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.

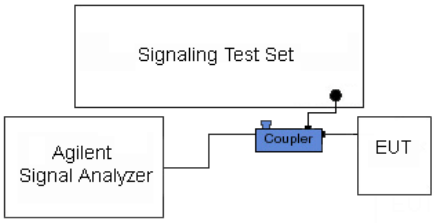


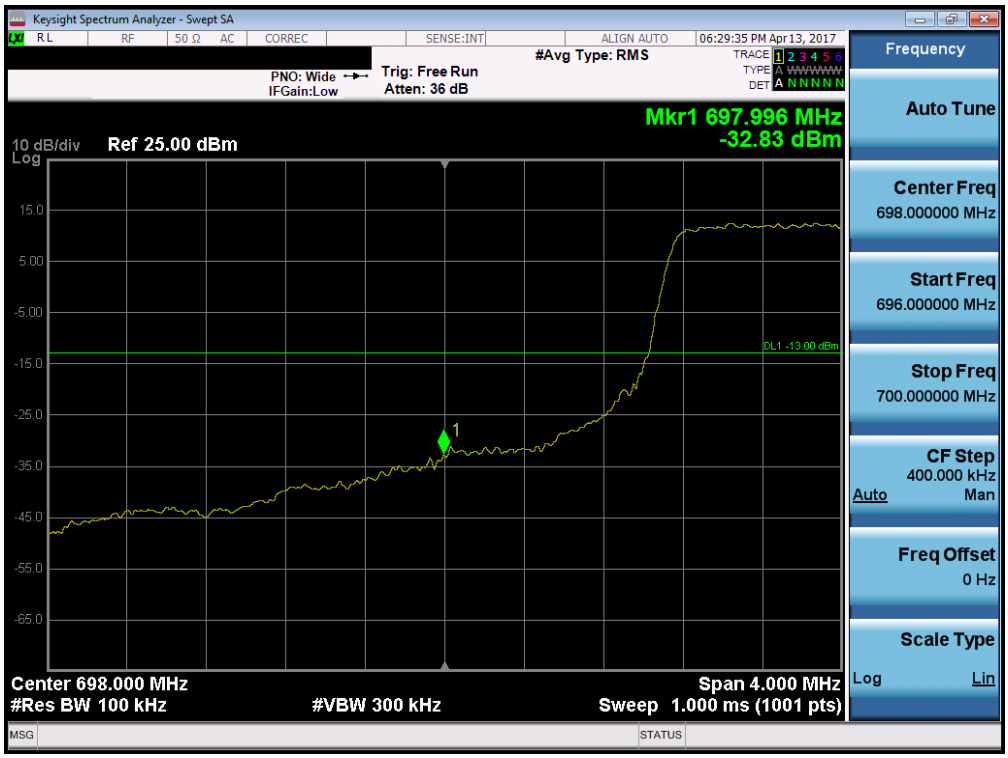
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

Per 22.917(b), 24.238(a), and 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.

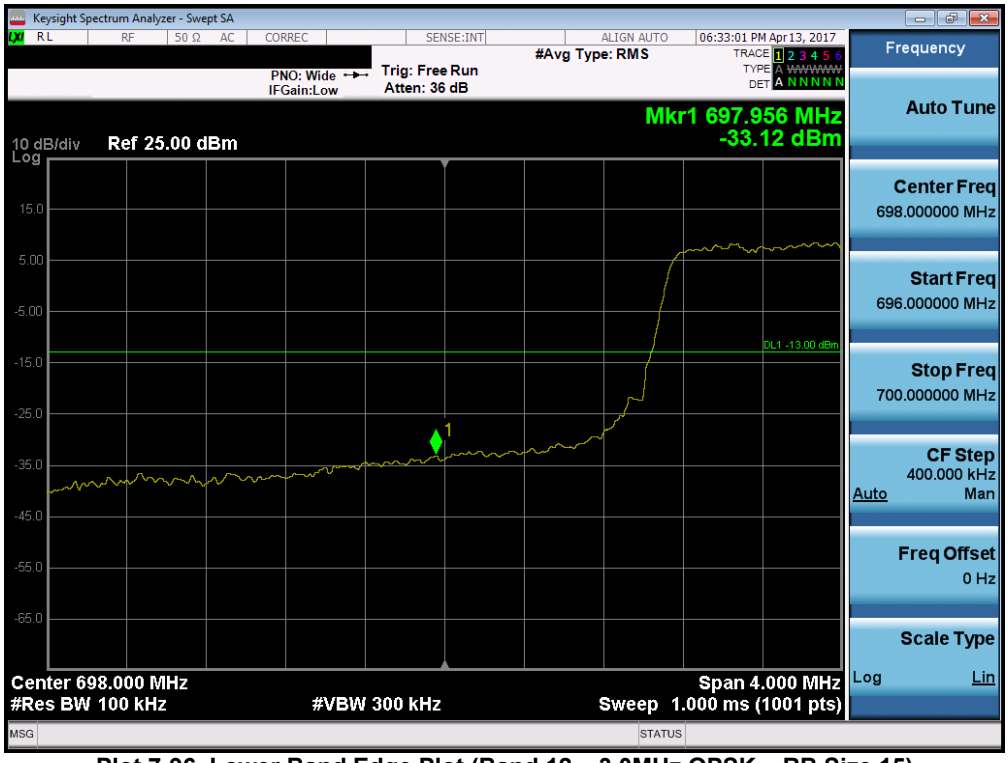
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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.



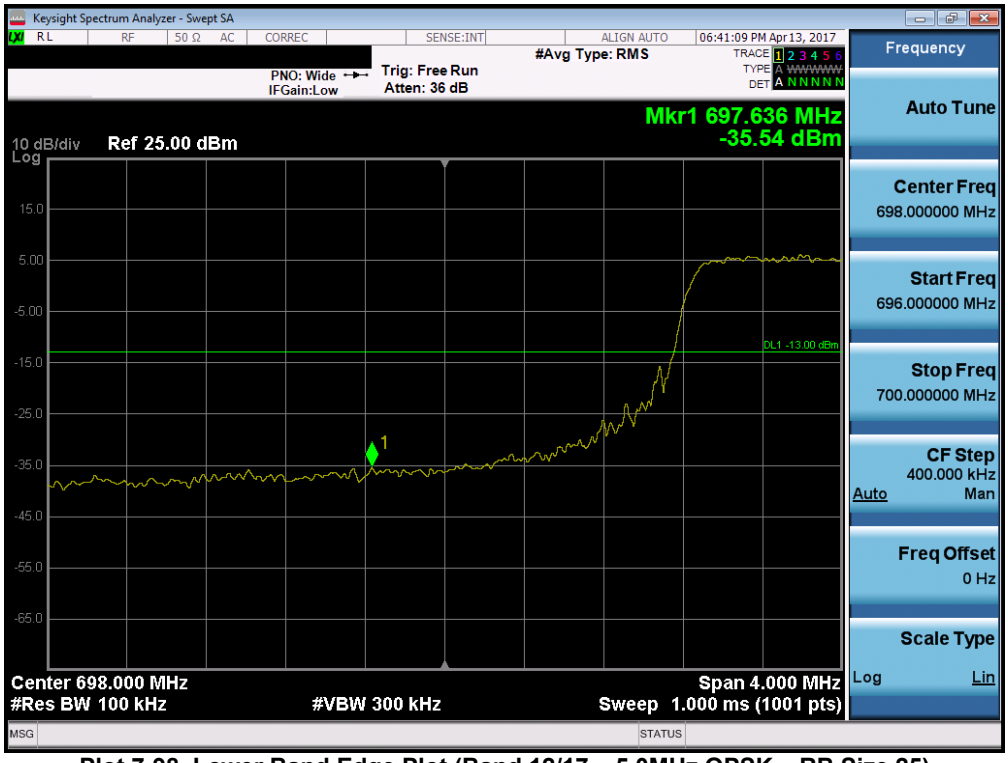
Plot 7-94. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

Plot 7-95. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



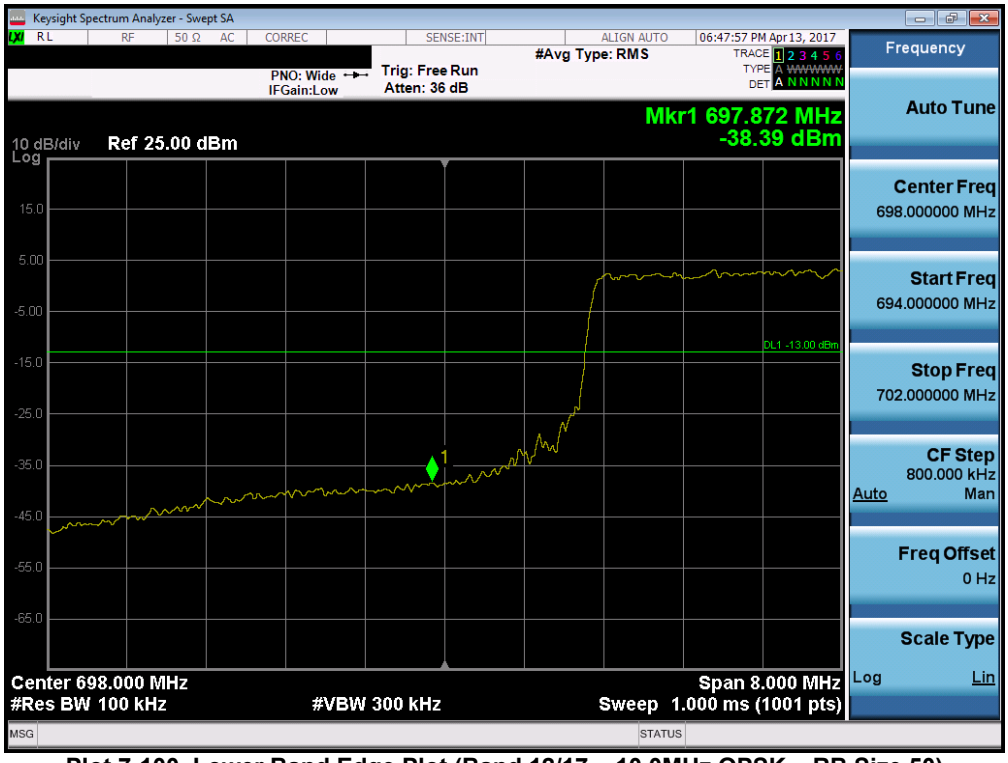
Plot 7-96. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

Plot 7-97. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-98. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

Plot 7-99. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

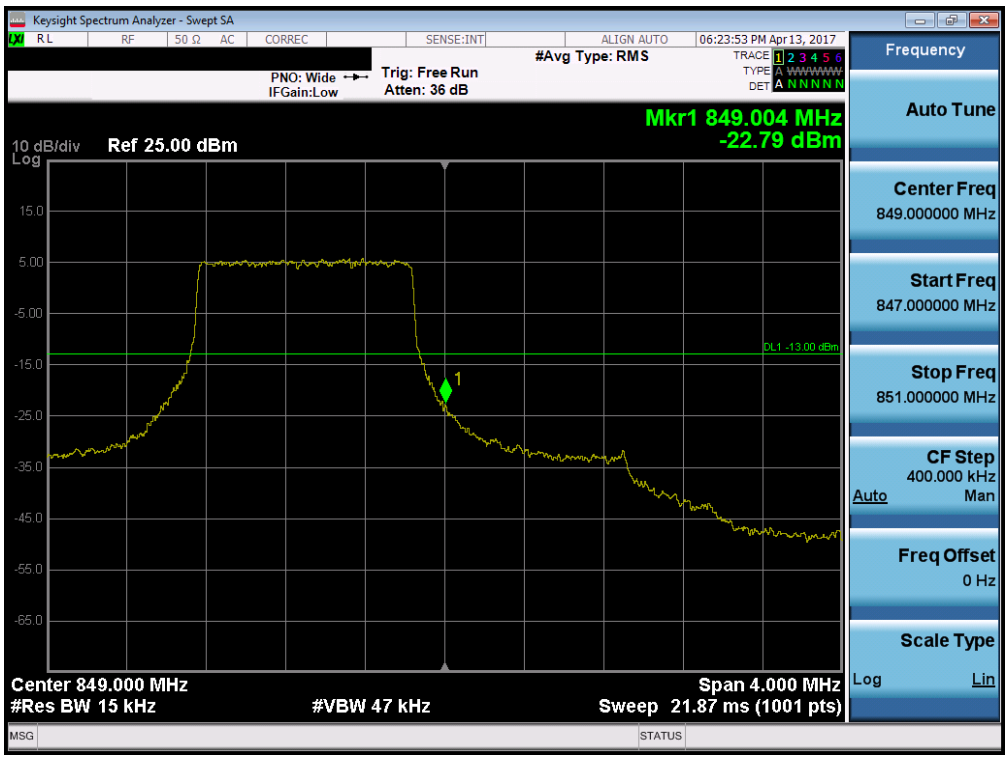


Plot 7-100. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

Plot 7-101. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

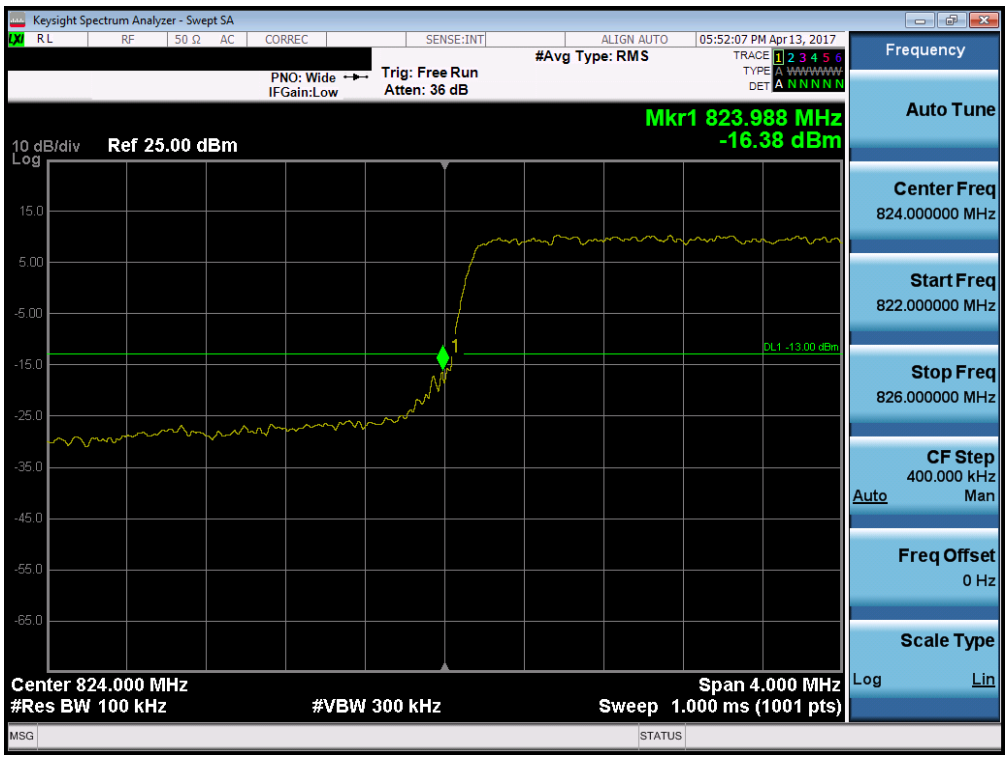
Plot 7-102. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

Plot 7-103. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

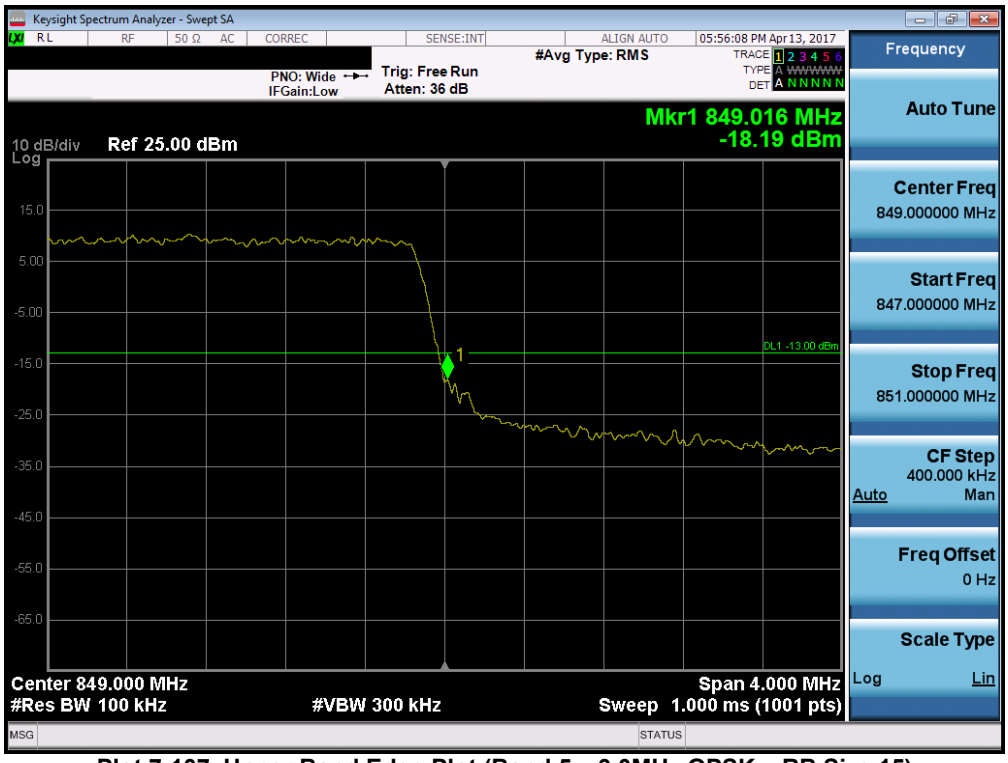


Plot 7-104. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

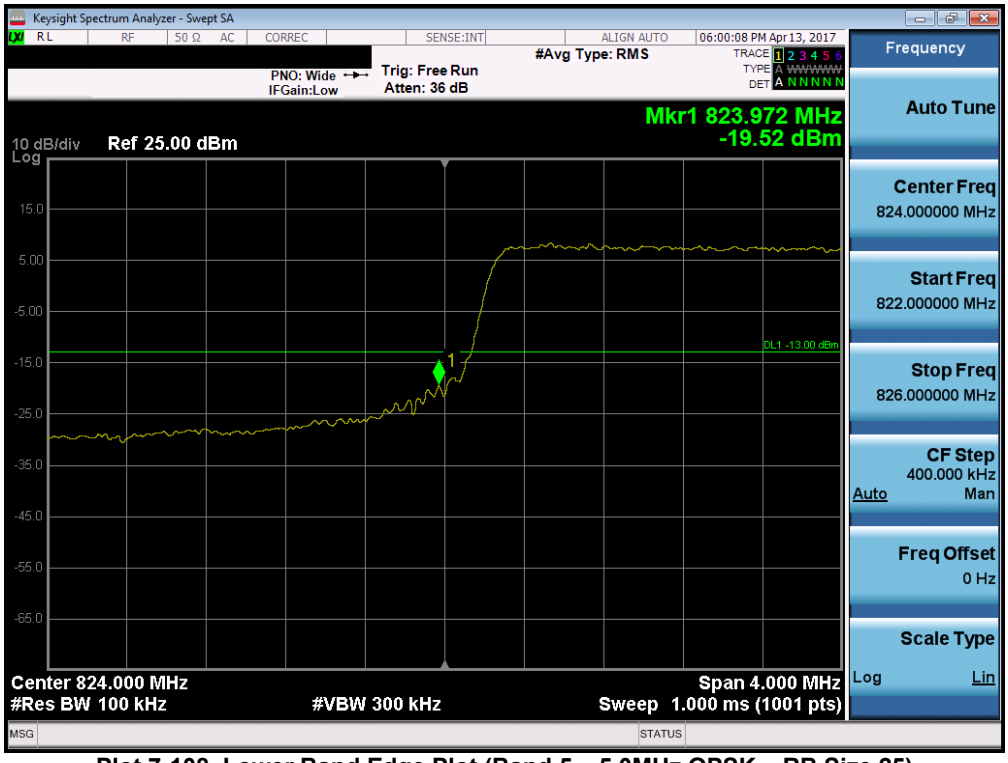
Plot 7-105. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-106. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-107. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

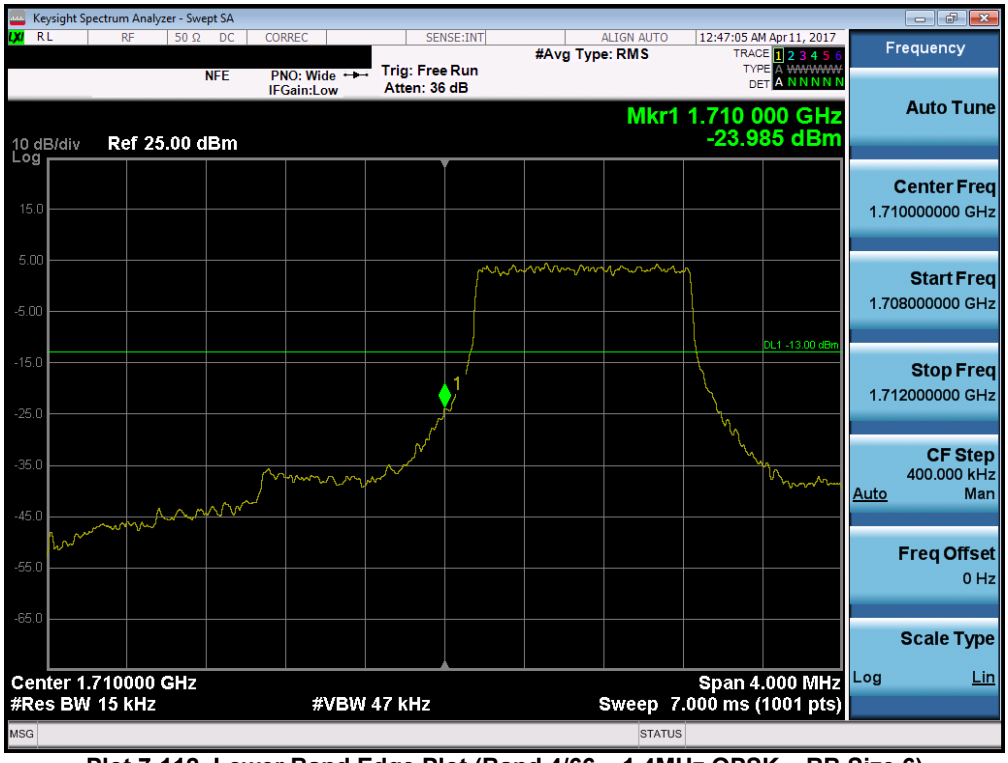


Plot 7-108. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

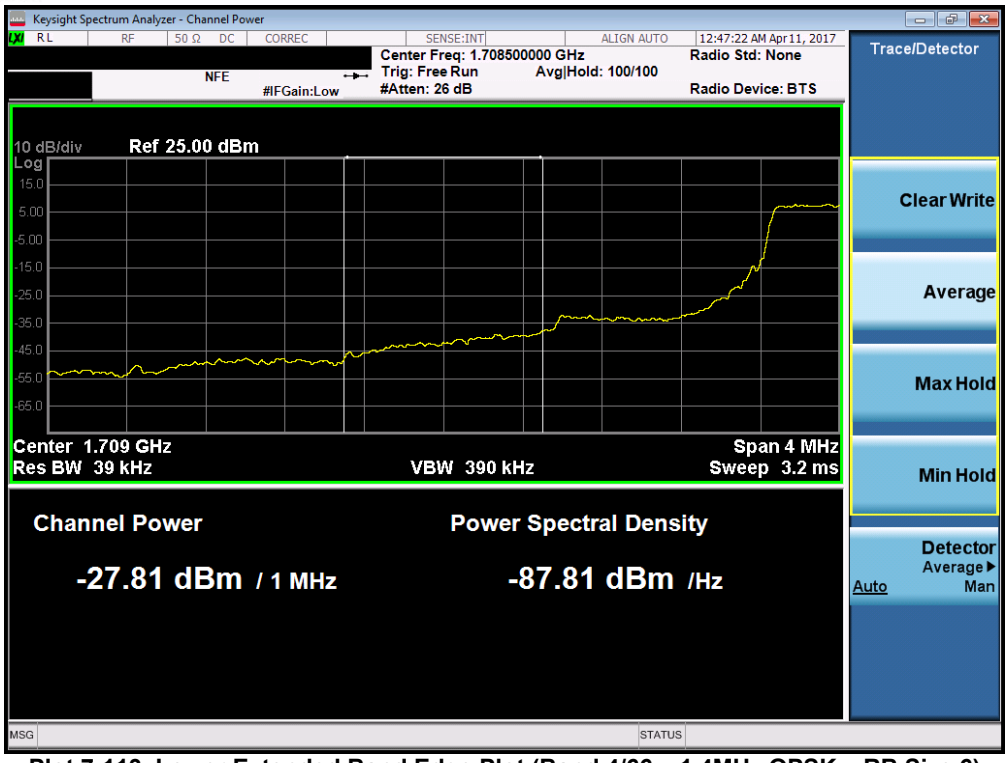
Plot 7-109. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

Plot 7-110. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

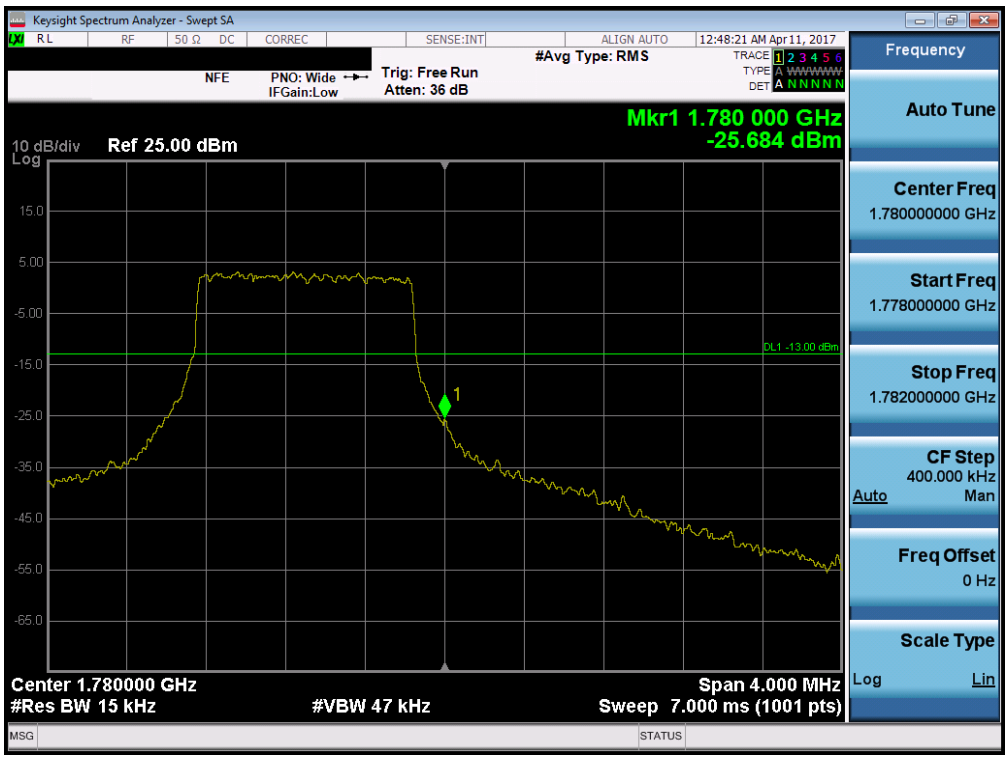
Plot 7-111. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



