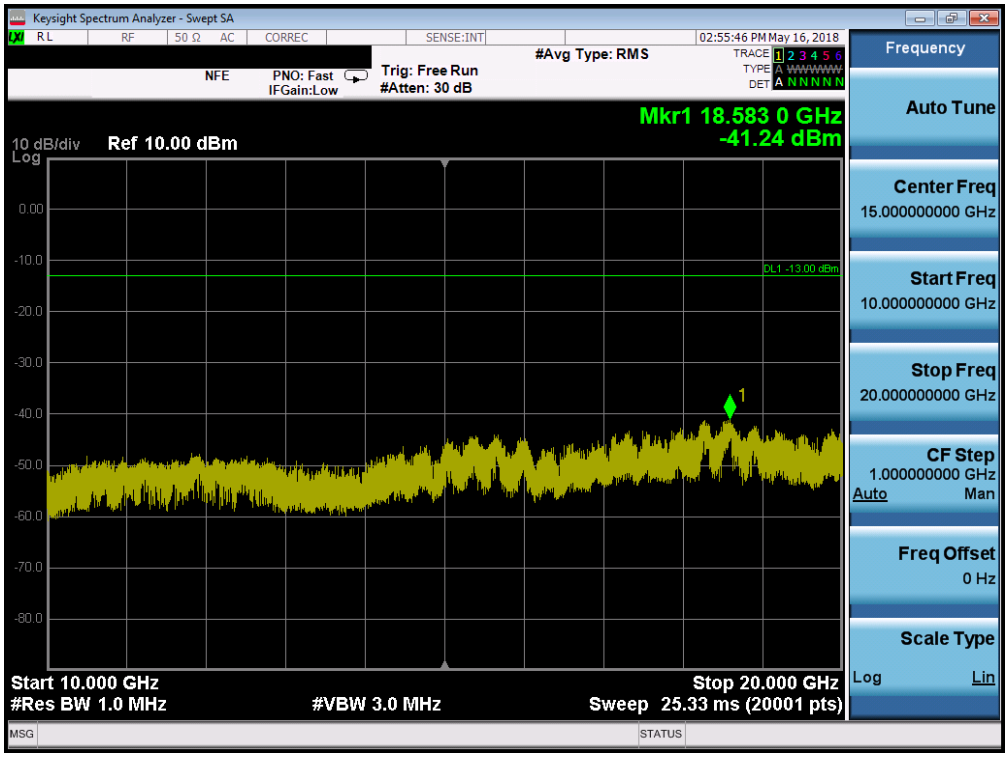


Plot 7-106. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

7.4 Band Edge Emissions at Antenna Terminal

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
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.

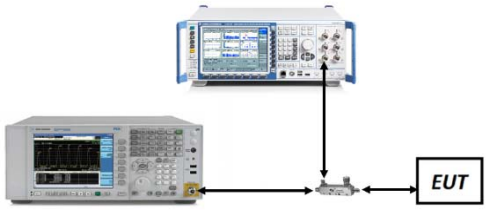


Figure 7-3. Test Instrument & Measurement Setup

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.

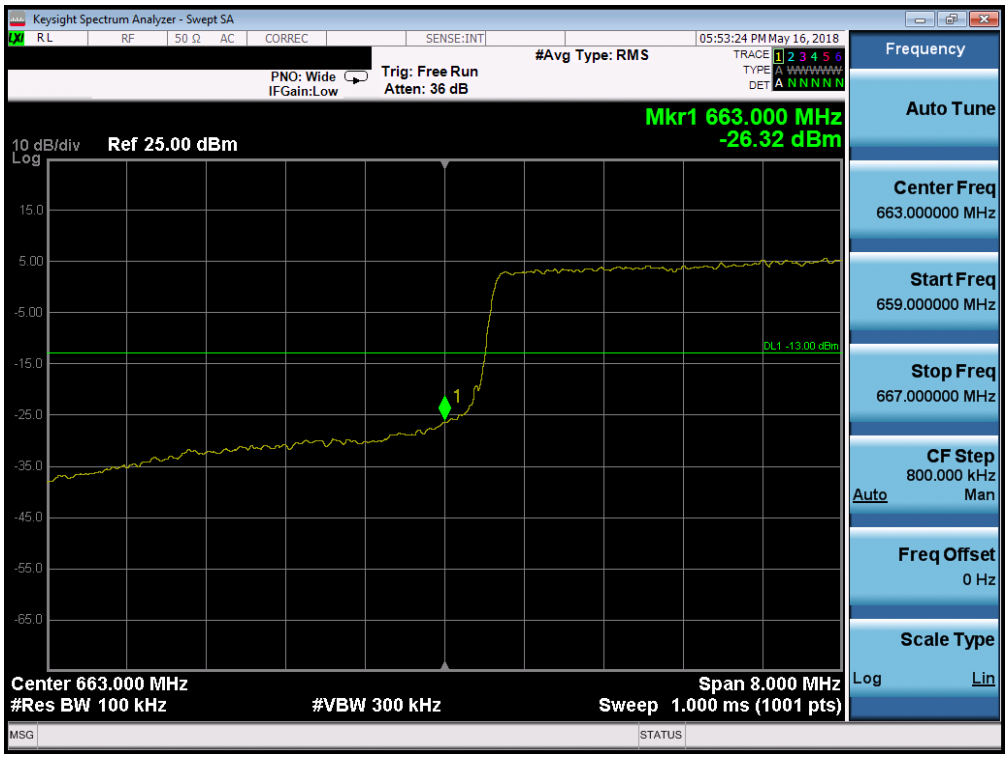
Per 27.53(g) for operations in the 600 MHz band and in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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.

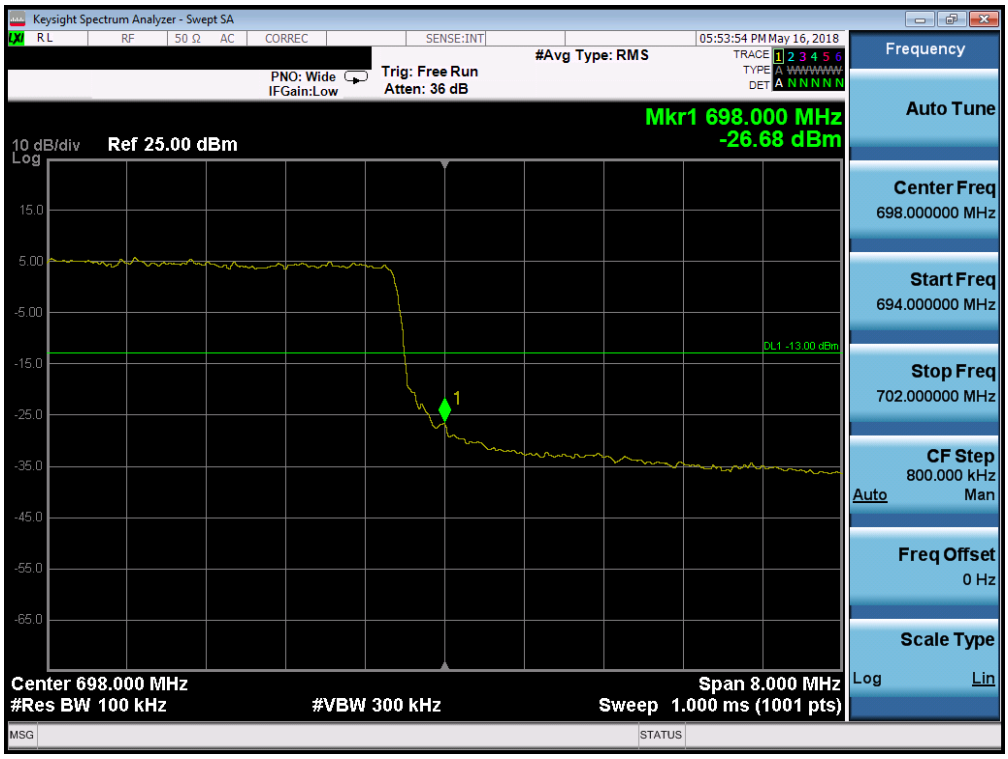
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is $65 + 10\log_{10}(P) = -35$dBm in a 6.25kHz bandwidth.

Plot 7-107. Lower Band Edge Plot (Band 71 - 5.0MHz QPSK - Full RB Configuration)

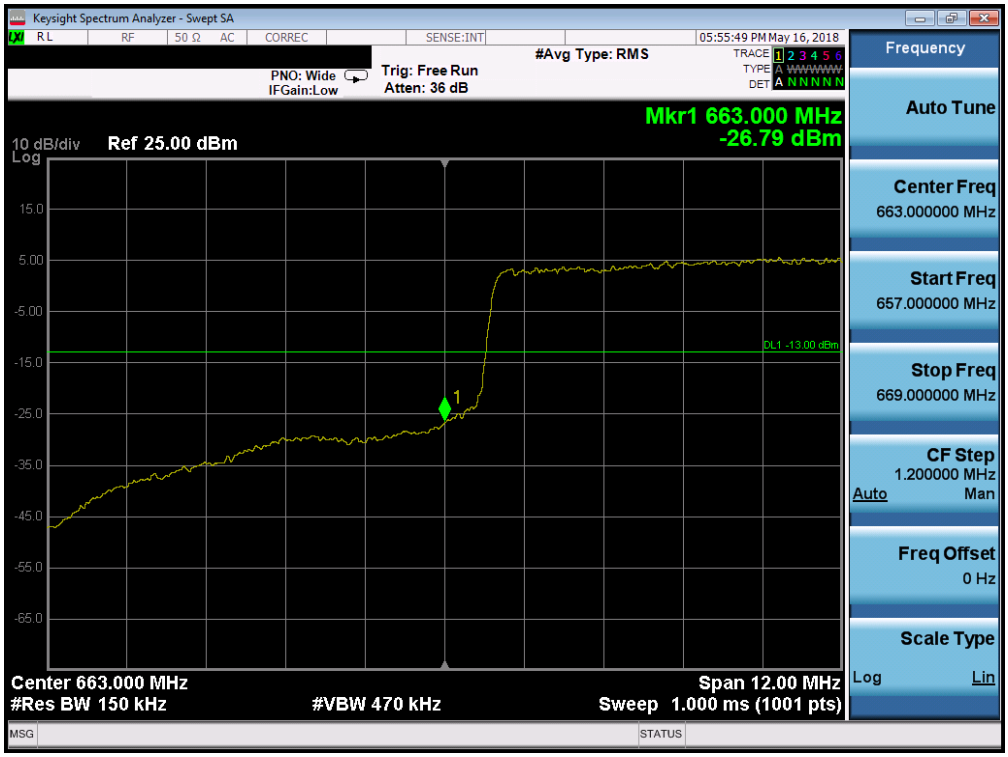
Plot 7-108. Upper Band Edge Plot (Band 71 - 5.0MHz QPSK - Full RB Configuration)



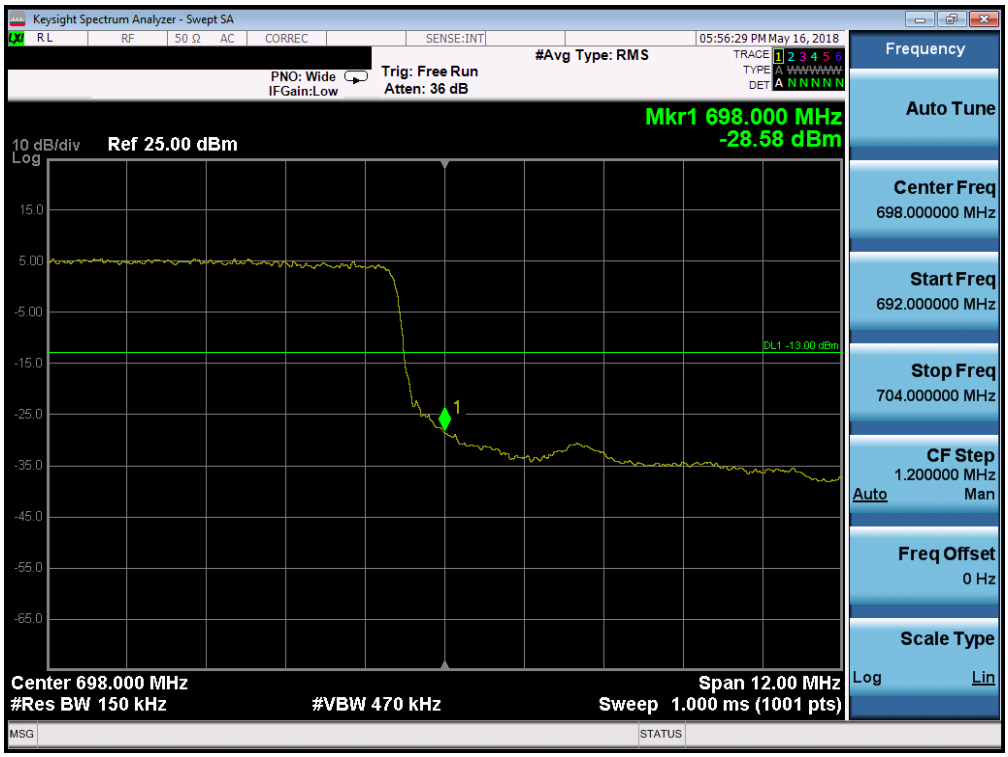
Plot 7-109. Lower Band Edge Plot (Band 71 - 10.0MHz QPSK - Full RB Configuration)



