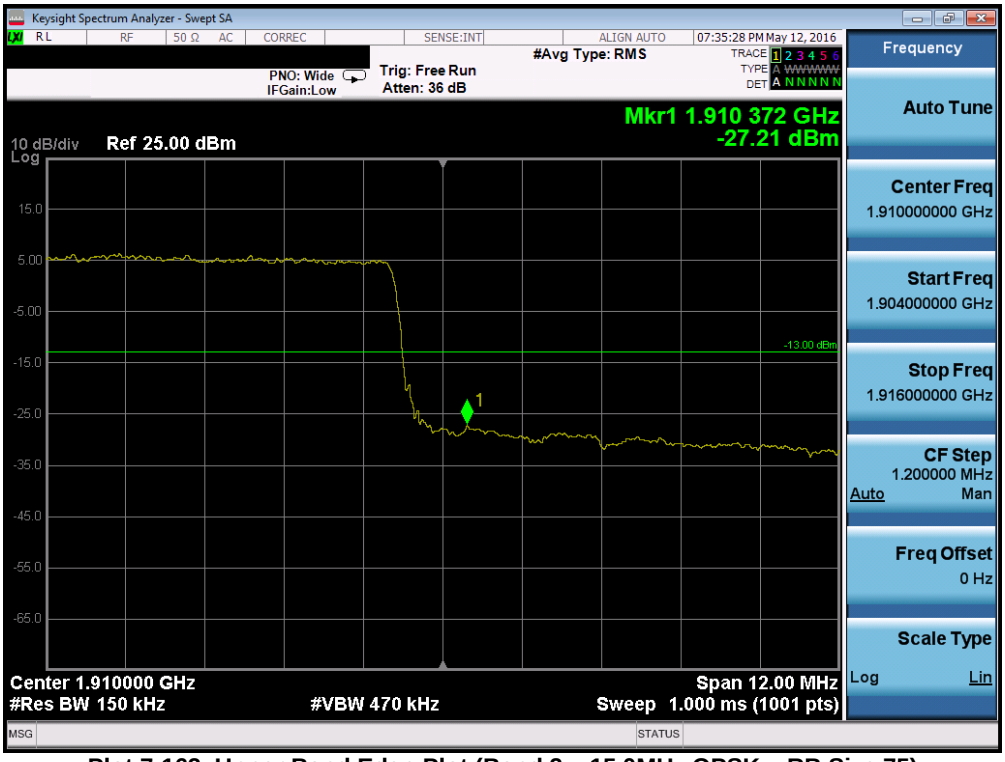
Plot 7-159. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



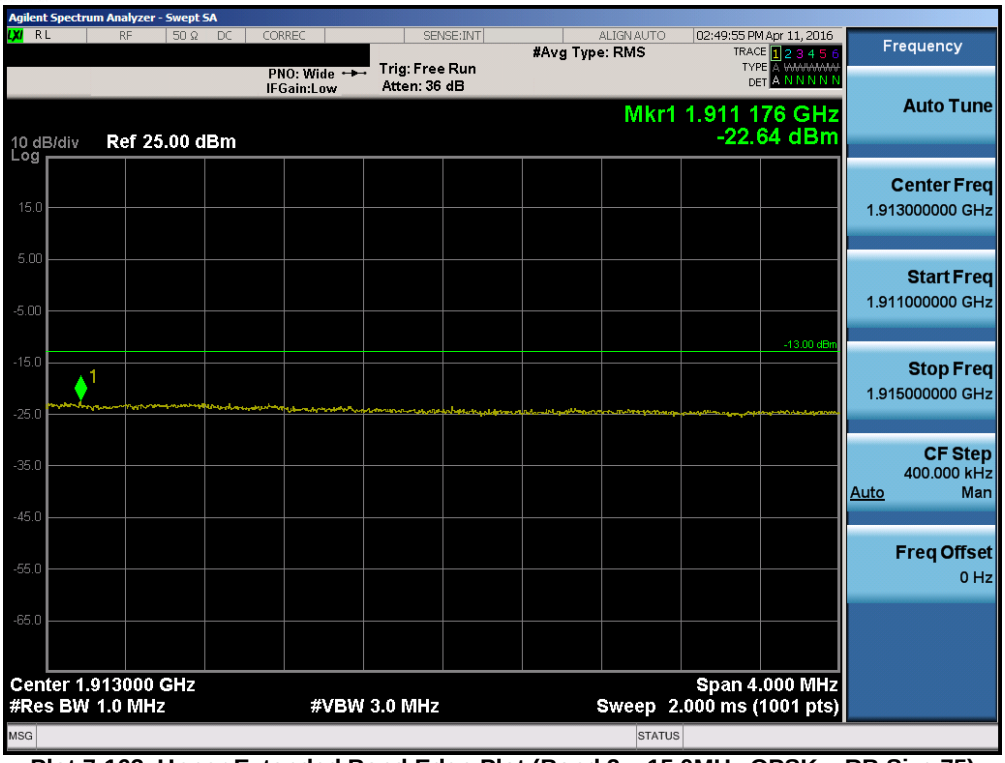
Plot 7-160. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



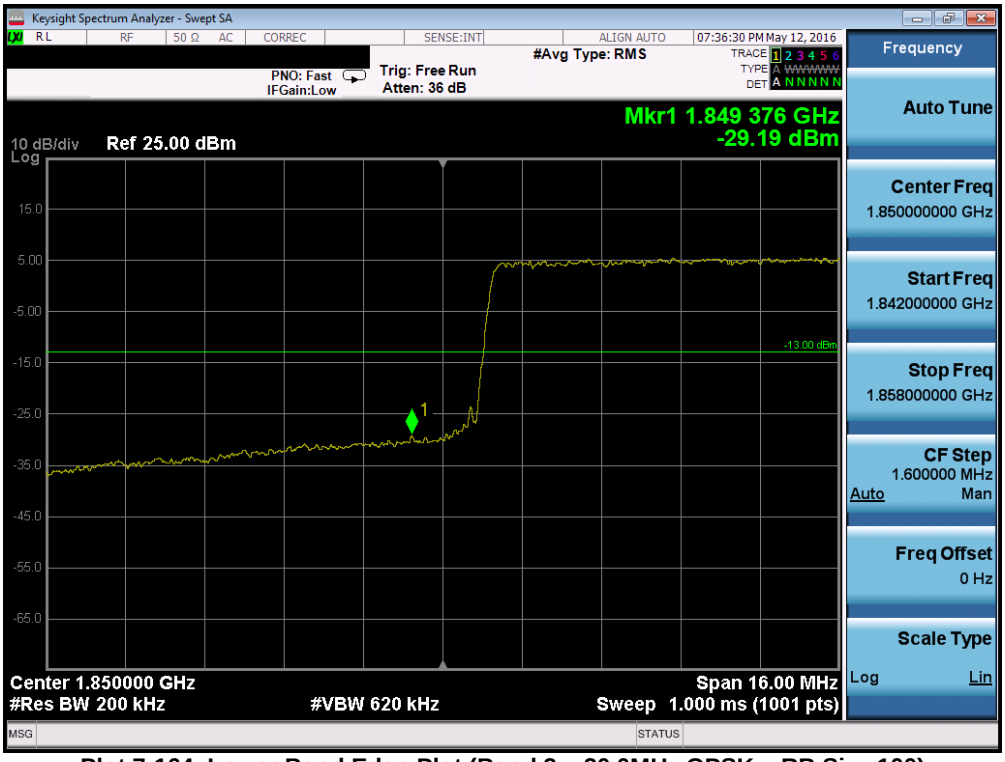
Plot 7-161. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



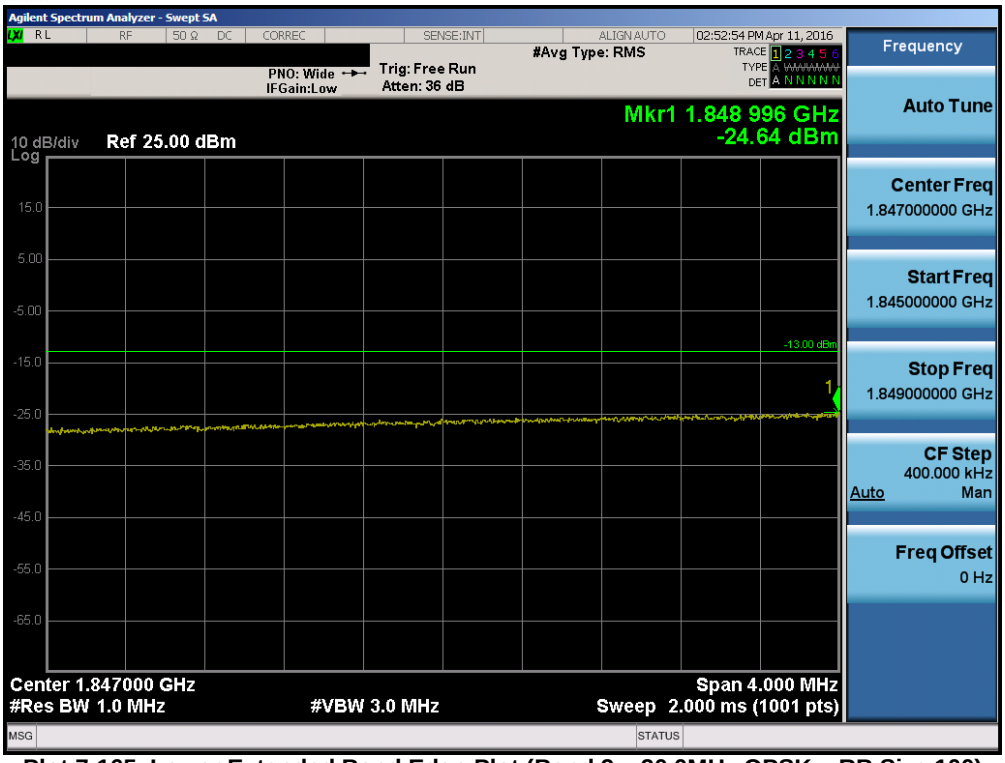
Plot 7-162. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



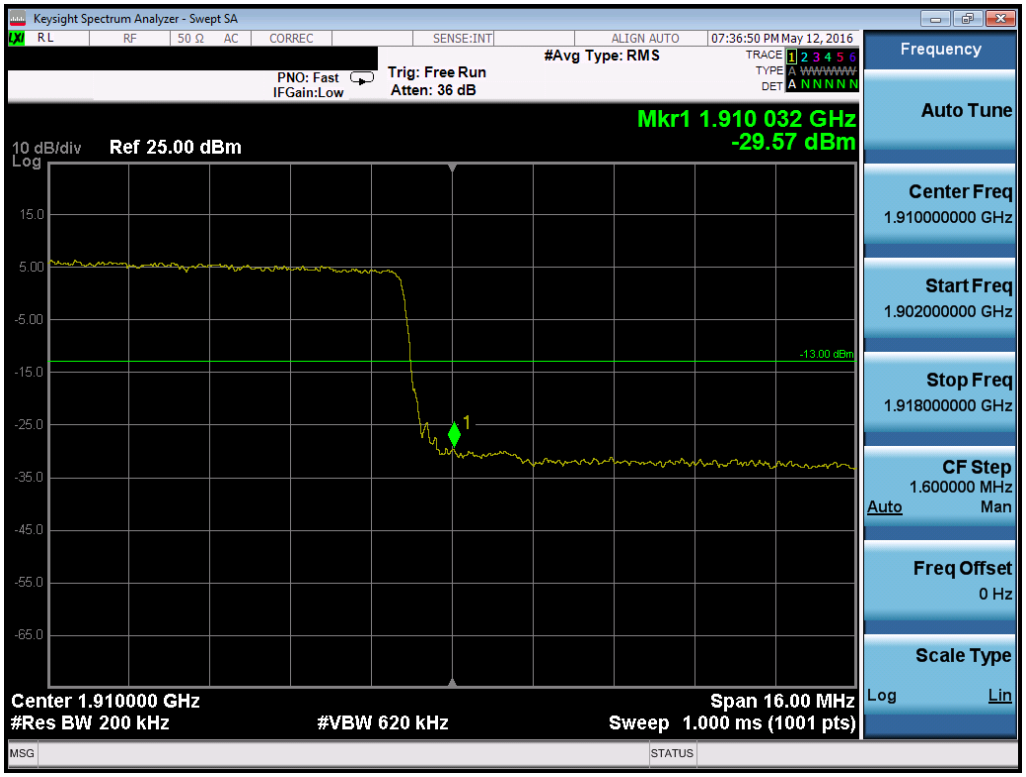
Plot 7-163. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