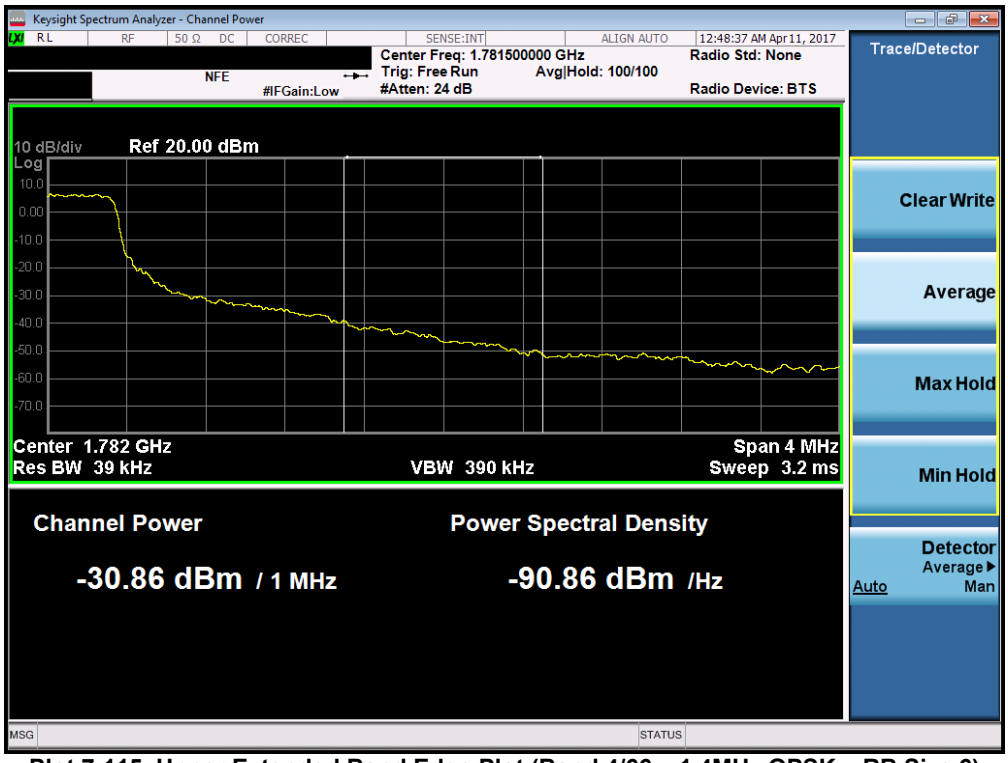
Plot 7-112. Lower Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)



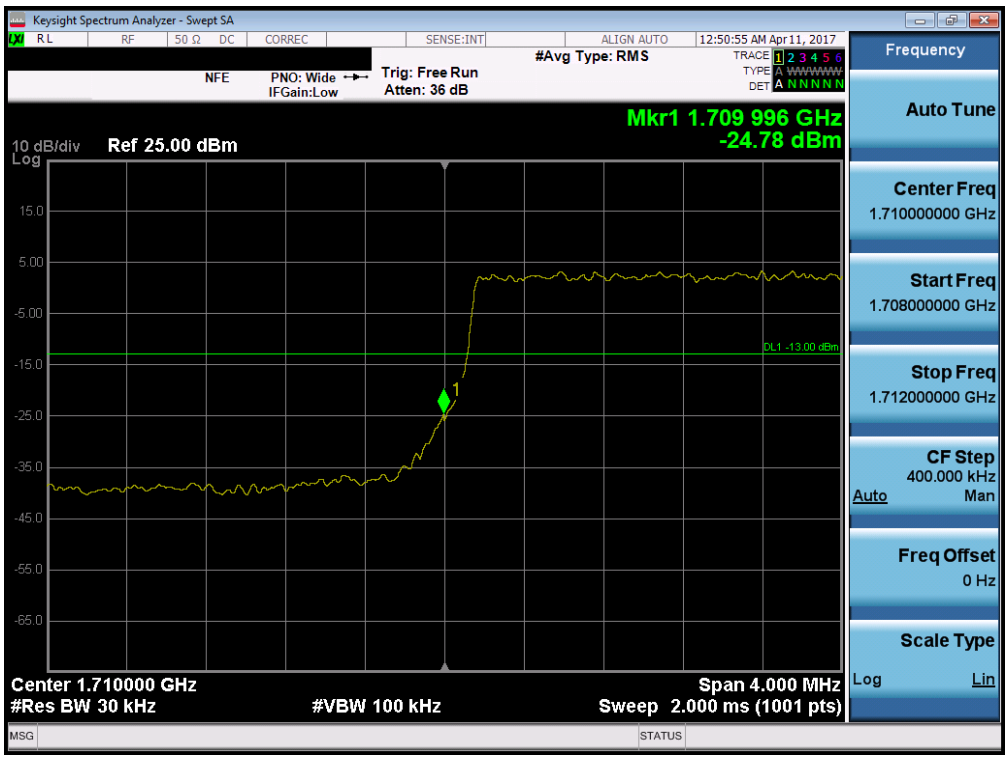
Plot 7-113. Lower Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)



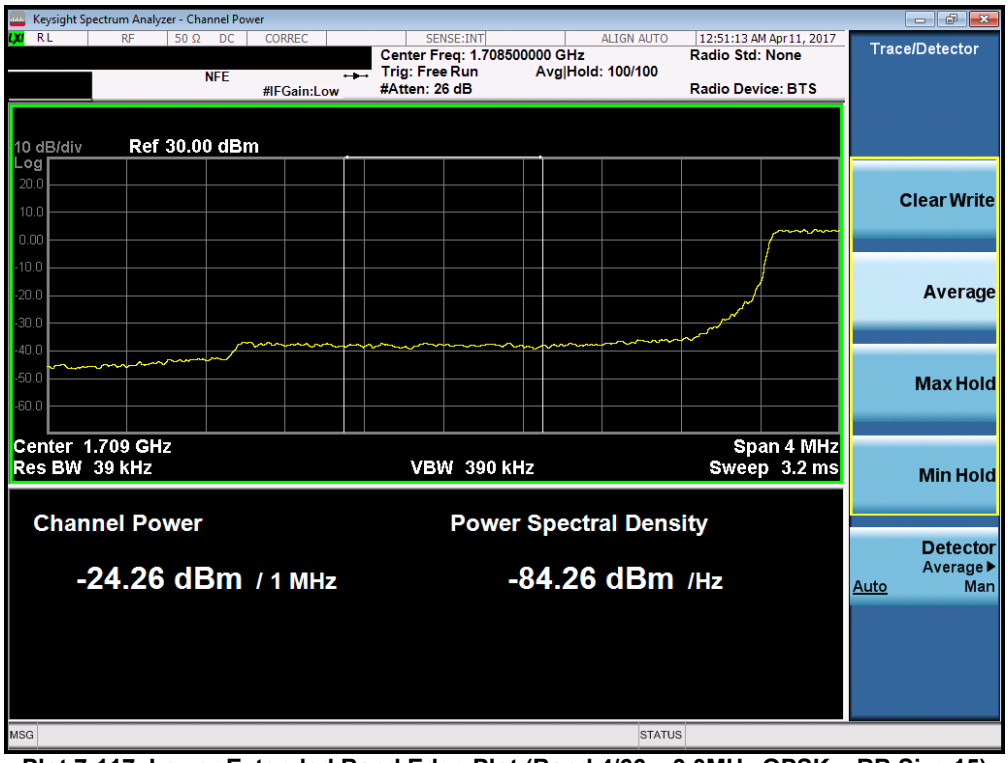
Plot 7-114. Upper Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)



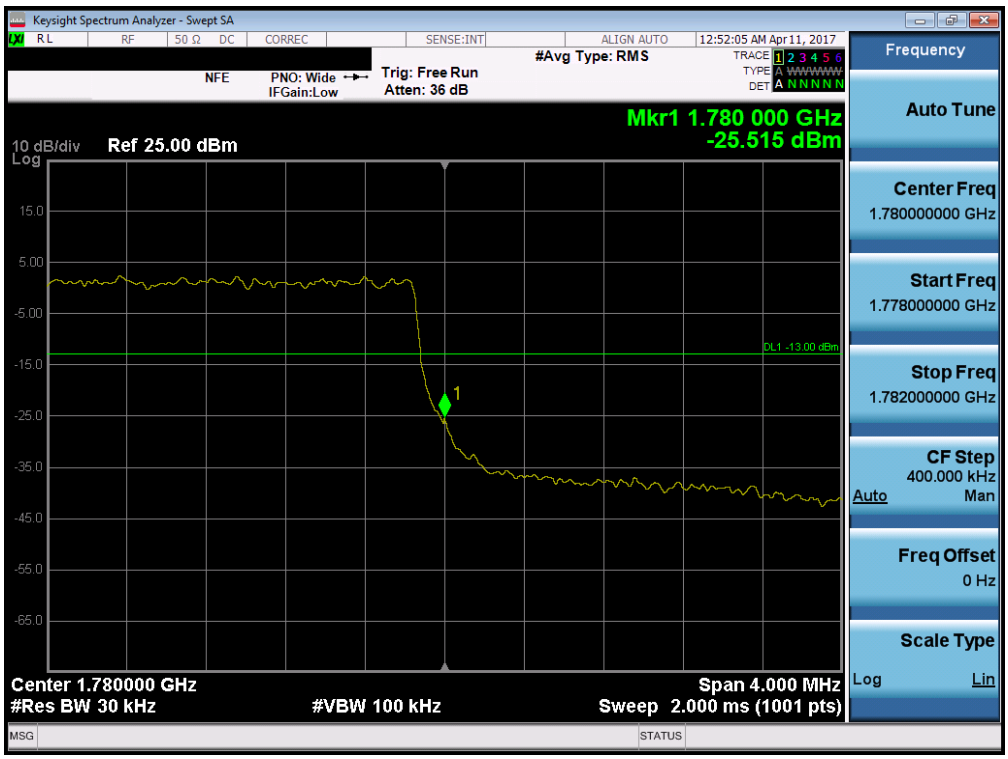
Plot 7-115. Upper Extended Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)



Plot 7-116. Lower Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



Plot 7-117. Lower Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



Plot 7-118. Upper Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)

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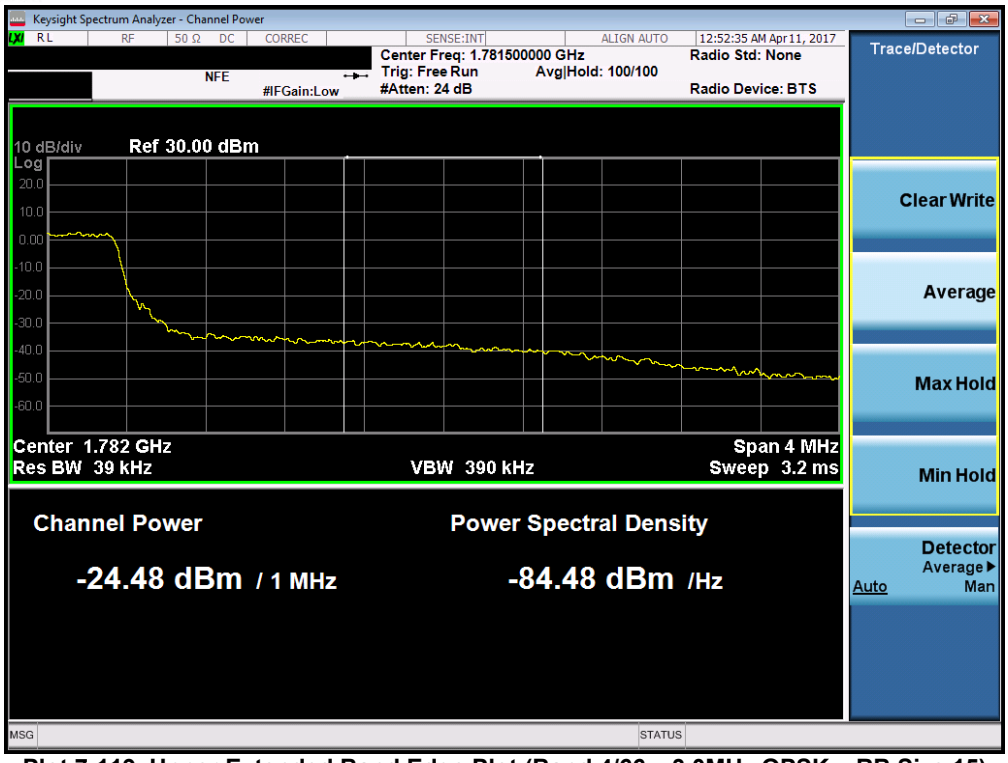
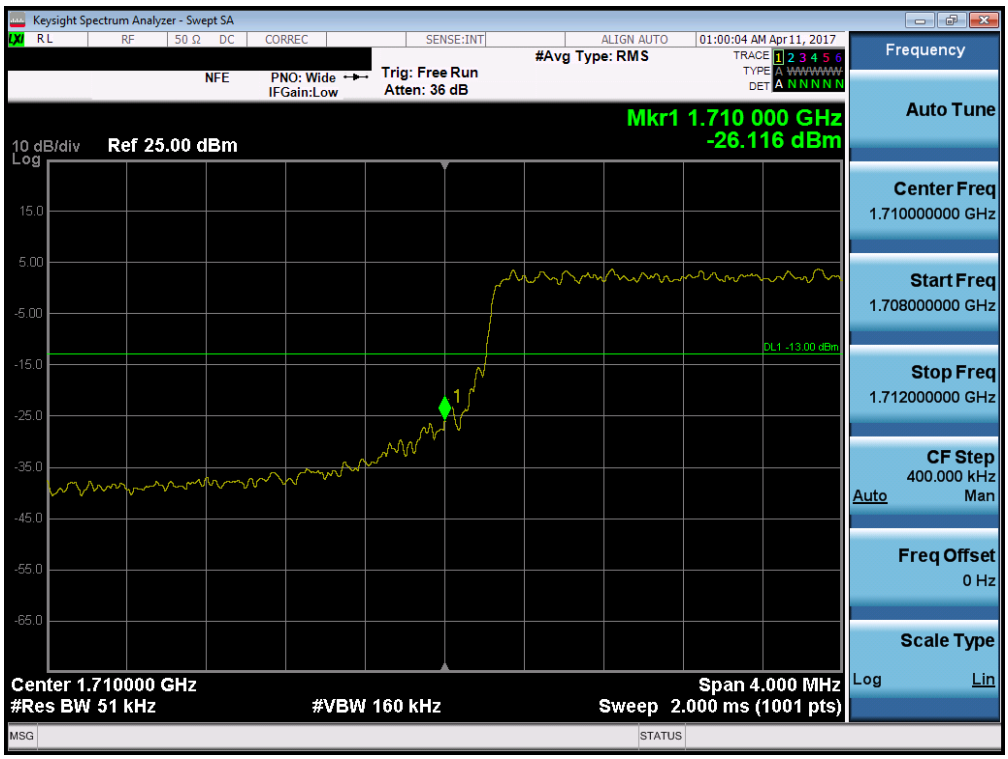


Plot 7-119. Upper Extended Band Edge Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



Plot 7-120. Lower Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

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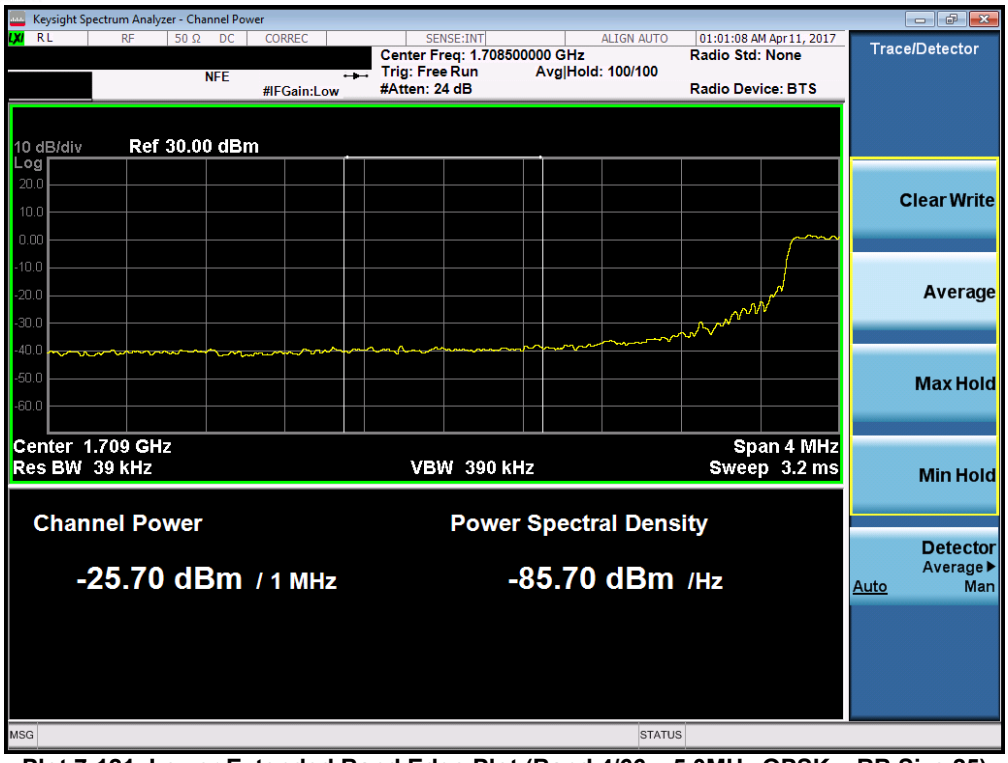
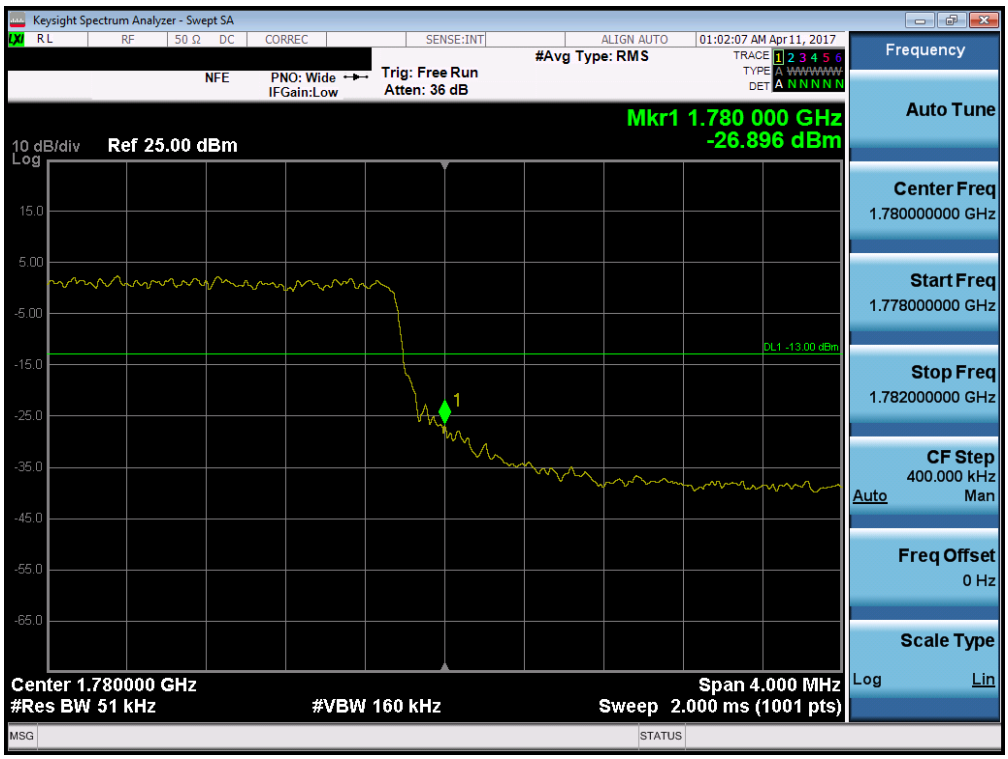
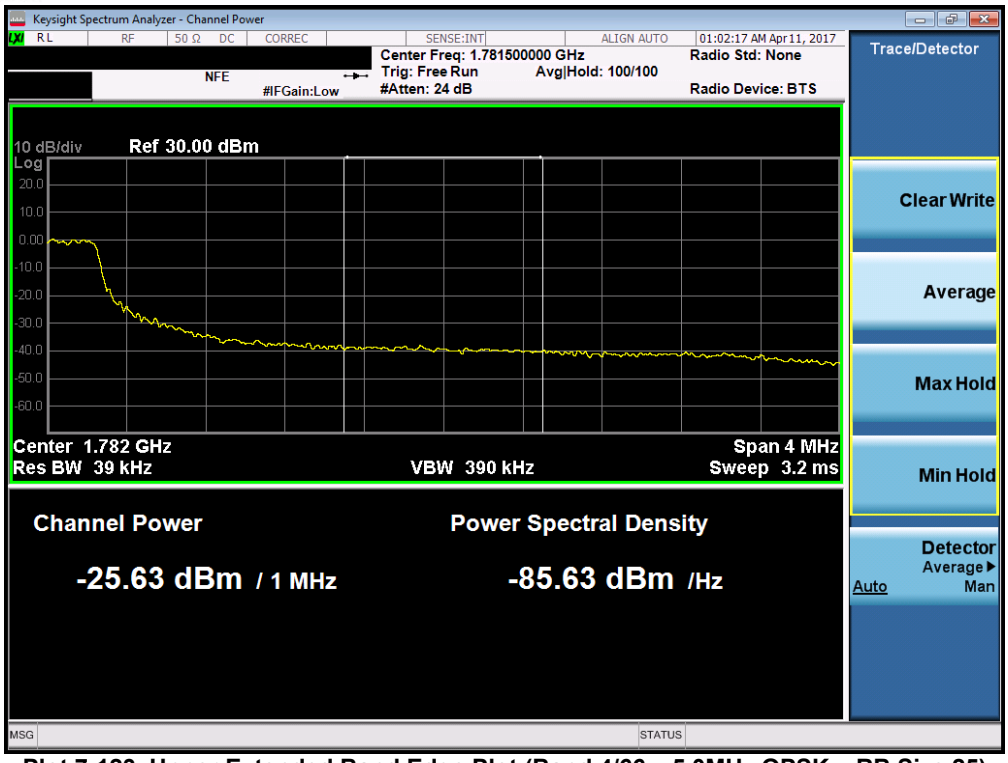


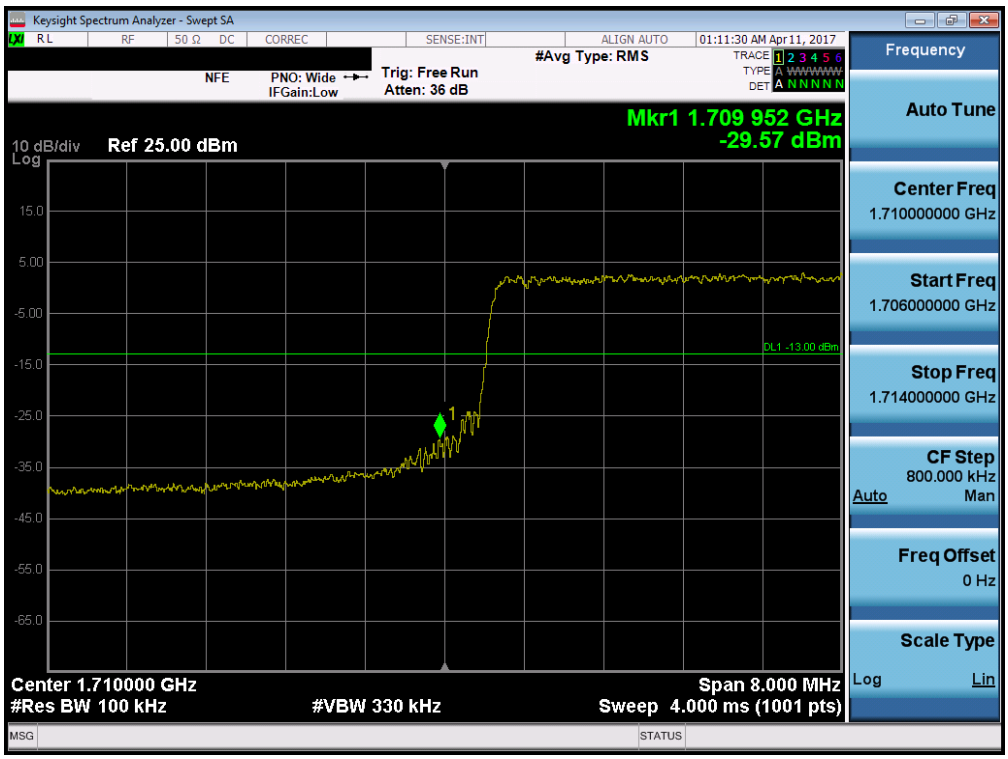
Plot 7-121. Lower Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-122. Upper Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-123. Upper Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-124. Lower Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