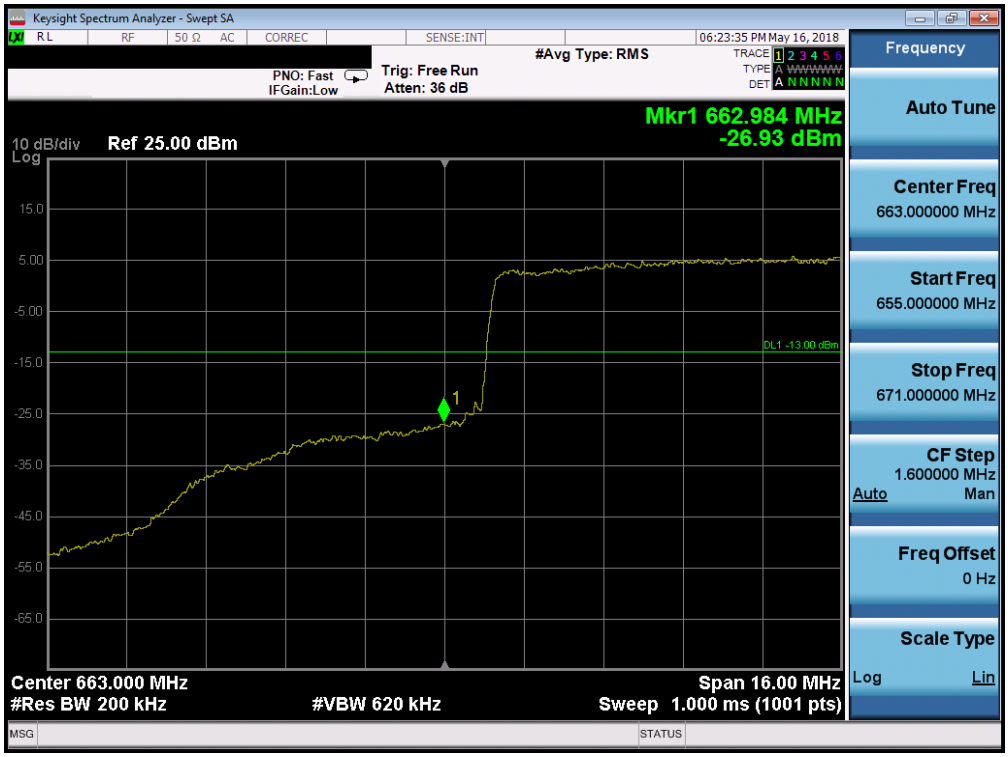
Plot 7-110. Upper Band Edge Plot (Band 71 - 10.0MHz QPSK - Full RB Configuration)



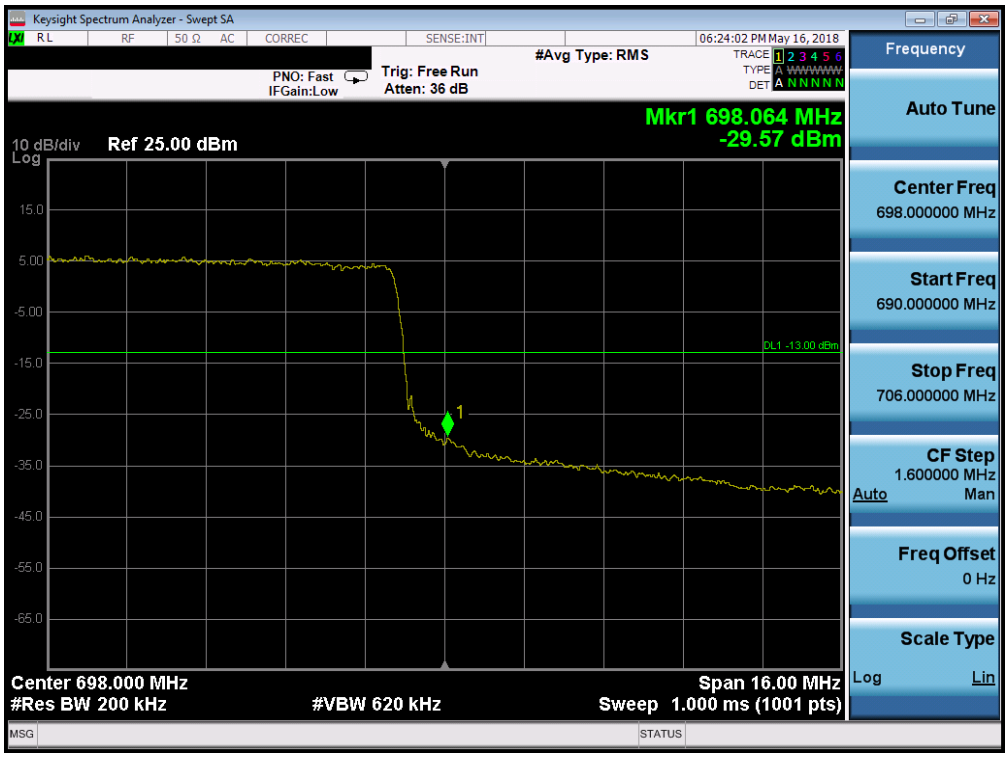
Plot 7-111. Lower Band Edge Plot (Band 71 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-112. Upper Band Edge Plot (Band 71 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-113. Lower Band Edge Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)

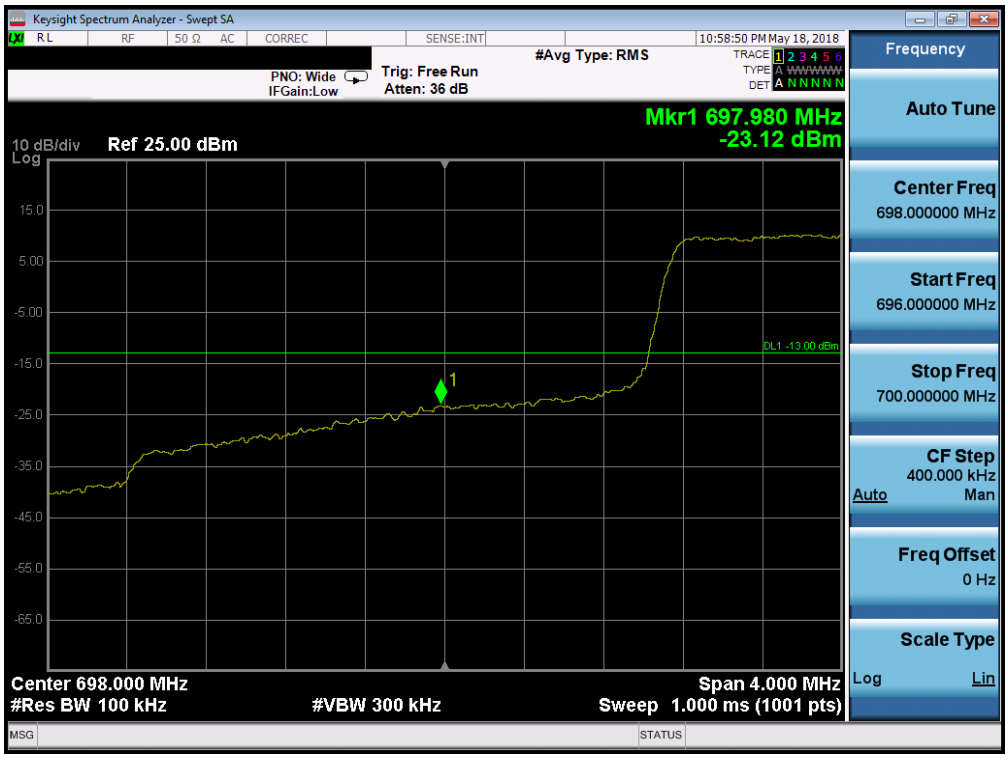


Plot 7-114. Upper Band Edge Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)

Band 12

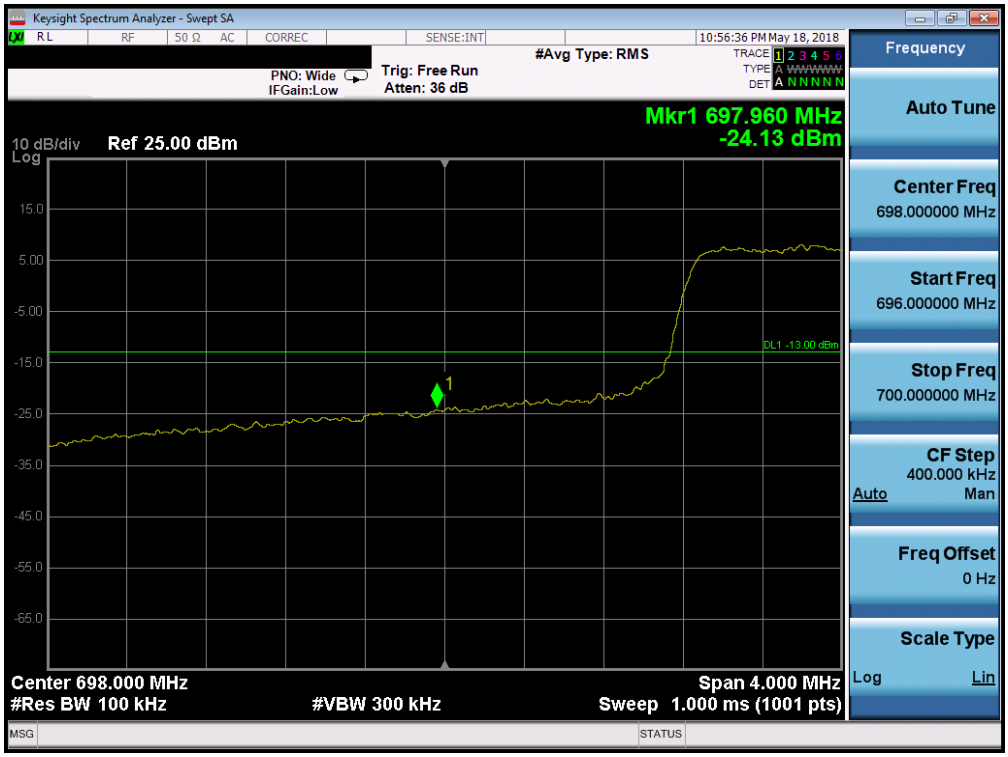
Plot 7-115. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

Plot 7-116. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



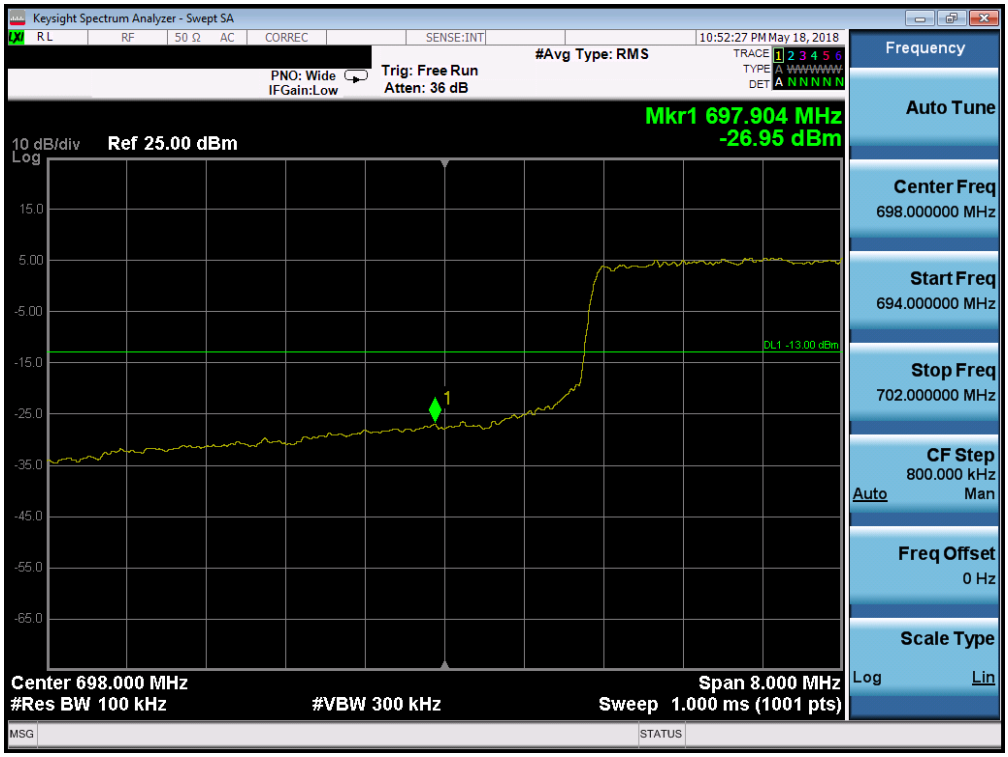
Plot 7-117. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-118. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-119. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-120. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