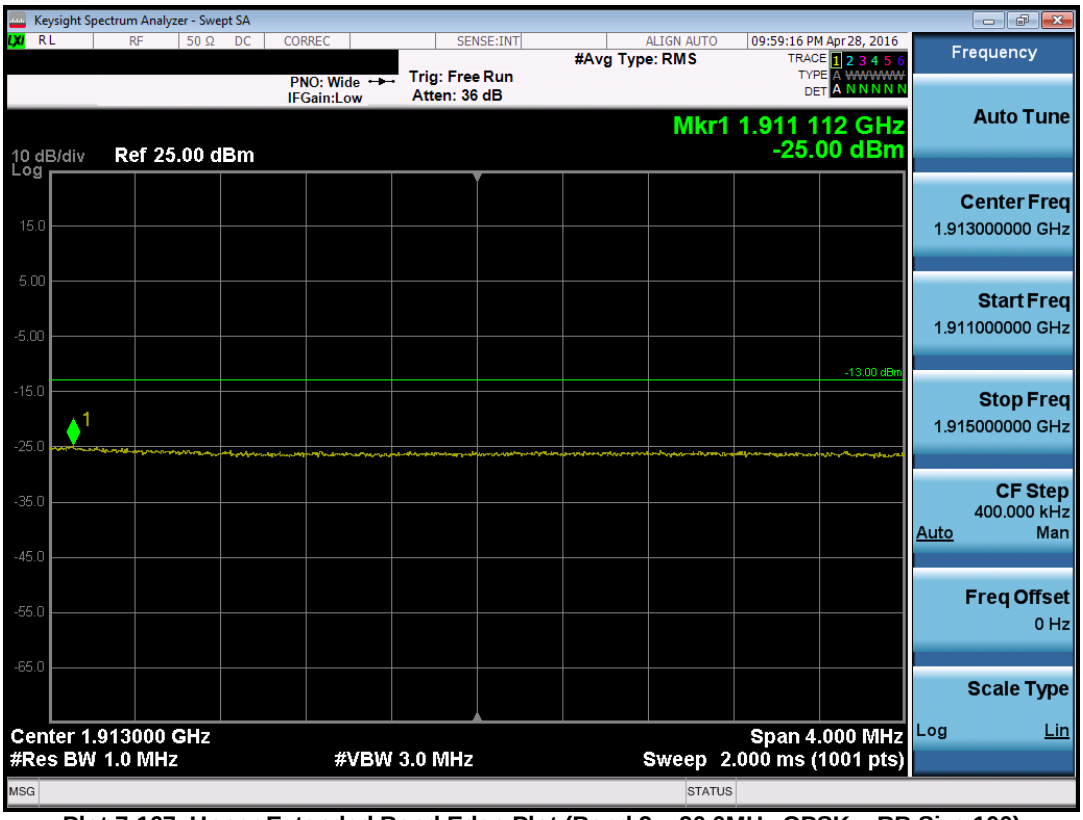
Plot 7-164. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-165. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-166. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-167. Upper Extended Band Edge Plot (Band 2 – 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.

Test Setup

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

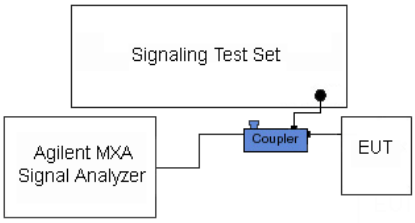
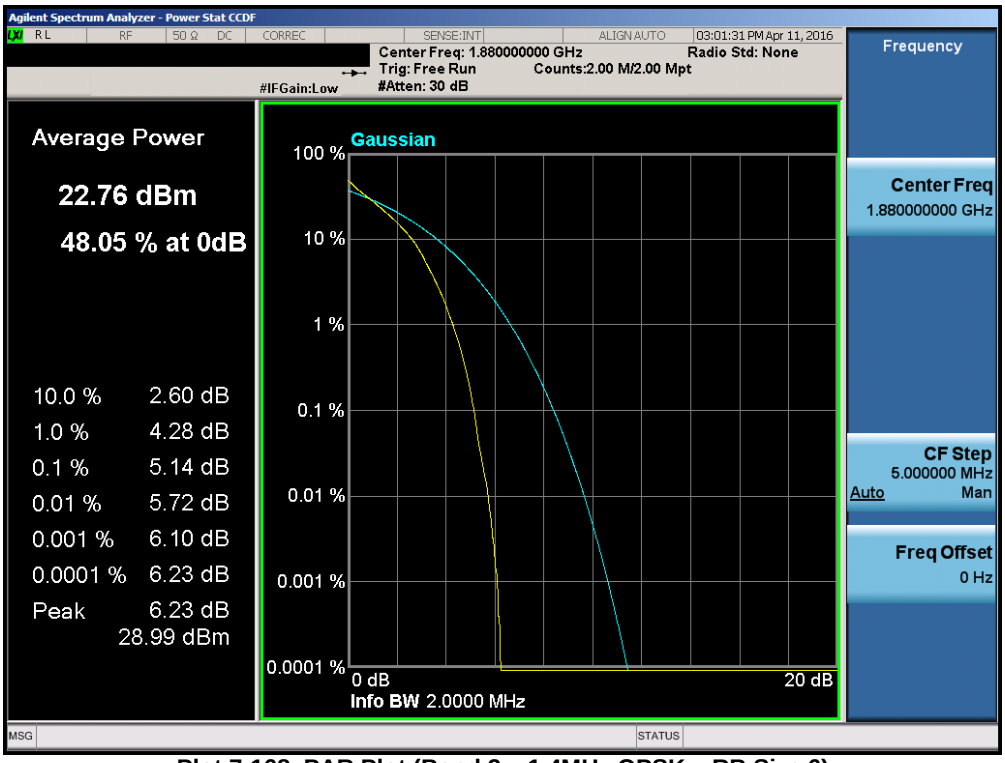


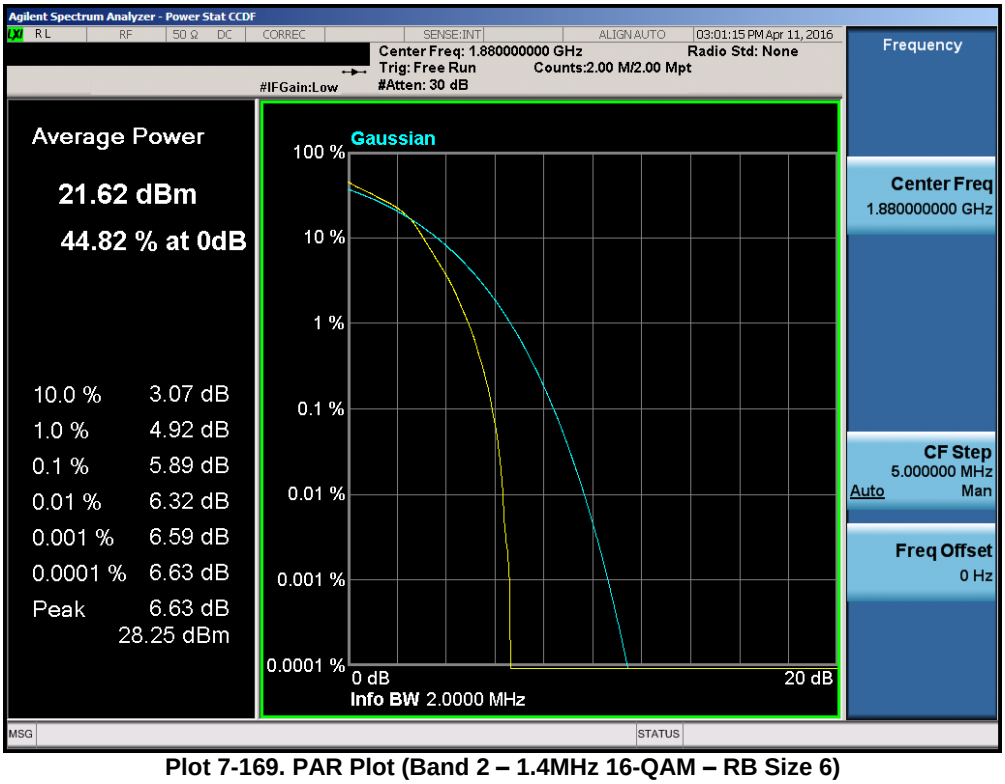
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

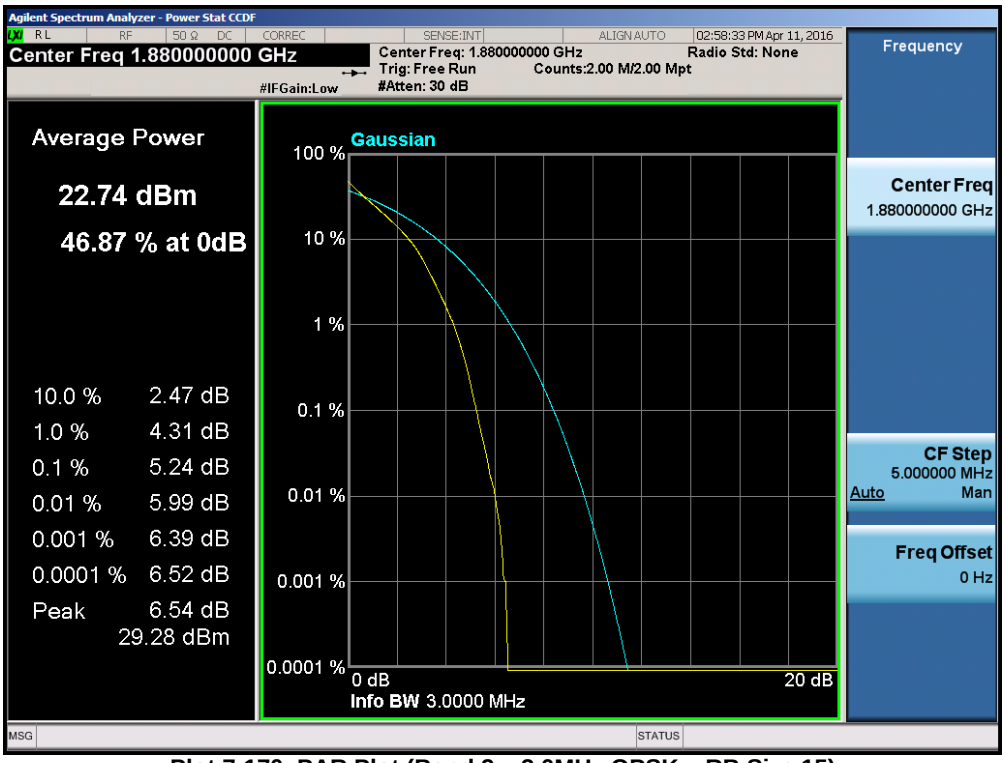
None.