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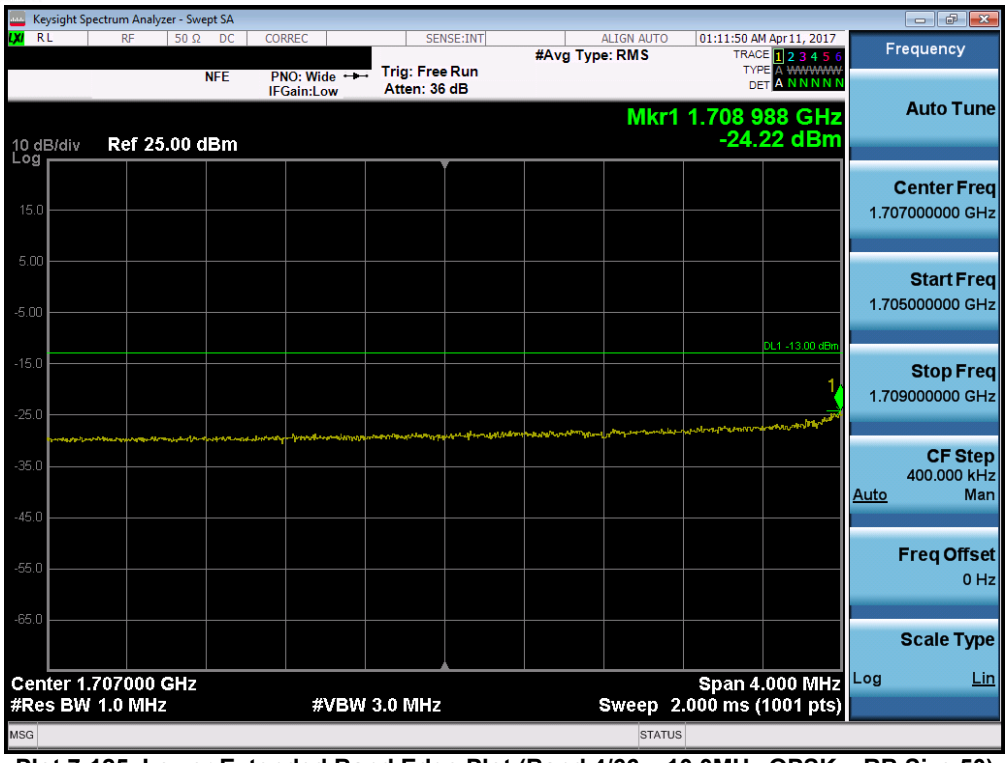
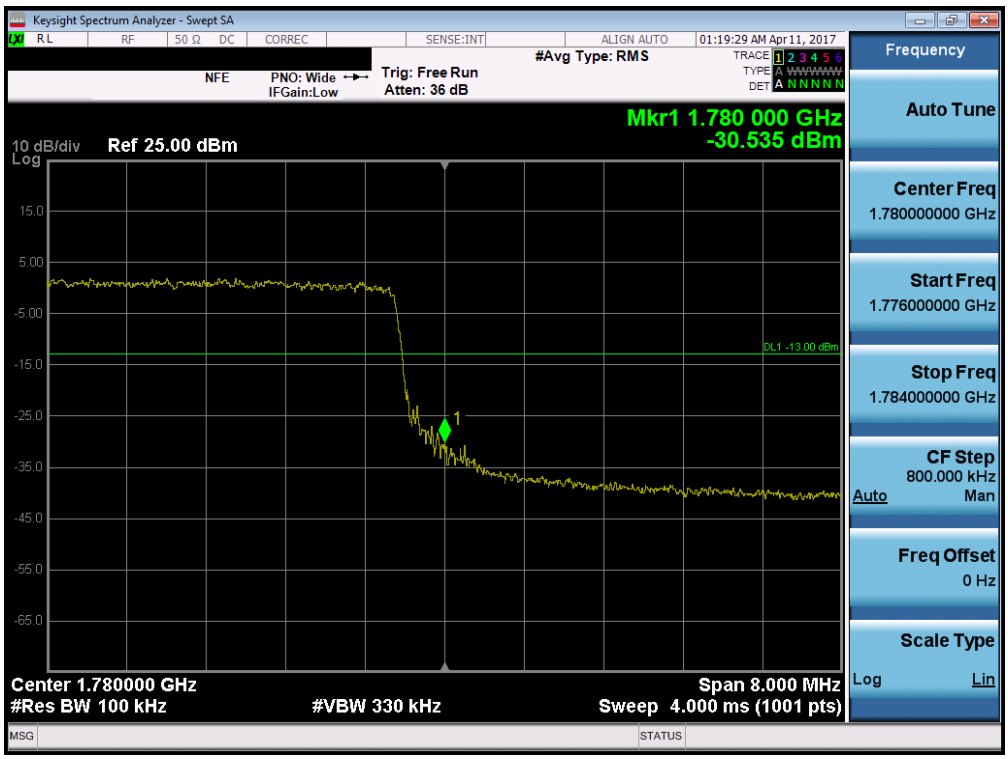
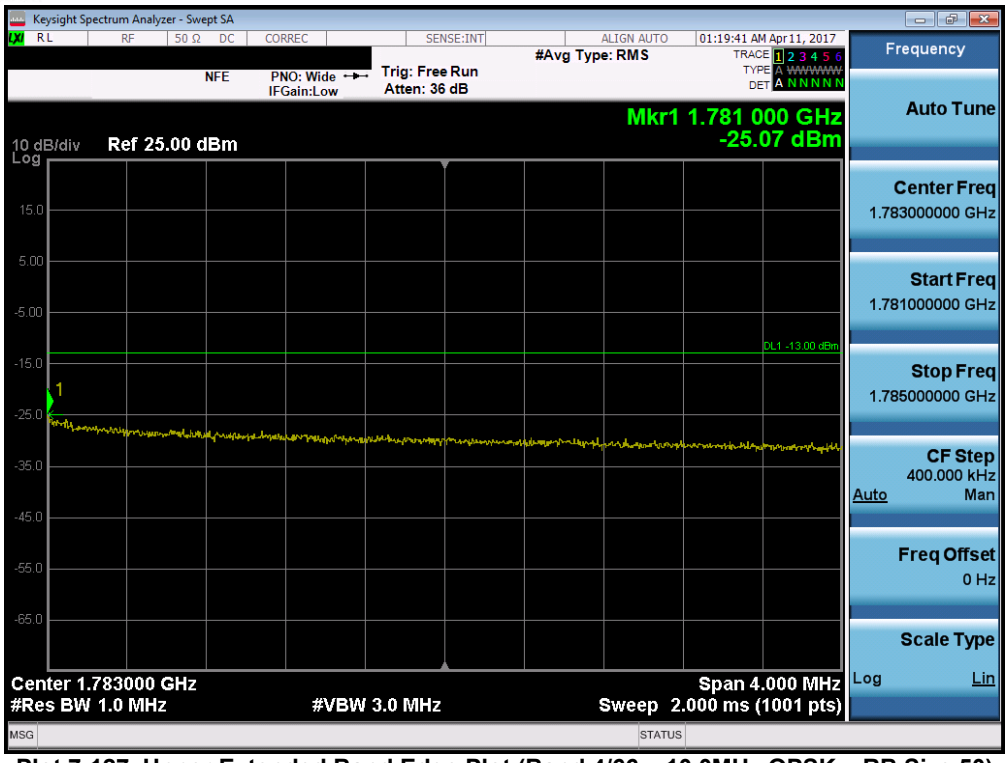


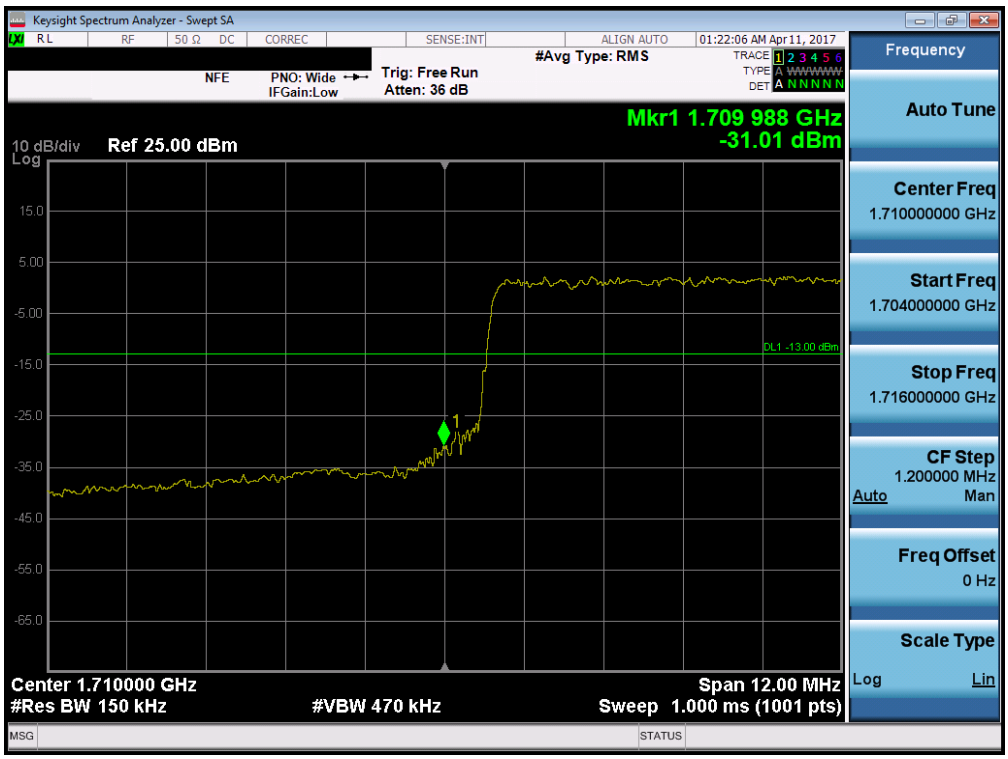
Plot 7-125. Lower Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



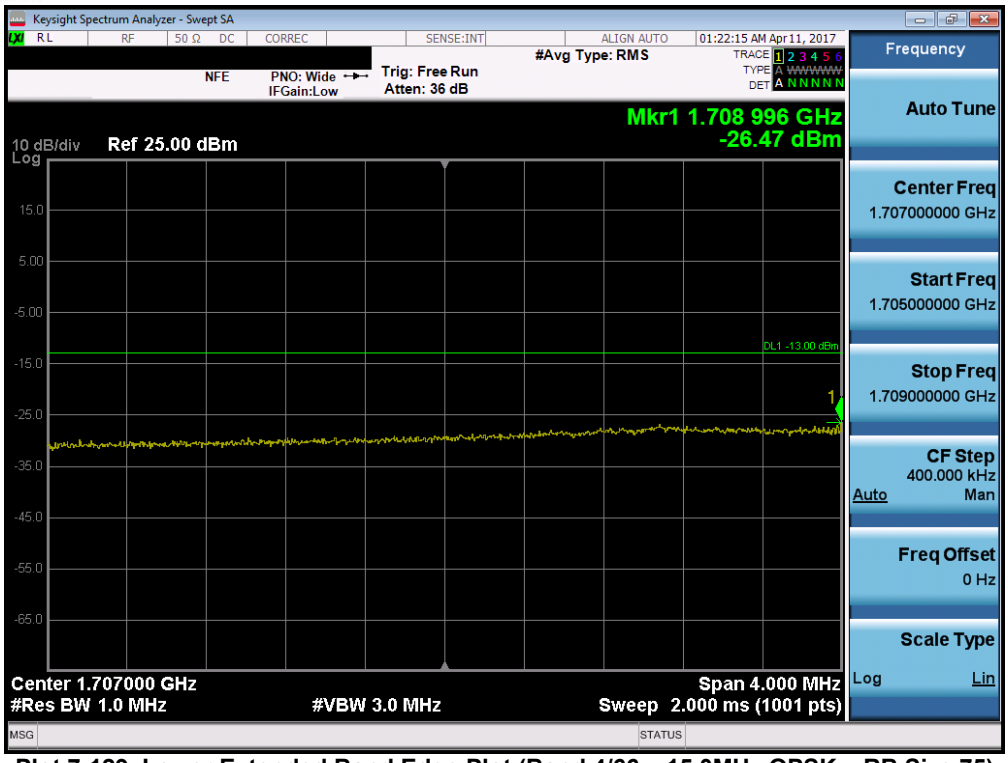
Plot 7-126. Upper Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



Plot 7-127. Upper Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



Plot 7-128. Lower Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



Plot 7-129. Lower Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

Plot 7-130. Upper Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

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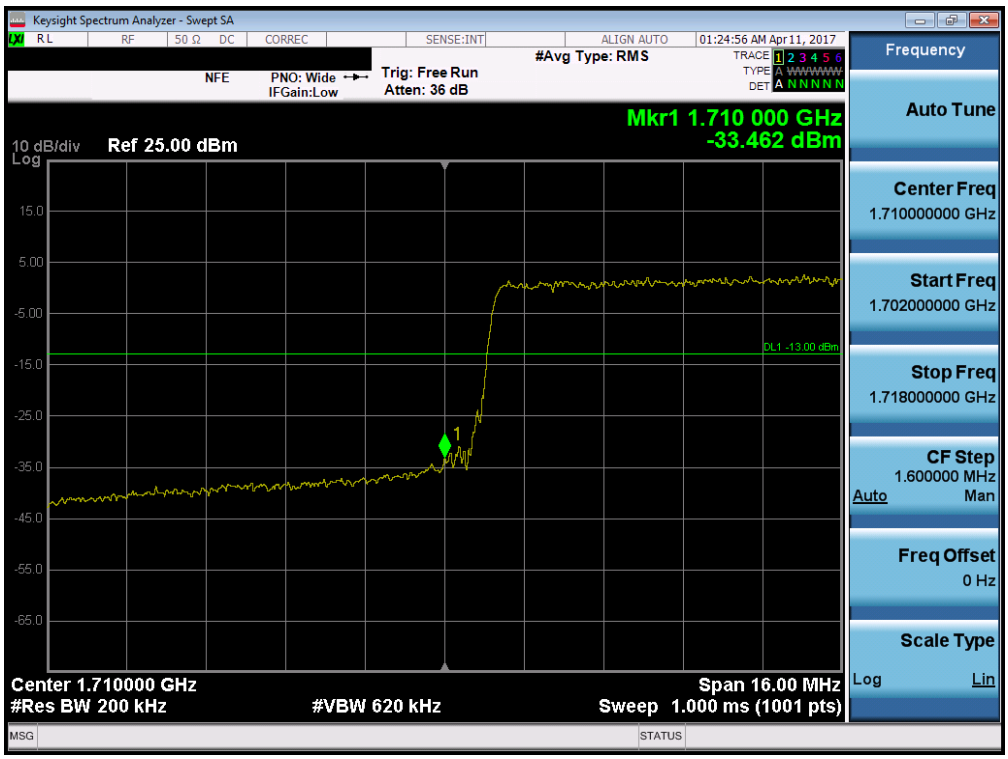
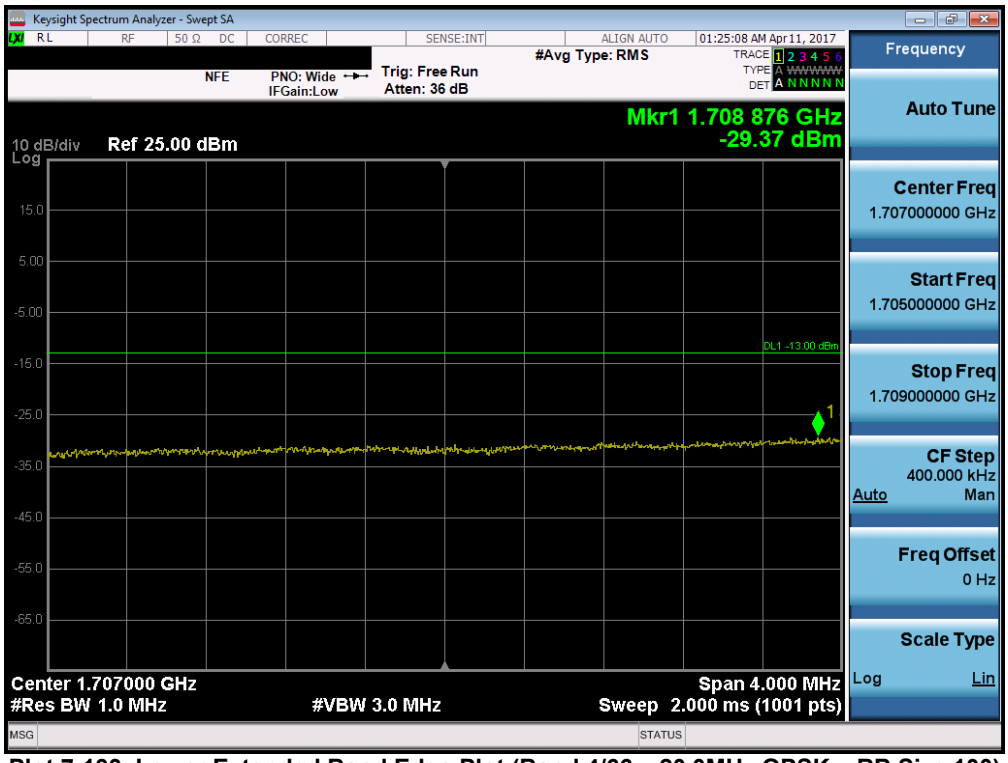
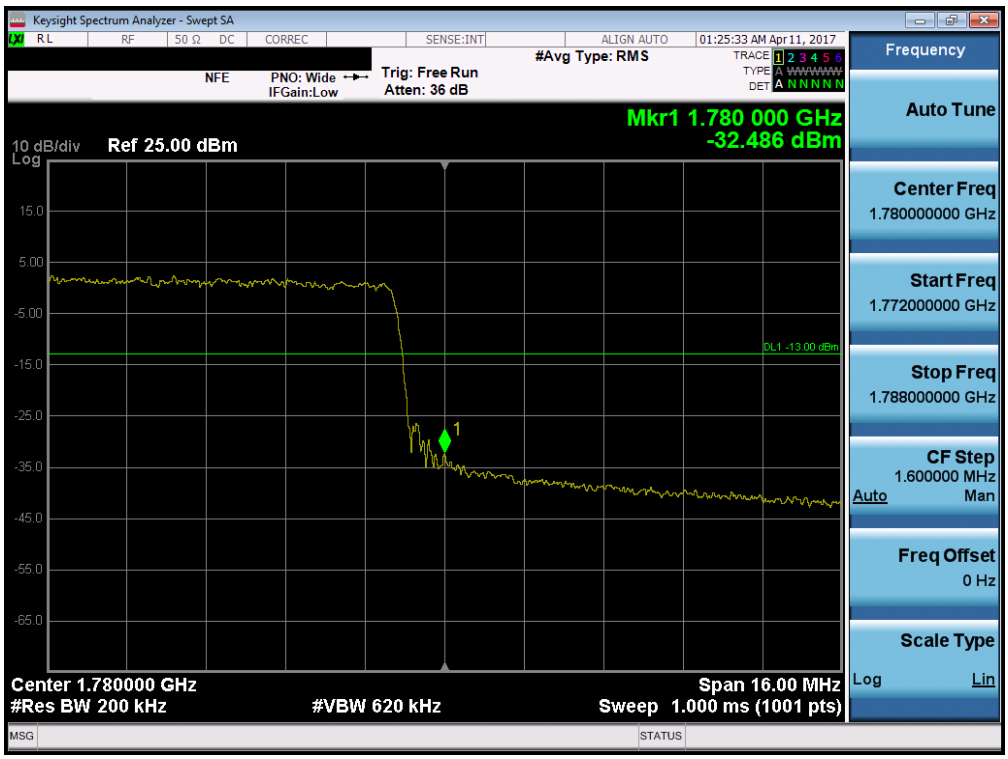
Plot 7-131. Upper Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



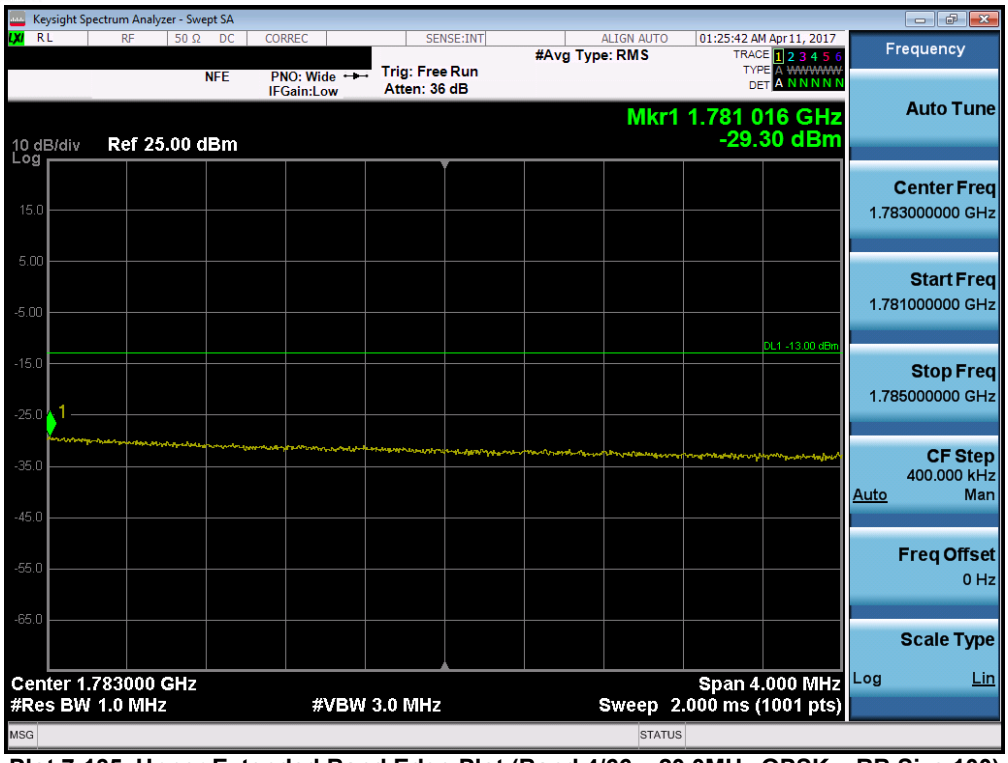
Plot 7-132. Lower Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



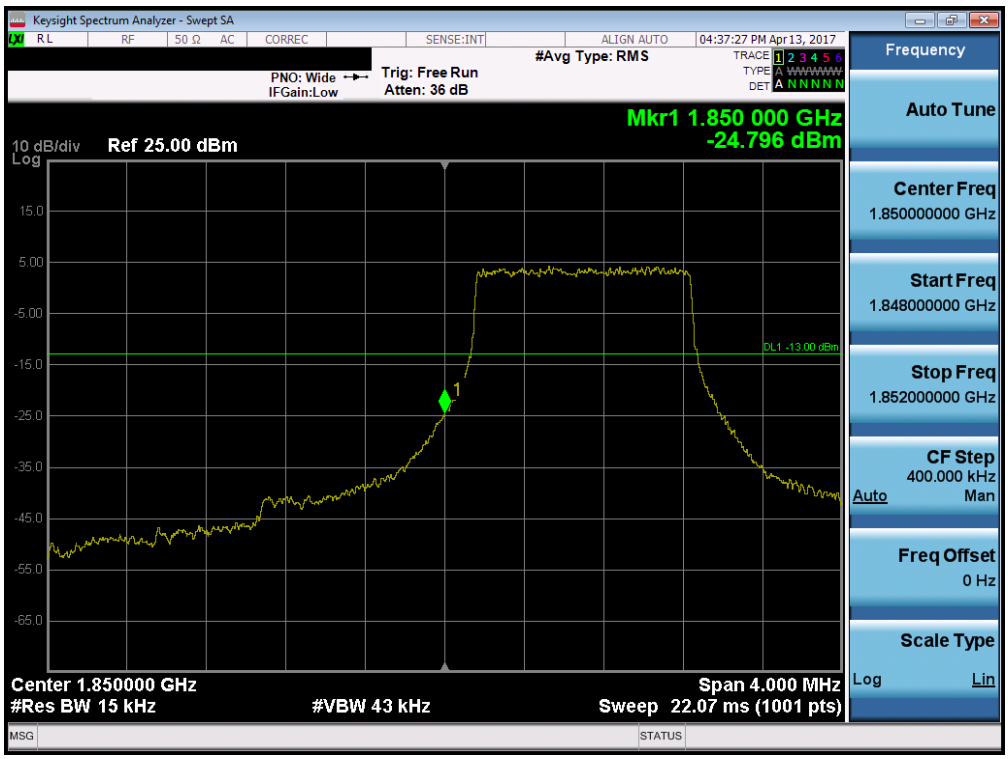
Plot 7-133. Lower Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



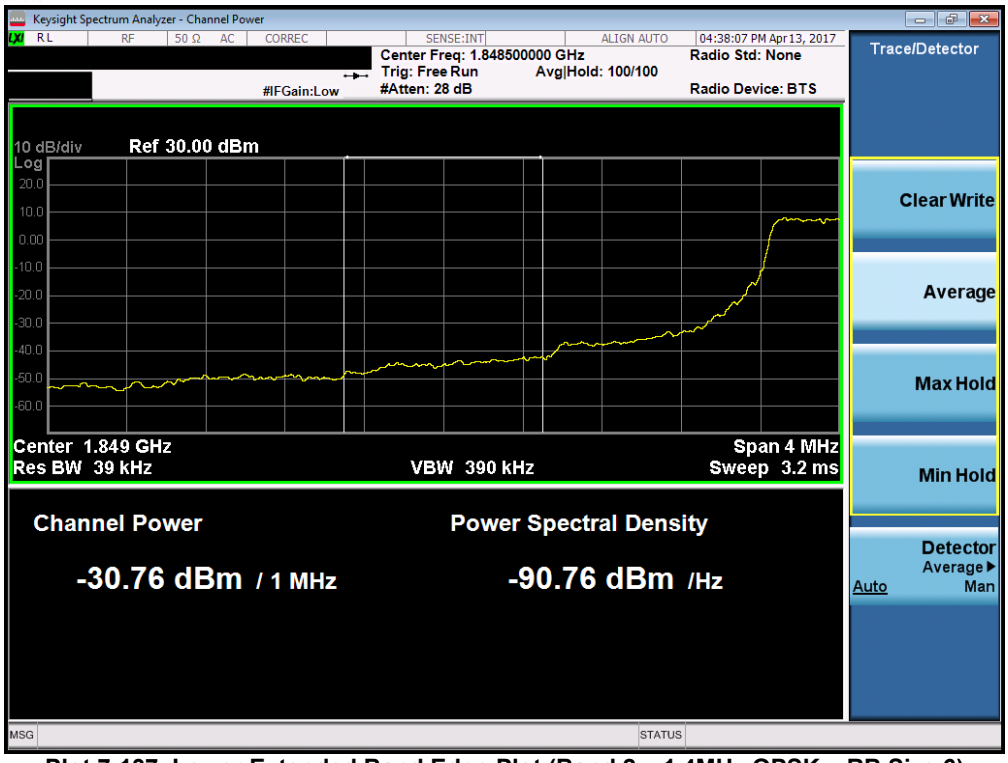
Plot 7-134. Upper Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



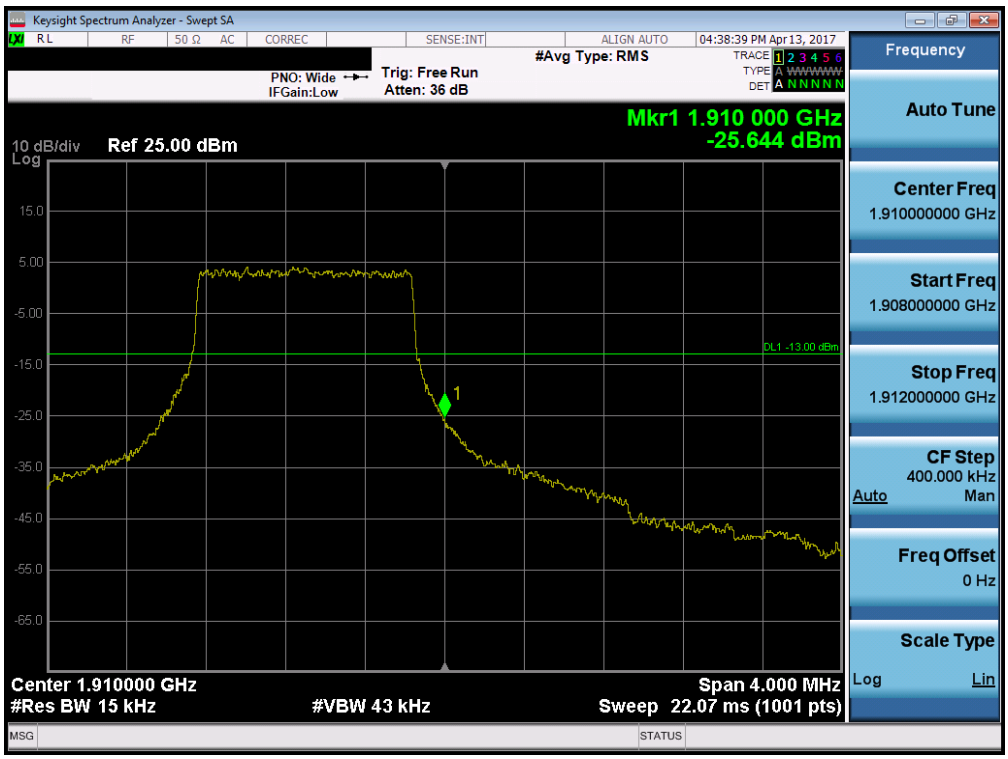
Plot 7-135. Upper Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



Plot 7-136. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 7-137. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