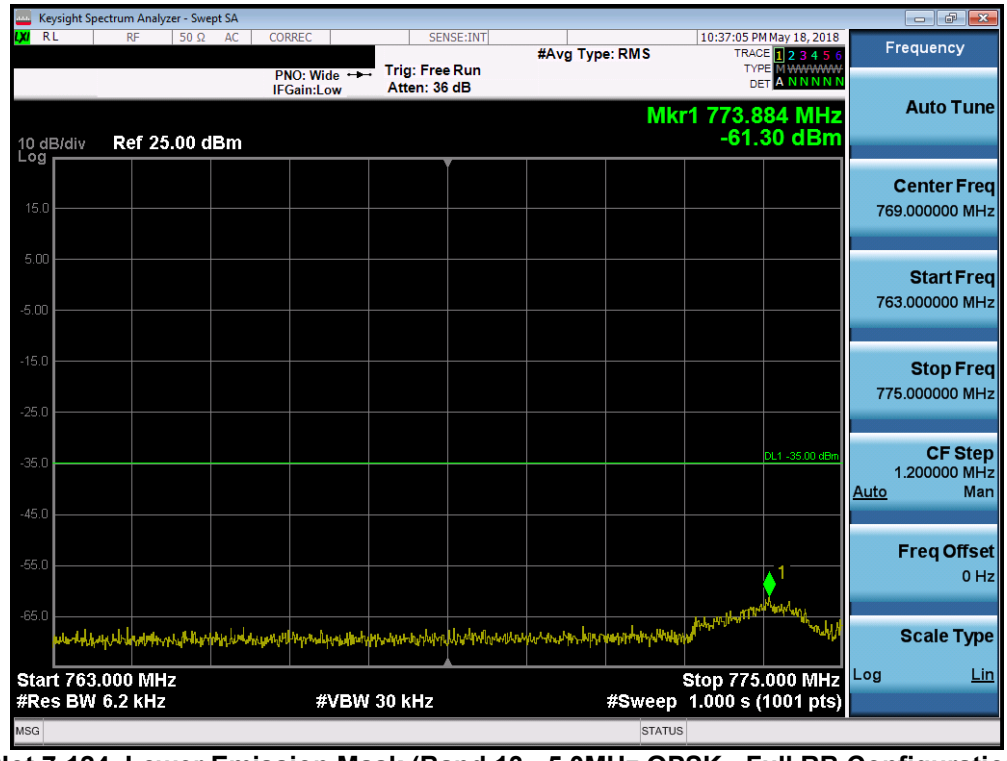


Plot 7-121. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

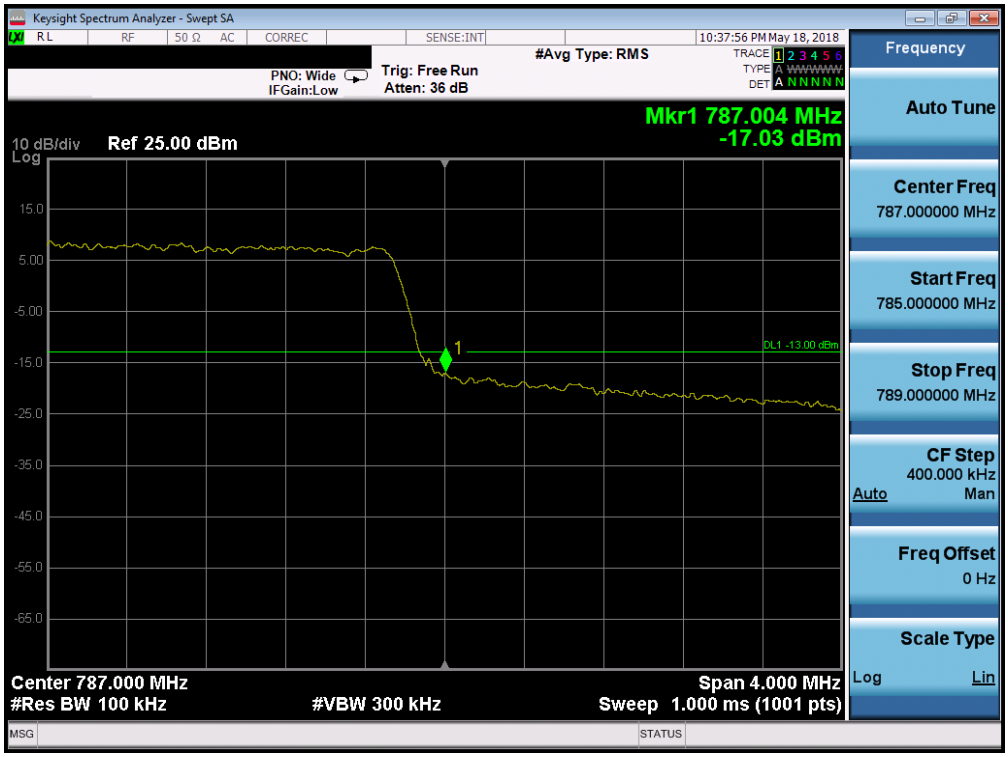
Plot 7-122. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

Band 13

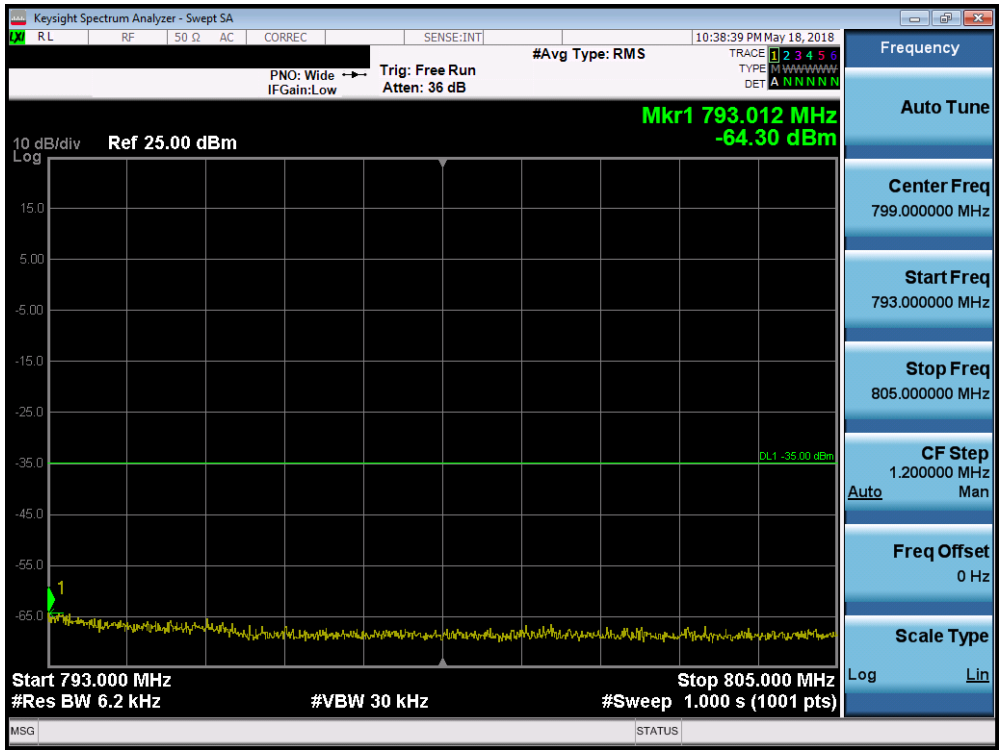
Plot 7-123. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-124. Lower Emission Mask (Band 13 - 5.0MHz QPSK - Full RB Configuration)

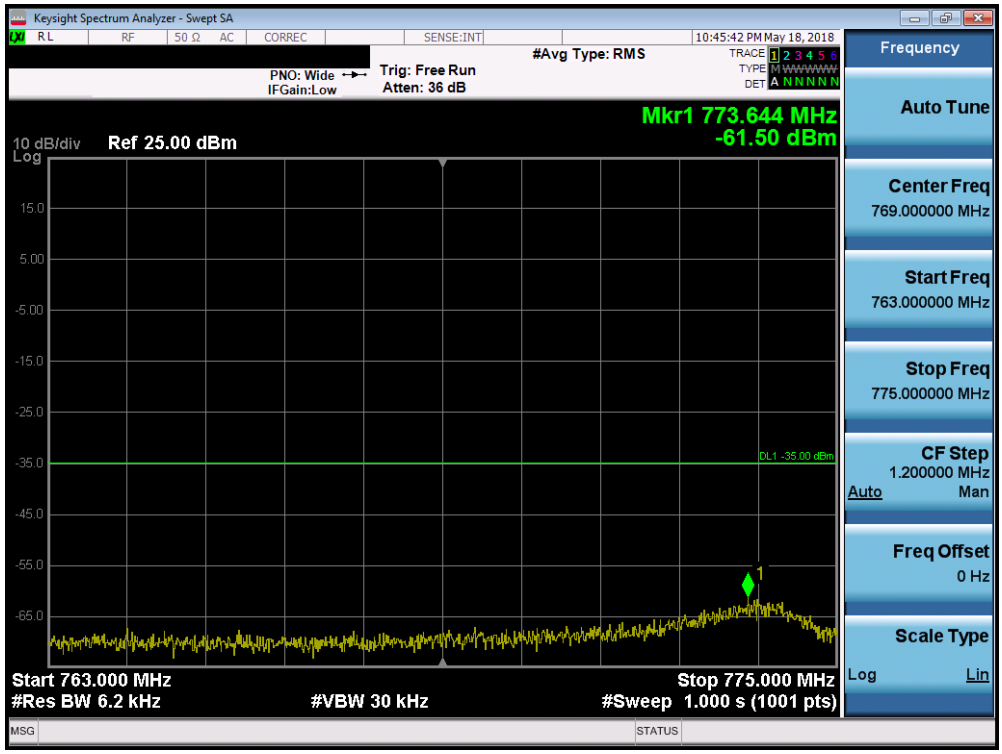


Plot 7-125. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



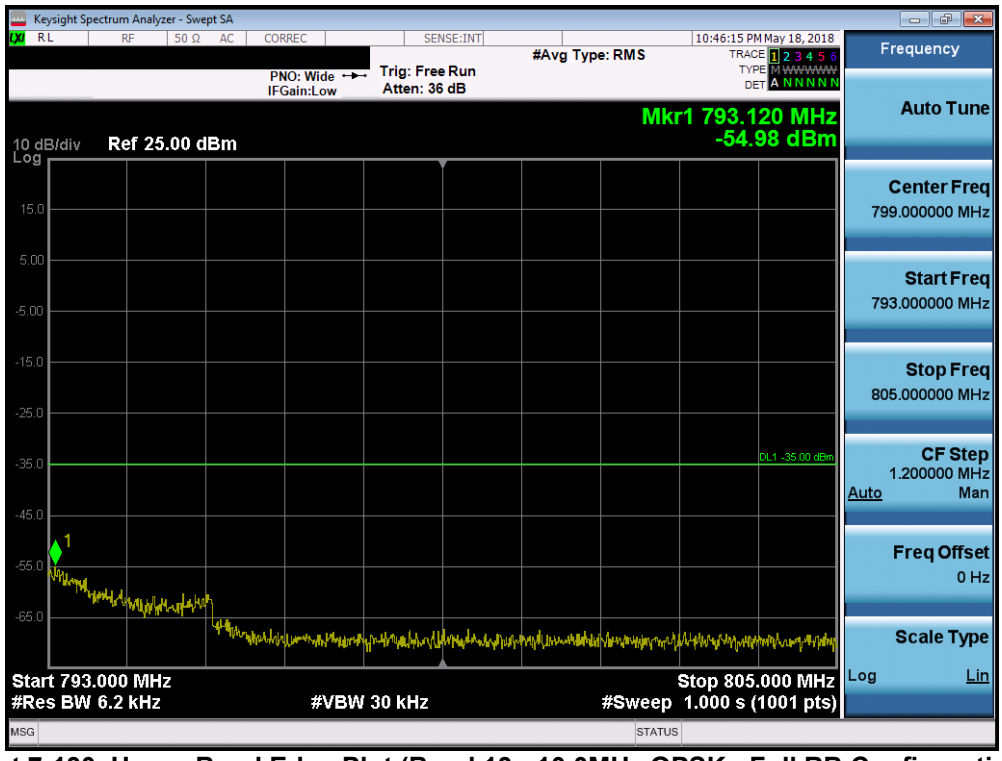
Plot 7-126. Upper Emission Mask (Band 13 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-127. Lower Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



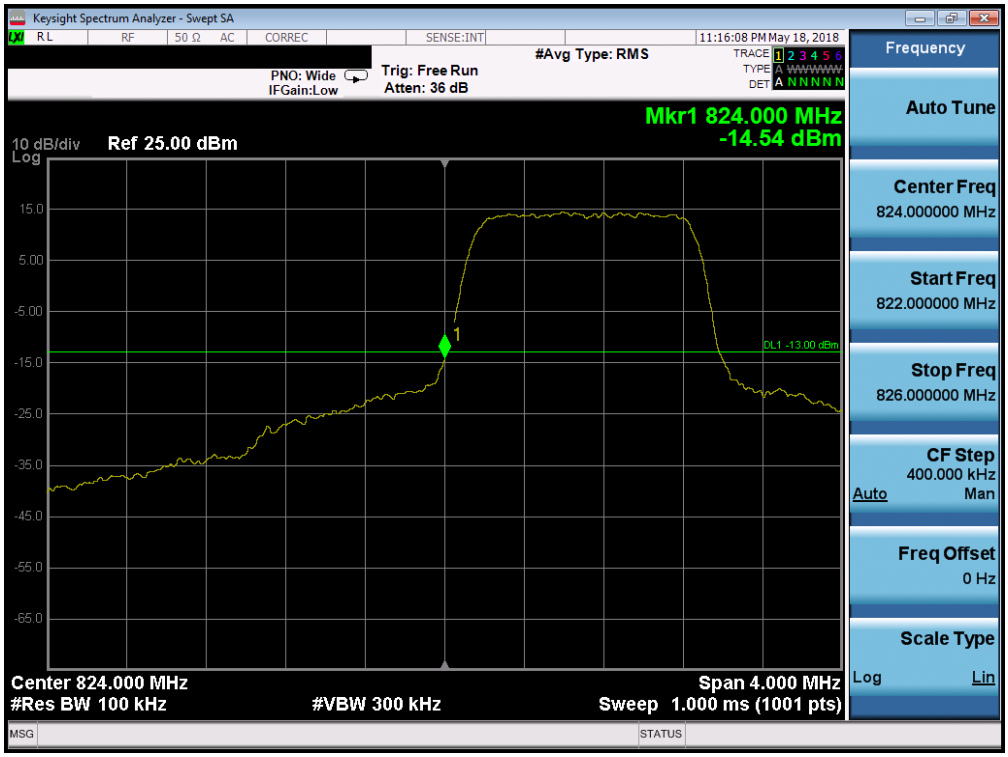
Plot 7-128. Lower Emission Mask (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-129. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