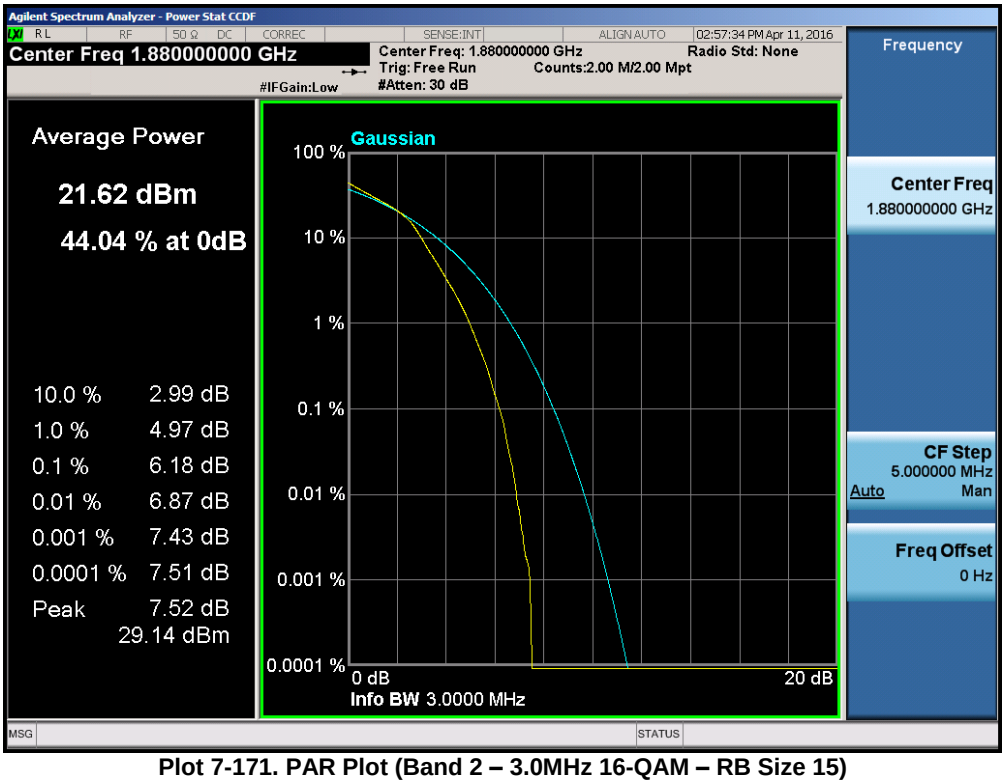
Plot 7-168. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



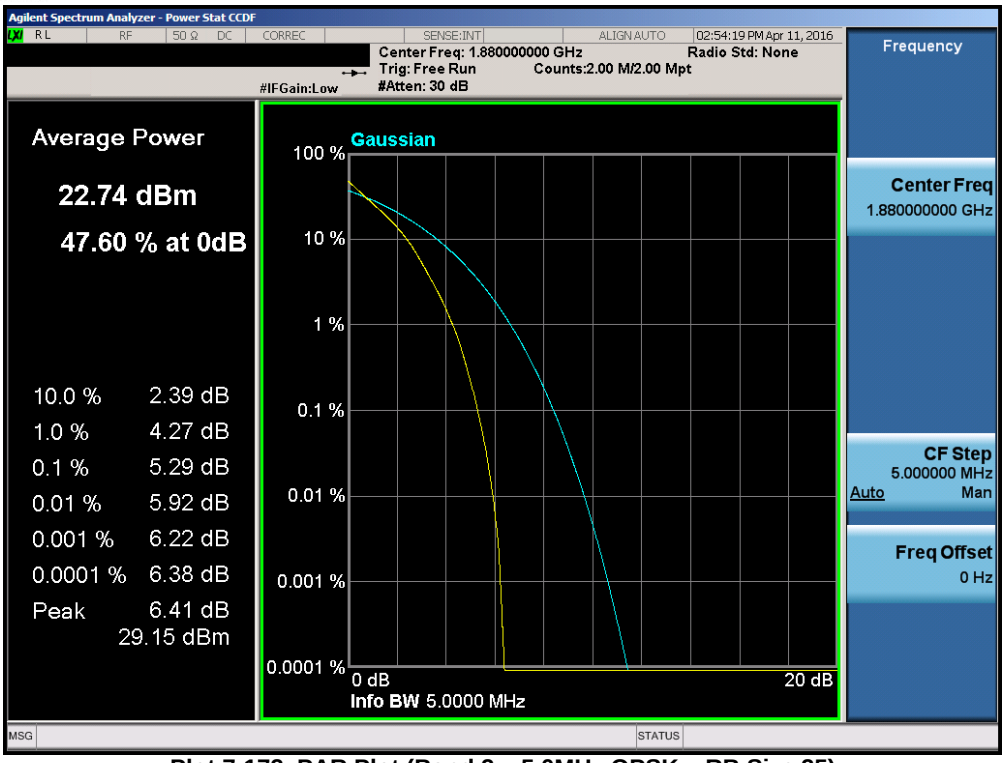
Plot 7-169. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)



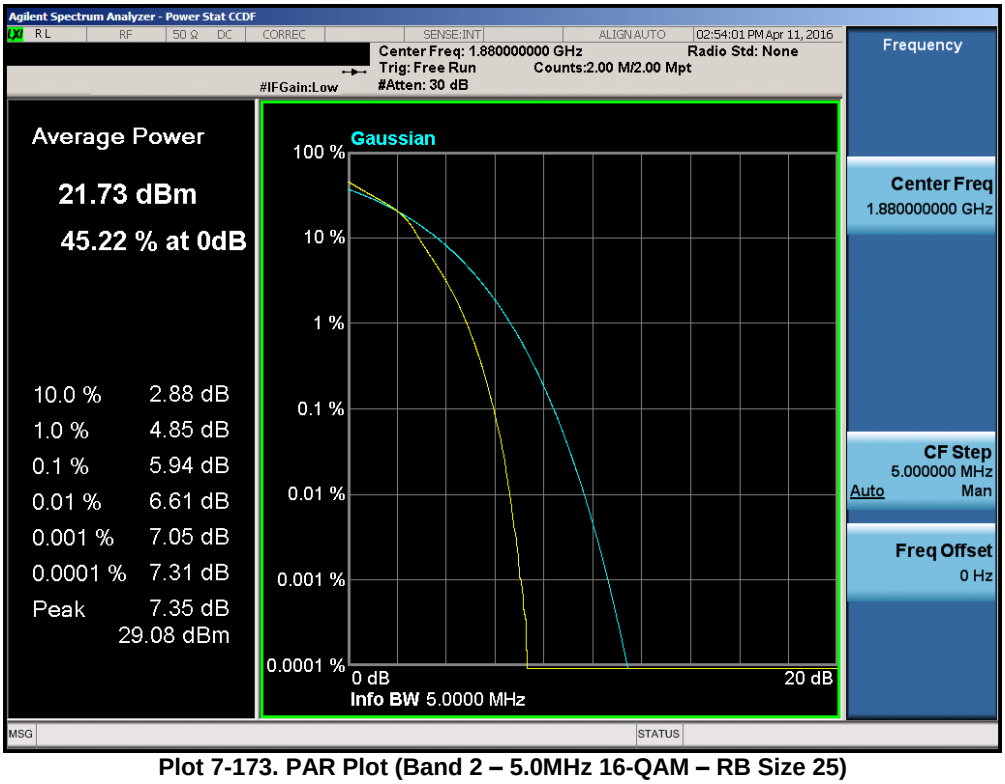
Plot 7-170. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



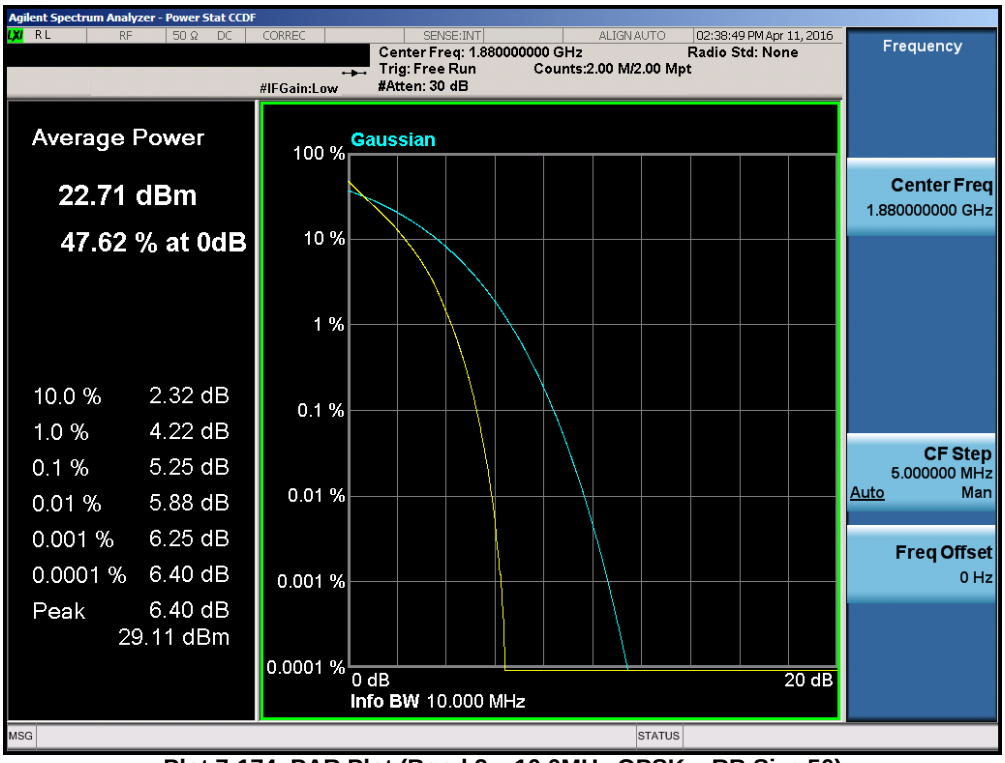
Plot 7-171. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)