Plot 7-138. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

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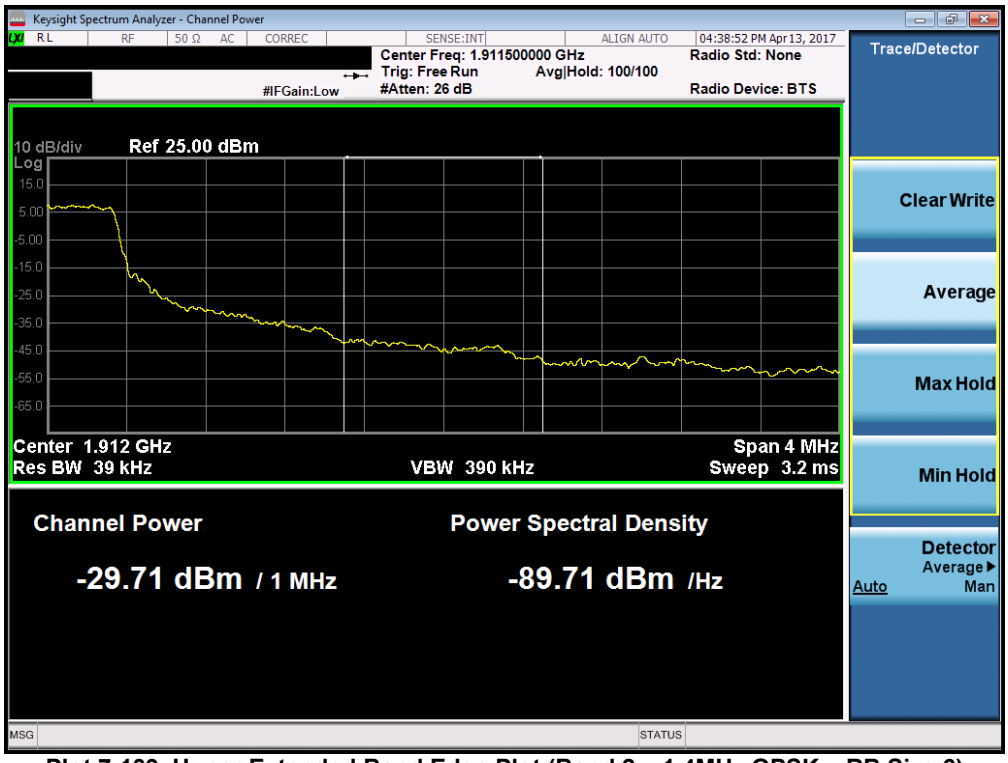
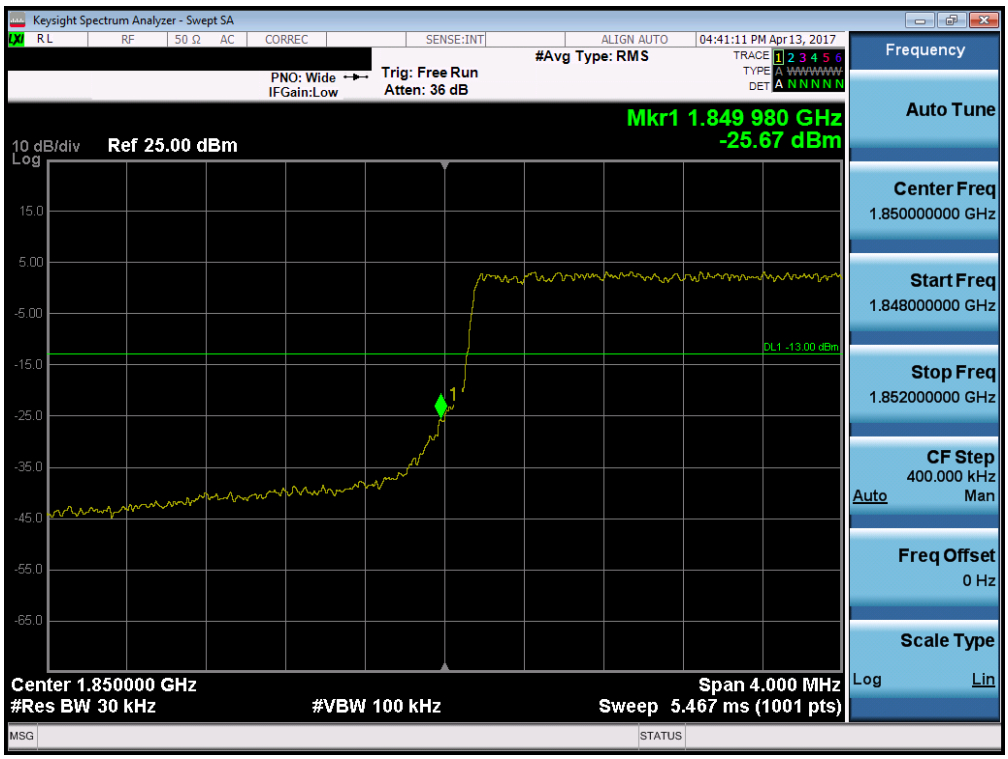
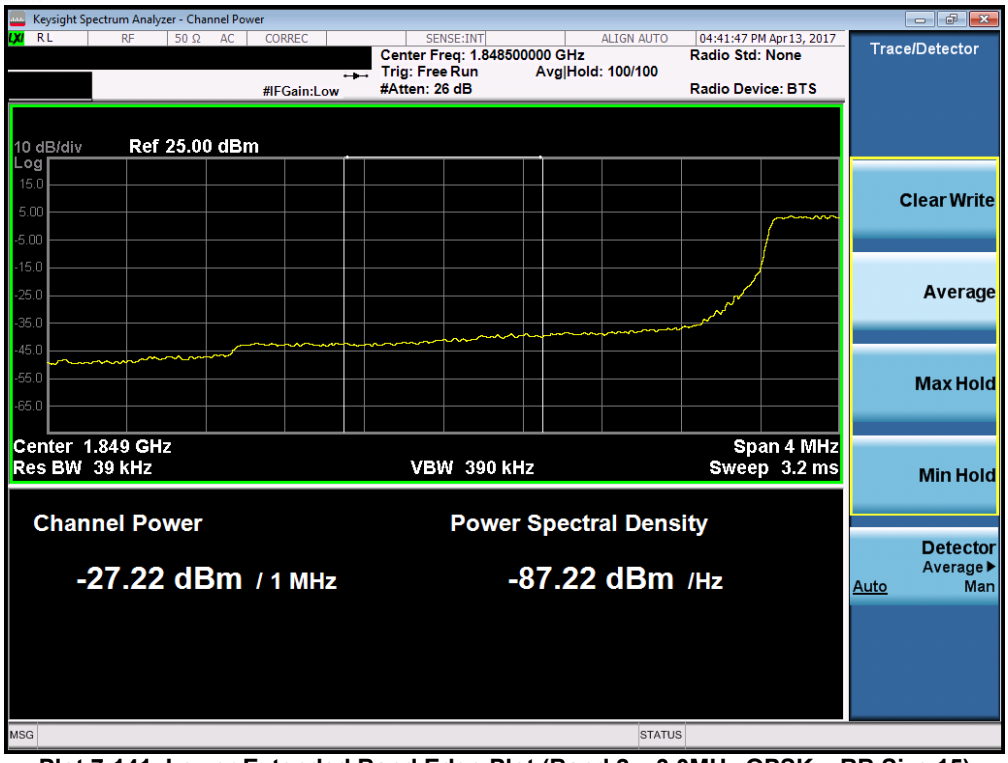


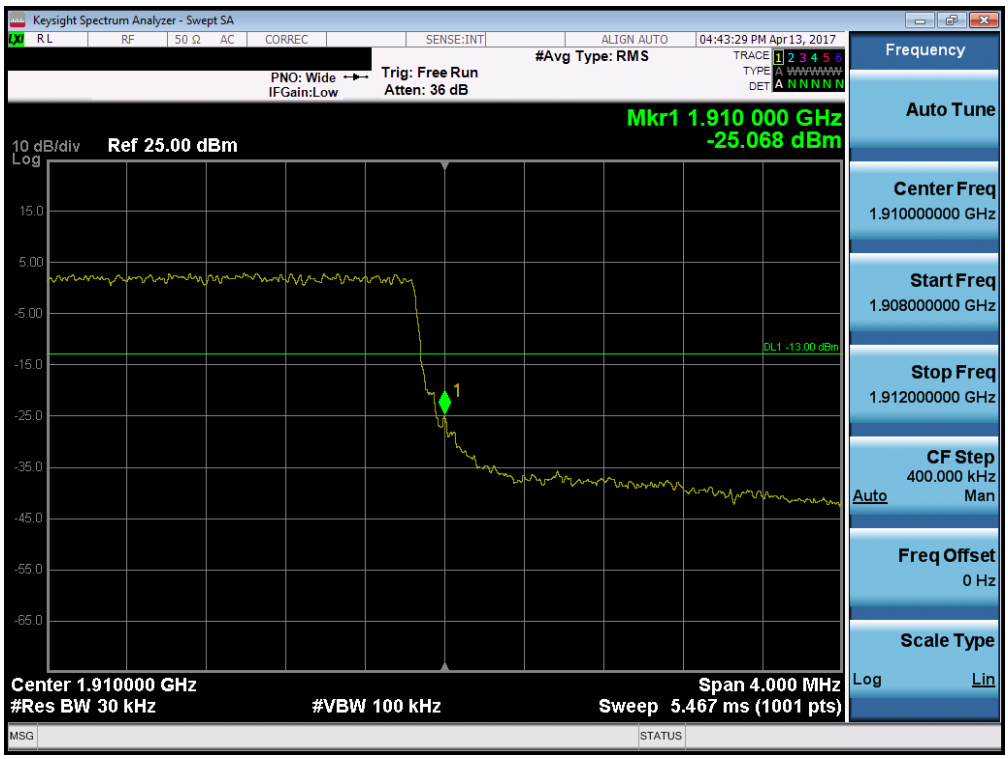
Plot 7-139. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



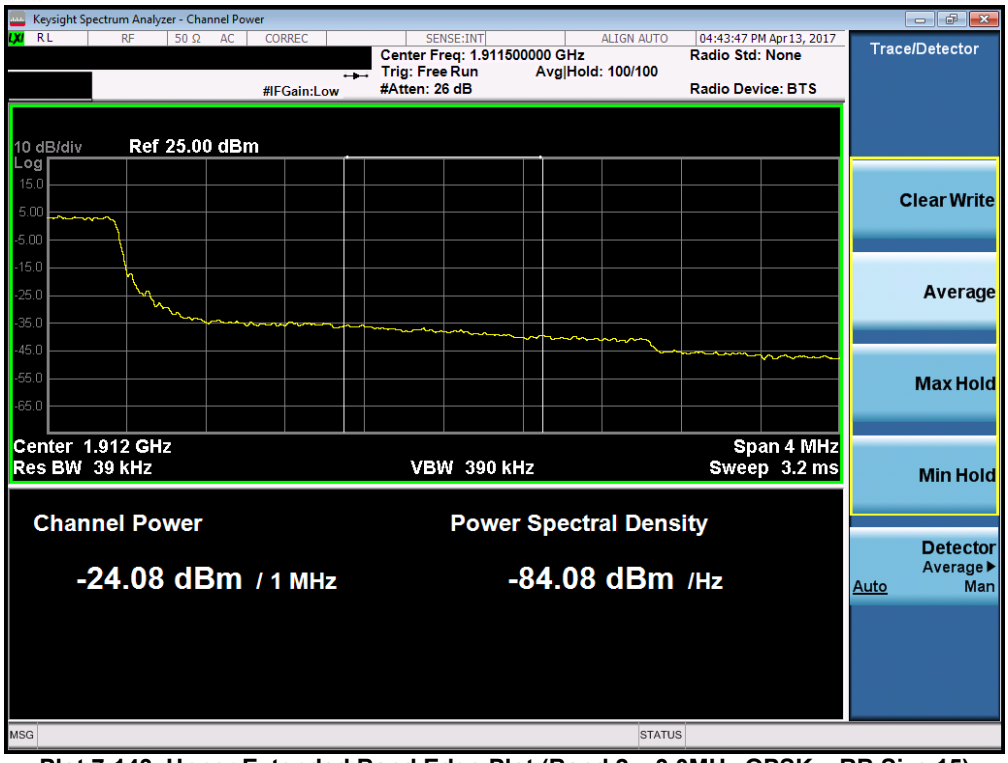
Plot 7-140. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



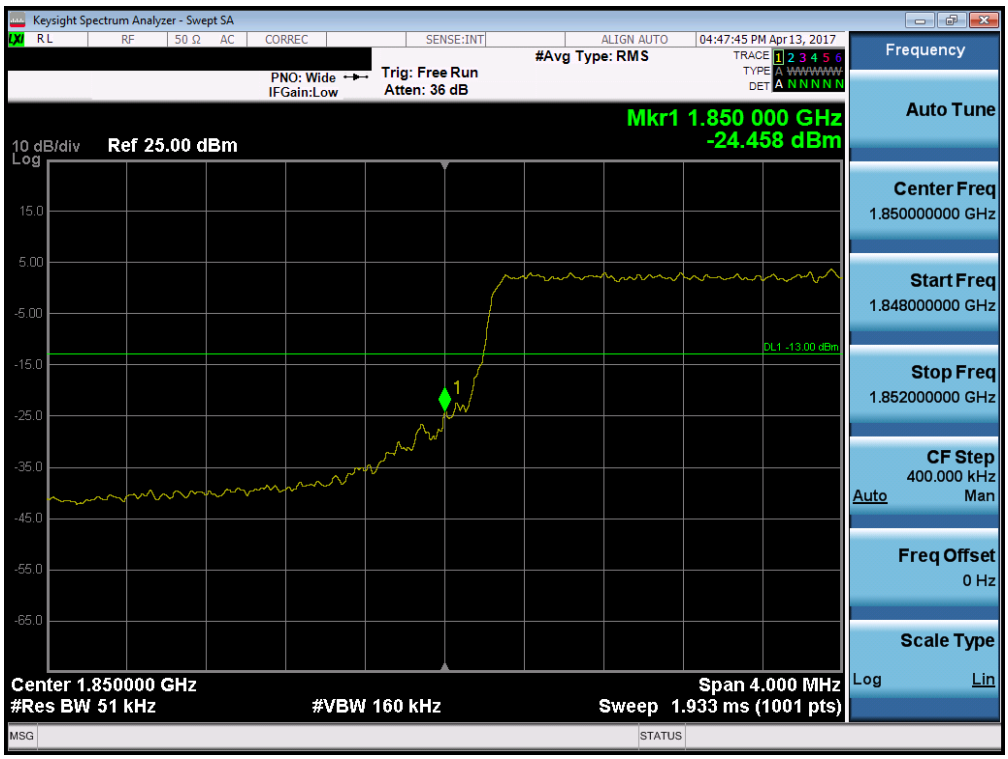
Plot 7-141. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



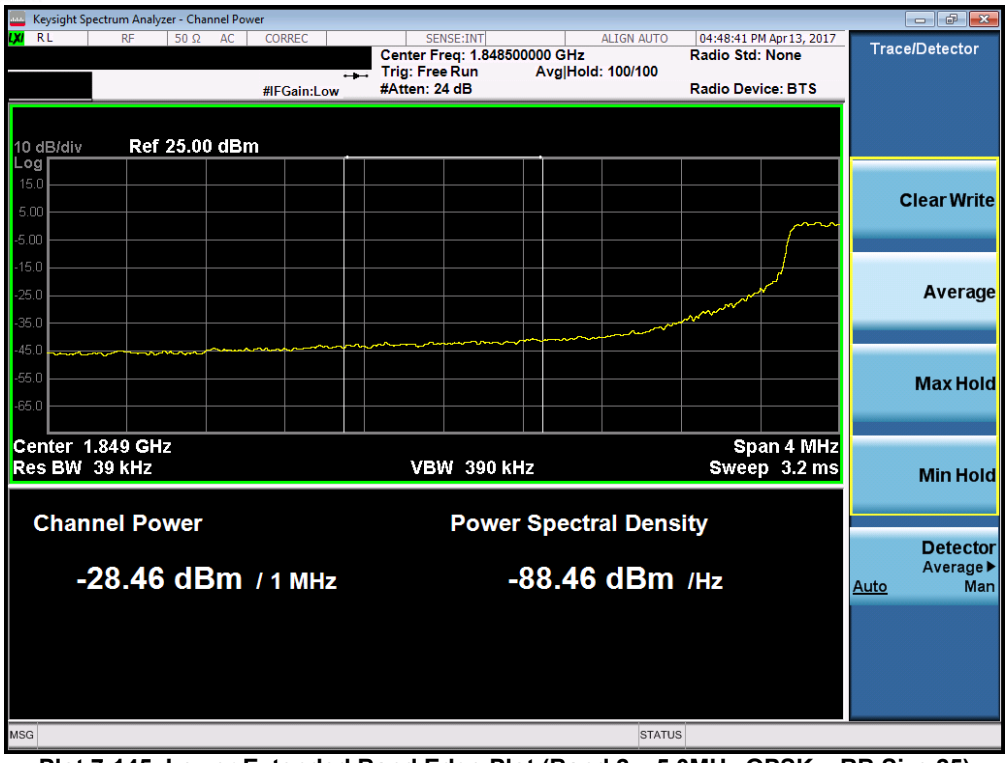
Plot 7-142. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



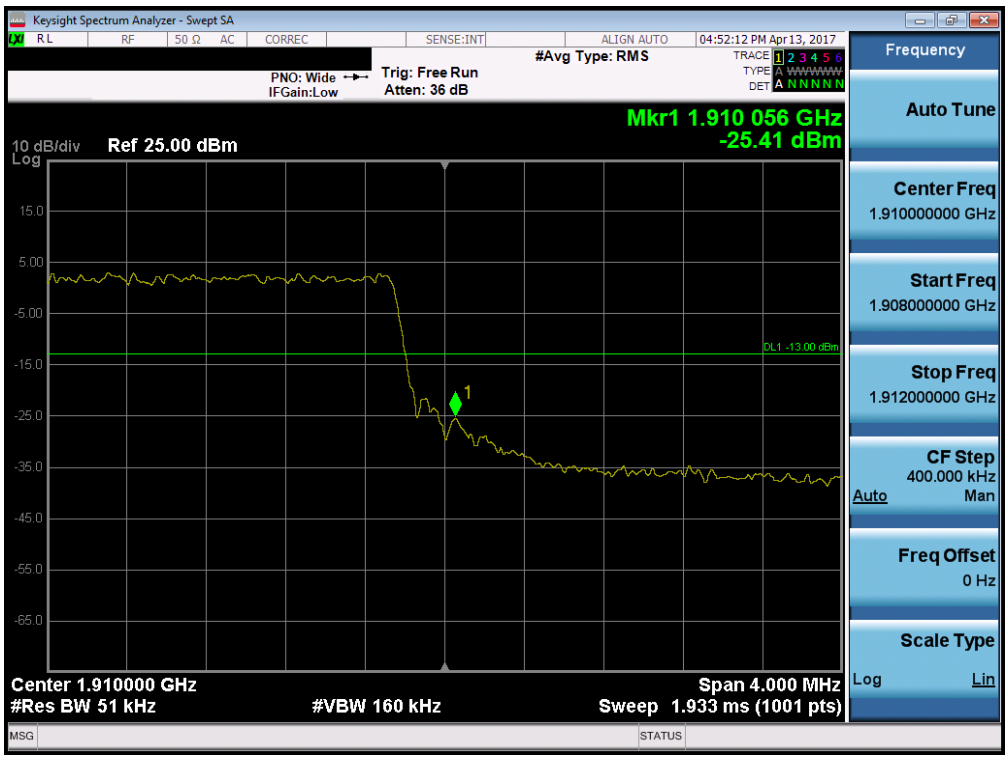
Plot 7-143. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



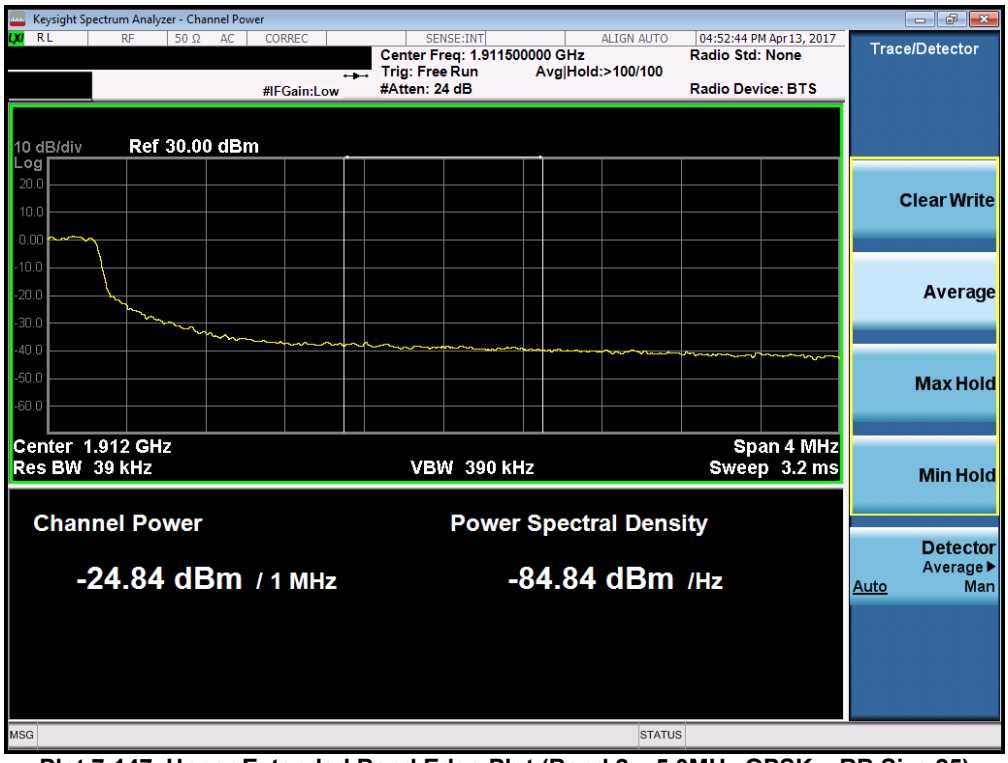
Plot 7-144. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



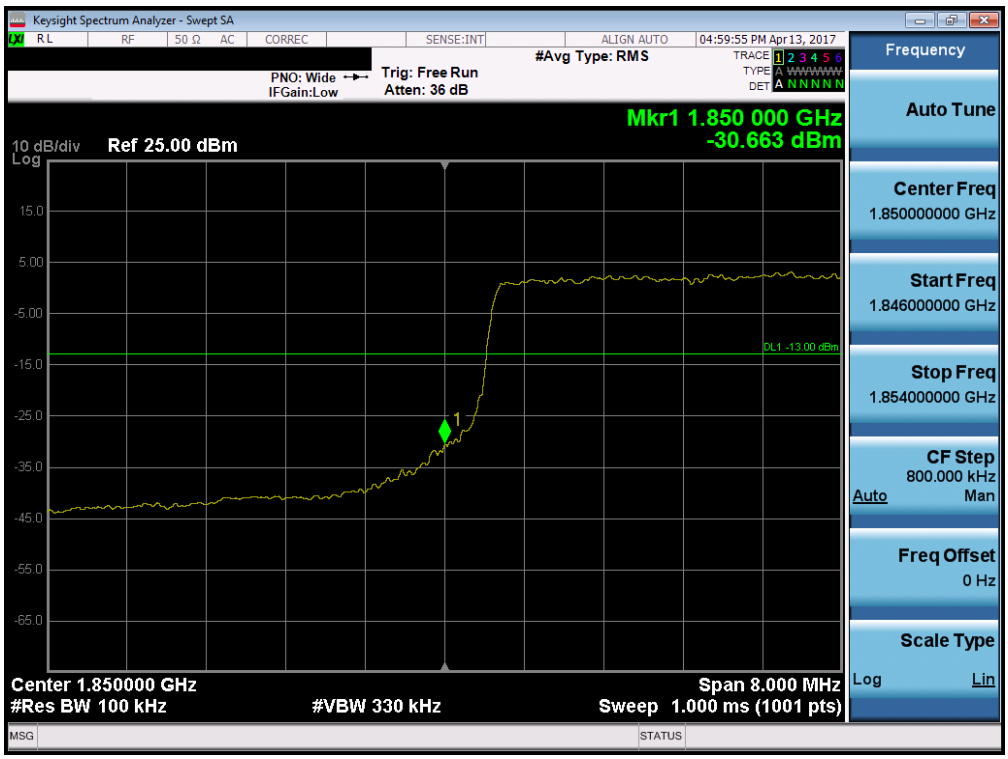
Plot 7-145. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 7-146. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 7-147. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 7-148. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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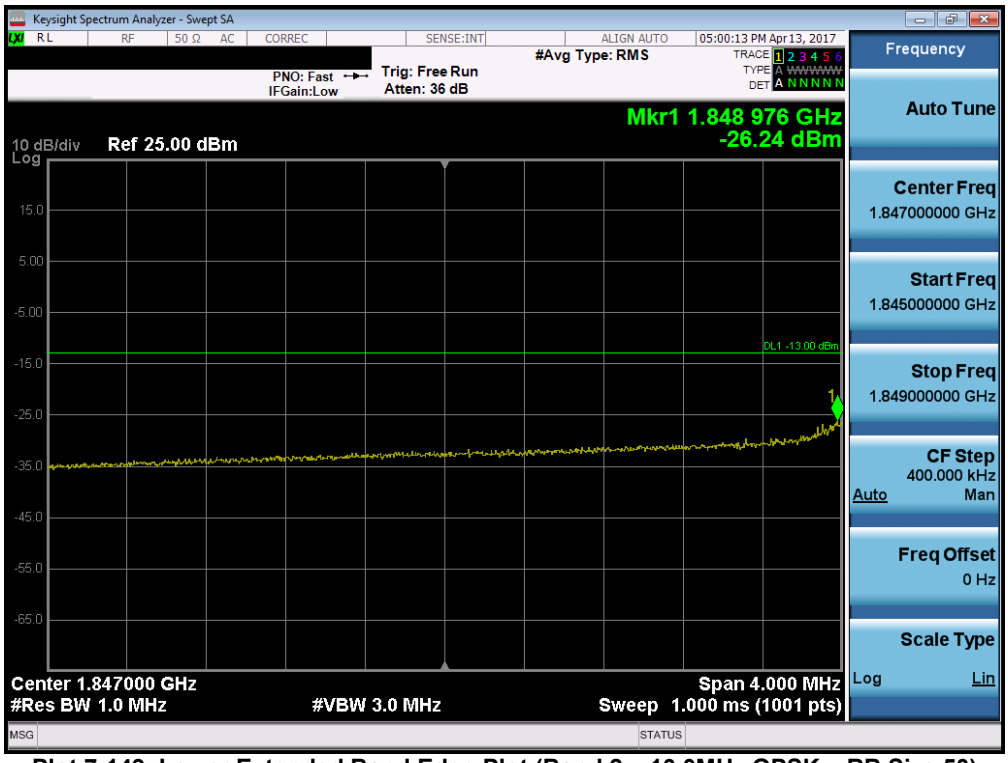