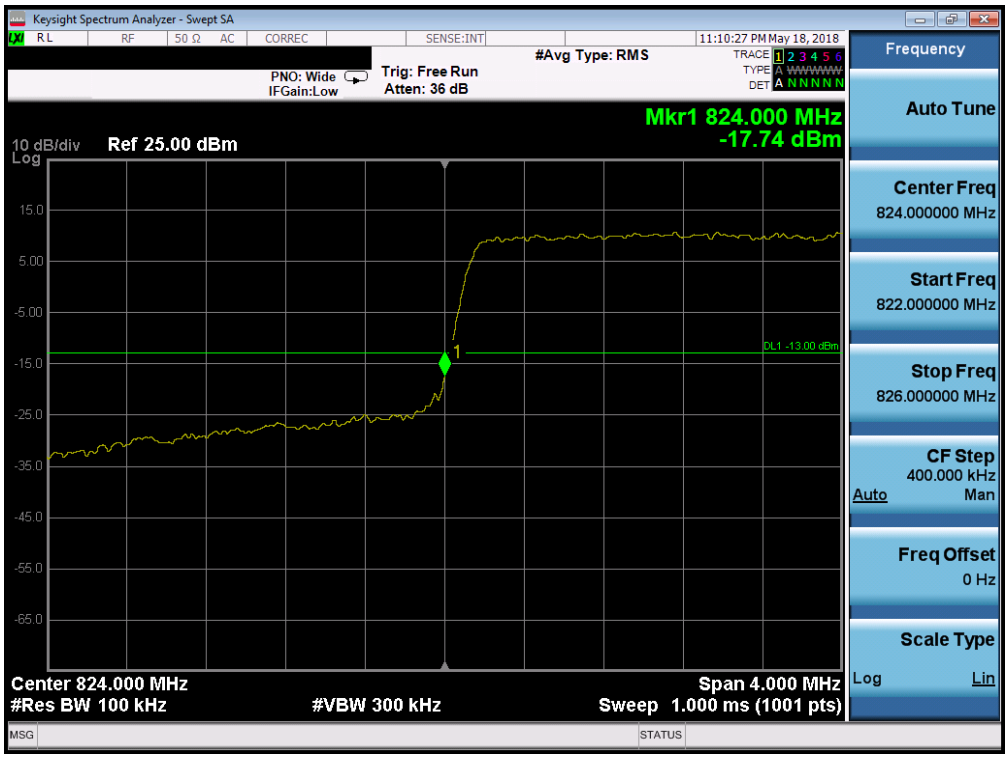
Plot 7-130. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Band 5



Plot 7-131. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

Plot 7-132. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

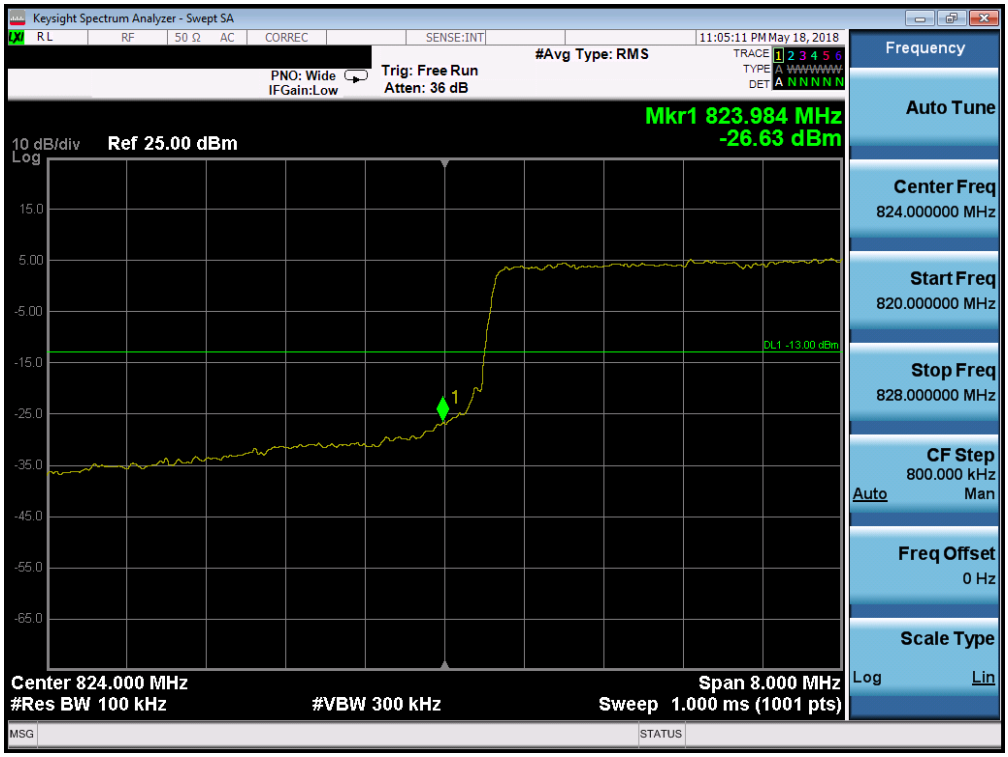


Plot 7-133. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-134. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-135. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

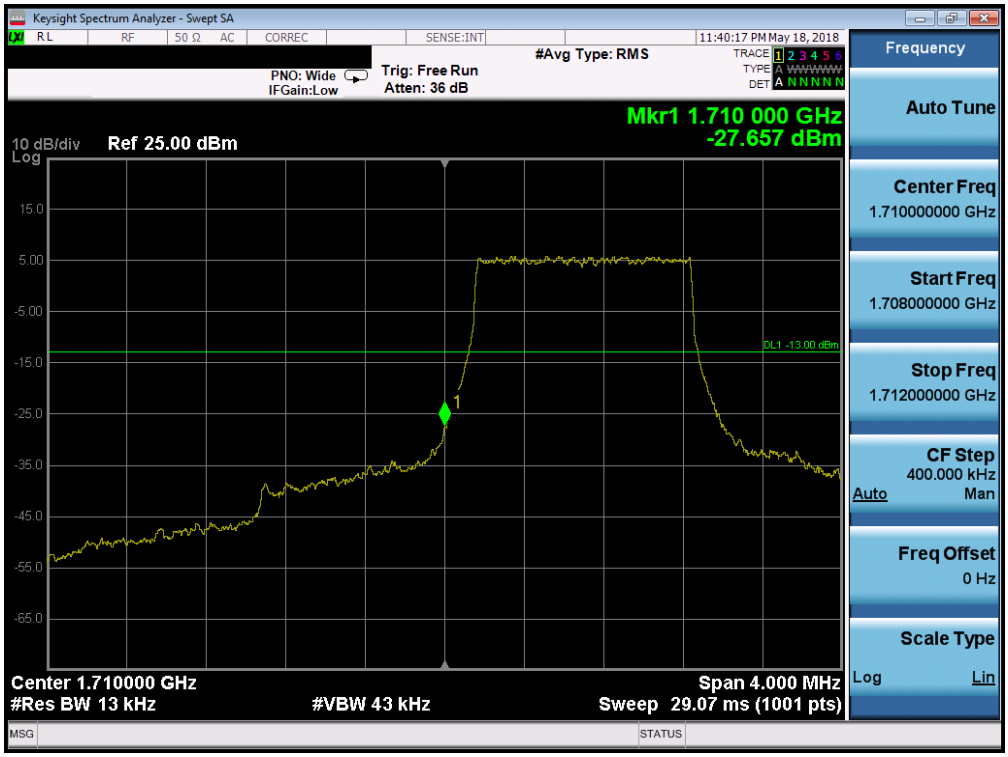
Plot 7-136. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



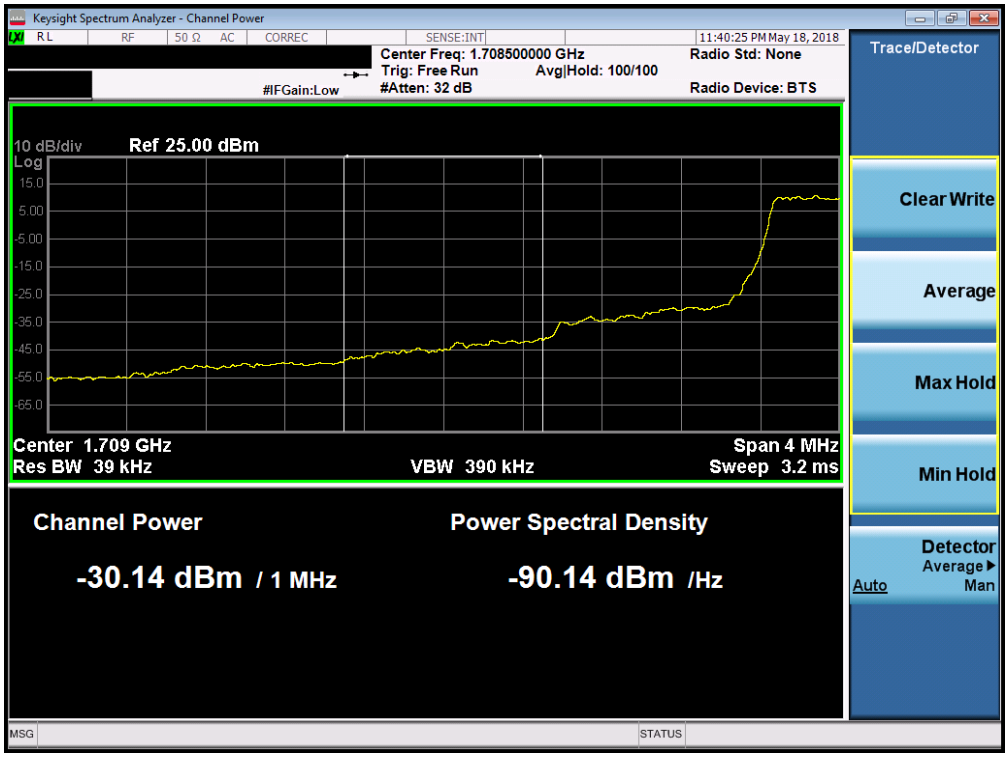
Plot 7-137. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-138. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