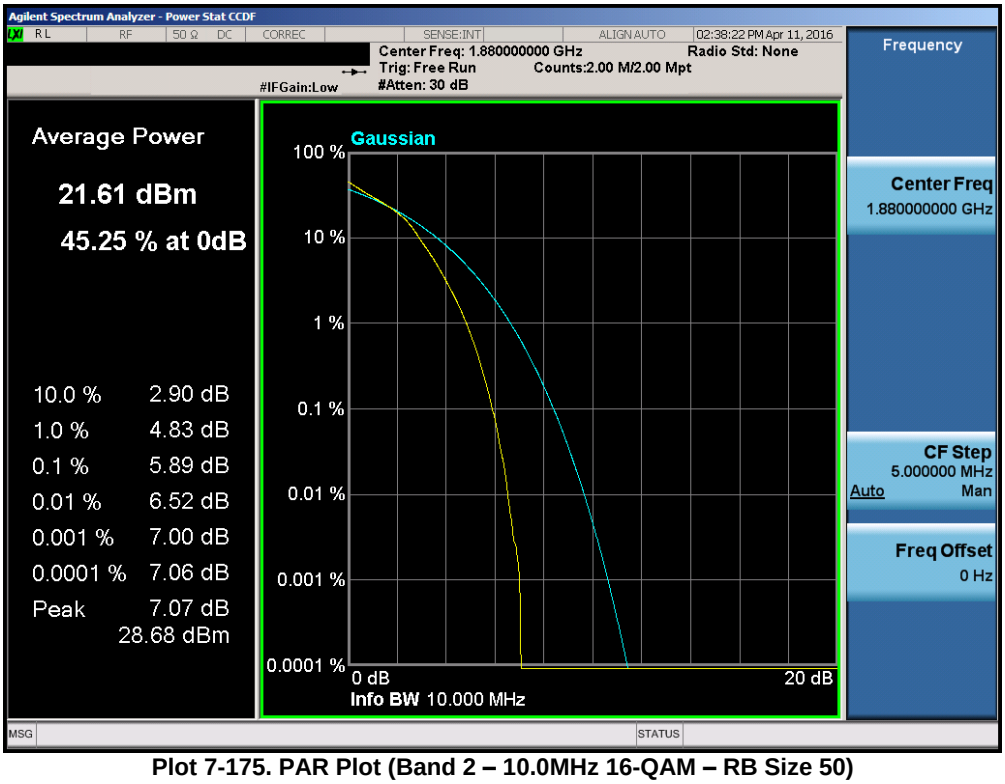
Plot 7-172. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



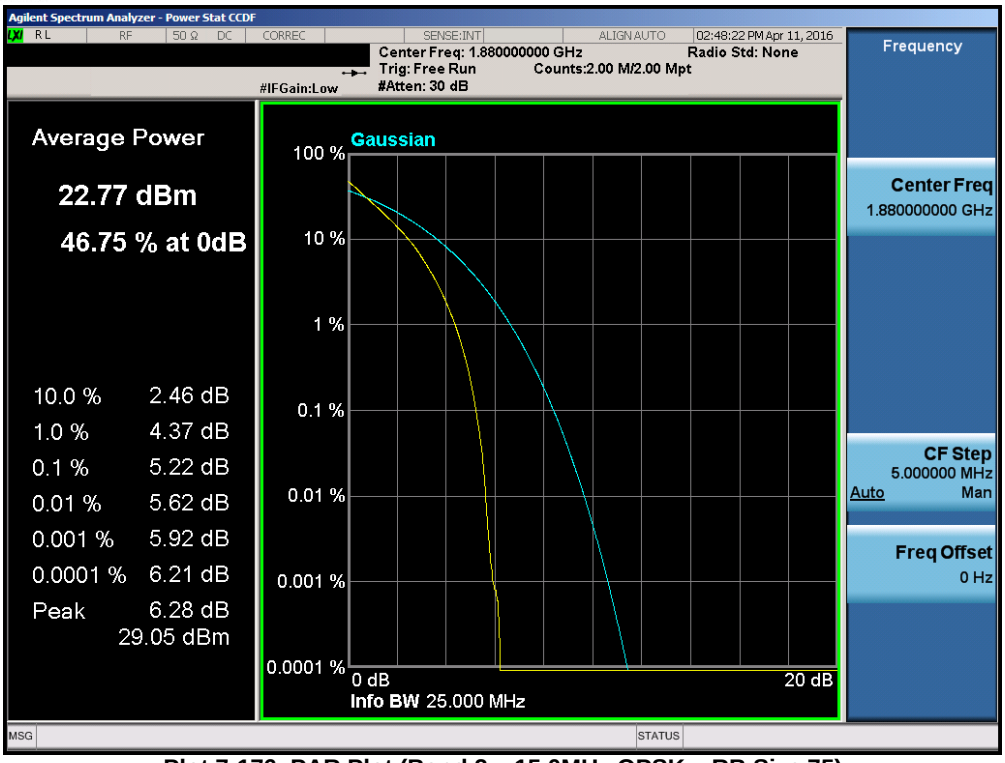
Plot 7-173. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)



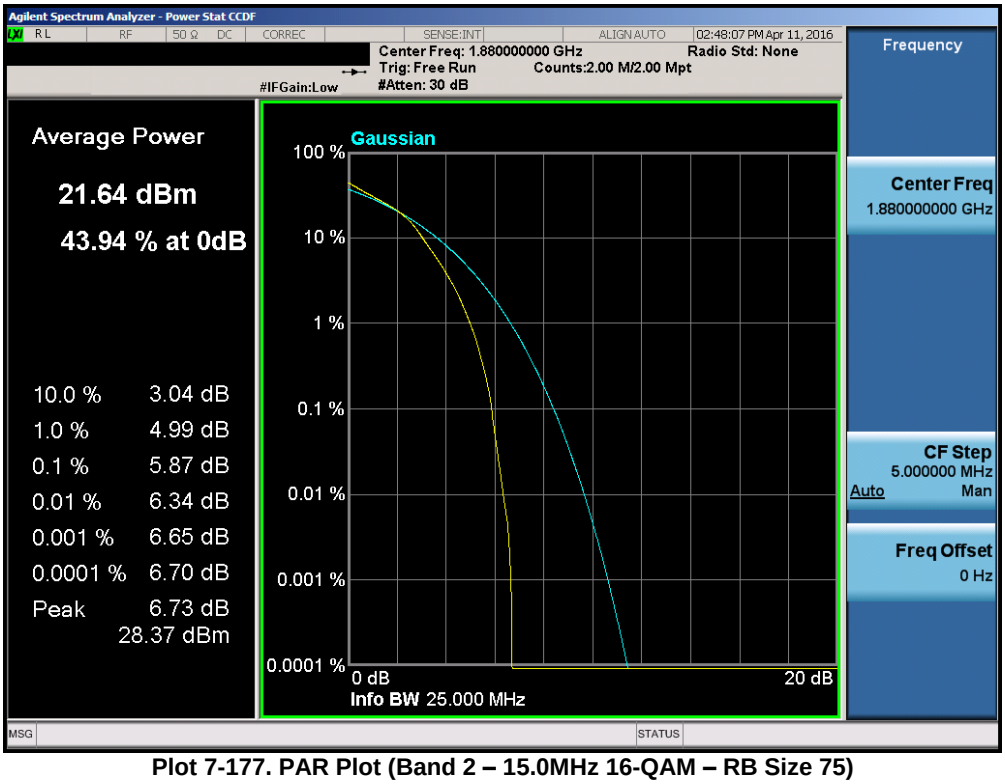
Plot 7-174. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



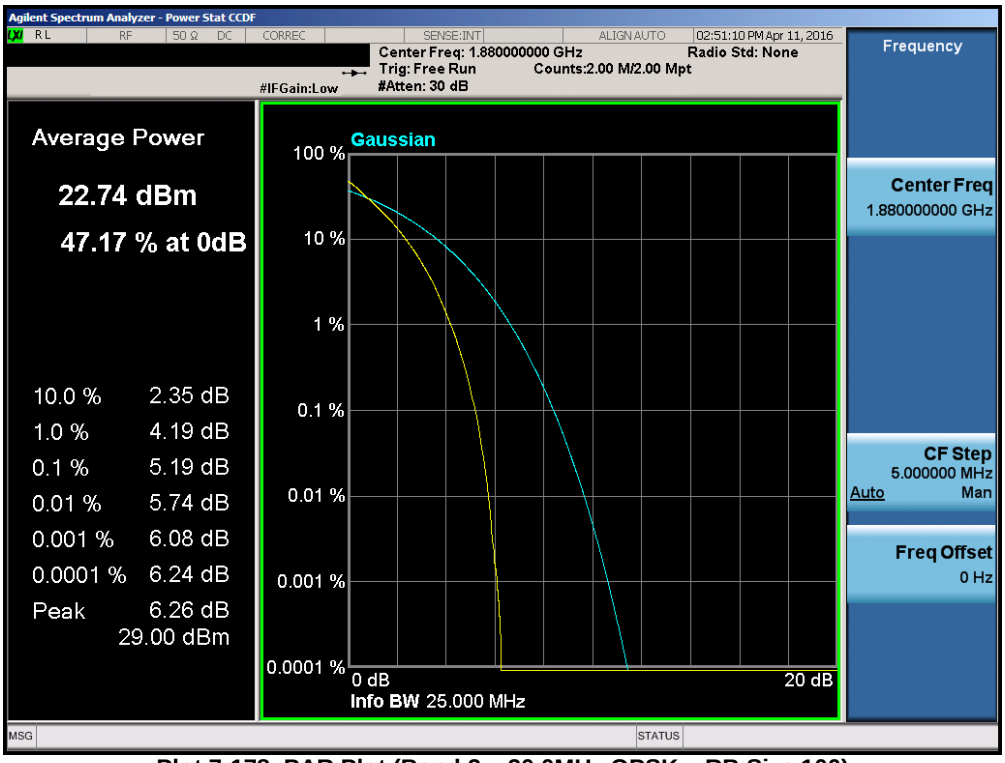
Plot 7-175. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)



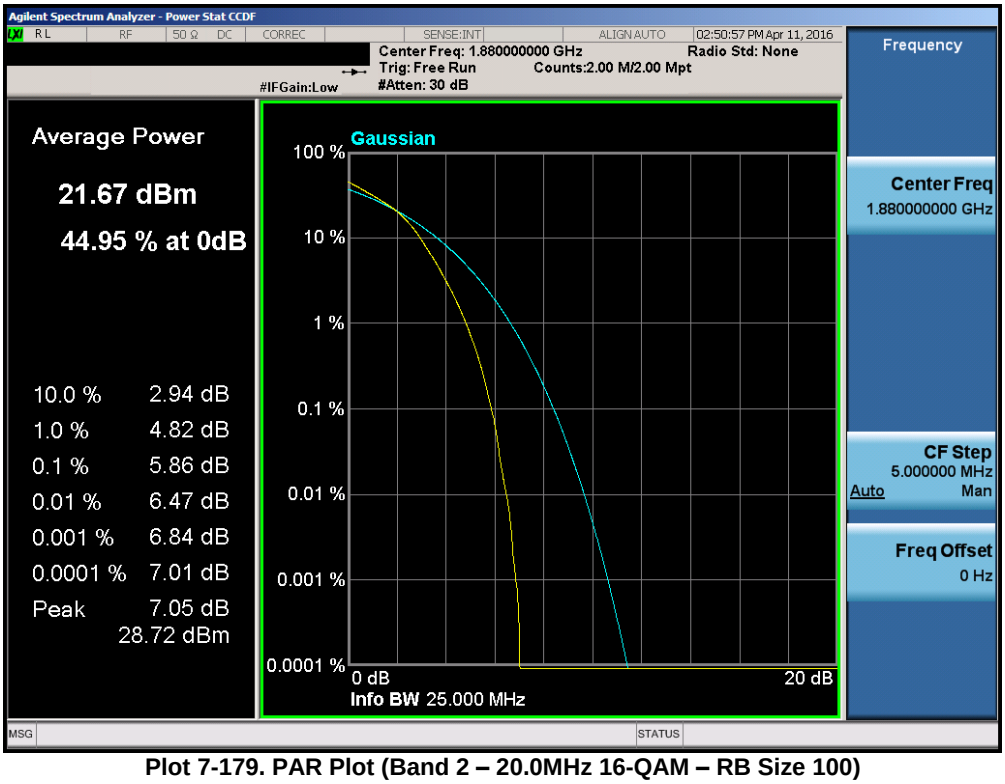
Plot 7-176. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-177. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)