Plot 7-149. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

Plot 7-150. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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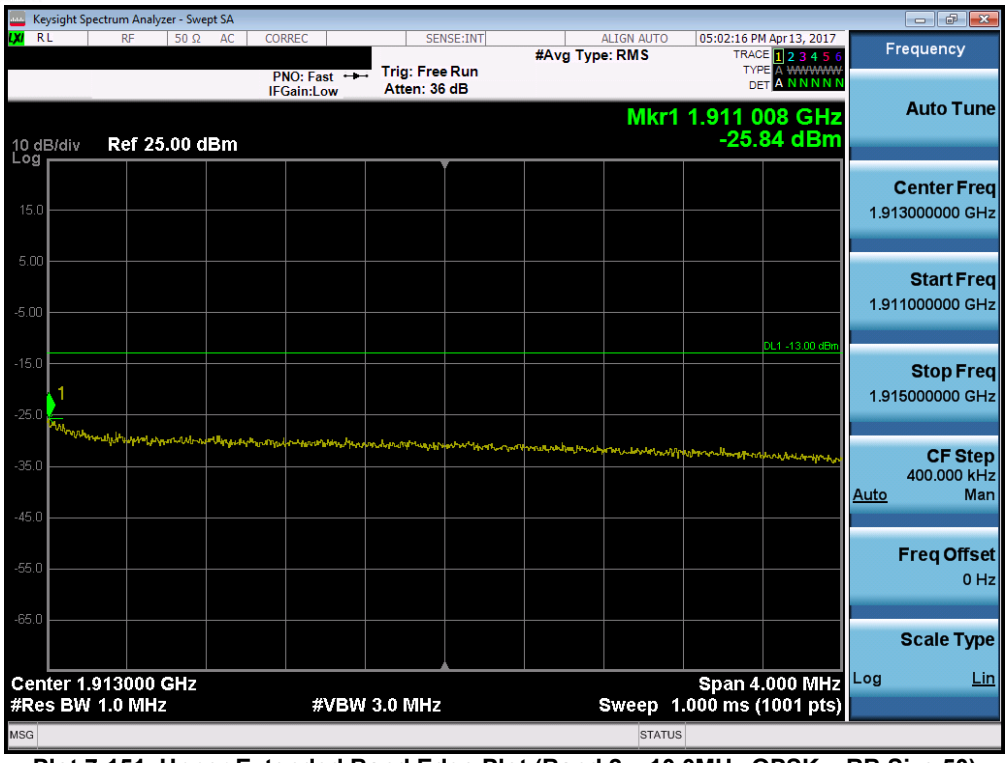
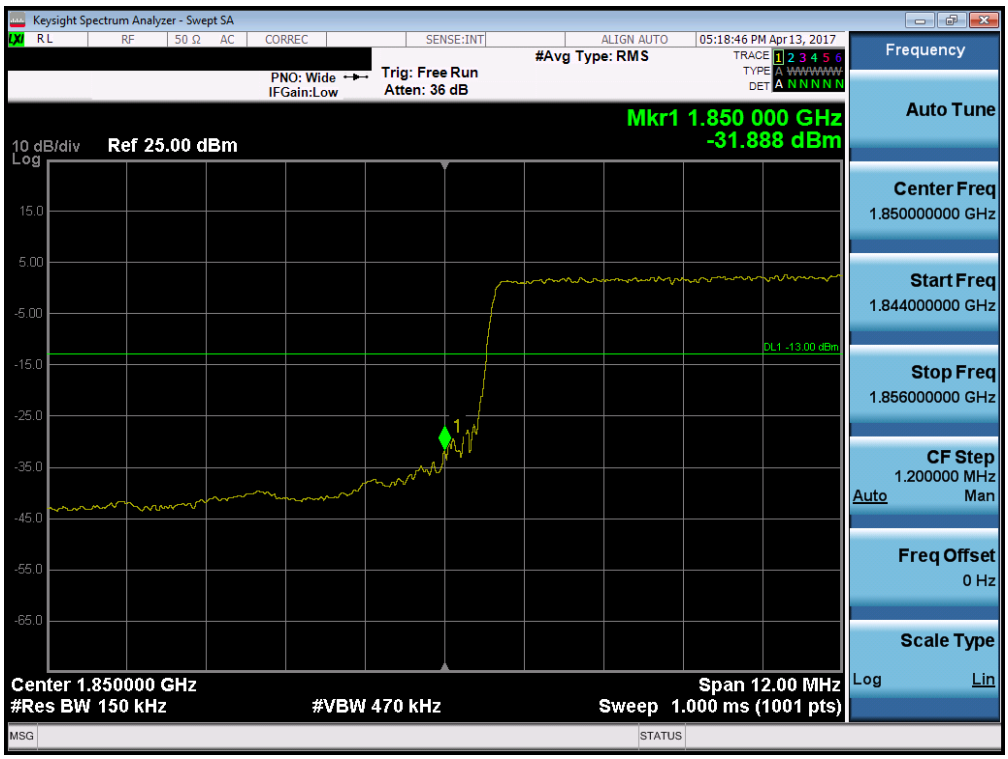


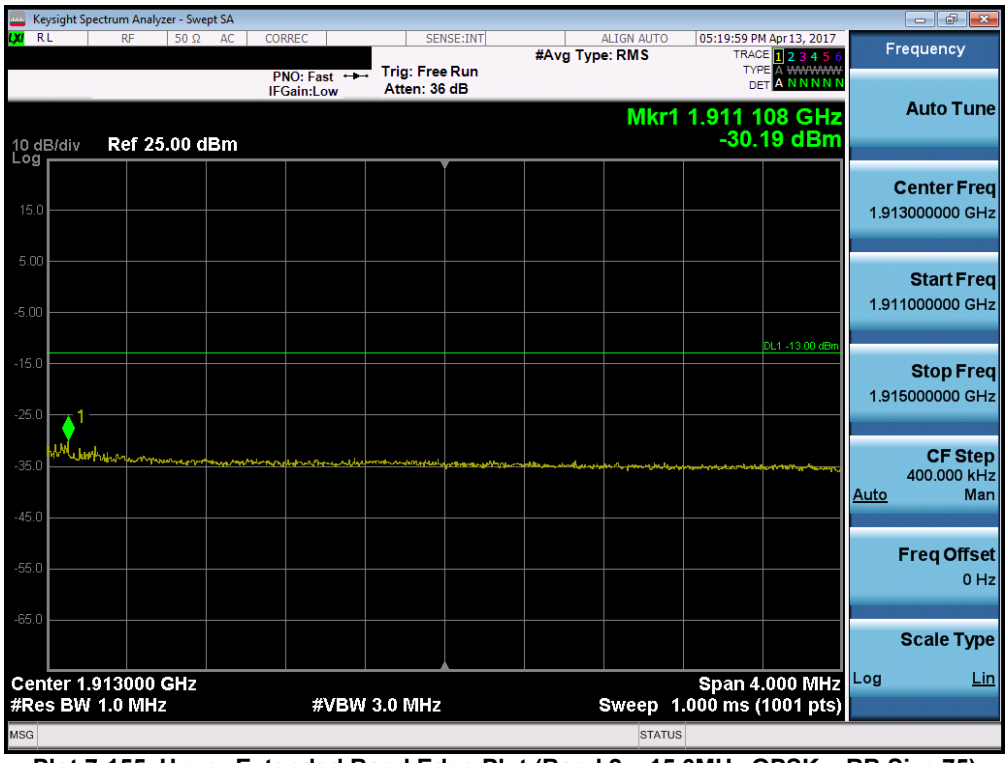
Plot 7-151. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



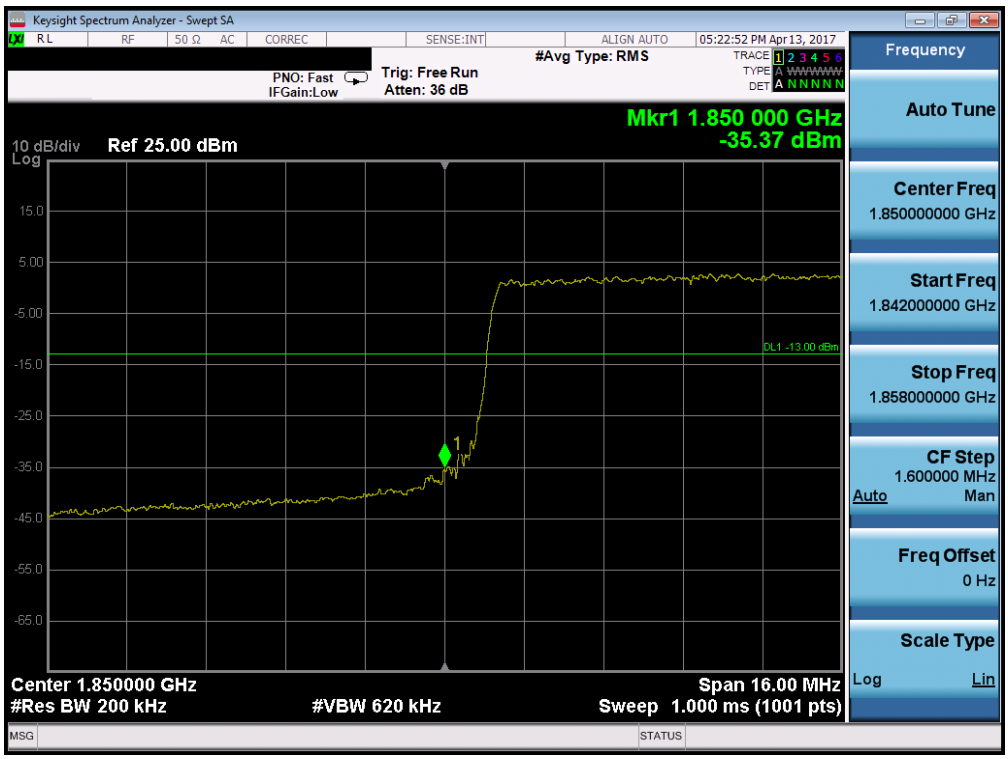
Plot 7-152. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

Plot 7-153. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

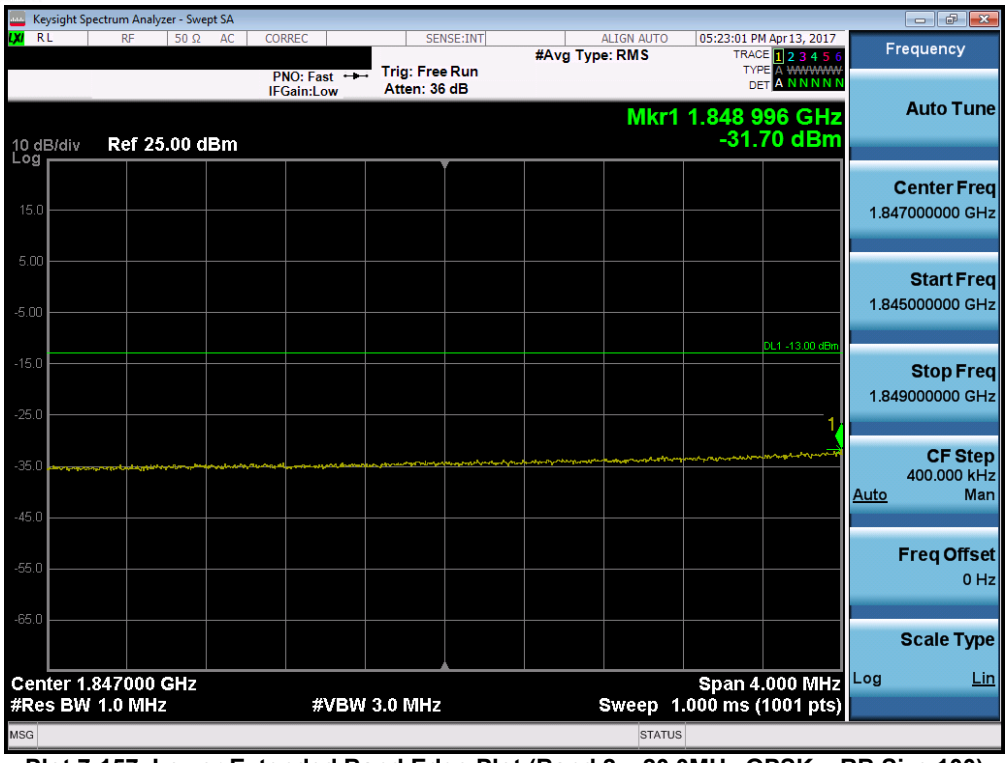
Plot 7-154. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



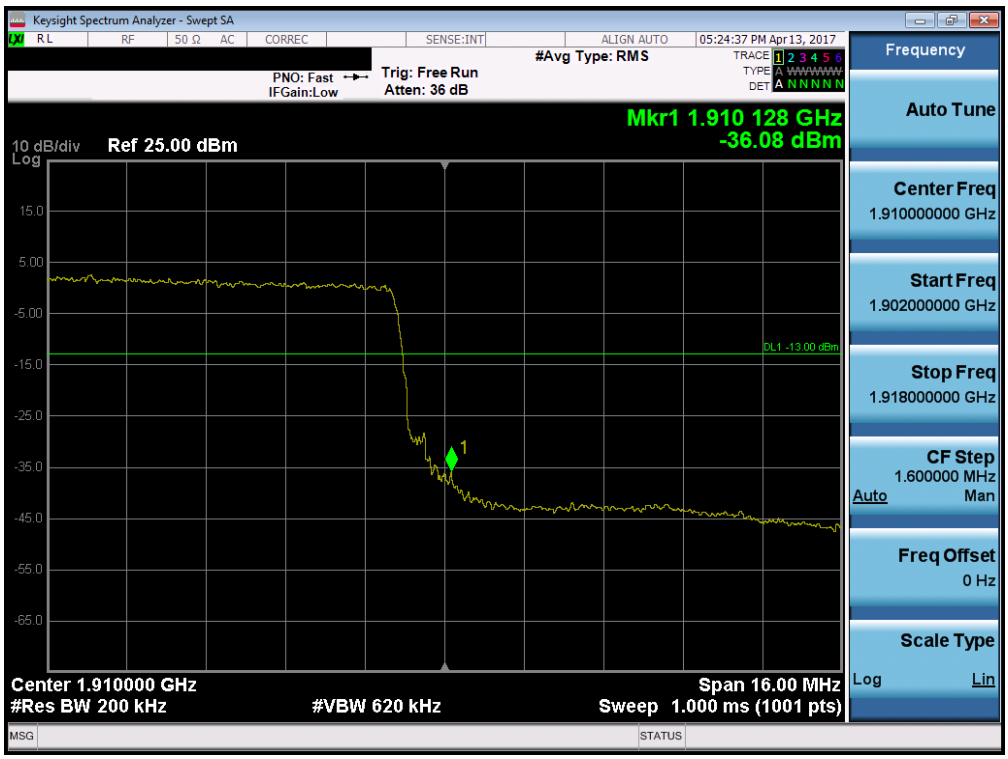
Plot 7-155. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



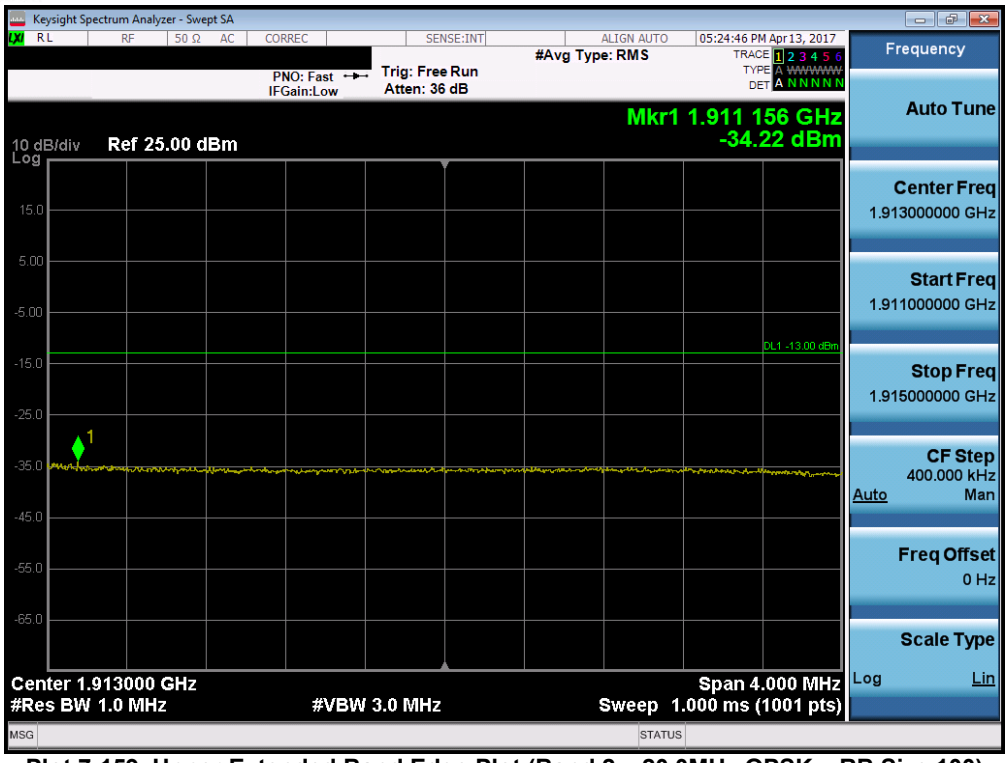
Plot 7-156. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



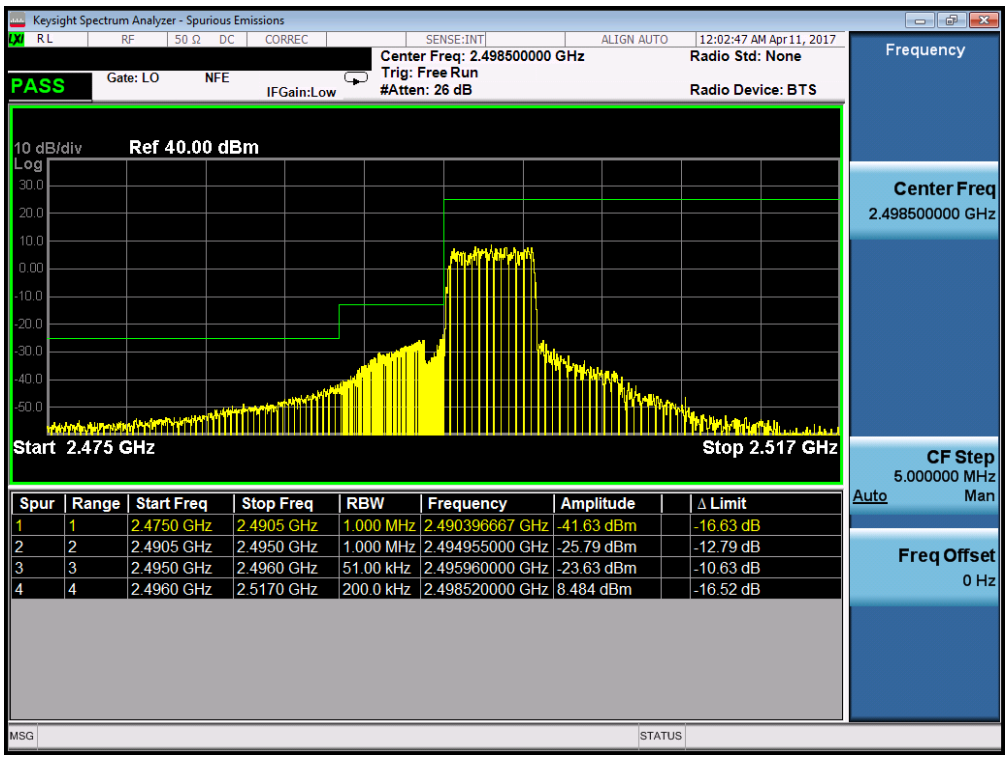
Plot 7-157. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-158. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-159. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-160. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

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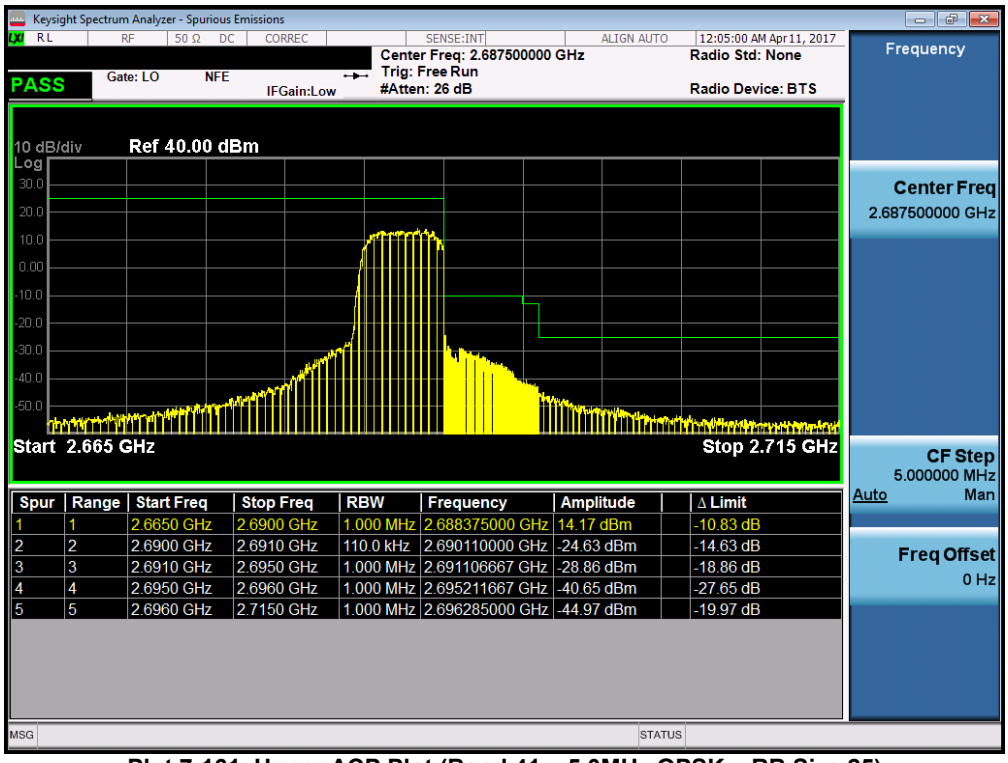
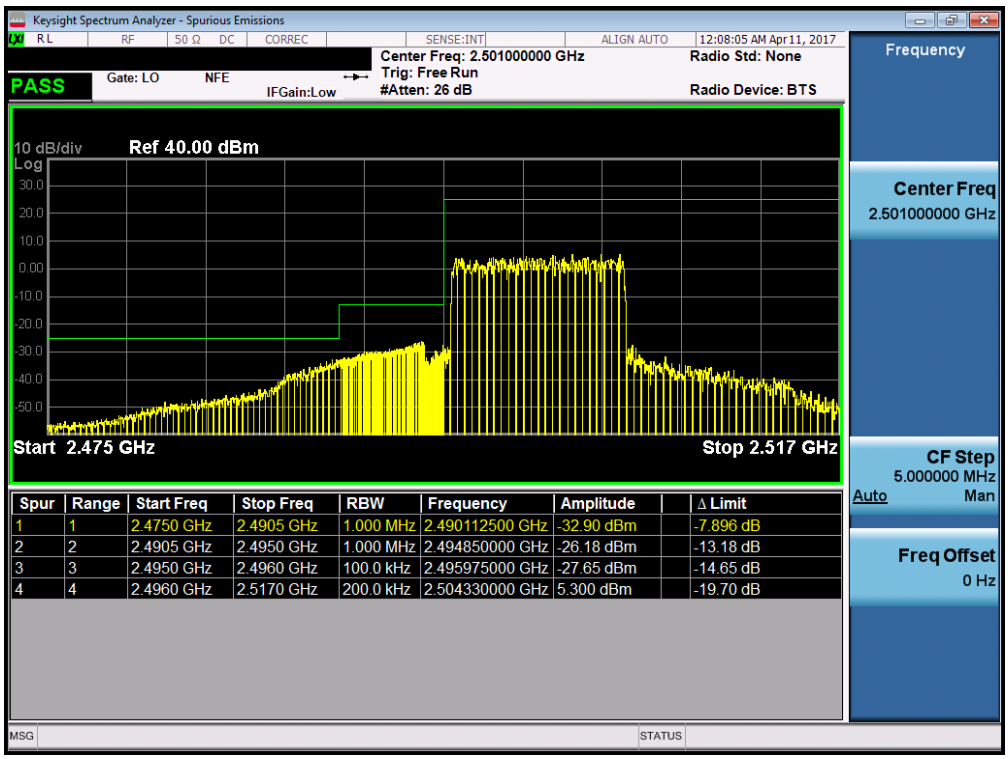
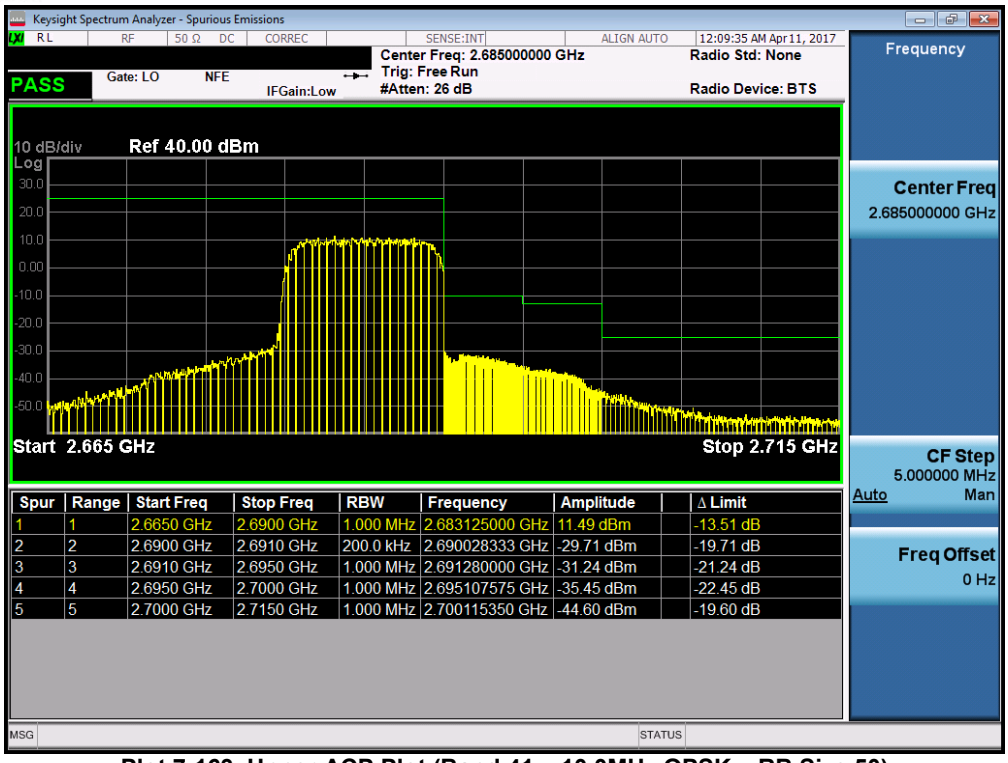