Band 66/4

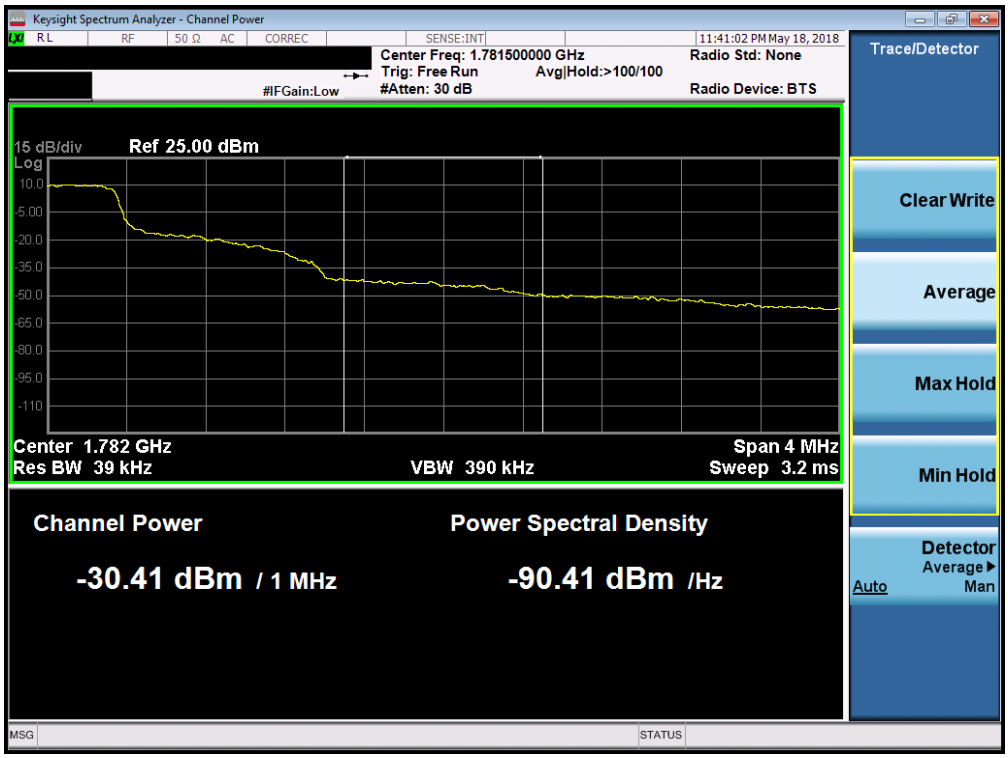


Plot 7-139. Lower Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

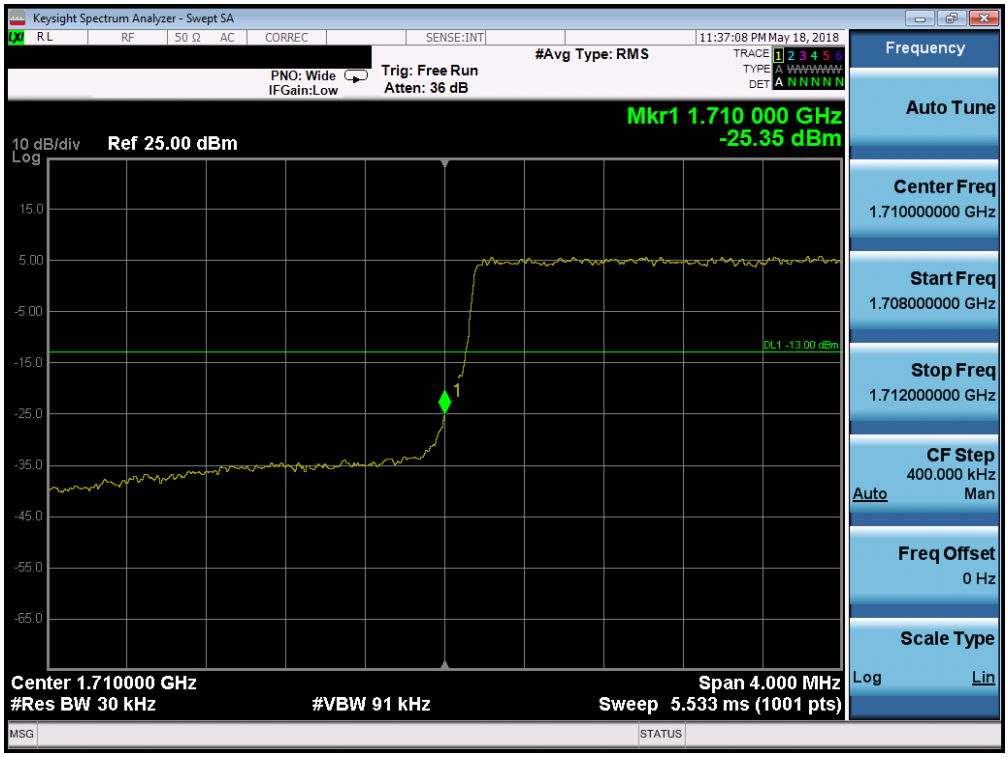


Plot 7-140. Lower Extended Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

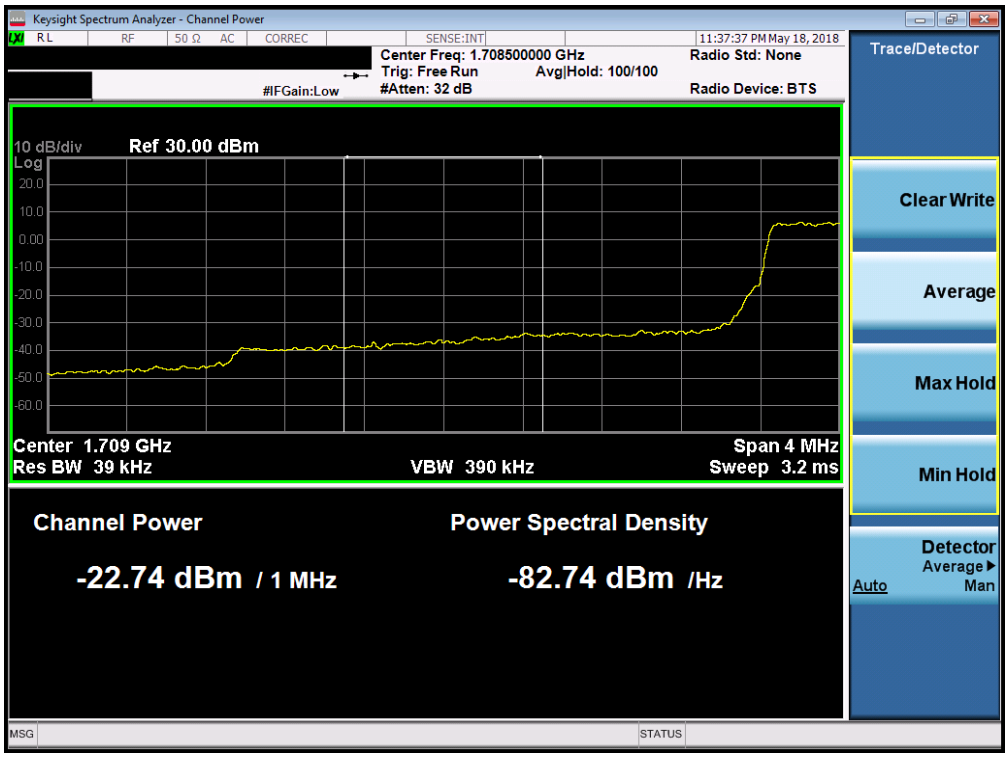
Plot 7-141. Upper Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-142. Upper Extended Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

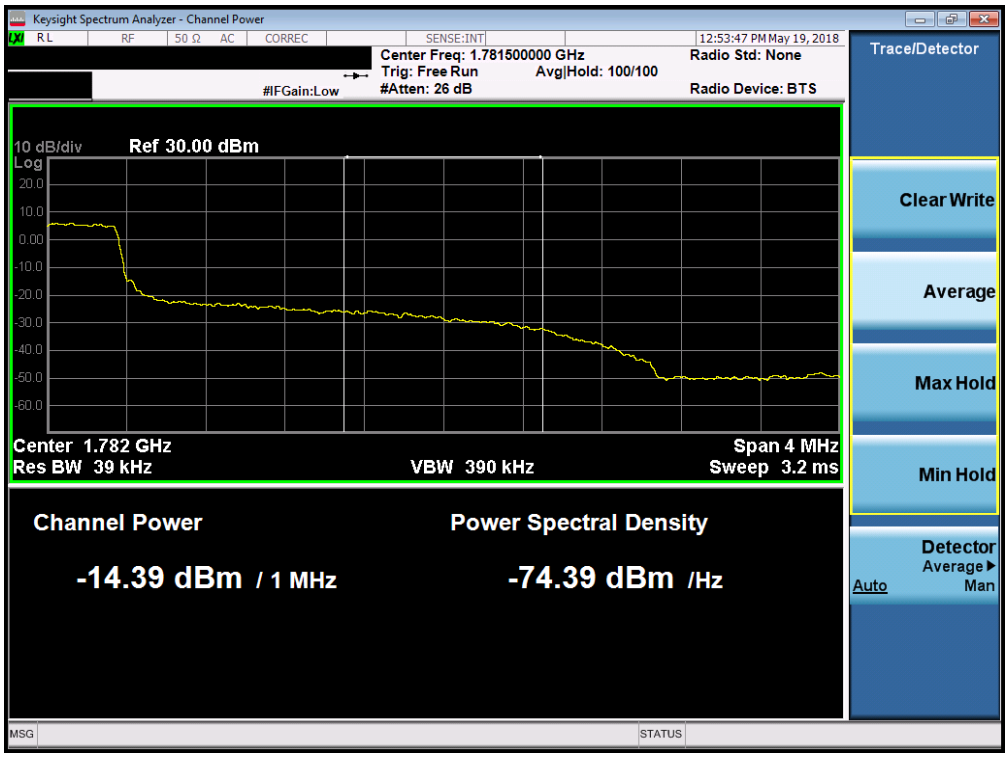


Plot 7-143. Lower Band Edge Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

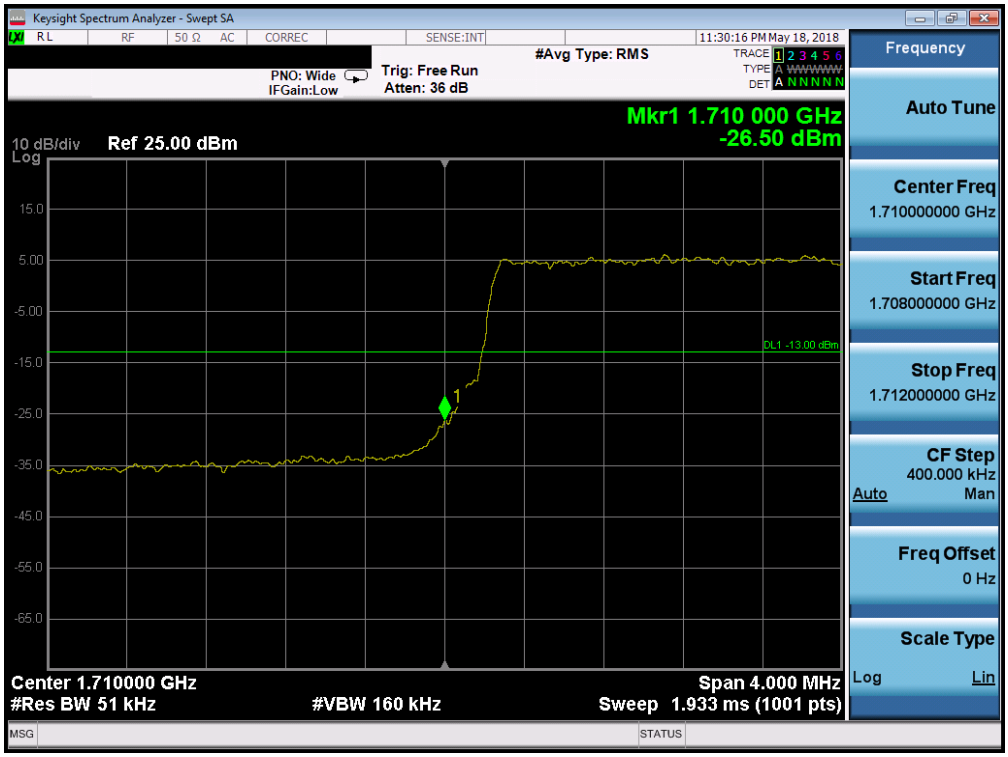


Plot 7-144. Lower Extended Band Edge Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

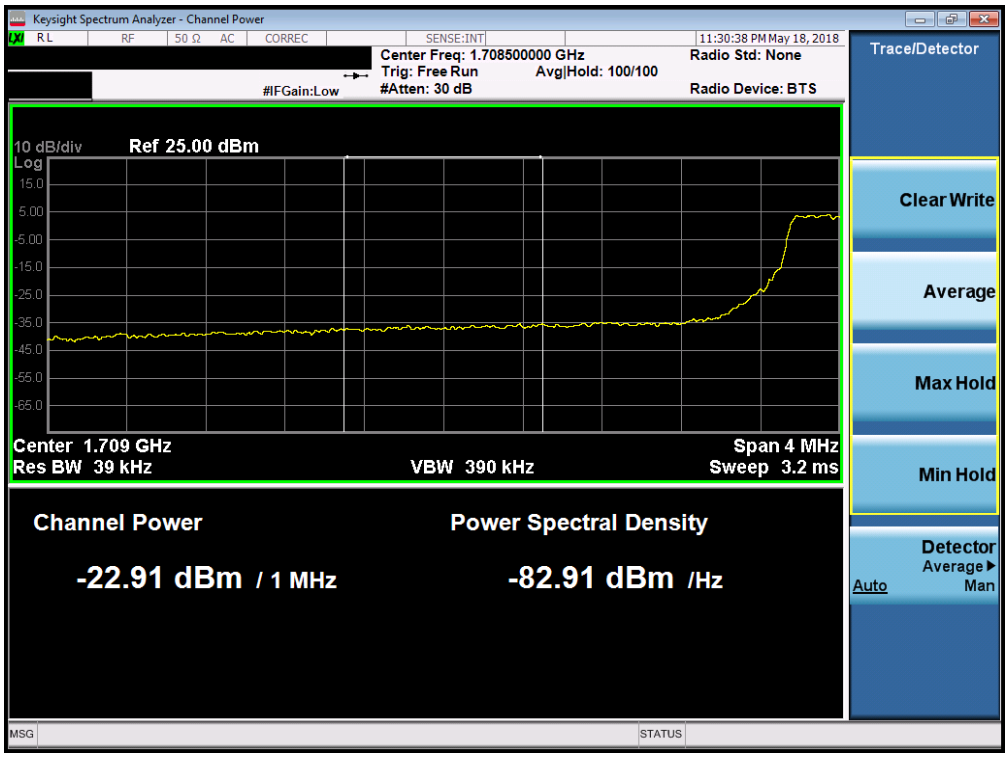
Plot 7-145. Upper Band Edge Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-146. Upper Extended Band Edge Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

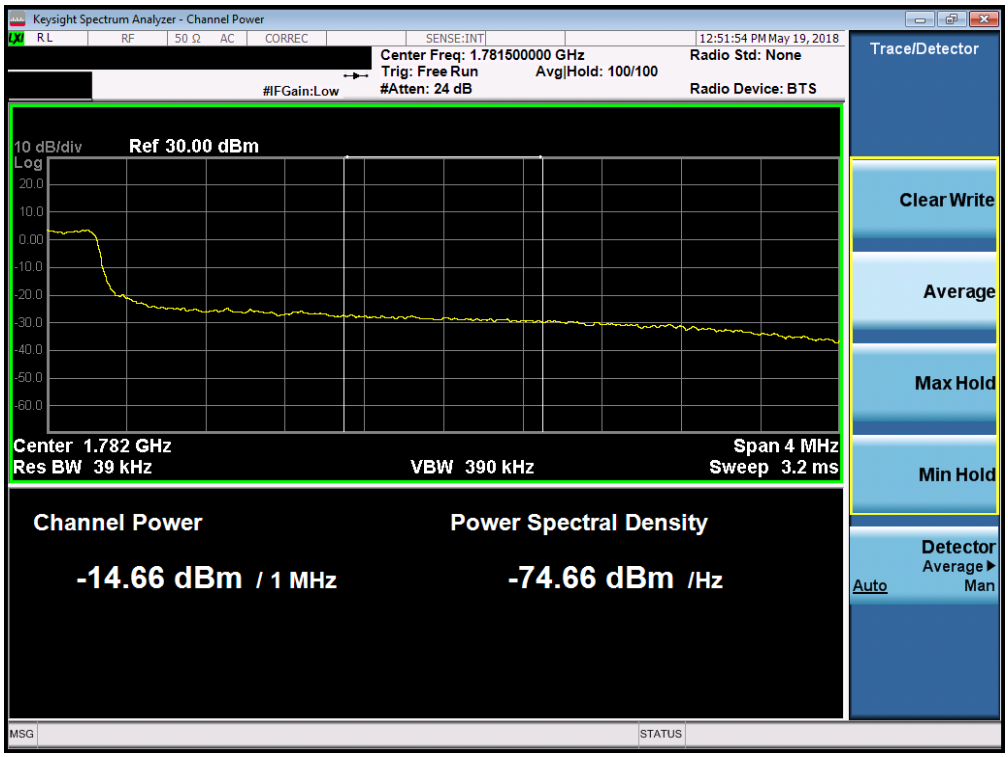


Plot 7-147. Lower Band Edge Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)