Plot 7-178. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-179. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

7.6 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(b.10) §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-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically 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-C-2004 – 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

Test Setup

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

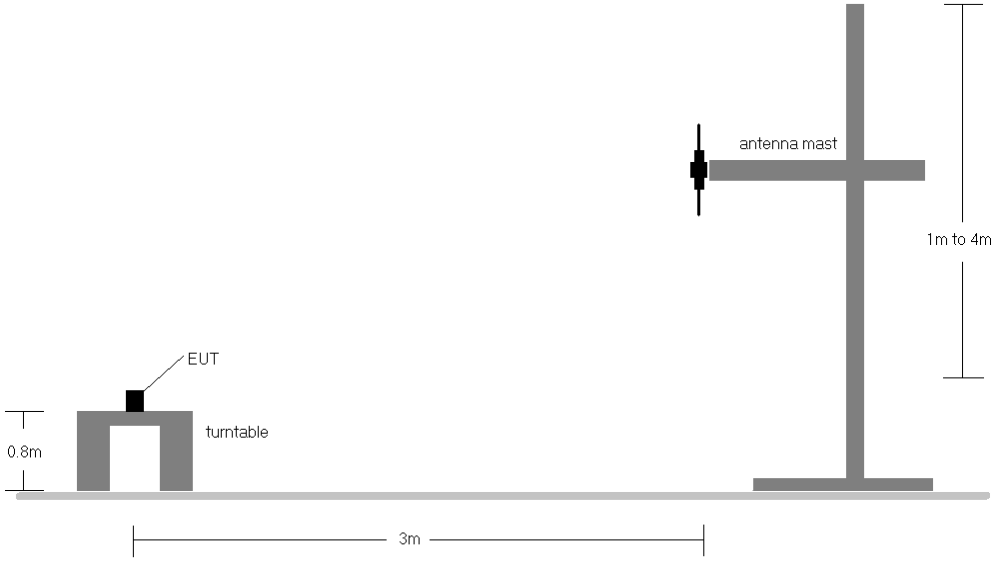


Figure 7-5. Radiated Test Setup <1GHz

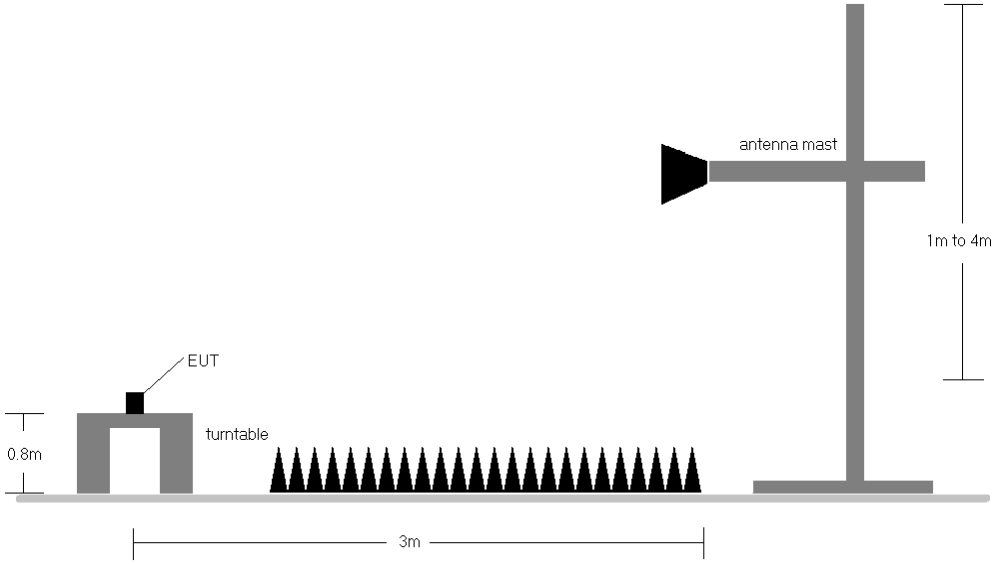


Figure 7-6. Radiated Test Setup >1GHz

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	170	200	1 / 0	15.49	2.72	18.21	34.77	-16.56
707.50	1.4	QPSK	H	165	210	1 / 5	16.14	2.88	19.02	34.77	-15.75
715.30	1.4	QPSK	H	179	155	1 / 0	16.43	3.06	19.49	34.77	-15.28
699.70	1.4	16-QAM	H	170	200	1 / 0	15.44	2.72	18.16	34.77	-16.61
707.50	1.4	16-QAM	H	165	210	1 / 5	16.00	2.88	18.88	34.77	-15.89
715.30	1.4	16-QAM	H	179	155	1 / 0	16.36	3.06	19.42	34.77	-15.35
700.50	3	QPSK	H	150	210	1 / 0	15.14	2.72	17.86	34.77	-16.91
707.50	3	QPSK	H	155	100	1 / 0	15.59	2.88	18.47	34.77	-16.30
714.50	3	QPSK	H	174	122	1 / 0	16.41	3.04	19.45	34.77	-15.32
700.50	3	16-QAM	H	150	210	1 / 0	15.05	2.72	17.77	34.77	-17.00
707.50	3	16-QAM	H	155	100	1 / 0	15.51	2.88	18.39	34.77	-16.38
714.50	3	16-QAM	H	174	122	1 / 0	16.35	3.04	19.39	34.77	-15.38
701.50	5	QPSK	H	155	122	1 / 24	15.42	2.75	18.17	34.77	-16.60
707.50	5	QPSK	H	145	100	1 / 24	16.07	2.88	18.95	34.77	-15.82
713.50	5	QPSK	H	156	245	1 / 24	16.23	3.02	19.25	34.77	-15.52
701.50	5	16-QAM	H	155	122	1 / 24	15.26	2.75	18.01	34.77	-16.76
707.50	5	16-QAM	H	145	100	1 / 24	16.00	2.88	18.88	34.77	-15.89
713.50	5	16-QAM	H	156	245	1 / 24	16.14	3.02	19.16	34.77	-15.61
704.00	10	QPSK	H	165	150	1 / 49	15.01	2.80	17.81	34.77	-16.96
707.50	10	QPSK	H	162	210	1 / 49	15.82	2.88	18.70	34.77	-16.07
711.00	10	QPSK	H	124	300	1 / 49	15.62	2.96	18.58	34.77	-16.19
704.00	10	16-QAM	H	165	150	1 / 49	14.91	2.80	17.71	34.77	-17.06
707.50	10	16-QAM	H	162	210	1 / 49	15.63	2.88	18.51	34.77	-16.26
711.00	10	16-QAM	H	124	300	1 / 49	15.51	2.96	18.47	34.77	-16.30

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]
779.50	5	QPSK	H	100	222	1 / 24	19.02	4.42	23.44	34.77	-11.33
782.00	5	QPSK	H	110	200	1 / 24	18.94	4.47	23.41	34.77	-11.36
784.50	5	QPSK	H	108	310	1 / 24	19.29	4.52	23.81	34.77	-10.96
779.50	5	16QAM	H	100	222	1 / 24	17.74	4.42	22.16	34.77	-12.61
782.00	5	16QAM	H	110	200	1 / 24	17.97	4.47	22.44	34.77	-12.33
784.50	5	16QAM	H	108	310	1 / 24	18.30	4.52	22.82	34.77	-11.95
782.00	10	QPSK	H	100	225	1 / 49	19.21	4.47	23.68	34.77	-11.09
782.00	10	16QAM	H	100	225	1 / 49	18.38	4.47	22.85	34.77	-11.92

Table 7-3. ERP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	120	125	1 / 5	13.55	4.95	18.50	38.45	-19.96
836.50	1.4	QPSK	H	122	156	1 / 5	13.00	5.00	18.00	38.45	-20.45
848.30	1.4	QPSK	H	145	200	1 / 5	12.78	5.05	17.83	38.45	-20.62
824.70	1.4	16-QAM	H	120	125	1 / 5	12.56	4.95	17.51	38.45	-20.95
836.50	1.4	16-QAM	H	122	156	1 / 5	12.06	5.00	17.06	38.45	-21.39
848.30	1.4	16-QAM	H	145	200	1 / 5	12.01	5.05	17.06	38.45	-21.39
825.50	3	QPSK	H	125	200	1 / 0	13.02	4.95	17.97	38.45	-20.48
836.50	3	QPSK	H	135	225	1 / 0	13.00	5.00	18.00	38.45	-20.45
847.50	3	QPSK	H	122	100	1 / 0	12.96	5.05	18.01	38.45	-20.44
825.50	3	16-QAM	H	125	200	1 / 0	12.09	4.95	17.04	38.45	-21.41
836.50	3	16-QAM	H	135	225	1 / 0	12.11	5.00	17.11	38.45	-21.34
847.50	3	16-QAM	H	122	100	1 / 0	12.06	5.05	17.11	38.45	-21.34
826.50	5	QPSK	H	150	170	1 / 0	15.04	4.95	19.99	38.45	-18.46
836.50	5	QPSK	H	165	172	1 / 0	15.01	5.00	20.01	38.45	-18.44
846.50	5	QPSK	H	162	165	1 / 0	14.57	5.04	19.61	38.45	-18.84
826.50	5	16-QAM	H	150	170	1 / 0	14.09	4.95	19.04	38.45	-19.41
836.50	5	16-QAM	H	165	172	1 / 0	13.94	5.00	18.94	38.45	-19.51
846.50	5	16-QAM	H	162	165	1 / 0	13.87	5.04	18.91	38.45	-19.54
829.00	10	QPSK	H	155	175	1 / 0	14.58	4.96	19.54	38.45	-18.91
836.50	10	QPSK	H	167	182	1 / 0	14.93	5.00	19.93	38.45	-18.52
844.00	10	QPSK	H	162	182	1 / 0	14.69	5.03	19.72	38.45	-18.73
829.00	10	16-QAM	H	155	175	1 / 0	13.61	4.96	18.57	38.45	-19.88
836.50	10	16-QAM	H	167	182	1 / 0	14.00	5.00	19.00	38.45	-19.45
844.00	10	16-QAM	H	162	182	1 / 0	13.68	5.03	18.71	38.45	-19.74

Table 7-4. ERP Data (Band 5)