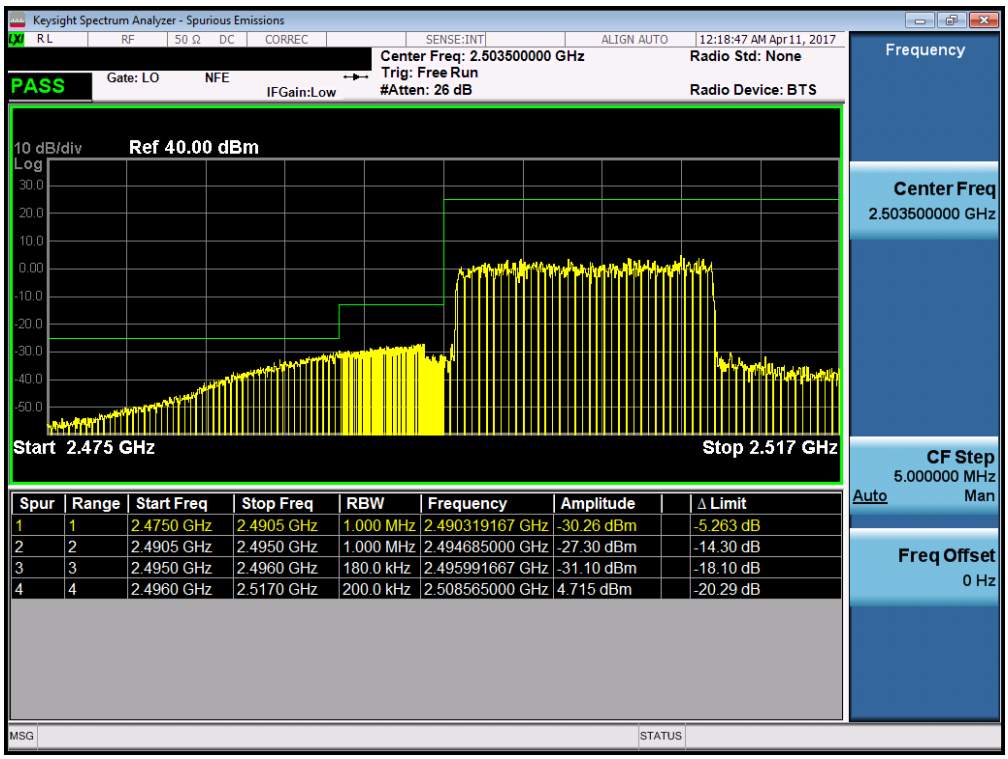
Plot 7-161. Upper ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



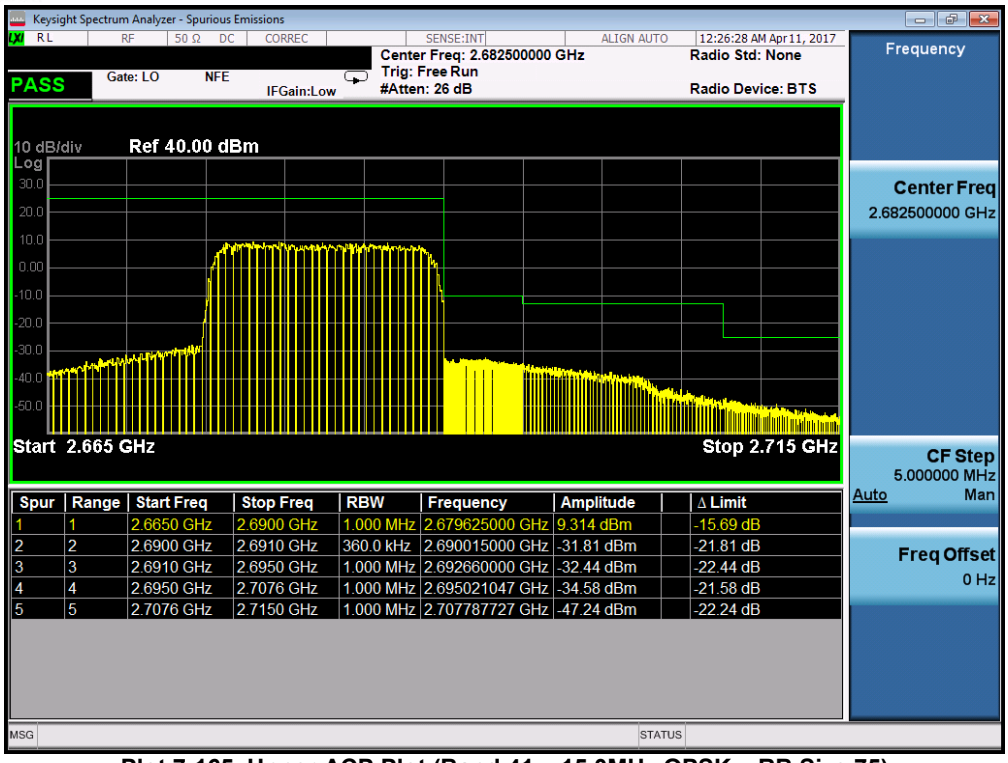
Plot 7-162. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



Plot 7-163. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

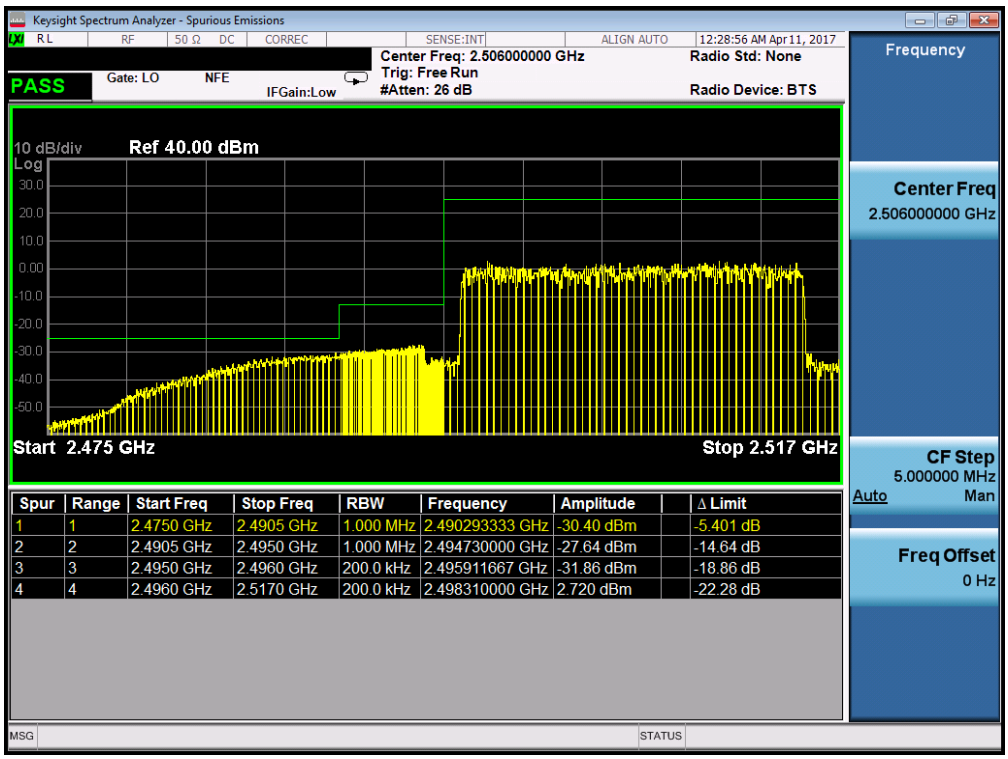


Plot 7-164. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



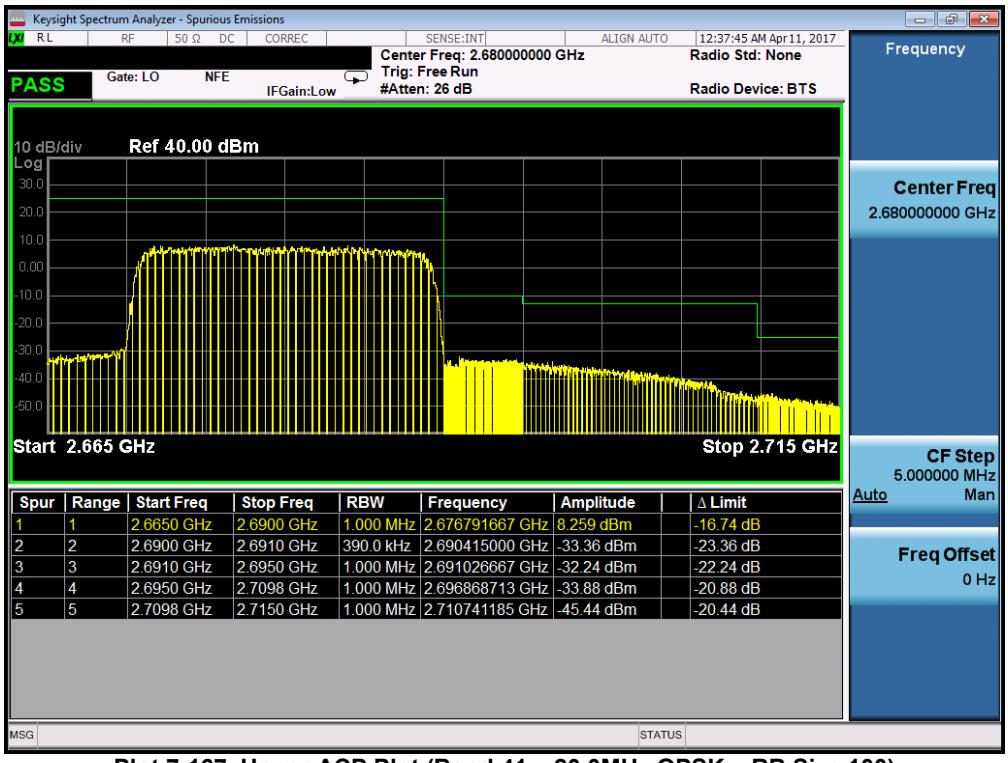
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.679625000 GHz	9.314 dBm	-15.69 dB
2	2	2.6900 GHz	2.6910 GHz	360.0 kHz	2.690015000 GHz	-31.81 dBm	-21.81 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692660000 GHz	-32.44 dBm	-22.44 dB
4	4	2.6950 GHz	2.7076 GHz	1.000 MHz	2.695021047 GHz	-34.58 dBm	-21.58 dB
5	5	2.7076 GHz	2.7150 GHz	1.000 MHz	2.707787727 GHz	-47.24 dBm	-22.24 dB

Plot 7-165. 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	2.490293333 GHz	-30.40 dBm	-5.401 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494730000 GHz	-27.64 dBm	-14.64 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495911667 GHz	-31.86 dBm	-18.86 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.498310000 GHz	2.720 dBm	-22.28 dB

Plot 7-166. 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	2.676791667 GHz	8.259 dBm	-16.74 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690415000 GHz	-33.36 dBm	-23.36 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691026667 GHz	-32.24 dBm	-22.24 dB
4	4	2.6950 GHz	2.7098 GHz	1.000 MHz	2.696868713 GHz	-33.88 dBm	-20.88 dB
5	5	2.7098 GHz	2.7150 GHz	1.000 MHz	2.710741185 GHz	-45.44 dBm	-20.44 dB

Plot 7-167. 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.

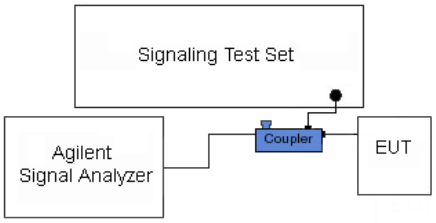
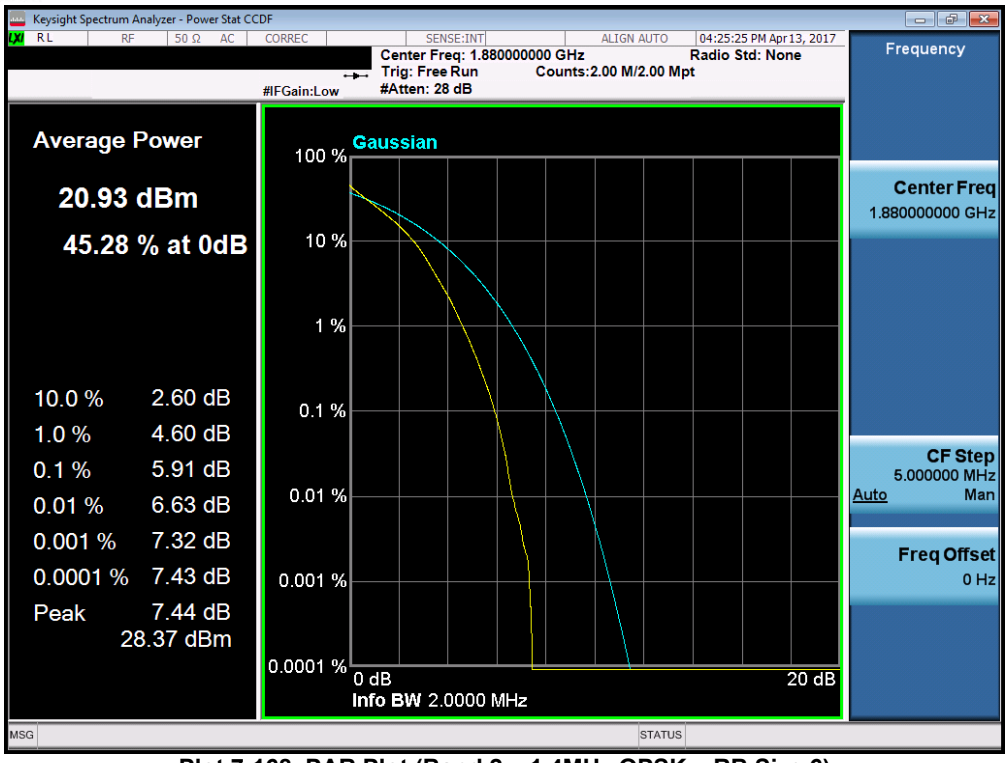


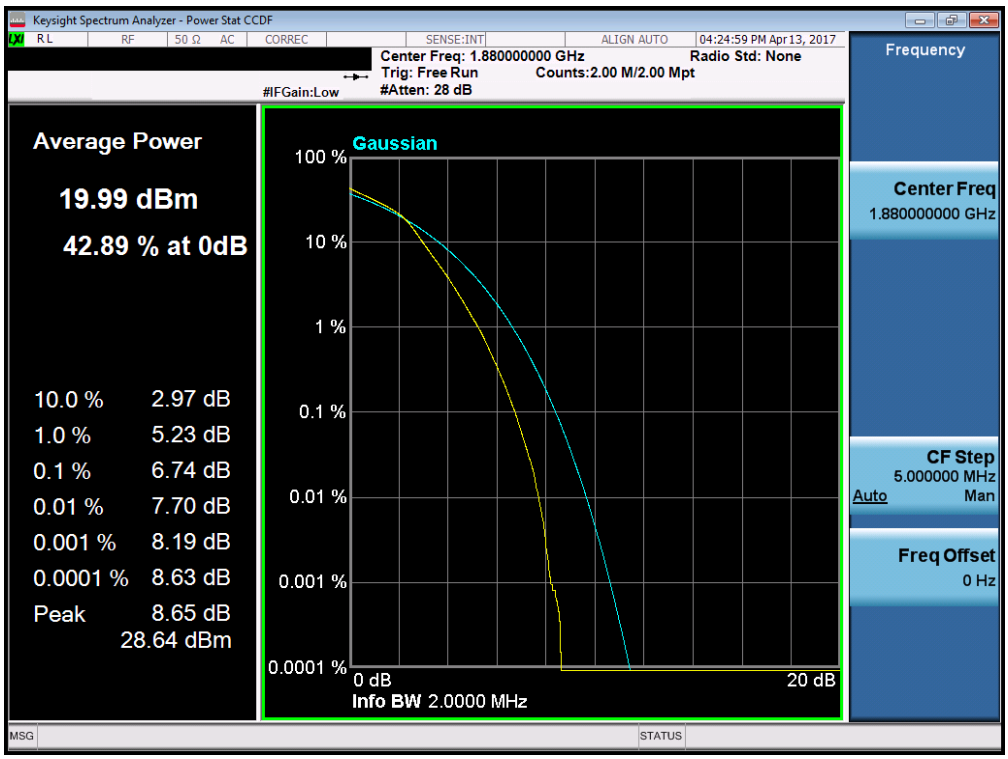
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

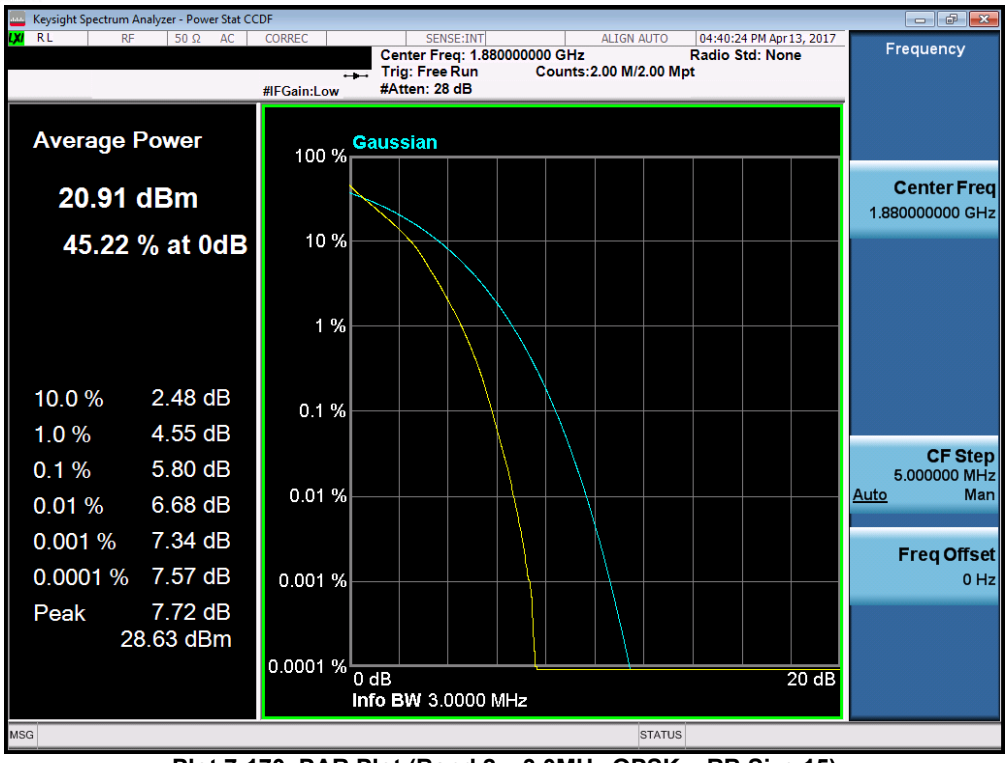
None.



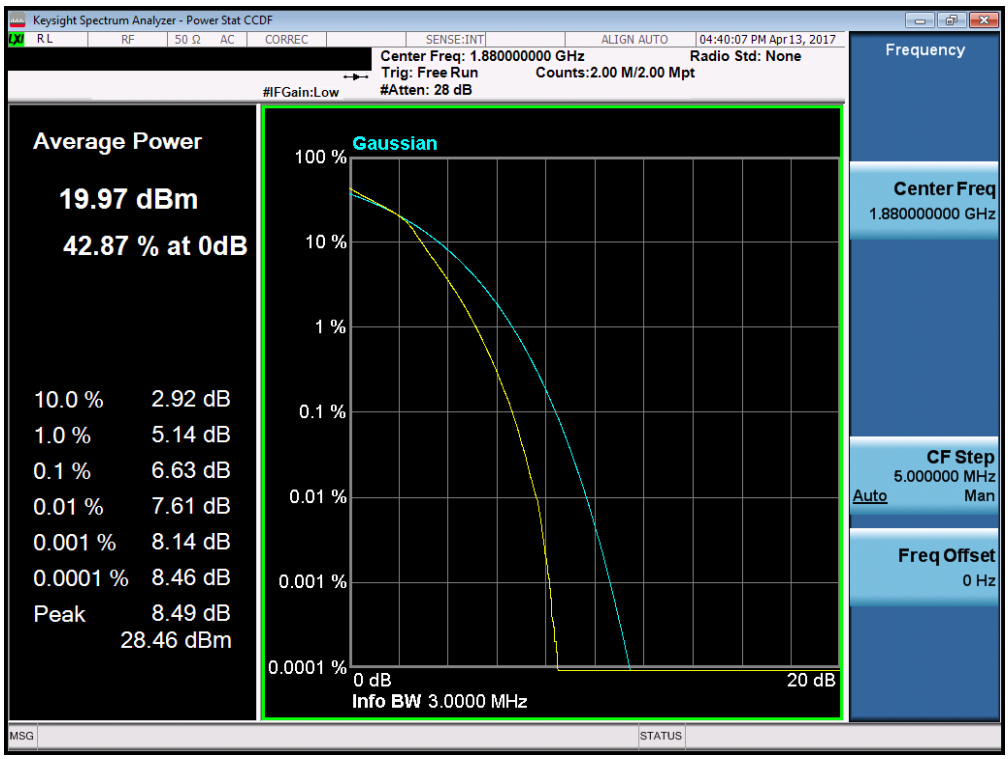
Plot 7-168. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



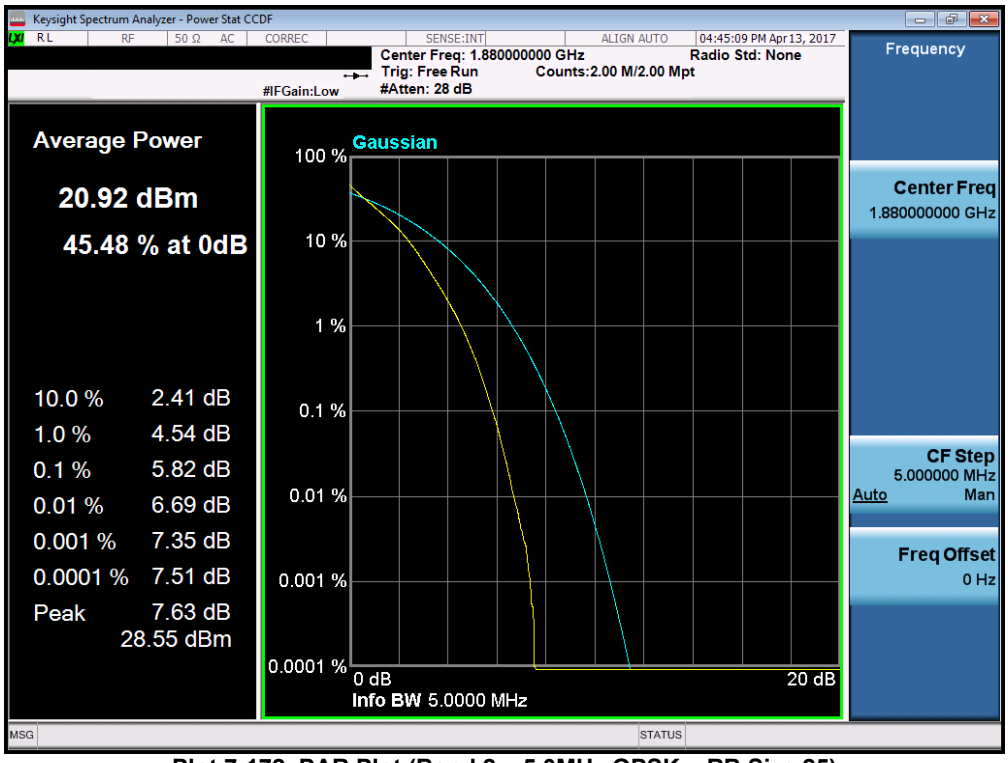
Plot 7-169. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)



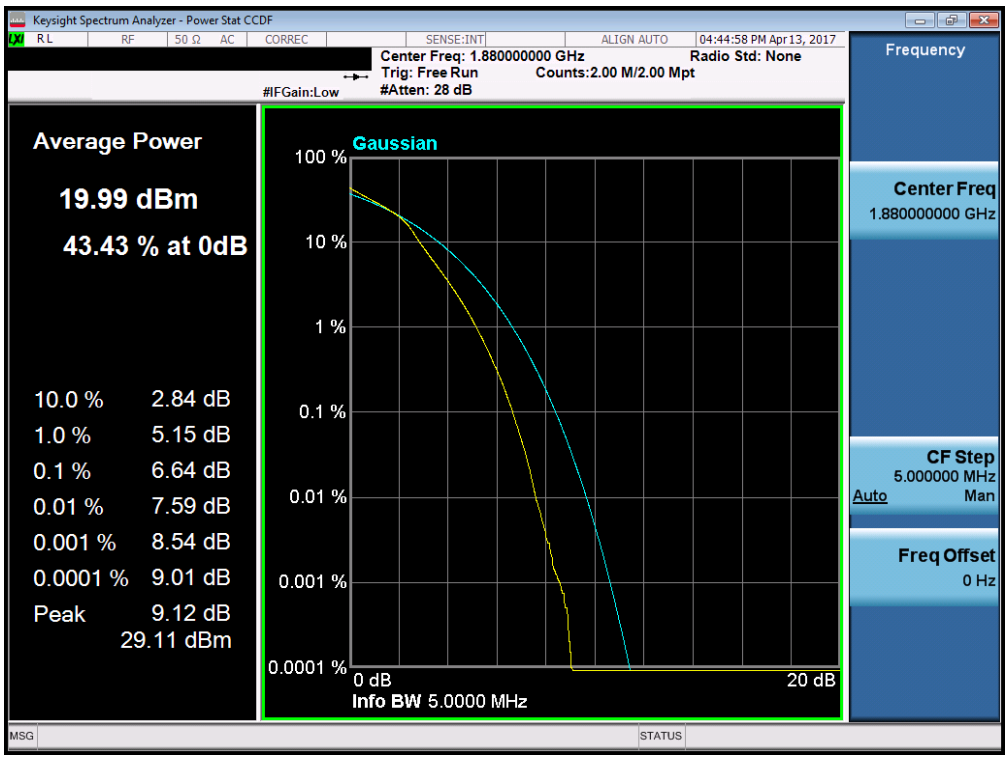
Plot 7-170. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



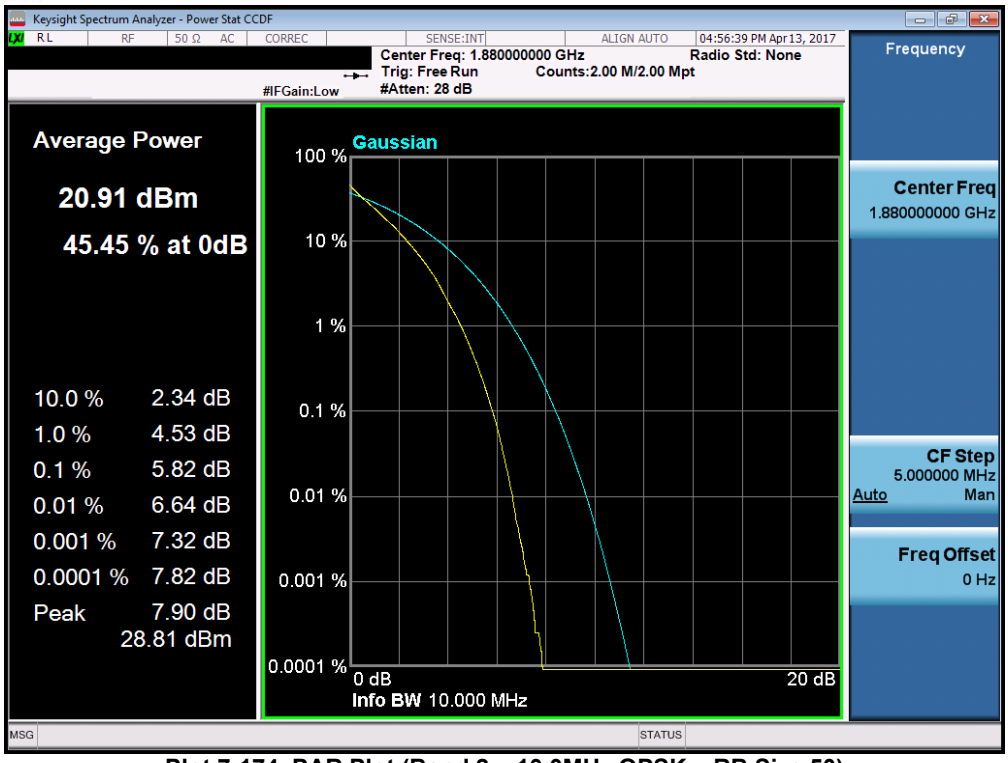
Plot 7-171. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)