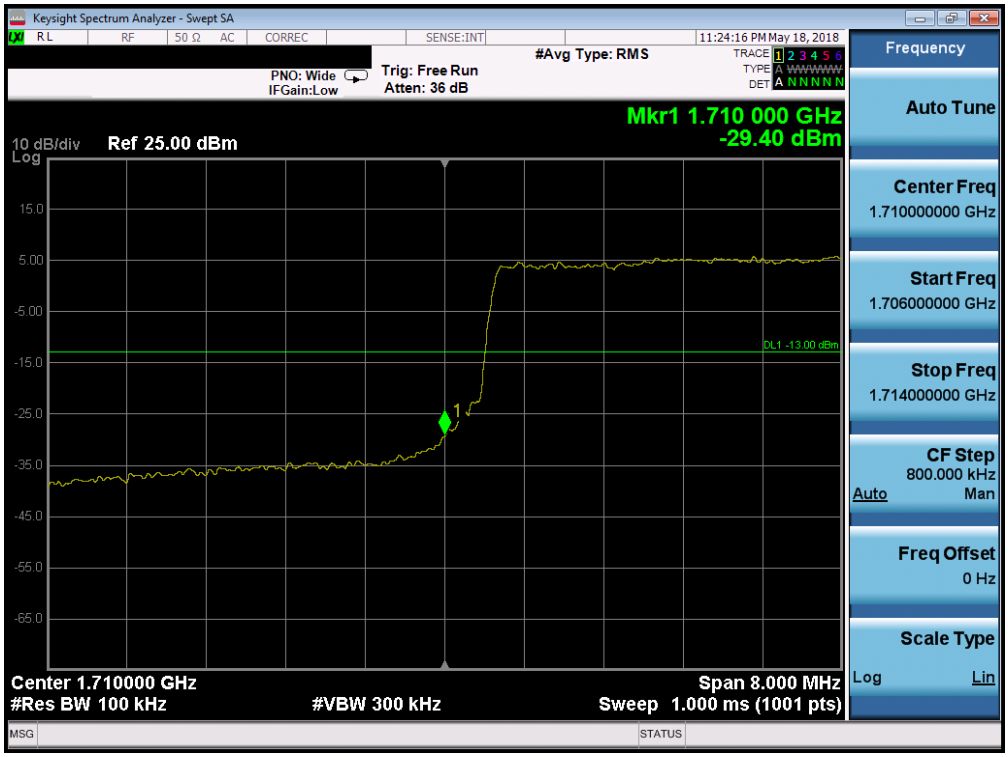


Plot 7-148. Lower Extended Band Edge Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)

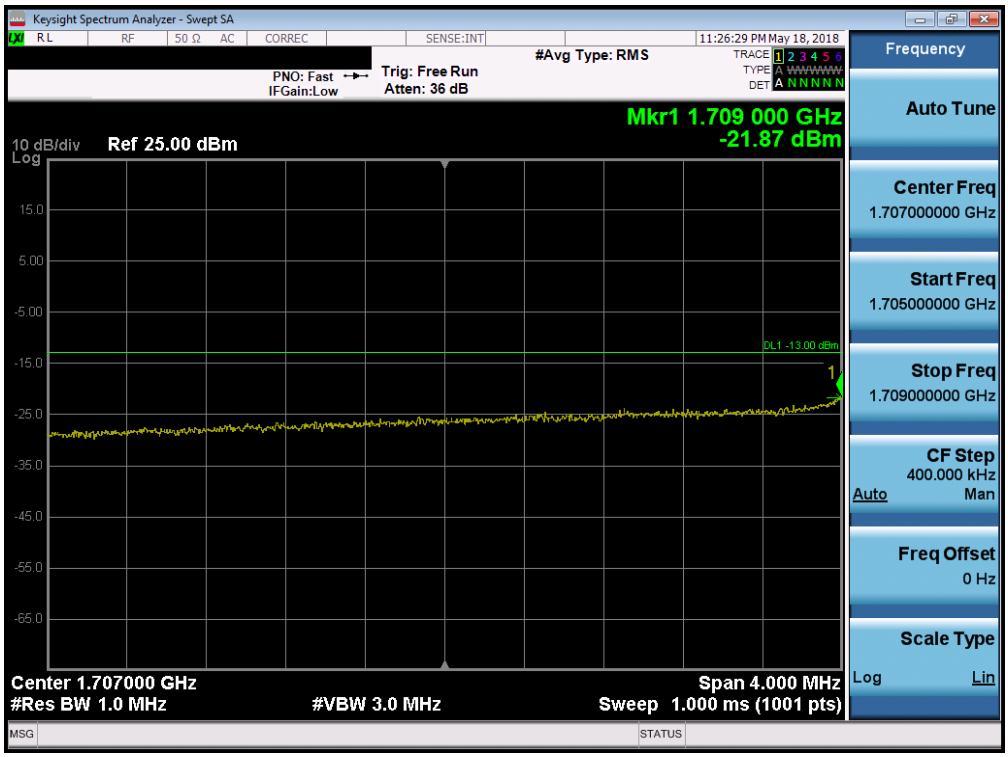
Plot 7-149. Upper Band Edge Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



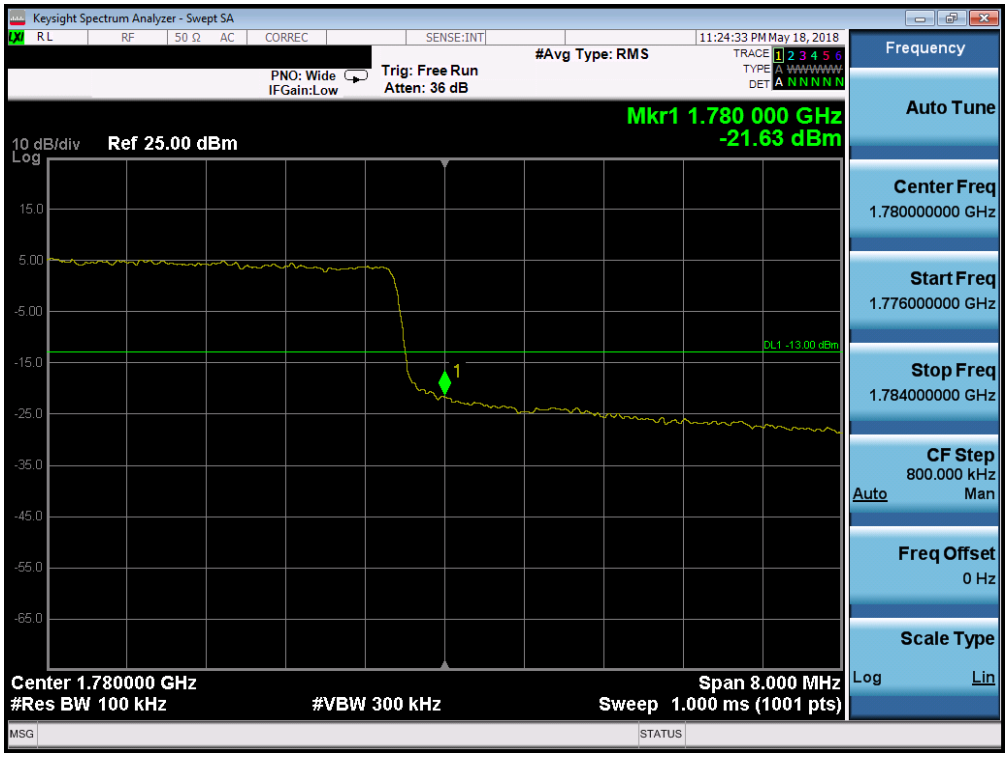
Plot 7-150. Upper Extended Band Edge Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



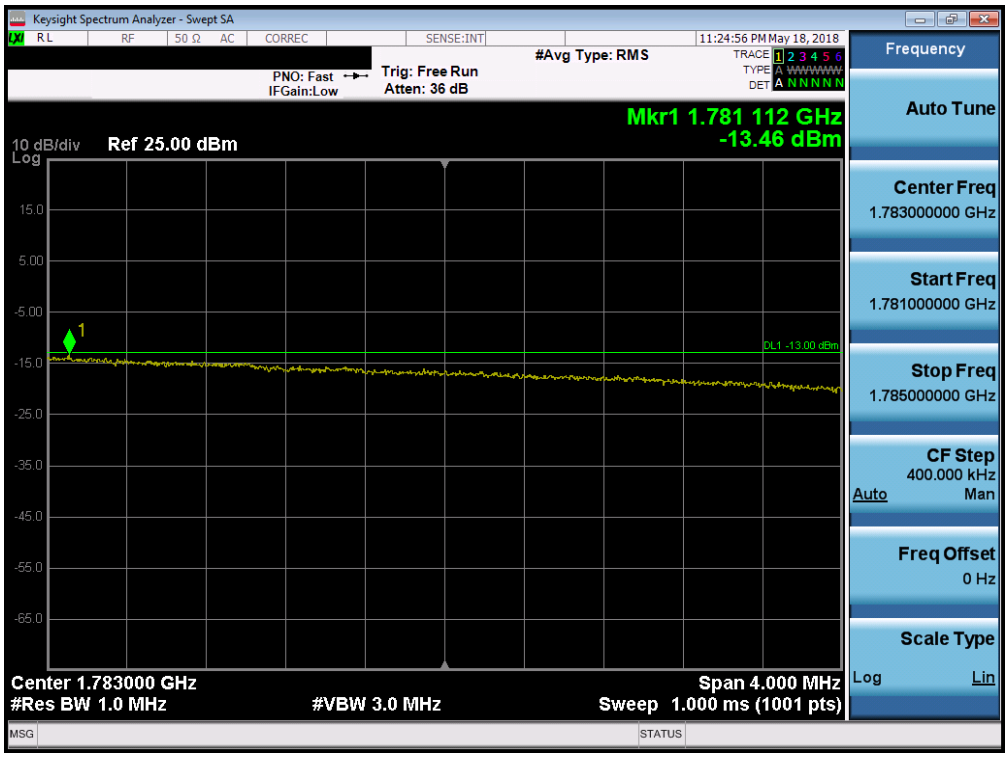
Plot 7-151. Lower Band Edge Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



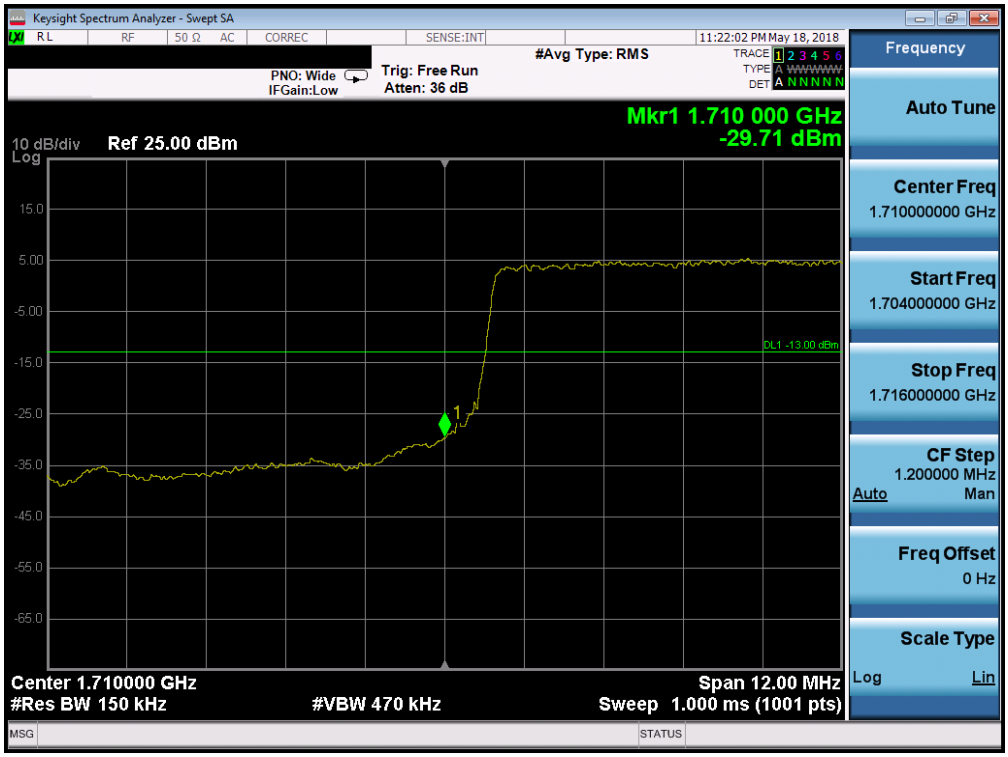
Plot 7-152. Lower Extended Band Edge Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



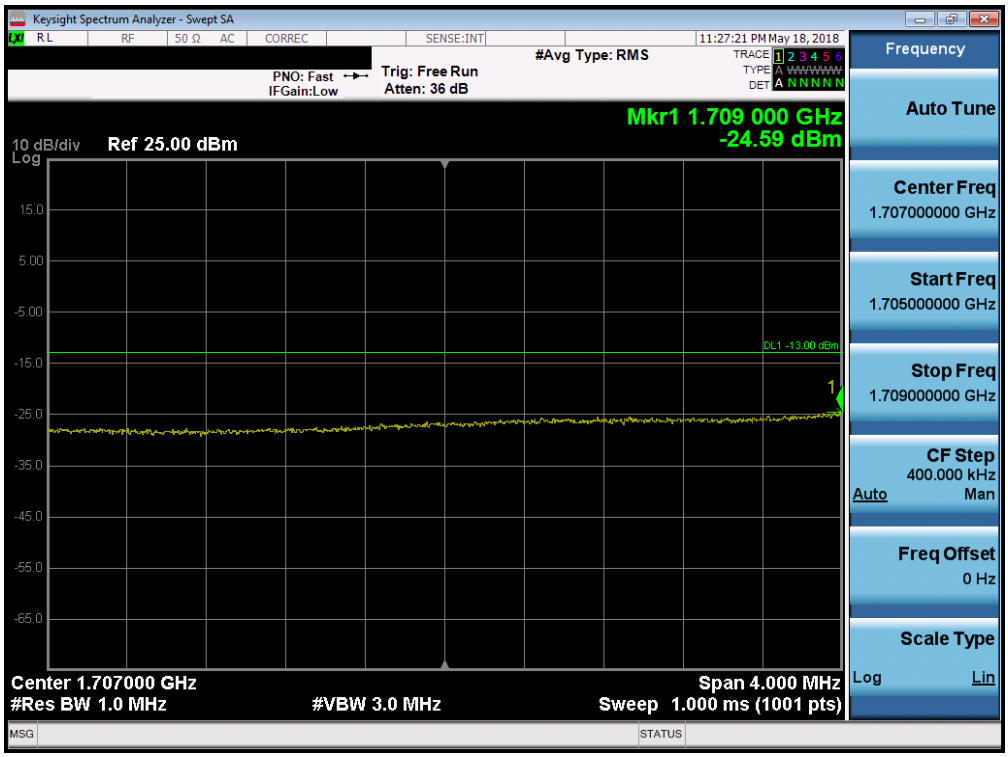
Plot 7-153. Upper Band Edge Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-154. Upper Extended Band Edge Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)