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	165	200	3 / 2	15.36	9.67	25.03	30.00	-4.97
1732.50	1.4	QPSK	H	162	150	3 / 2	15.21	9.53	24.74	30.00	-5.26
1754.30	1.4	QPSK	H	155	210	3 / 2	13.87	9.39	23.26	30.00	-6.74
1710.70	1.4	16-QAM	H	165	200	3 / 2	14.19	9.67	23.86	30.00	-6.14
1732.50	1.4	16-QAM	H	162	150	3 / 2	14.08	9.53	23.61	30.00	-6.39
1754.30	1.4	16-QAM	H	155	210	3 / 2	13.00	9.39	22.39	30.00	-7.61
1711.50	3	QPSK	H	162	200	1 / 0	15.68	9.67	25.35	30.00	-4.65
1732.50	3	QPSK	H	155	310	1 / 0	15.10	9.53	24.63	30.00	-5.37
1753.50	3	QPSK	H	200	122	1 / 0	14.46	9.40	23.86	30.00	-6.14
1711.50	3	16-QAM	H	162	200	1 / 0	14.46	9.67	24.13	30.00	-5.87
1732.50	3	16-QAM	H	155	310	1 / 0	14.08	9.53	23.61	30.00	-6.39
1753.50	3	16-QAM	H	200	122	1 / 0	13.54	9.40	22.94	30.00	-7.06
1712.50	5	QPSK	H	145	200	1 / 0	15.34	9.66	25.00	30.00	-5.00
1732.50	5	QPSK	H	125	199	1 / 0	14.90	9.53	24.43	30.00	-5.57
1752.50	5	QPSK	H	135	25	1 / 0	14.52	9.40	23.92	30.00	-6.08
1712.50	5	16-QAM	H	145	200	1 / 0	14.32	9.66	23.98	30.00	-6.02
1732.50	5	16-QAM	H	125	199	1 / 0	13.54	9.53	23.07	30.00	-6.93
1752.50	5	16-QAM	H	135	25	1 / 0	13.73	9.40	23.13	30.00	-6.87
1715.00	10	QPSK	H	110	130	1 / 0	14.81	9.64	24.45	30.00	-5.55
1732.50	10	QPSK	H	113	132	1 / 0	15.01	9.53	24.54	30.00	-5.46
1750.00	10	QPSK	H	140	182	1 / 0	14.35	9.42	23.77	30.00	-6.23
1715.00	10	16-QAM	H	110	130	1 / 0	13.77	9.64	23.41	30.00	-6.59
1732.50	10	16-QAM	H	113	132	1 / 0	14.22	9.53	23.75	30.00	-6.25
1750.00	10	16-QAM	H	140	182	1 / 0	13.25	9.42	22.67	30.00	-7.33
1717.50	15	QPSK	H	122	200	1 / 0	14.24	9.63	23.87	30.00	-6.13
1732.50	15	QPSK	H	145	25	1 / 0	14.38	9.53	23.91	30.00	-6.09
1747.50	15	QPSK	H	100	264	1 / 0	13.32	9.43	22.75	30.00	-7.25
1717.50	15	16-QAM	H	122	200	1 / 0	13.46	9.63	23.09	30.00	-6.91
1732.50	15	16-QAM	H	145	25	1 / 0	13.37	9.53	22.90	30.00	-7.10
1747.50	15	16-QAM	H	100	264	1 / 0	12.59	9.43	22.02	30.00	-7.98
1720.00	20	QPSK	H	199	66	1 / 0	14.35	9.61	23.96	30.00	-6.04
1732.50	20	QPSK	H	125	129	1 / 0	14.38	9.53	23.91	30.00	-6.09
1745.00	20	QPSK	H	150	100	1 / 0	13.38	9.45	22.83	30.00	-7.17
1720.00	20	16-QAM	H	199	66	1 / 0	13.10	9.61	22.71	30.00	-7.29
1732.50	20	16-QAM	H	125	129	1 / 0	13.39	9.53	22.92	30.00	-7.08
1745.00	20	16-QAM	H	150	100	1 / 0	12.32	9.45	21.77	30.00	-8.23
1711.50	3	L-BATTERY	H	200	270	1 / 0	15.50	7.52	23.02	30.00	-6.98

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	110	200	1 / 5	15.06	9.21	24.27	33.01	-8.74
1880.00	1.4	QPSK	H	125	25	1 / 5	13.76	9.27	23.03	33.01	-9.98
1909.30	1.4	QPSK	H	132	166	1 / 5	12.24	9.36	21.60	33.01	-11.41
1850.70	1.4	16-QAM	H	110	200	1 / 5	14.05	9.21	23.26	33.01	-9.75
1880.00	1.4	16-QAM	H	125	25	1 / 5	12.79	9.27	22.06	33.01	-10.95
1909.30	1.4	16-QAM	H	132	166	1 / 5	11.32	9.36	20.68	33.01	-12.33
1851.50	3	QPSK	H	250	99	1 / 0	14.92	9.21	24.13	33.01	-8.88
1880.00	3	QPSK	H	205	235	1 / 0	14.15	9.27	23.42	33.01	-9.59
1908.50	3	QPSK	H	100	29	1 / 0	13.23	9.36	22.59	33.01	-10.42
1851.50	3	16-QAM	H	250	99	1 / 0	14.02	9.21	23.23	33.01	-9.78
1880.00	3	16-QAM	H	205	235	1 / 0	13.17	9.27	22.44	33.01	-10.57
1908.50	3	16-QAM	H	100	29	1 / 0	12.25	9.36	21.61	33.01	-11.40
1852.50	5	QPSK	H	120	25	1 / 0	15.03	9.22	24.25	33.01	-8.76
1880.00	5	QPSK	H	100	100	1 / 0	13.96	9.27	23.23	33.01	-9.78
1907.50	5	QPSK	H	225	325	1 / 0	13.17	9.35	22.52	33.01	-10.49
1852.50	5	16-QAM	H	120	25	1 / 0	13.61	9.22	22.83	33.01	-10.18
1880.00	5	16-QAM	H	100	100	1 / 0	12.97	9.27	22.24	33.01	-10.77
1907.50	5	16-QAM	H	225	325	1 / 0	12.25	9.35	21.60	33.01	-11.41
1855.00	10	QPSK	H	110	133	1 / 0	15.02	9.22	24.24	33.01	-8.77
1880.00	10	QPSK	H	110	136	1 / 0	14.14	9.27	23.41	33.01	-9.60
1905.00	10	QPSK	H	110	127	1 / 0	12.76	9.34	22.10	33.01	-10.91
1855.00	10	16-QAM	H	110	133	1 / 0	14.17	9.22	23.39	33.01	-9.62
1880.00	10	16-QAM	H	110	136	1 / 0	13.28	9.27	22.55	33.01	-10.46
1905.00	10	16-QAM	H	110	127	1 / 0	11.74	9.34	21.08	33.01	-11.93
1857.50	15	QPSK	H	112	60	1 / 0	14.92	9.23	24.15	33.01	-8.86
1880.00	15	QPSK	H	110	62	1 / 0	14.90	9.27	24.17	33.01	-8.84
1902.50	15	QPSK	H	125	100	1 / 0	13.09	9.33	22.42	33.01	-10.59
1857.50	15	16-QAM	H	112	60	1 / 0	13.95	9.23	23.18	33.01	-9.83
1880.00	15	16-QAM	H	110	62	1 / 0	13.99	9.27	23.26	33.01	-9.75
1902.50	15	16-QAM	H	125	100	1 / 0	12.14	9.33	21.47	33.01	-11.54
1860.00	20	QPSK	H	120	23	1 / 0	14.99	9.23	24.22	33.01	-8.79
1880.00	20	QPSK	H	199	145	1 / 0	14.46	9.27	23.73	33.01	-9.28
1900.00	20	QPSK	H	100	100	1 / 0	13.00	9.31	22.31	33.01	-10.70
1860.00	20	16-QAM	H	120	23	1 / 0	14.07	9.23	23.30	33.01	-9.71
1880.00	20	16-QAM	H	199	145	1 / 0	13.58	9.27	22.85	33.01	-10.16
1900.00	20	16-QAM	H	100	100	1 / 0	11.91	9.31	21.22	33.01	-11.79

Table 7-6. EIRP Data (Band 2)

7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 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-C-2004 – 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 = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize

Test Setup

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

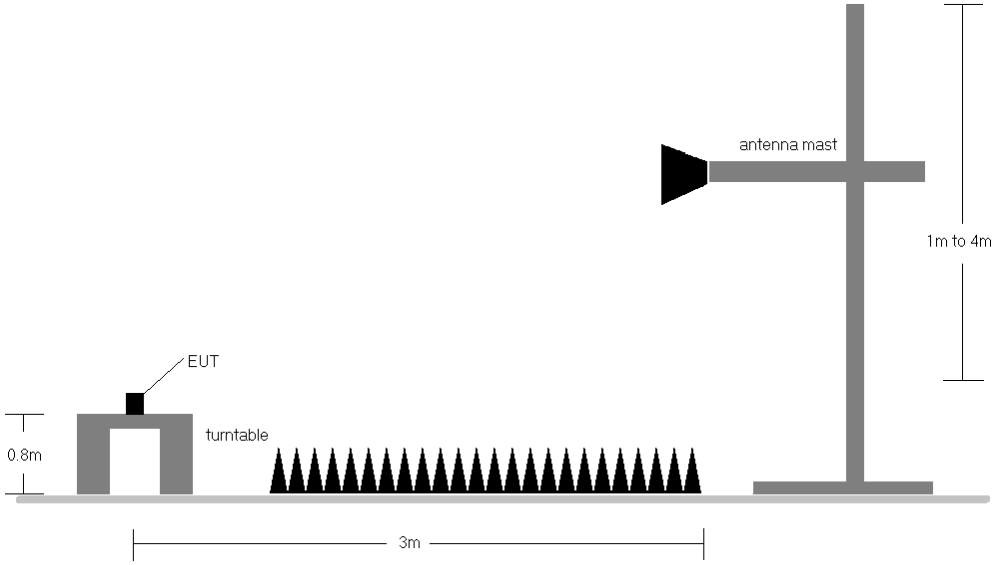


Figure 7-7. Test Instrument & Measurement Setup

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.

OPERATING FREQUENCY:	699.70	MHz		
CHANNEL:	23017			
MEASURED OUTPUT POWER:	18.21	dBm	=	0.066 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.21	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]
1399.40	H	112	250	-49.30	2.42	-46.89	65.1
2099.10	H	100	200	-52.91	2.95	-49.96	68.2
2798.80	H	-	-	-55.97	4.76	-51.21	69.4

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

OPERATING FREQUENCY:	707.50	MHz		
CHANNEL:	23095			
MEASURED OUTPUT POWER:	19.02	dBm	=	0.080 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.02	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	105	250	-52.37	2.59	-49.78	68.8
2122.50	H	122	200	-51.81	3.02	-48.79	67.8
2830.00	H	-	-	-56.65	4.74	-51.91	70.9

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

OPERATING FREQUENCY:	715.30	MHz		
CHANNEL:	23173			
MEASURED OUTPUT POWER:	19.49	dBm	=	0.089 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.49	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]
1430.60	H	100	222	-49.41	2.76	-46.65	66.1
2145.90	H	145	25	-52.03	3.09	-48.94	68.4
2861.20	H	-	-	-56.06	4.72	-51.34	70.8

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

OPERATING FREQUENCY:	779.50	MHz		
CHANNEL:	23205			
MEASURED OUTPUT POWER:	23.44	dBm	=	0.221 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.44	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]
2338.50	H	-	-	-58.74	3.67	-55.07	78.5

Table 7-10. Radiated Spurious Data (Band 13 – Low Channel)

OPERATING FREQUENCY:	782.00	MHz		
CHANNEL:	23230			
MEASURED OUTPUT POWER:	23.41	dBm	=	0.219 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.41	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]
2346.00	H	-	-	-55.91	3.67	-52.24	75.7

Table 7-11. Radiated Spurious Data (Band 13 – Mid Channel)

OPERATING FREQUENCY:	784.50	MHz		
CHANNEL:	23255			
MEASURED OUTPUT POWER:	23.81	dBm	=	0.241 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.81	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]
2353.50	H	-	-	-56.56	3.66	-52.90	76.7