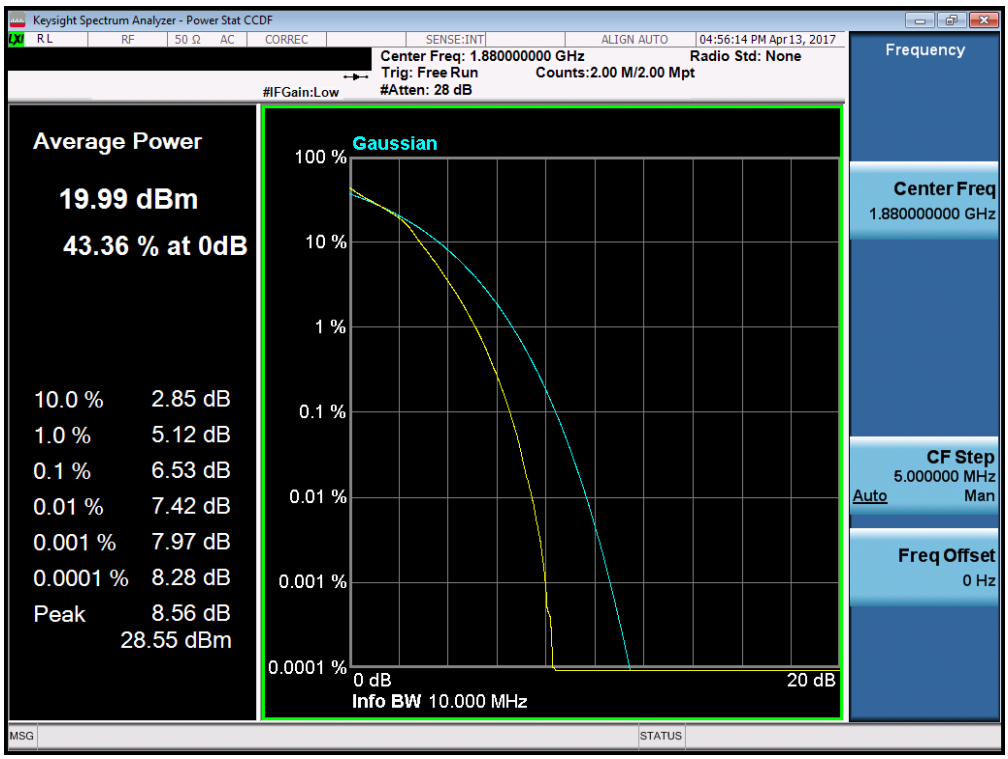
Plot 7-172. PAR Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



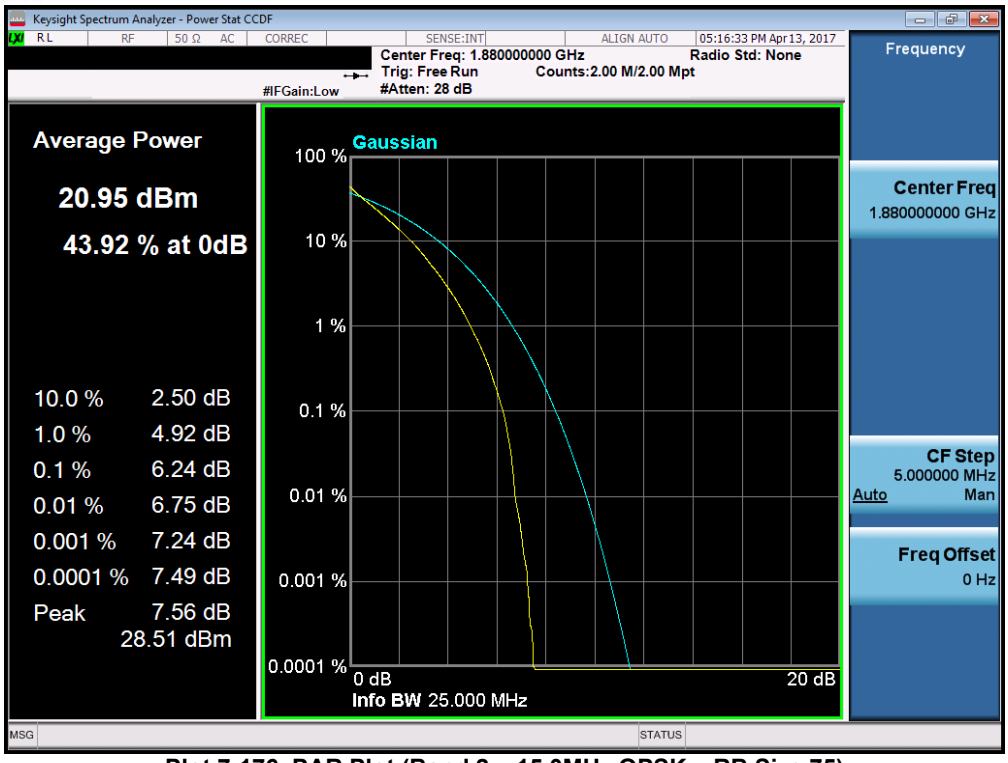
Plot 7-173. PAR Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)



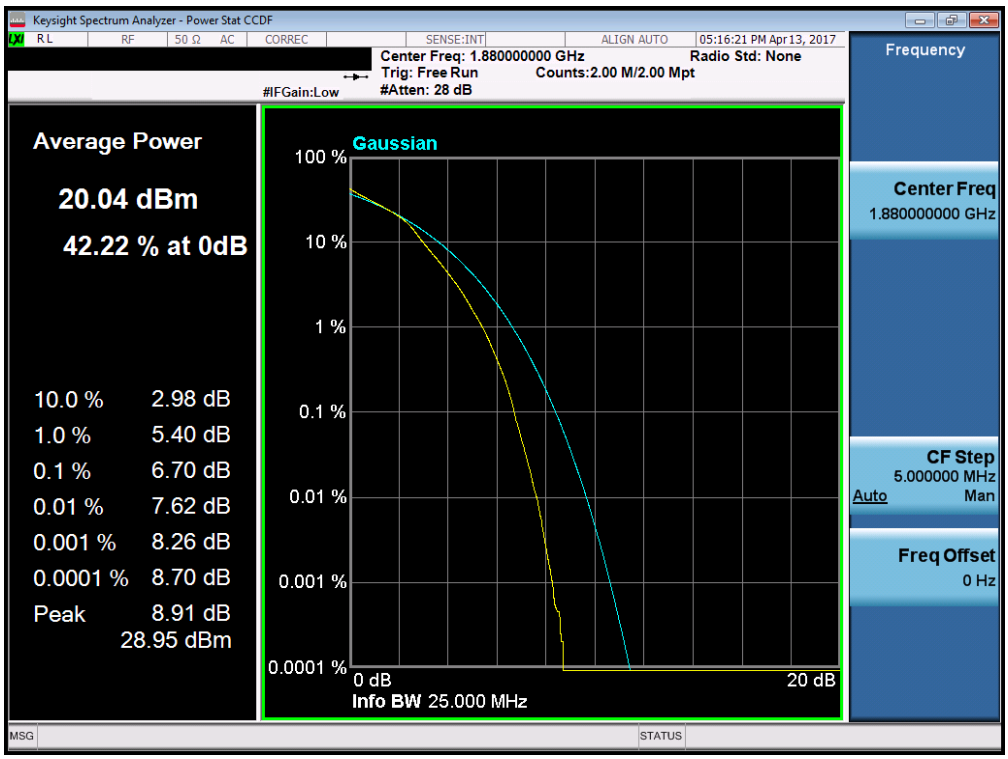
Plot 7-174. PAR Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



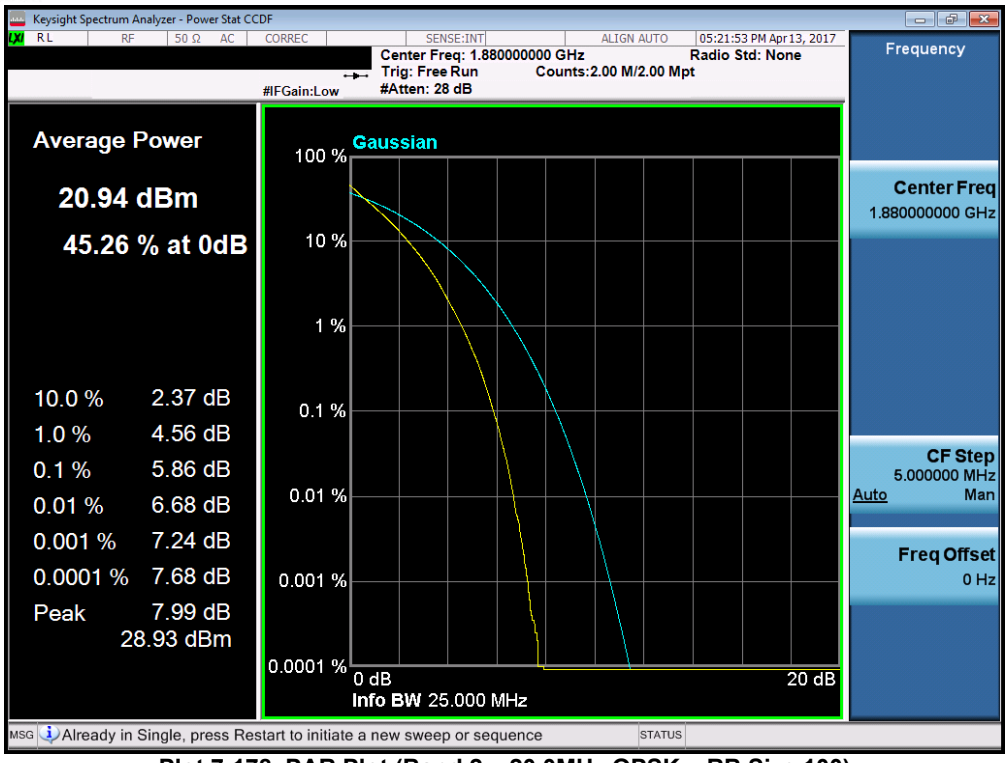
Plot 7-175. PAR Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)



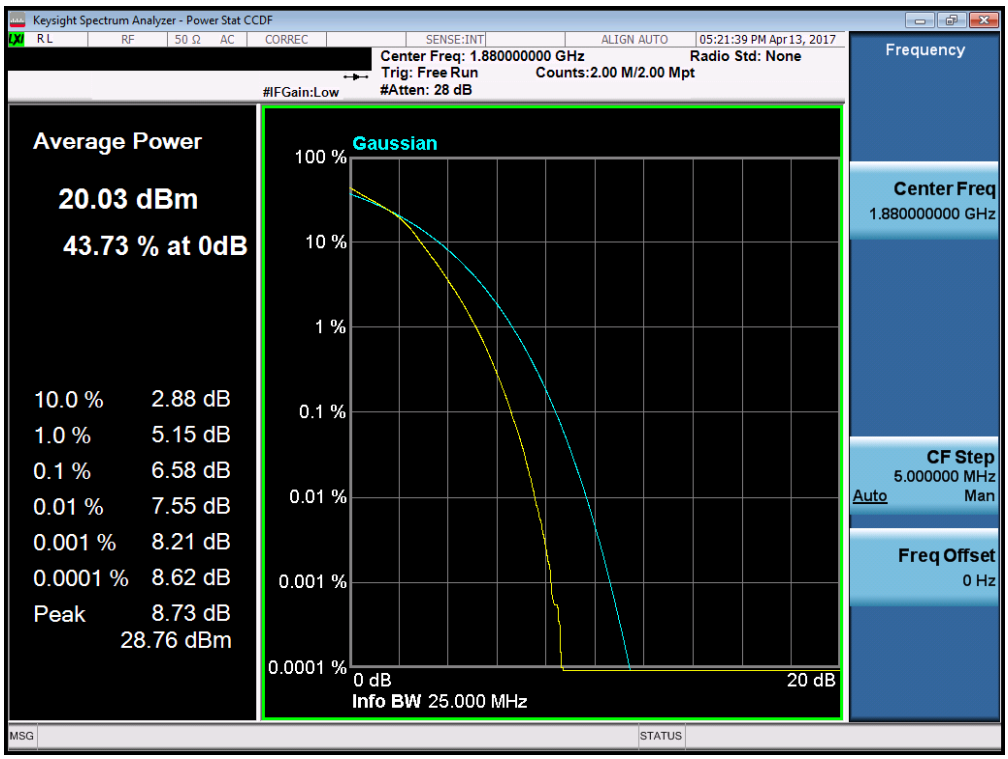
Plot 7-176. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



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(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.

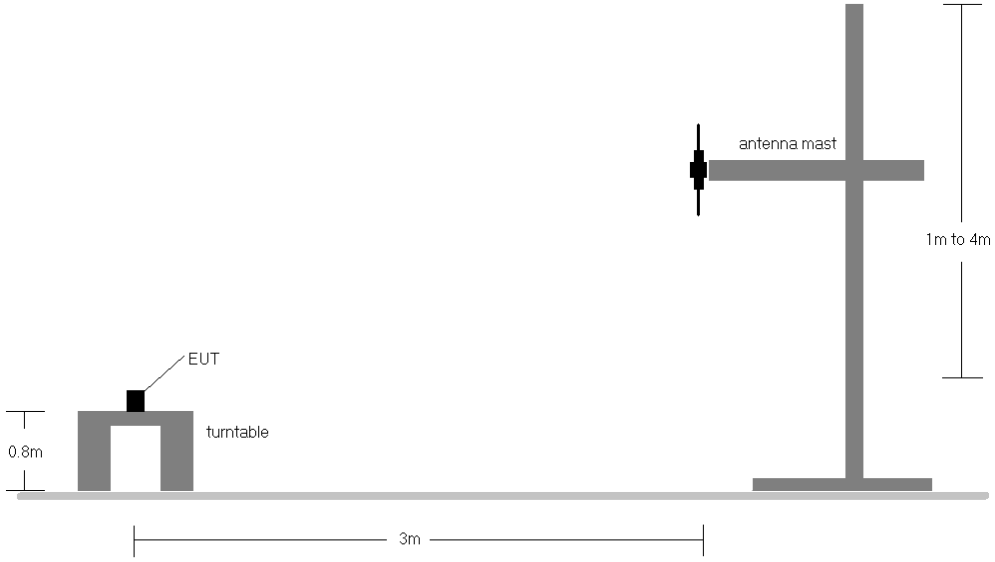


Figure 7-5. Radiated Test Setup <1GHz

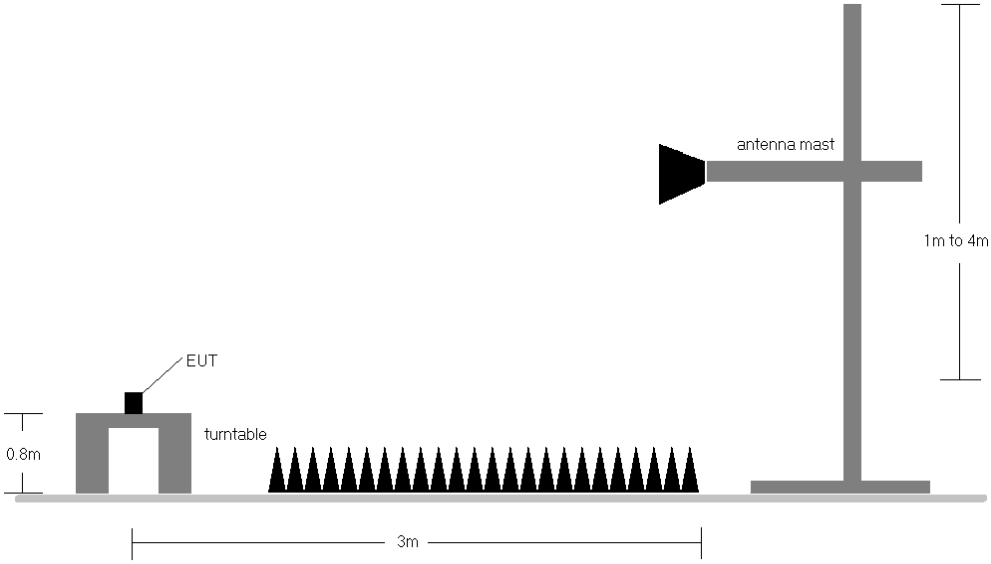


Figure 7-6. Radiated Test Setup >1GHz

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	136	6	1 / 5	13.33	2.56	15.89	34.77	-18.88
707.50	1.4	QPSK	H	126	325	1 / 5	14.08	2.56	16.64	34.77	-18.13
715.30	1.4	QPSK	H	130	8	1 / 0	13.98	2.60	16.58	34.77	-18.20
707.50	1.4	16-QAM	H	126	325	1 / 5	12.13	2.56	14.69	34.77	-20.08
700.50	3	QPSK	H	130	352	1 / 14	13.65	2.48	16.13	34.77	-18.64
707.50	3	QPSK	H	139	8	1 / 14	14.11	2.56	16.67	34.77	-18.10
714.50	3	QPSK	H	126	345	1 / 14	14.12	2.60	16.72	34.77	-18.05
714.50	3	16-QAM	H	126	345	1 / 14	12.06	2.60	14.66	34.77	-20.11

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]
701.50	5	QPSK	H	134	15	1 / 24	15.14	2.49	17.63	34.77	-17.14
707.50	5	QPSK	H	134	7	1 / 0	15.75	2.56	18.31	34.77	-16.46
713.50	5	QPSK	H	138	6	1 / 24	15.50	2.60	18.10	34.77	-16.67
707.50	5	16-QAM	H	134	7	1 / 0	13.31	2.56	15.87	34.77	-18.90
704.00	10	QPSK	H	130	351	1 / 0	14.85	2.51	17.36	34.77	-17.41
707.50	10	QPSK	H	136	10	1 / 49	15.21	2.56	17.77	34.77	-17.00
711.00	10	QPSK	H	130	17	1 / 49	14.78	2.60	17.38	34.77	-17.40
707.50	10	16-QAM	H	136	10	1 / 49	13.23	2.56	15.79	34.77	-18.98
707.50	5	QPSK	V	126	354	1 / 74	14.28	2.99	17.27	34.77	-17.50

Table 7-3. ERP Data (Band 12/17)

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	V	150	186	1 / 0	20.21	-0.65	19.56	38.45	-18.89
836.50	1.4	QPSK	V	150	152	1 / 5	20.52	-0.65	19.87	38.45	-18.58
848.30	1.4	QPSK	V	150	196	1 / 0	20.17	-0.65	19.52	38.45	-18.93
836.50	1.4	16-QAM	V	150	152	1 / 5	19.53	-0.65	18.88	38.45	-19.57
825.50	3	QPSK	V	150	192	1 / 14	20.28	-0.65	19.63	38.45	-18.82
836.50	3	QPSK	V	150	147	1 / 0	20.55	-0.65	19.90	38.45	-18.55
847.50	3	QPSK	V	150	201	1 / 14	20.49	-0.65	19.84	38.45	-18.61
836.50	3	16-QAM	V	150	147	1 / 0	19.54	-0.65	18.89	38.45	-19.56
826.50	5	QPSK	V	150	187	1 / 24	20.49	-0.65	19.84	38.45	-18.61
836.50	5	QPSK	V	150	190	1 / 0	20.01	-0.65	19.36	38.45	-19.09
846.50	5	QPSK	V	150	197	1 / 24	20.02	-0.65	19.37	38.45	-19.08
826.50	5	16-QAM	V	150	187	1 / 24	19.39	-0.65	18.74	38.45	-19.71
829.00	10	QPSK	V	150	186	1 / 49	20.52	-0.65	19.87	38.45	-18.58
836.50	10	QPSK	V	150	179	1 / 49	20.08	-0.65	19.43	38.45	-19.02
844.00	10	QPSK	V	150	207	1 / 49	20.54	-0.65	19.89	38.45	-18.56
844.00	10	16-QAM	V	150	207	1 / 49	19.43	-0.65	18.78	38.45	-19.67
836.50	3	QPSK	H	150	130	1 / 0	18.77	-0.65	18.12	38.45	-20.33

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	150	80	1 / 5	16.77	5.56	22.33	30.00	-7.67
1745.00	1.4	QPSK	H	150	80	1 / 5	19.49	5.32	24.81	30.00	-5.19
1779.30	1.4	QPSK	H	150	80	1 / 0	19.81	5.09	24.90	30.00	-5.10
1779.30	1.4	16-QAM	H	150	80	1 / 0	19.02	5.09	24.11	30.00	-5.89
1711.50	3	QPSK	H	150	77	1 / 14	16.76	5.55	22.31	30.00	-7.69
1745.00	3	QPSK	H	150	77	1 / 14	19.62	5.32	24.94	30.00	-5.06
1778.50	3	QPSK	H	150	79	1 / 0	20.26	5.10	25.36	30.00	-4.64
1778.50	3	16-QAM	H	150	79	1 / 0	19.05	5.10	24.15	30.00	-5.85
1712.50	5	QPSK	H	150	80	1 / 24	16.86	5.55	22.41	30.00	-7.59
1745.00	5	QPSK	H	150	79	1 / 24	19.92	5.32	25.24	30.00	-4.76
1777.50	5	QPSK	H	150	79	1 / 0	20.39	5.10	25.49	30.00	-4.51
1777.50	5	16-QAM	H	150	79	1 / 0	19.37	5.10	24.47	30.00	-5.53
1715.00	10	QPSK	H	150	79	1 / 49	16.86	5.53	22.39	30.00	-7.61
1745.00	10	QPSK	H	150	80	1 / 49	19.82	5.32	25.14	30.00	-4.86
1775.00	10	QPSK	H	15	82	1 / 0	20.61	5.12	25.73	30.00	-4.27
1775.00	10	16-QAM	H	150	82	1 / 0	19.00	5.12	24.12	30.00	-5.88
1717.50	15	QPSK	H	150	79	1 / 74	17.32	5.51	22.83	30.00	-7.17
1745.00	15	QPSK	H	150	80	1 / 74	19.97	5.32	25.29	30.00	-4.71
1772.50	15	QPSK	H	150	80	1 / 0	20.25	5.14	25.39	30.00	-4.61
1772.50	15	16-QAM	H	150	80	1 / 0	18.28	5.14	23.42	30.00	-6.58
1720.00	20	QPSK	H	150	81	1 / 99	17.71	5.49	23.20	30.00	-6.80
1745.00	20	QPSK	H	150	81	1 / 99	19.73	5.32	25.05	30.00	-4.95
1770.00	20	QPSK	H	150	80	1 / 0	20.00	5.15	25.15	30.00	-4.85
1770.00	20	16-QAM	H	150	80	1 / 0	18.01	5.15	23.16	30.00	-6.84
1775.00	10	QPSK	V	150	37	100 / 0	15.46	4.95	20.41	30.00	-9.59

Table 7-5. EIRP Data (Band 4/66)

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	150	75	1 / 5	18.30	4.82	23.12	33.01	-9.89
1880.00	1.4	QPSK	H	150	77	1 / 5	17.50	4.74	22.24	33.01	-10.77
1909.30	1.4	QPSK	H	150	80	1 / 0	17.52	4.68	22.20	33.01	-10.81
1850.70	1.4	16-QAM	H	150	75	1 / 5	16.24	4.82	21.06	33.01	-11.95
1851.50	3	QPSK	H	150	77	1 / 0	18.40	4.82	23.22	33.01	-9.79
1880.00	3	QPSK	H	150	74	1 / 0	17.57	4.74	22.31	33.01	-10.70
1908.50	3	QPSK	H	150	75	1 / 14	17.80	4.68	22.48	33.01	-10.53
1851.50	3	16-QAM	H	150	77	1 / 0	16.05	4.82	20.87	33.01	-12.14
1852.50	5	QPSK	H	150	77	1 / 0	18.50	4.81	23.31	33.01	-9.70
1880.00	5	QPSK	H	150	74	1 / 0	18.05	4.74	22.79	33.01	-10.22
1907.50	5	QPSK	H	150	80	1 / 24	18.24	4.68	22.92	33.01	-10.09
1852.50	5	16-QAM	H	150	77	1 / 0	16.13	4.81	20.94	33.01	-12.07
1855.00	10	QPSK	H	150	71	1 / 0	18.34	4.81	23.15	33.01	-9.86
1880.00	10	QPSK	H	150	76	1 / 0	17.68	4.74	22.42	33.01	-10.59
1905.00	10	QPSK	H	150	79	1 / 49	17.97	4.68	22.65	33.01	-10.36
1855.00	10	16-QAM	H	150	71	1 / 0	16.04	4.81	20.85	33.01	-12.16
1857.50	15	QPSK	H	150	74	1 / 74	18.09	4.80	22.89	33.01	-10.12
1880.00	15	QPSK	H	150	77	1 / 0	17.62	4.74	22.36	33.01	-10.65
1902.50	15	QPSK	H	150	78	1 / 74	17.79	4.69	22.48	33.01	-10.53
1857.50	15	16-QAM	H	150	74	1 / 74	15.56	4.80	20.36	33.01	-12.65
1860.00	20	QPSK	H	150	77	1 / 0	17.92	4.79	22.71	33.01	-10.30
1880.00	20	QPSK	H	150	79	1 / 0	17.53	4.74	22.27	33.01	-10.74
1900.00	20	QPSK	H	150	79	1 / 99	17.78	4.69	22.47	33.01	-10.54
1860.00	20	16-QAM	H	150	77	1 / 0	15.44	4.79	20.23	33.01	-12.78
1852.50	5	QPSK	V	150	36	100 / 0	14.81	4.79	19.60	33.01	-13.41

Table 7-6. EIRP Data (Band 2)

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	150	16	1 / 0	16.18	5.73	21.91	33.01	-11.10
2593.00	5	QPSK	H	150	30	1 / 0	13.44	6.07	19.51	33.01	-13.50
2687.50	5	QPSK	H	150	43	1 / 0	13.32	6.48	19.80	33.01	-13.21
2498.50	5	16-QAM	H	150	16	1 / 0	14.88	5.73	20.61	33.01	-12.40
2501.00	10	QPSK	H	150	12	1 / 0	15.55	5.73	21.28	33.01	-11.73
2593.00	10	QPSK	H	150	42	1 / 49	13.03	6.07	19.10	33.01	-13.91
2685.00	10	QPSK	H	15	56	1 / 49	13.54	6.47	20.01	33.01	-13.00
2501.00	10	16-QAM	H	150	12	1 / 0	14.58	5.73	20.31	33.01	-12.70
2503.50	15	QPSK	H	150	14	1 / 0	16.32	5.74	22.06	33.01	-10.95
2593.00	15	QPSK	H	150	34	1 / 0	13.36	6.07	19.43	33.01	-13.58
2682.50	15	QPSK	H	150	65	1 / 0	13.72	6.46	20.18	33.01	-12.83
2503.50	15	16-QAM	H	150	14	1 / 0	14.97	5.74	20.71	33.01	-12.30
2506.00	20	QPSK	H	150	27	1 / 0	15.64	5.75	21.39	33.01	-11.62
2593.00	20	QPSK	H	150	35	1 / 0	12.69	6.07	18.76	33.01	-14.25
2680.00	20	QPSK	H	150	54	1 / 99	13.06	6.45	19.51	33.01	-13.50
2506.00	20	16-QAM	H	150	27	1 / 0	13.58	5.75	19.33	33.01	-13.68
2503.50	15	QPSK	V	150	247	1 / 0	15.50	5.61	21.11	33.01	-11.90

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.