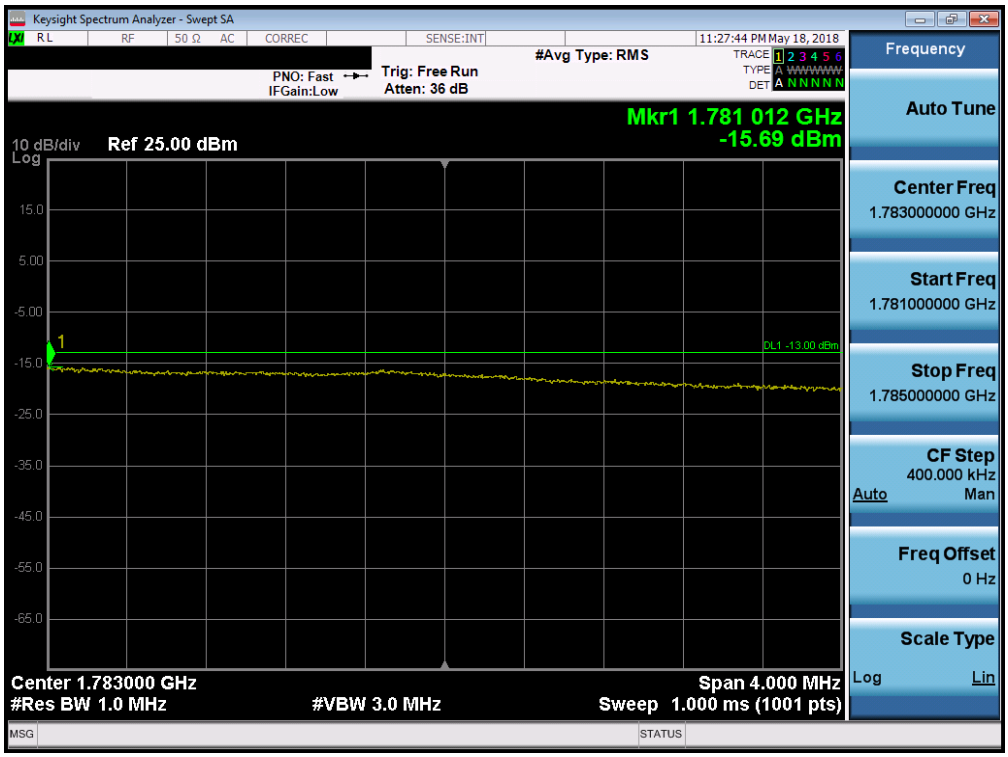


Plot 7-155. Lower Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)

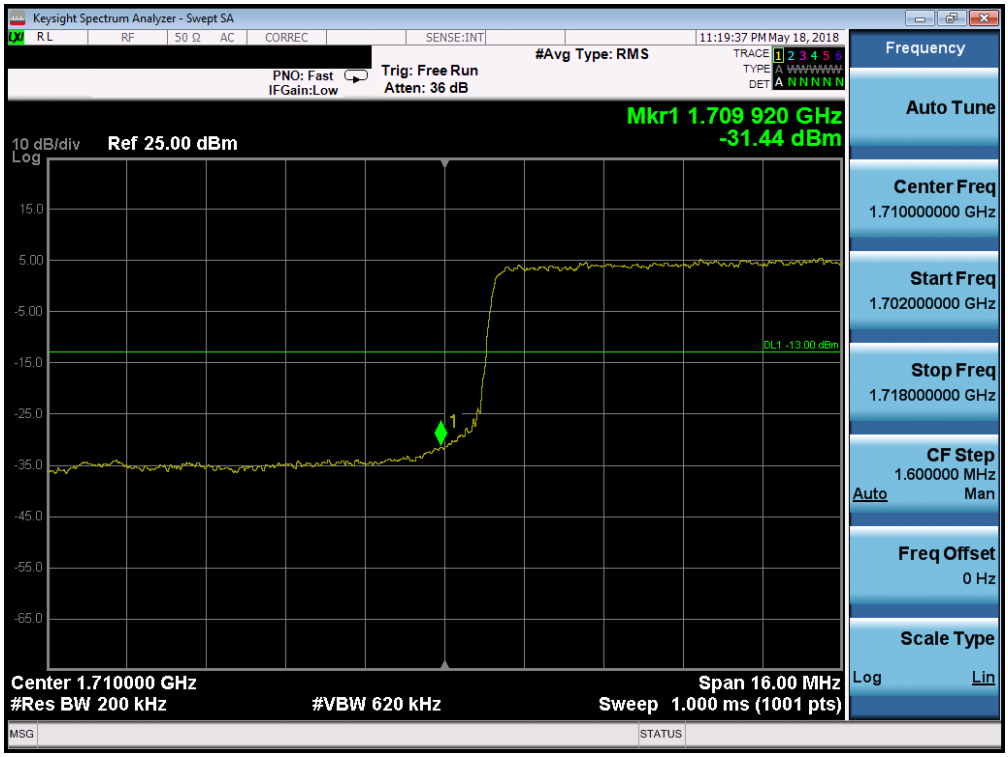


Plot 7-156. Lower Extended Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)

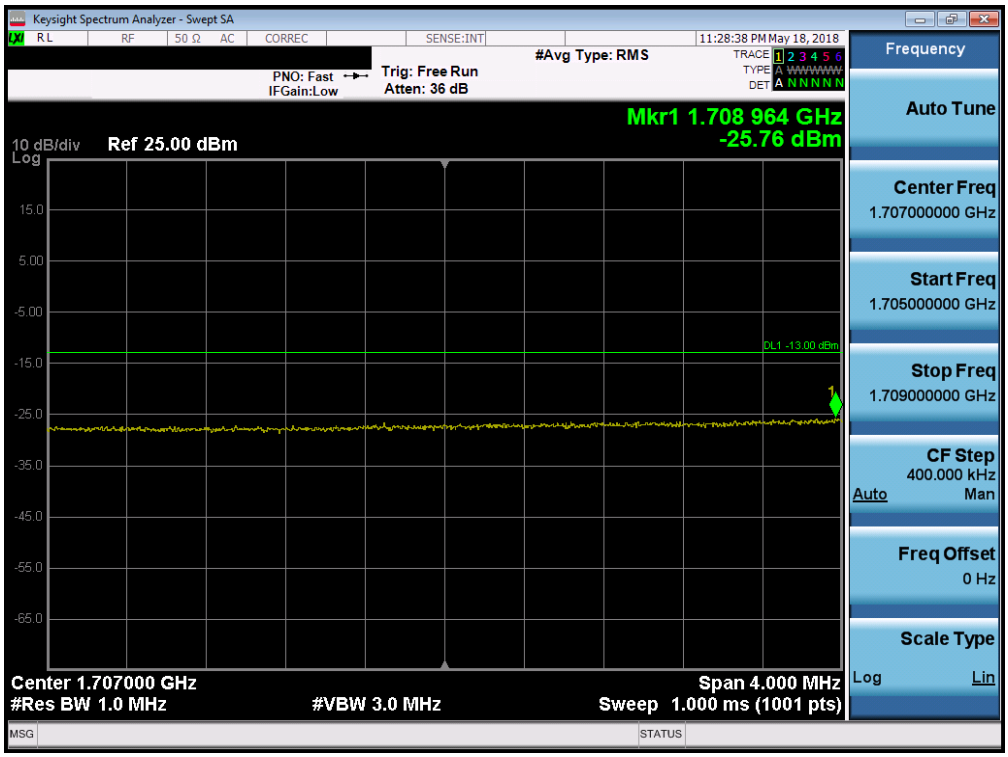
Plot 7-157. Upper Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



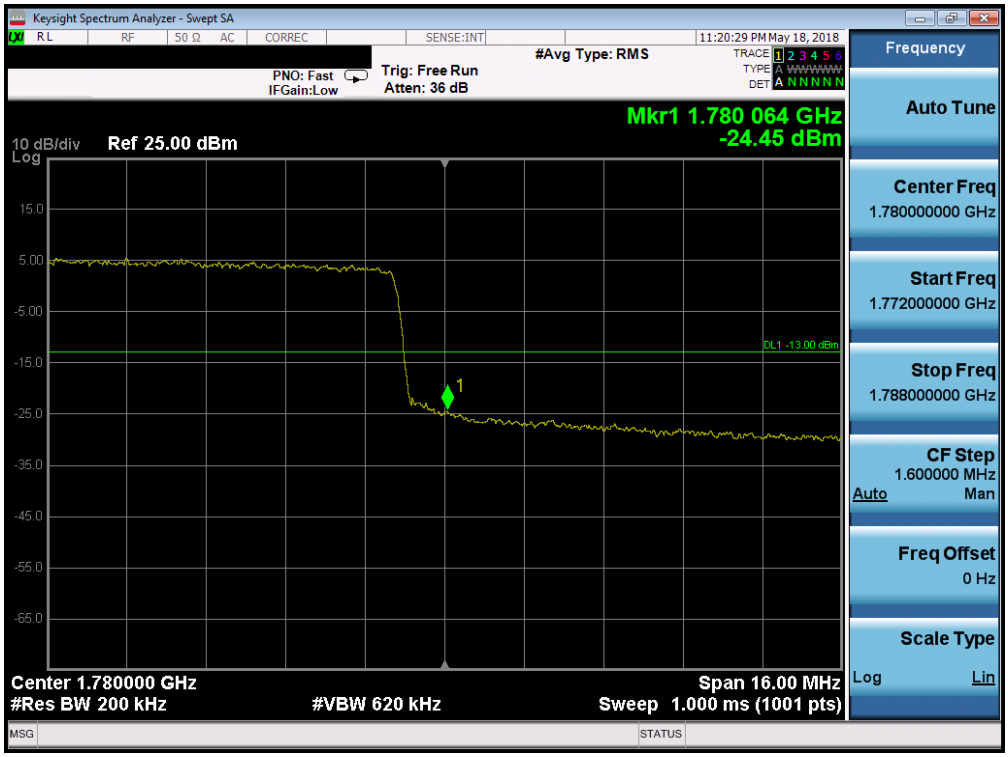
Plot 7-158. Upper Extended Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



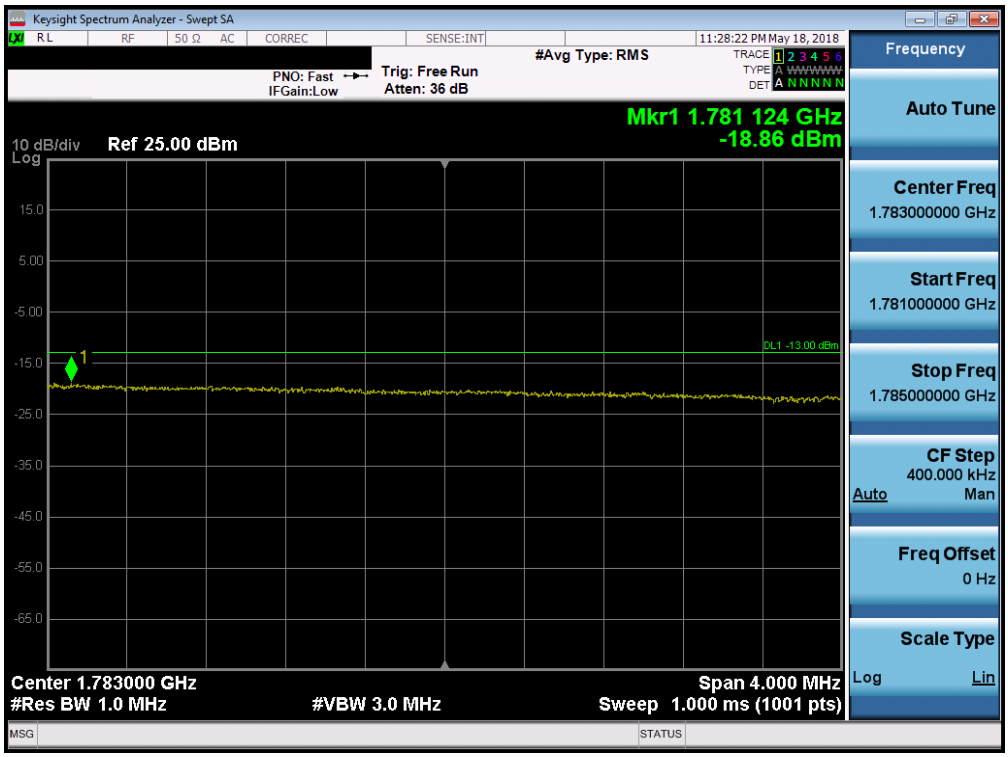
Plot 7-159. Lower Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-160. Lower Extended Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