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	H	-	-	-60.06	3.68	-56.39	-16.4
1564.00	H	-	-	-60.13	3.69	-56.44	-16.4
1569.00	H	-	-	-60.51	3.71	-56.80	-16.8

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

OPERATING FREQUENCY:	826.50	MHz		
CHANNEL:	20425			
MEASURED OUTPUT POWER:	19.99	dBm	=	0.100 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.99	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]
1653.00	H	100	355	-58.64	3.60	-55.04	75.0
2479.50	H	122	200	-51.66	3.57	-48.09	68.1
3306.00	H	-	-	-55.80	5.68	-50.12	70.1

Table 7-14. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz		
CHANNEL:	20525			
MEASURED OUTPUT POWER:	20.01	dBm	=	0.100 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.01	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]
1673.00	H	122	367	-57.50	3.53	-53.97	74.0
2509.50	H	125	200	-47.94	3.57	-44.37	64.4
3346.00	H	-	-	-57.15	5.78	-51.37	71.4

Table 7-15. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	846.50	MHz		
CHANNEL:	20625			
MEASURED OUTPUT POWER:	19.61	dBm	=	0.091 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.61	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]
1693.00	H	125	200	-58.51	3.46	-55.05	74.7
2539.50	H	100	125	-48.68	3.63	-45.05	64.7
3386.00	H	-	-	-55.79	5.89	-49.90	69.5

Table 7-16. Radiated Spurious Data (Band 5 – High Channel)

OPERATING FREQUENCY:	1711.50	MHz		
CHANNEL:	19965			
MEASURED OUTPUT POWER:	25.35	dBm	=	0.342 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.35	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]
3423.00	H	110	126	-46.13	8.15	-37.98	63.3
5134.50	H	200	126	-55.63	10.26	-45.37	70.7
6846.00	H	-	-	-58.89	11.38	-47.50	72.8

Table 7-17. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY:	1732.50	MHz		
CHANNEL:	20175			
MEASURED OUTPUT POWER:	24.63	dBm	=	0.290 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.63	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	120	24	-44.71	8.29	-36.42	61.1
5197.50	H	123	100	-55.27	10.35	-44.92	69.6
6930.00	H	-	-	-60.52	11.49	-49.03	73.7

Table 7-18. Radiated Spurious Data (Band 4 – Mid Channel)

OPERATING FREQUENCY:	1753.50	MHz		
CHANNEL:	20385			
MEASURED OUTPUT POWER:	23.86	dBm	=	0.243 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.86	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]
3507.00	H	100	120	-49.22	8.41	-40.81	64.7
5260.50	H	123	200	-55.94	10.36	-45.58	69.4
7014.00	H	-	-	-62.78	11.57	-51.21	75.1

Table 7-19. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY:	1850.70	MHz		
CHANNEL:	18607			
MEASURED OUTPUT POWER:	24.27	dBm	=	0.267 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.27	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	120	255	-55.80	8.40	-47.40	71.7
5552.10	H	-	-	-55.07	10.56	-44.52	68.8

Table 7-20. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz		
CHANNEL:	18900			
MEASURED OUTPUT POWER:	23.03	dBm	=	0.201 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.03	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	290	100	-56.05	8.38	-47.66	70.7
5640.00	H	-	-	-53.43	10.70	-42.73	65.8

Table 7-21. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1909.30	MHz		
CHANNEL:	19193			
MEASURED OUTPUT POWER:	21.60	dBm	=	0.145 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	1.4	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.60	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	120	145	-55.15	8.40	-46.75	68.4
5727.90	H	-	-	-55.16	10.76	-44.40	66.0

Table 7-22. Radiated Spurious Data (Band 2 – 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-C-2004. 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-C-2004

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)	707,499,850	-150	-0.0000212
100 %		- 30	707,499,915	-85	-0.0000120
100 %		- 20	707,499,943	-57	-0.0000080
100 %		- 10	707,499,874	-126	-0.0000178
100 %		0	707,499,958	-42	-0.0000060
100 %		+ 10	707,499,867	-133	-0.0000188
100 %		+ 20	707,499,978	-22	-0.0000031
100 %		+ 30	707,499,908	-92	-0.0000130
100 %		+ 40	707,499,908	-92	-0.0000129
100 %		+ 50	707,499,804	-196	-0.0000277
BATT. ENDPOINT	3.40	+ 20	707,499,939	-61	-0.0000087

Table 7-23. 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.

Band 12 Frequency Stability Measurements

§2.1055 §27.54

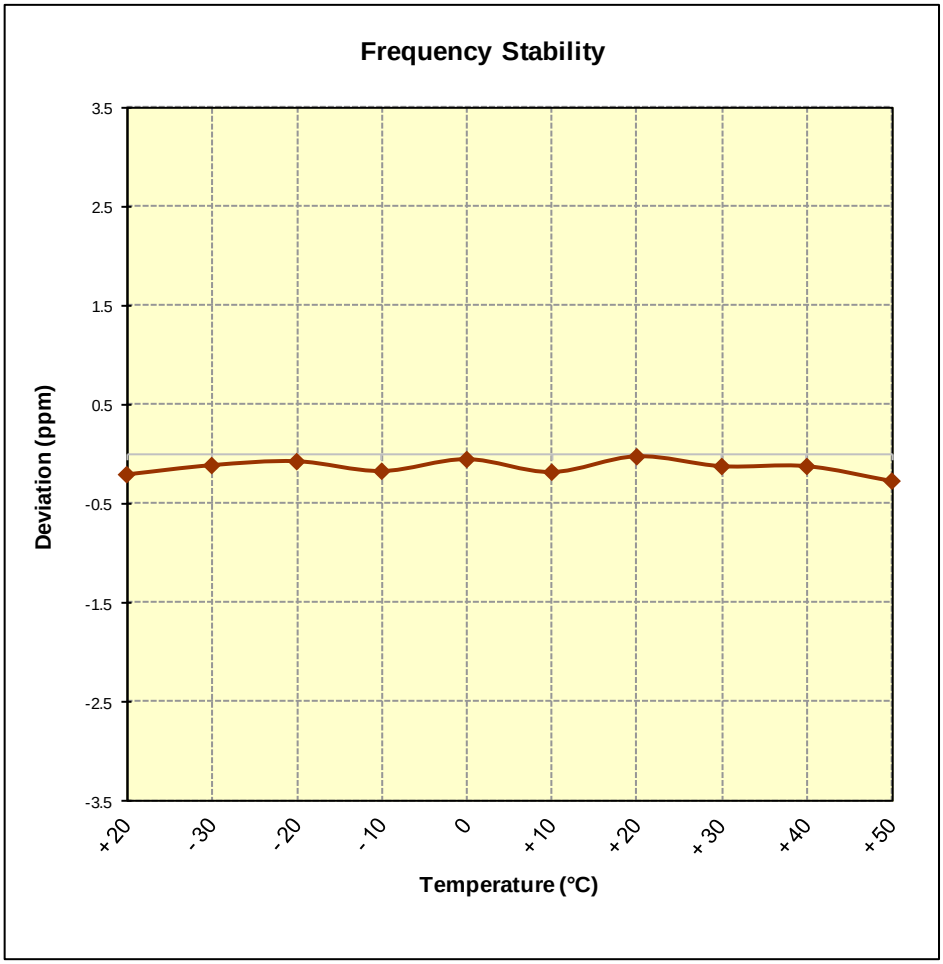


Figure 7-8. Frequency Stability Graph (Band 12)

Band 13 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	781,999,934	-66	-0.0000085
100 %		- 30	781,999,817	-183	-0.0000234
100 %		- 20	781,999,847	-153	-0.0000195
100 %		- 10	781,999,939	-61	-0.0000079
100 %		0	781,999,983	-17	-0.0000022
100 %		+ 10	781,999,960	-40	-0.0000051
100 %		+ 20	781,999,942	-58	-0.0000074
100 %		+ 30	781,999,971	-29	-0.0000037
100 %		+ 40	781,999,869	-131	-0.0000168
100 %		+ 50	781,999,818	-182	-0.0000233
BATT. ENDPOINT	3.40	+ 20	781,999,934	-66	-0.0000084

Table 7-24. Frequency Stability Data (Band 13)

Note:

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

Band 13 Frequency Stability Measurements

§2.1055 §27.54

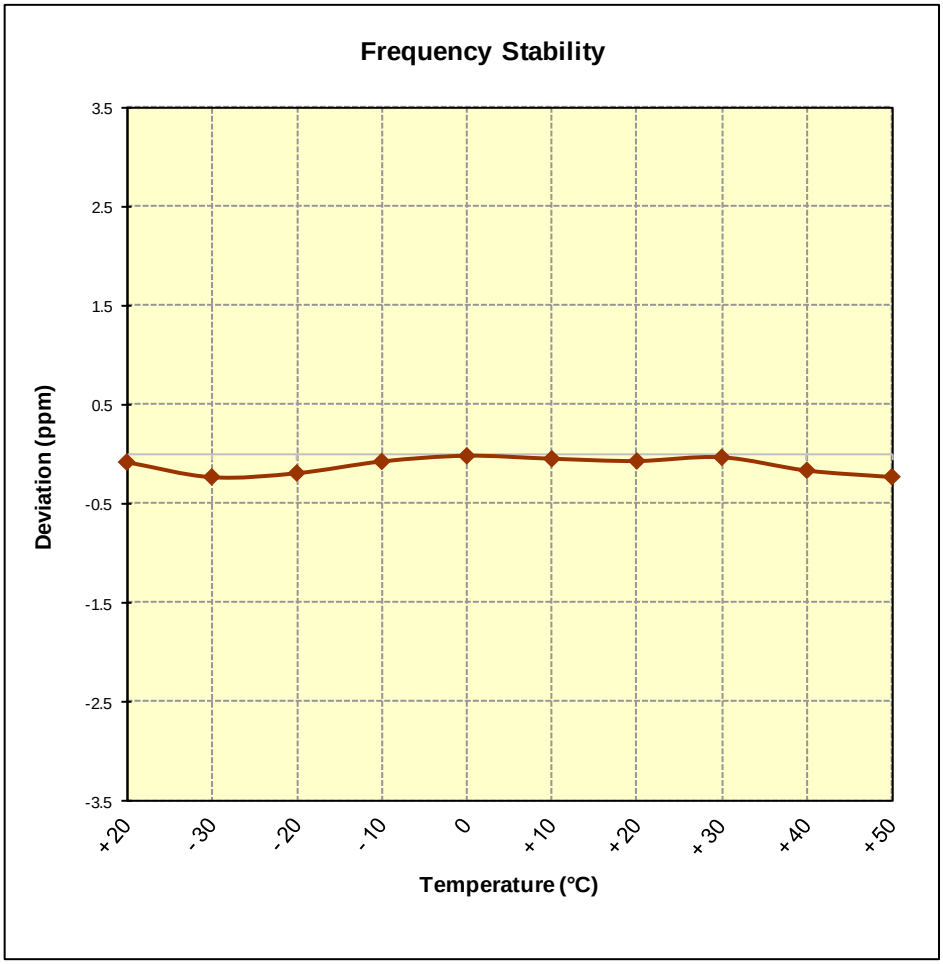


Figure 7-9. Frequency Stability Graph (Band 13)

Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
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)	836,499,957	-43	-0.0000051
100 %		- 30	836,499,982	-18	-0.0000022
100 %		- 20	836,499,917	-83	-0.0000099
100 %		- 10	836,499,823	-177	-0.0000212
100 %		0	836,499,845	-155	-0.0000186
100 %		+ 10	836,499,889	-111	-0.0000132
100 %		+ 20	836,499,928	-72	-0.0000086
100 %		+ 30	836,499,972	-28	-0.0000033
100 %		+ 40	836,499,818	-182	-0.0000218
100 %		+ 50	836,499,993	-7	-0.0000008
BATT. ENDPOINT	3.40	+ 20	836,499,857	-143	-0.0000171

Table 7-25. Frequency Stability Data (Band 5)

Band 5 Frequency Stability Measurements

§2.1055 §22.355

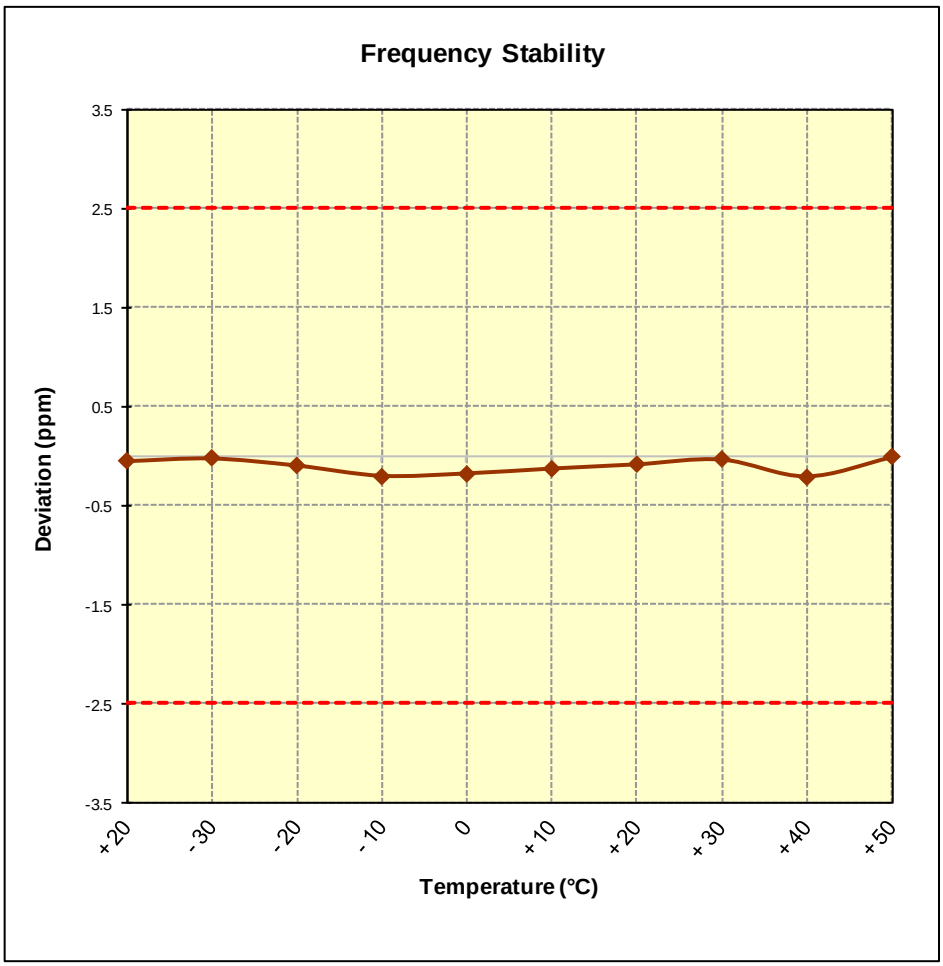


Figure 7-10. Frequency Stability Graph (Band 5)

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)	1,732,499,814	-186	-0.0000107
100 %		- 30	1,732,499,815	-185	-0.0000107
100 %		- 20	1,732,499,902	-98	-0.0000057
100 %		- 10	1,732,499,989	-11	-0.0000006
100 %		0	1,732,499,843	-157	-0.0000090
100 %		+ 10	1,732,499,996	-4	-0.0000002
100 %		+ 20	1,732,499,994	-6	-0.0000004
100 %		+ 30	1,732,499,813	-187	-0.0000108
100 %		+ 40	1,732,499,959	-41	-0.0000024
100 %		+ 50	1,732,499,826	-174	-0.0000101
BATT. ENDPOINT	3.40	+ 20	1,732,499,827	-173	-0.0000100

Table 7-26. 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

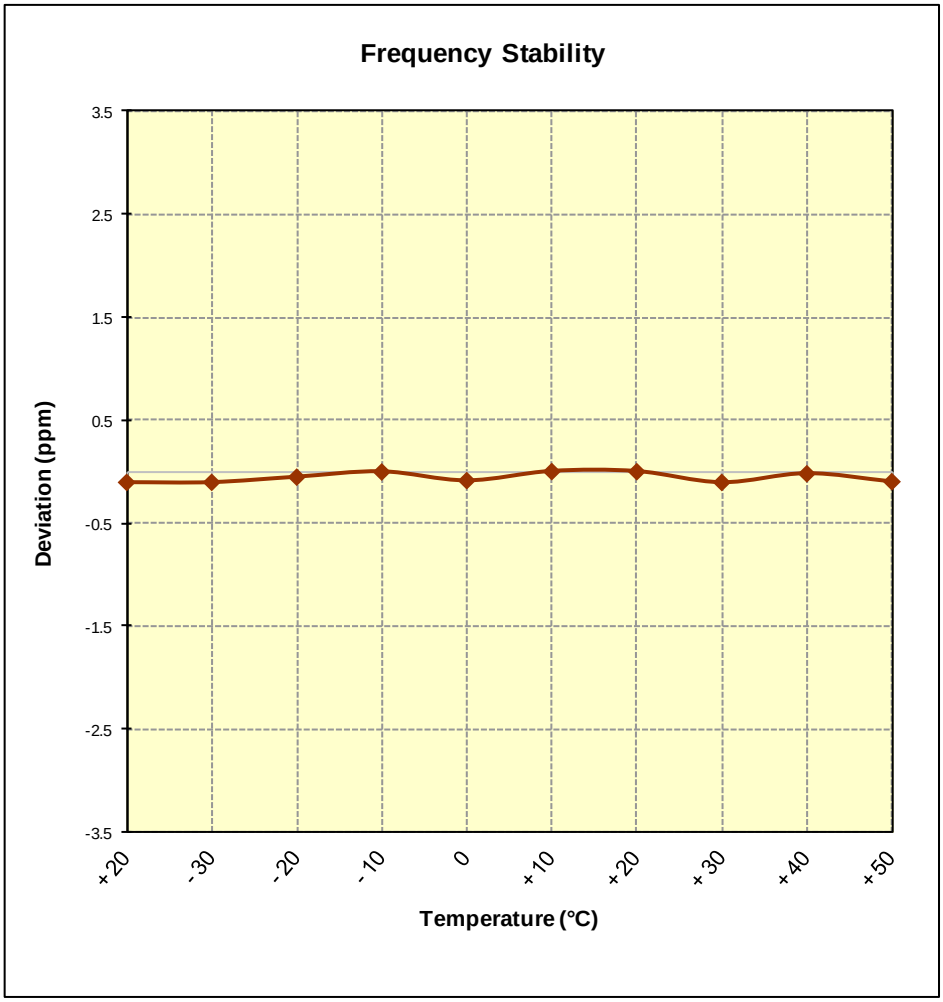


Figure 7-11. Frequency Stability Graph (Band 4)

Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,845	-155	-0.0000082
100 %		- 30	1,879,999,872	-128	-0.0000068
100 %		- 20	1,879,999,936	-64	-0.0000034
100 %		- 10	1,879,999,941	-59	-0.0000031
100 %		0	1,879,999,970	-30	-0.0000016
100 %		+ 10	1,879,999,952	-48	-0.0000025
100 %		+ 20	1,879,999,878	-122	-0.0000065
100 %		+ 30	1,879,999,904	-96	-0.0000051
100 %		+ 40	1,879,999,967	-33	-0.0000018
100 %		+ 50	1,879,999,879	-121	-0.0000065
BATT. ENDPOINT	3.40	+ 20	1,879,999,933	-67	-0.0000036

Table 7-27. Frequency Stability Data (Band 2)

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 Frequency Stability Measurements

§2.1055 §24.235

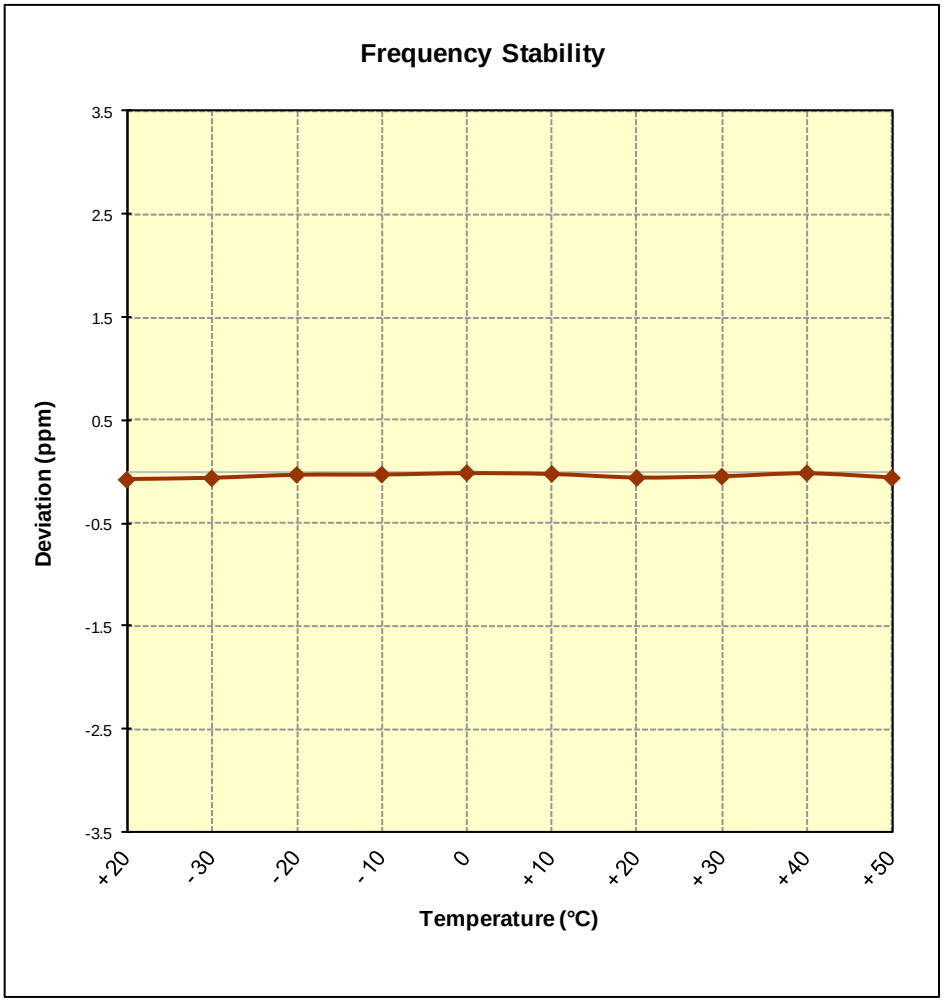


Figure 7-12. Frequency Stability Graph (Band 2)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Panasonic Corporation of North America Portable Handset FCC ID: ACJFZN1B** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.