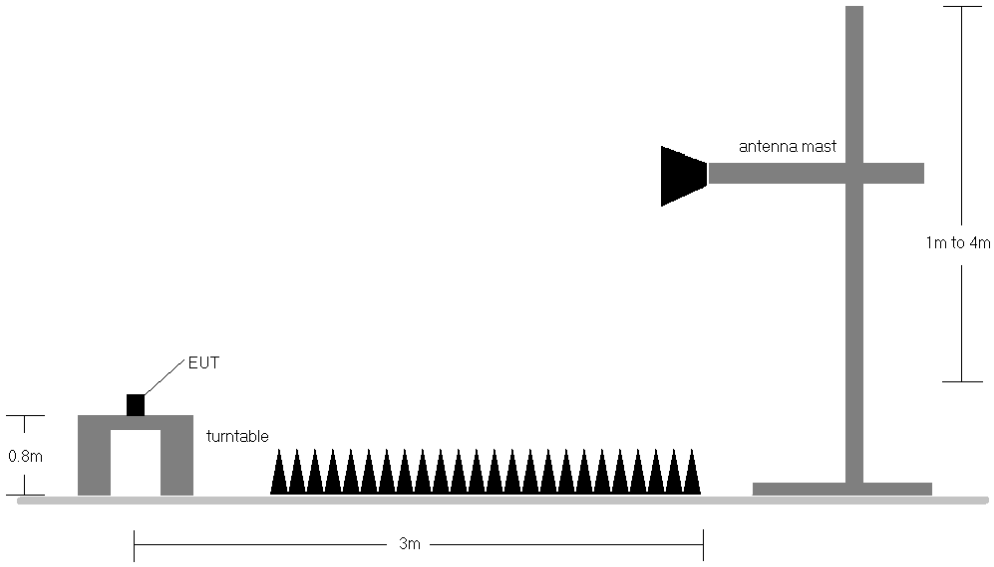


Figure 7-7. Test Instrument & Measurement Setup

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:	17.63	dBm	=	0.058	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 log$_{10}$ (W) =	30.63	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	110	88	-56.76	5.60	-51.16	68.8
2104.50	H	110	24	-71.02	6.67	-64.35	82.0
2806.00	H	110	122	-68.80	7.92	-60.88	78.5
3507.50	H	110	128	-65.83	7.80	-58.03	75.7
4209.00	H	-	-	-69.13	8.30	-60.83	78.5

Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz			
CHANNEL:	23095				
MEASURED OUTPUT POWER:	18.31	dBm	=	0.068	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 log$_{10}$ (W) =	31.31	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	110	88	-61.00	5.69	-55.31	73.6
2122.50	H	110	10	-71.93	6.75	-65.19	83.5
2830.00	H	110	119	-69.56	7.90	-61.66	80.0
3537.50	H	110	124	-67.06	7.81	-59.25	77.6
4245.00	H	-	-	-68.71	8.41	-60.30	78.6

Table 7-9. Radiated Spurious Data (Band 12/17 – Mid Channel)

OPERATING FREQUENCY:	713.50	MHz		
CHANNEL:	23155			
MEASURED OUTPUT POWER:	18.10	dBm	=	0.065 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.10	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	110	90	-56.56	5.79	-50.77	68.9
2140.50	H	110	140	-71.92	6.82	-65.10	83.2
2854.00	H	110	120	-66.49	7.88	-58.61	76.7
3567.50	H	110	122	-66.90	7.82	-59.08	77.2
4281.00	H	-	-	-68.72	8.52	-60.20	78.3

Table 7-10. Radiated Spurious Data (Band 12/17 – High Channel)

OPERATING FREQUENCY:	825.50	MHz		
CHANNEL:	20415			
MEASURED OUTPUT POWER:	19.63	dBm	=	0.092 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	3.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.63	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	V	110	269	-73.12	6.74	-66.39	86.0
2476.50	V	-	-	-72.51	7.52	-64.99	84.6
3302.00	V	-	-	-69.42	7.50	-61.92	81.6

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

OPERATING FREQUENCY:	836.50	MHz			
CHANNEL:	20525				
MEASURED OUTPUT POWER:	19.90	dBm	=	0.098	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	3.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.90	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	V	110	89	-73.95	6.77	-67.18	87.1
2509.50	V	-	-	-72.49	7.65	-64.84	84.7
3346.00	V	-	-	-69.56	7.53	-62.03	81.9

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

OPERATING FREQUENCY:	847.50	MHz			
CHANNEL:	20635				
MEASURED OUTPUT POWER:	19.84	dBm	=	0.096	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	3.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.84	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	V	110	79	-73.31	6.80	-66.51	86.4
2542.50	V	-	-	-72.30	7.62	-64.68	84.5
3390.00	V	-	-	-68.84	7.56	-61.28	81.1

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

OPERATING FREQUENCY:	1715.00	MHz			
CHANNEL:	132022				
MEASURED OUTPUT POWER:	22.39	dBm	=	0.173	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	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]
3430.00	H	-	-	-70.61	9.87	-60.73	83.1
5145.00	H	-	-	-68.55	10.75	-57.79	80.2

Table 7-14. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz			
CHANNEL:	132322				
MEASURED OUTPUT POWER:	25.14	dBm	=	0.327	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.14	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]
3490.00	H	-	-	-70.32	9.94	-60.38	85.5
5235.00	H	-	-	-67.99	10.72	-57.26	82.4

Table 7-15. Radiated Spurious Data (Band 4/66 – Mid Channel)

OPERATING FREQUENCY:	1775.00	MHz			
CHANNEL:	132622				
MEASURED OUTPUT POWER:	25.73	dBm	=	0.374	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.73	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]
3550.00	H	-	-	-70.77	9.96	-60.80	86.5
5325.00	H	-	-	-68.16	10.71	-57.45	83.2

Table 7-16. Radiated Spurious Data (Band 4/66 – High Channel)

OPERATING FREQUENCY:	1852.50	MHz			
CHANNEL:	18625				
MEASURED OUTPUT POWER:	23.31	dBm	=	0.214	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	5.0	MHz			
DISTANCE:	3	meters			
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.31	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]
3705.00	H	110	352	-67.58	9.52	-58.07	81.4
5557.50	H	100	43	-66.29	11.03	-55.26	78.6
7410.00	H	110	285	-58.52	10.95	-47.57	70.9
9262.50	H	110	274	-51.95	11.53	-40.42	63.7
11115.00	H	-	-	-58.40	12.80	-45.60	68.9

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

OPERATING FREQUENCY:	1880.00	MHz		
CHANNEL:	18900			
MEASURED OUTPUT POWER:	22.79	dBm	=	0.190 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.79	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	110	89	-67.15	9.39	-57.77	80.6
5640.00	H	110	32	-66.36	11.22	-55.14	77.9
7520.00	H	110	33	-58.49	11.10	-47.38	70.2
9400.00	H	110	270	-52.61	11.54	-41.07	63.9
11280.00	H	-	-	-57.68	12.76	-44.92	67.7

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

OPERATING FREQUENCY:	1907.50	MHz		
CHANNEL:	19175			
MEASURED OUTPUT POWER:	22.92	dBm	=	0.196 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.92	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]
3815.00	H	110	118	-66.45	9.32	-57.13	80.1
5722.50	H	110	304	-65.46	11.35	-54.12	77.0
7630.00	H	110	288	-57.40	11.32	-46.08	69.0
9537.50	H	110	293	-57.70	11.75	-45.95	68.9
11445.00	H	-	-	-58.67	12.70	-45.97	68.9

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

OPERATING FREQUENCY:	2503.50	MHz			
CHANNEL:	39725				
MEASURED OUTPUT POWER:	22.06	dBm	=	0.161	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	15.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W)	47.06	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]
5007.00	V	110	346	-54.24	10.88	-43.36	65.4
7510.50	V	110	352	-56.91	11.09	-45.82	67.9
10014.00	V	-	-	-56.42	12.06	-44.37	66.4

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

OPERATING FREQUENCY:	2593.00	MHz			
CHANNEL:	40620				
MEASURED OUTPUT POWER:	19.43	dBm	=	0.088	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	15.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W)	44.43	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	117	114	-54.25	10.62	-43.63	63.1
7779.00	V	110	256	-56.30	11.40	-44.90	64.3
10372.00	V	-	-	-57.12	12.54	-44.58	64.0

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

OPERATING FREQUENCY:	2682.50	MHz		
CHANNEL:	41515			
MEASURED OUTPUT POWER:	20.18	dBm	=	0.104 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	15.0	MHz		
DISTANCE:	3	meters		
LIMIT:	55 + 10 log10 (W)	45.18	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]
5365.00	V	110	77	-47.19	10.72	-36.46	56.6
8047.50	V	110	80	-49.49	11.14	-38.36	58.5
10730.00	V	-	-	-57.13	12.70	-44.43	64.6

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 12/17 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,500,344	344	0.0000486
100 %		- 30	707,500,176	176	0.0000249
100 %		- 20	707,500,046	46	0.0000065
100 %		- 10	707,500,160	160	0.0000226
100 %		0	707,500,180	180	0.0000254
100 %		+ 10	707,500,387	387	0.0000547
100 %		+ 20	707,499,653	-347	-0.0000490
100 %		+ 30	707,500,279	279	0.0000394
100 %		+ 40	707,499,995	-5	-0.0000007
100 %		+ 50	707,499,854	-146	-0.0000206
BATT. ENDPOINT	3.45	+ 20	707,500,142	142	0.0000201

Table 7-23. Frequency Stability Data (Band 12/17)

Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

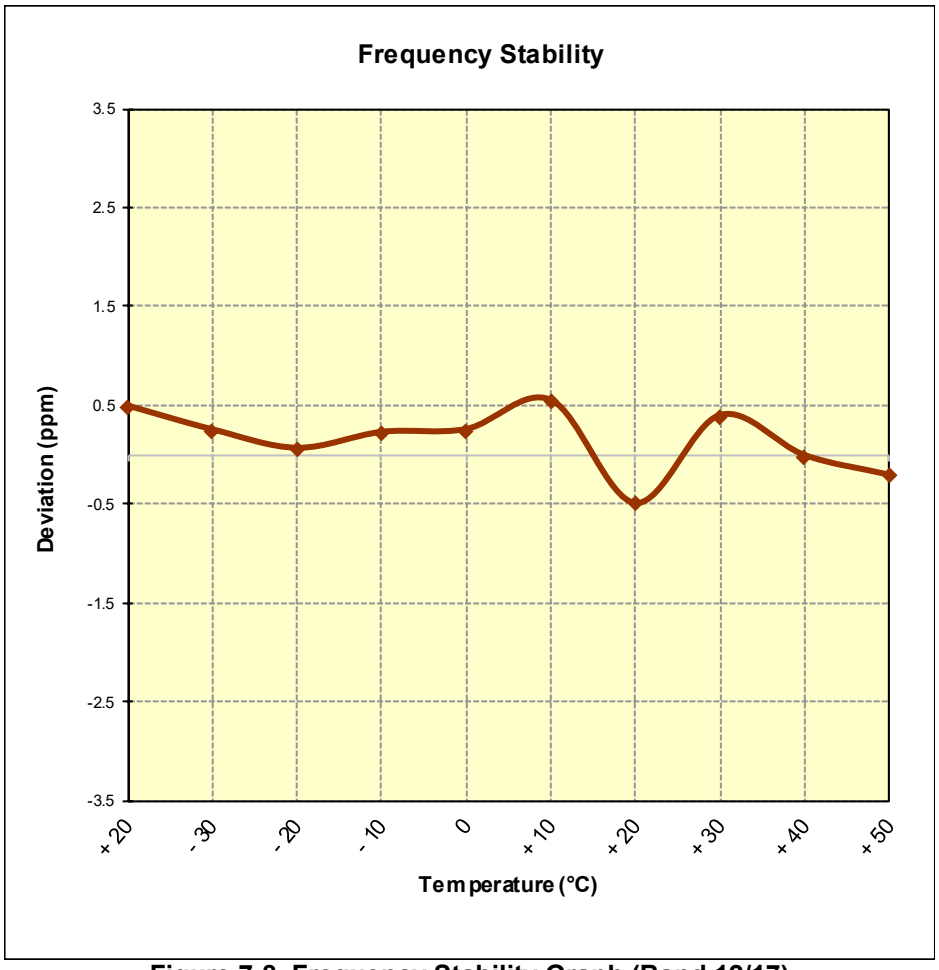


Figure 7-8. Frequency Stability Graph (Band 12/17)

Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,499,645	-355	-0.0000424
100 %		- 30	836,500,100	100	0.0000120
100 %		- 20	836,500,055	55	0.0000066
100 %		- 10	836,499,783	-217	-0.0000259
100 %		0	836,500,207	207	0.0000247
100 %		+ 10	836,500,102	102	0.0000122
100 %		+ 20	836,500,402	402	0.0000481
100 %		+ 30	836,500,016	16	0.0000019
100 %		+ 40	836,500,193	193	0.0000231
100 %		+ 50	836,499,984	-16	-0.0000019
BATT. ENDPOINT	3.45	+ 20	836,499,889	-111	-0.0000133

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

Band 5 Frequency Stability Measurements

§2.1055 §22.355

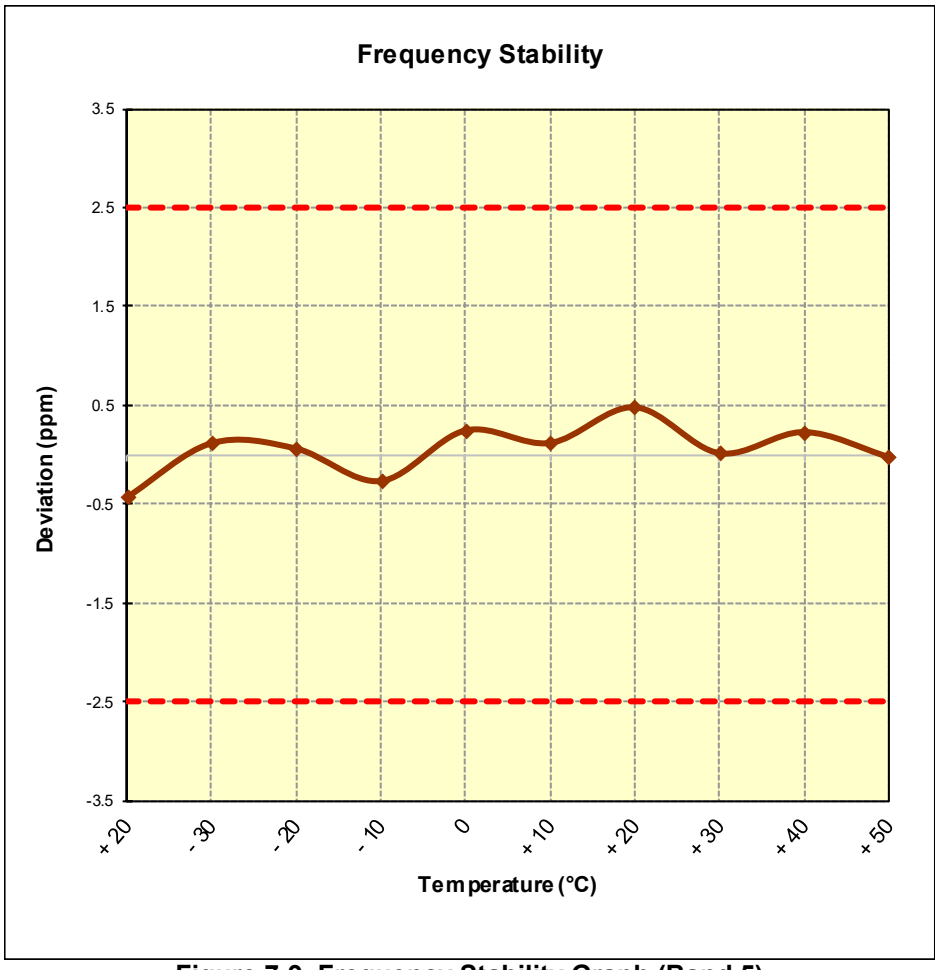


Figure 7-9. Frequency Stability Graph (Band 5)

Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,745,000,198	198	0.0000113
100 %		- 30	1,745,000,255	255	0.0000146
100 %		- 20	1,745,000,067	67	0.0000038
100 %		- 10	1,745,000,118	118	0.0000068
100 %		0	1,744,999,944	-56	-0.0000032
100 %		+ 10	1,745,000,121	121	0.0000069
100 %		+ 20	1,745,000,028	28	0.0000016
100 %		+ 30	1,745,000,070	70	0.0000040
100 %		+ 40	1,744,999,958	-42	-0.0000024
100 %		+ 50	1,745,000,261	261	0.0000150
BATT. ENDPOINT	3.45	+ 20	1,745,000,154	154	0.0000088

Table 7-25. Frequency Stability Data (Band 4/66)

Note:

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

Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54

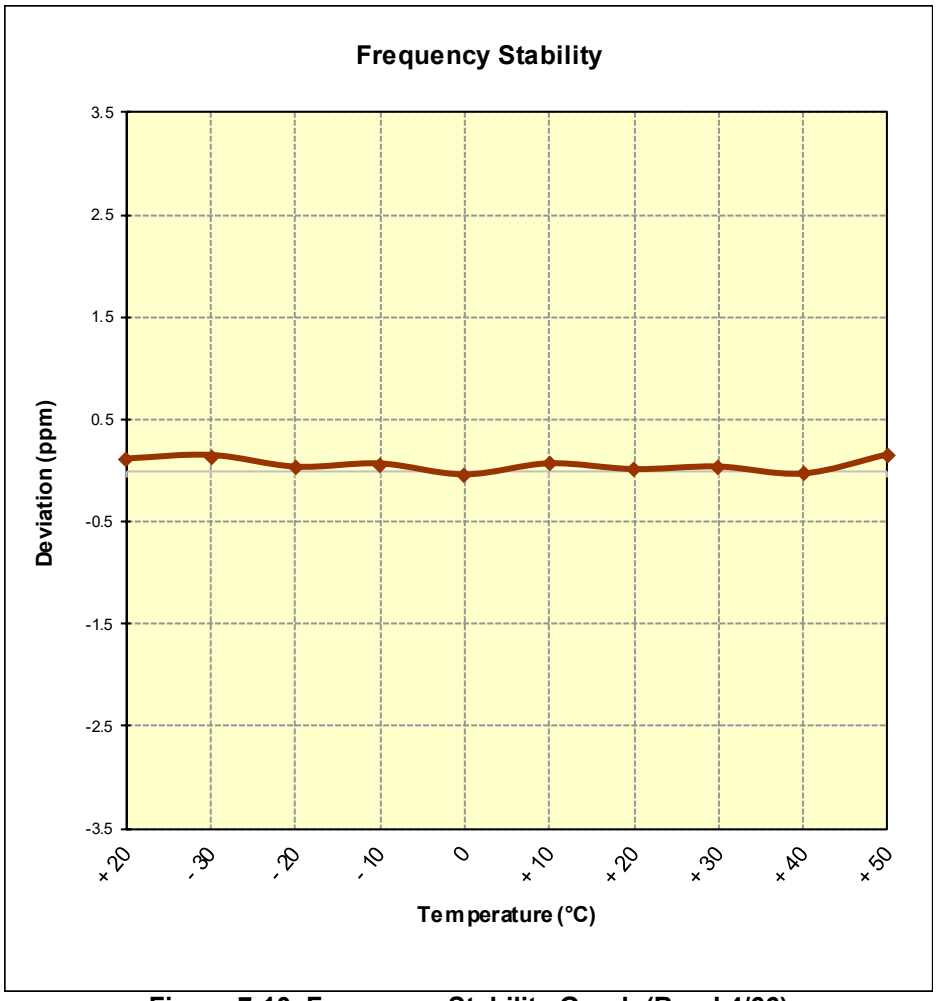


Figure 7-10. Frequency Stability Graph (Band 4/66)

Band 2 Frequency Stability Measurements

§2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,880,000,207	207	0.0000110
100 %		- 30	1,879,999,775	-225	-0.0000120
100 %		- 20	1,880,000,006	6	0.0000003
100 %		- 10	1,880,000,299	299	0.0000159
100 %		0	1,880,000,024	24	0.0000013
100 %		+ 10	1,880,000,091	91	0.0000048
100 %		+ 20	1,879,999,924	-76	-0.0000040
100 %		+ 30	1,880,000,380	380	0.0000202
100 %		+ 40	1,879,999,950	-50	-0.0000027
100 %		+ 50	1,879,999,876	-124	-0.0000066
BATT. ENDPOINT	3.45	+ 20	1,879,999,965	-35	-0.0000019

Table 7-26. 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

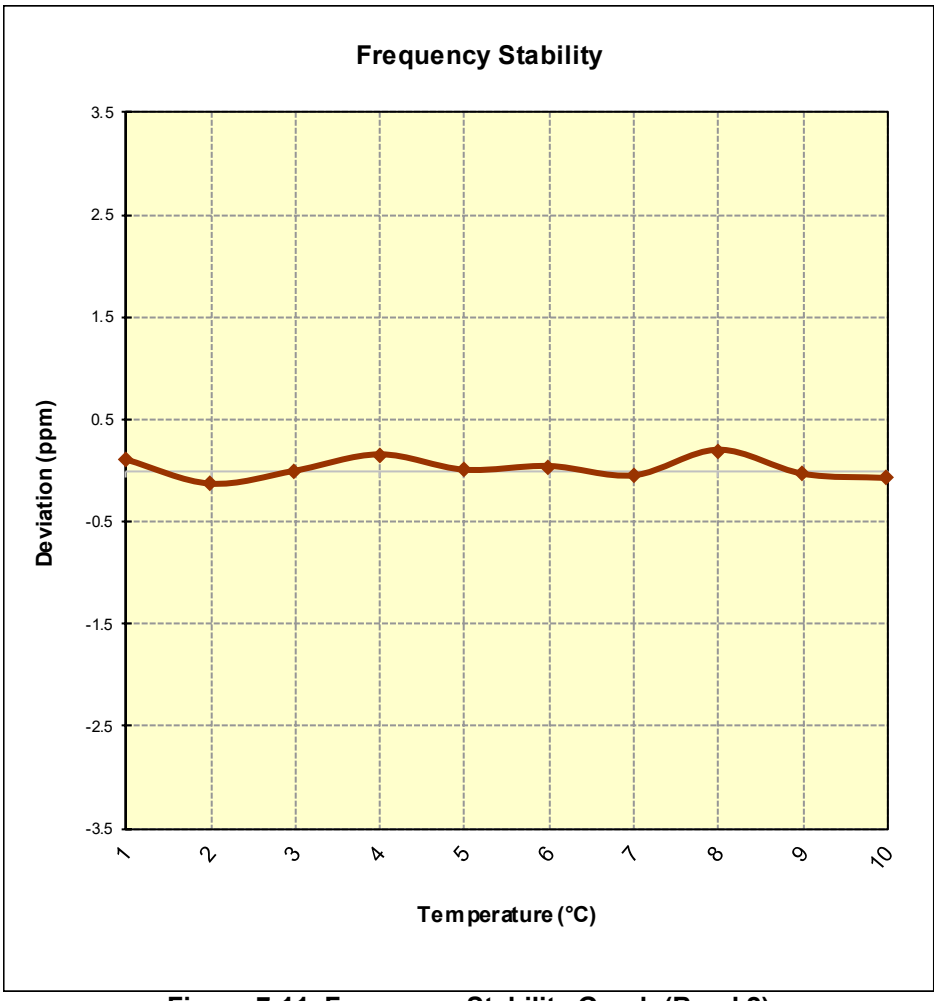


Figure 7-11. Frequency Stability Graph (Band 2)

Band 41 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,593,000,138	138	0.0000053
100 %		- 30	2,593,000,001	1	0.0000000
100 %		- 20	2,593,000,375	375	0.0000145
100 %		- 10	2,592,999,578	-422	-0.0000163
100 %		0	2,593,000,172	172	0.0000066
100 %		+ 10	2,592,999,762	-238	-0.0000092
100 %		+ 20	2,593,000,408	408	0.0000157
100 %		+ 30	2,592,999,722	-278	-0.0000107
100 %		+ 40	2,593,000,343	343	0.0000132
100 %		+ 50	2,592,999,791	-209	-0.0000081
BATT. ENDPOINT	3.45	+ 20	2,592,999,767	-233	-0.0000090

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

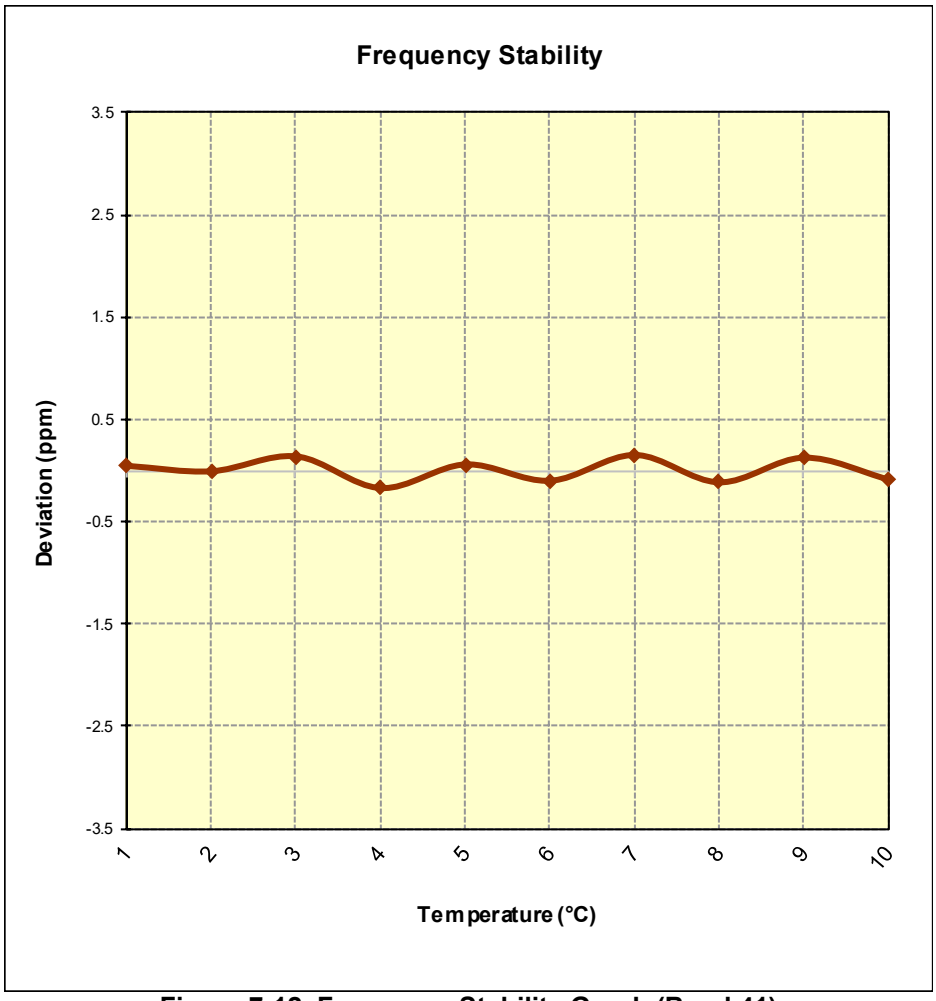


Figure 7-12. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMJ530GM** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.