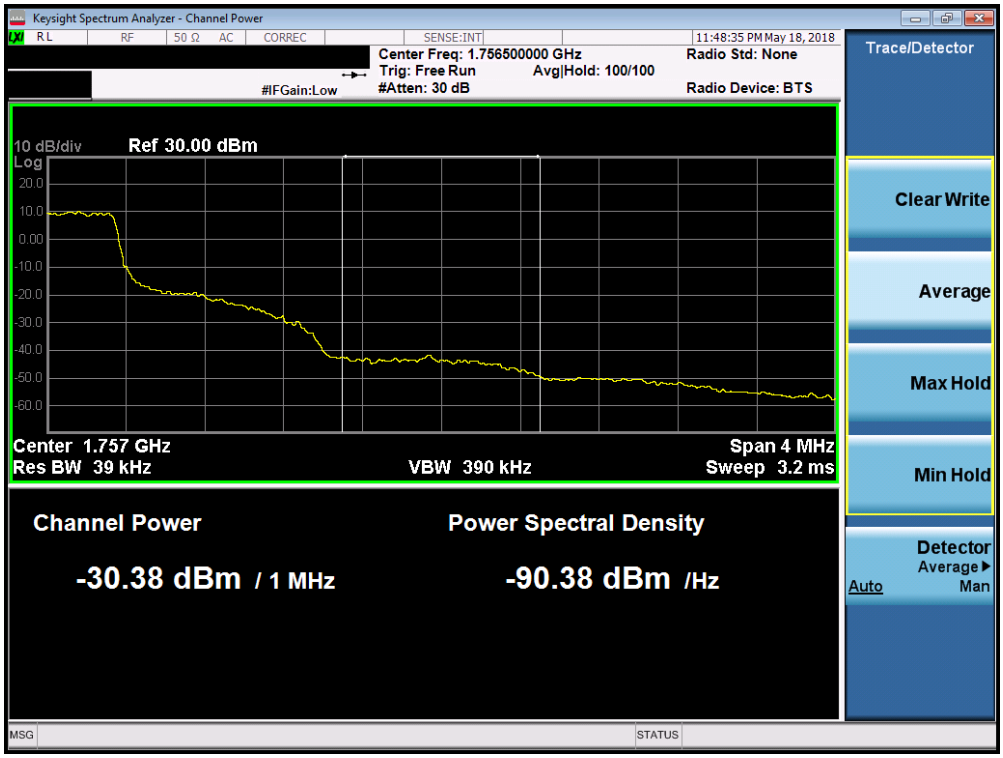
Plot 7-161. Upper Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-162. Upper Extended Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

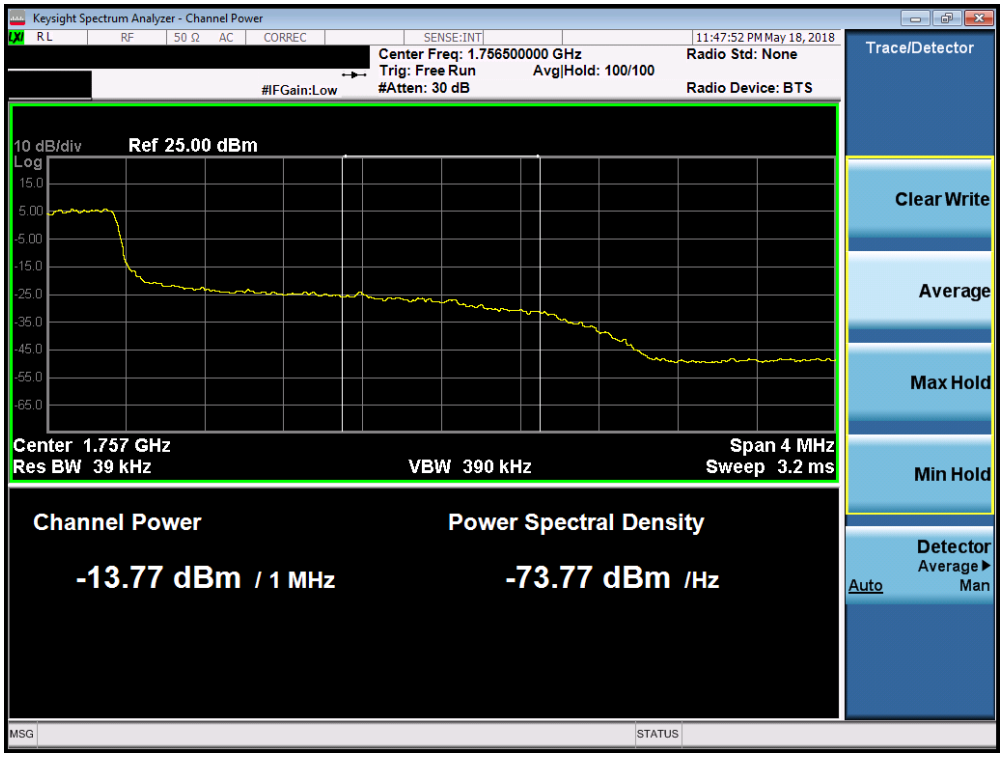
Band 4

Plot 7-163. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK - Full RB Configuration)



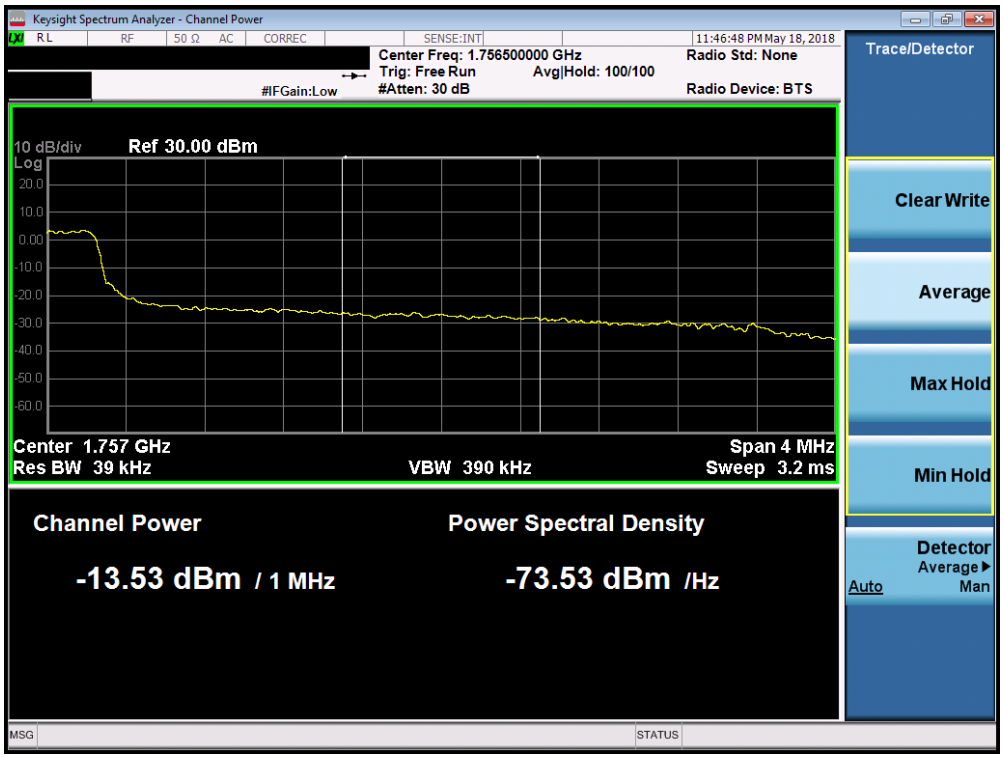
Plot 7-164. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK - Full RB Configuration)

Plot 7-165. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK - Full RB Configuration)



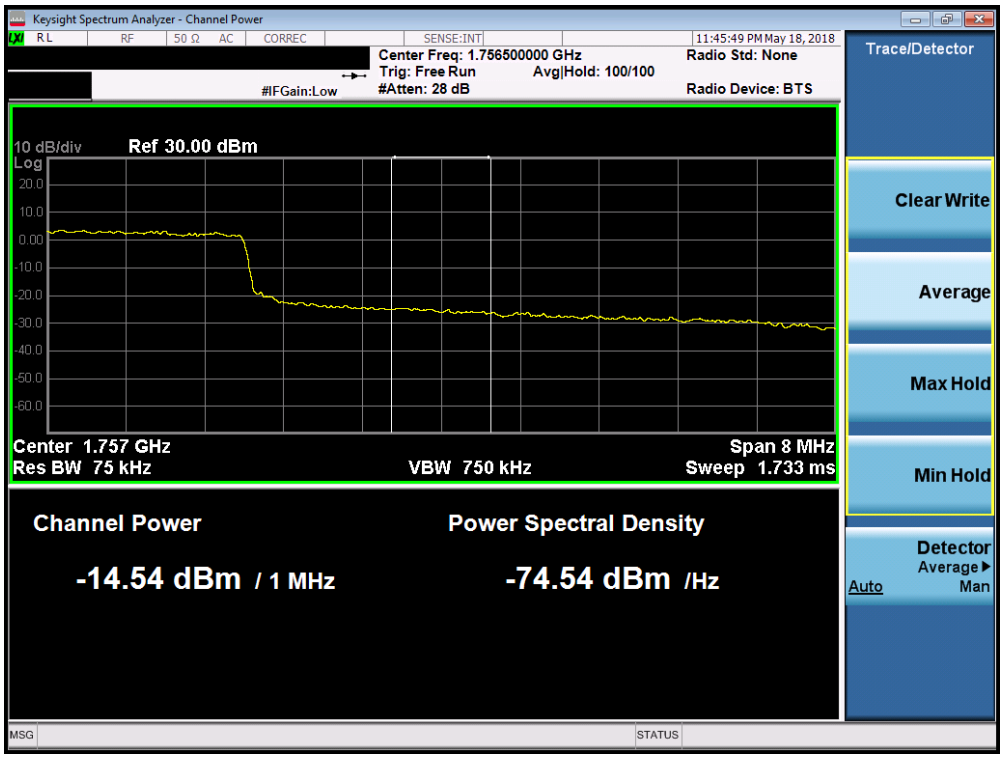
Plot 7-166. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-167. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



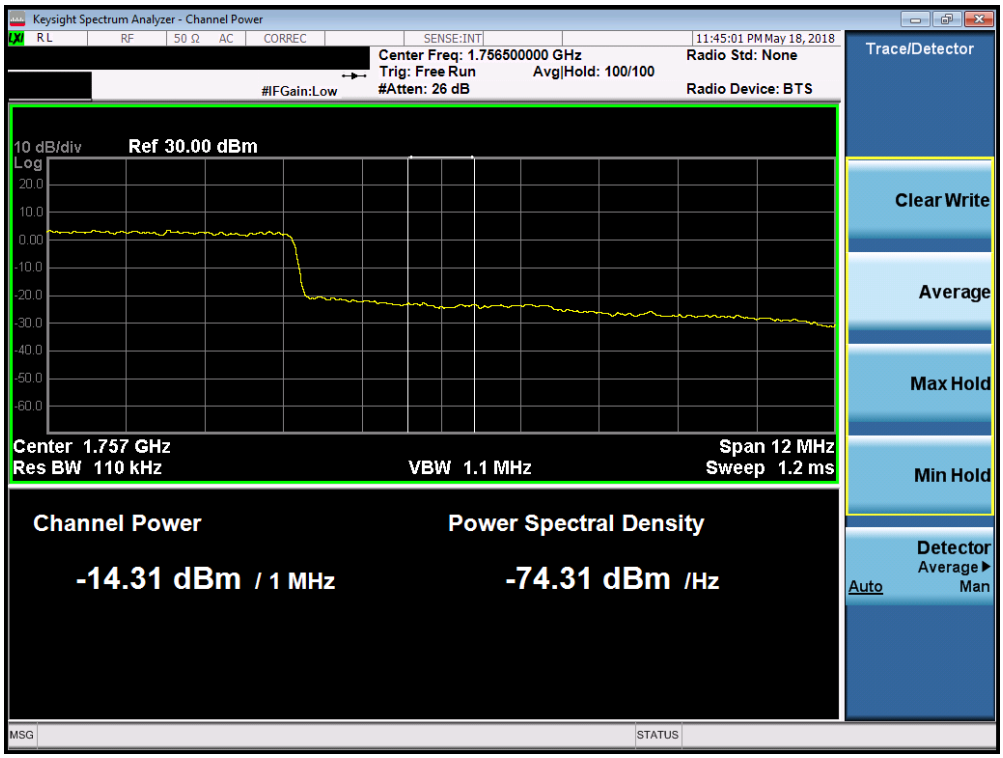
Plot 7-168. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-169. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

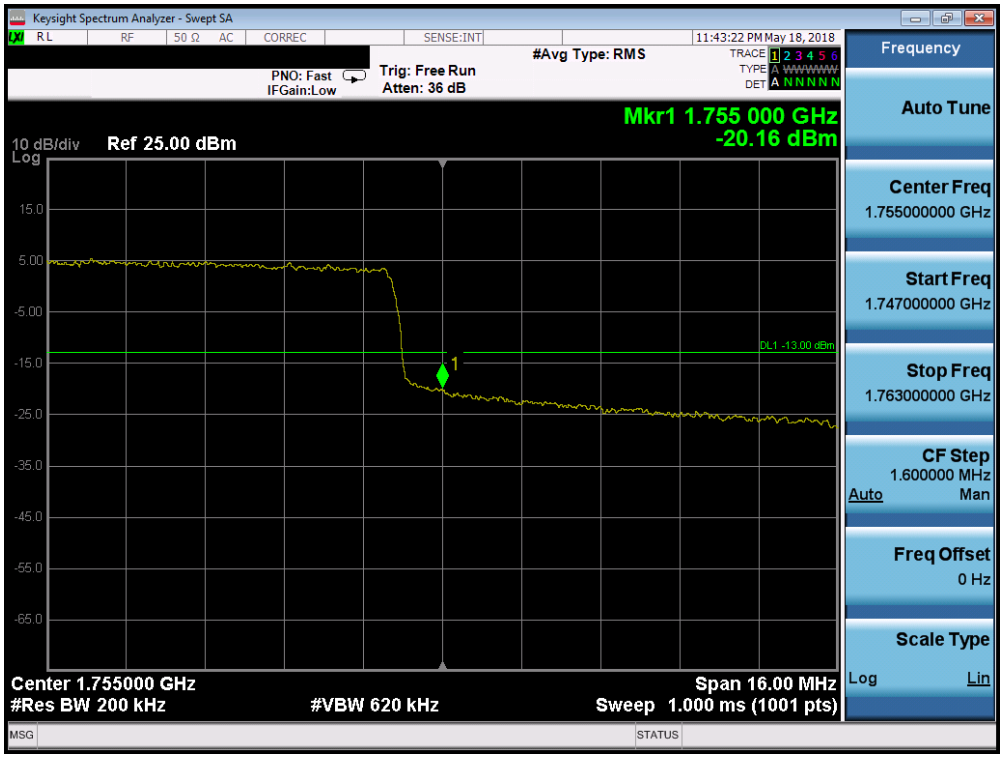


Plot 7-170. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

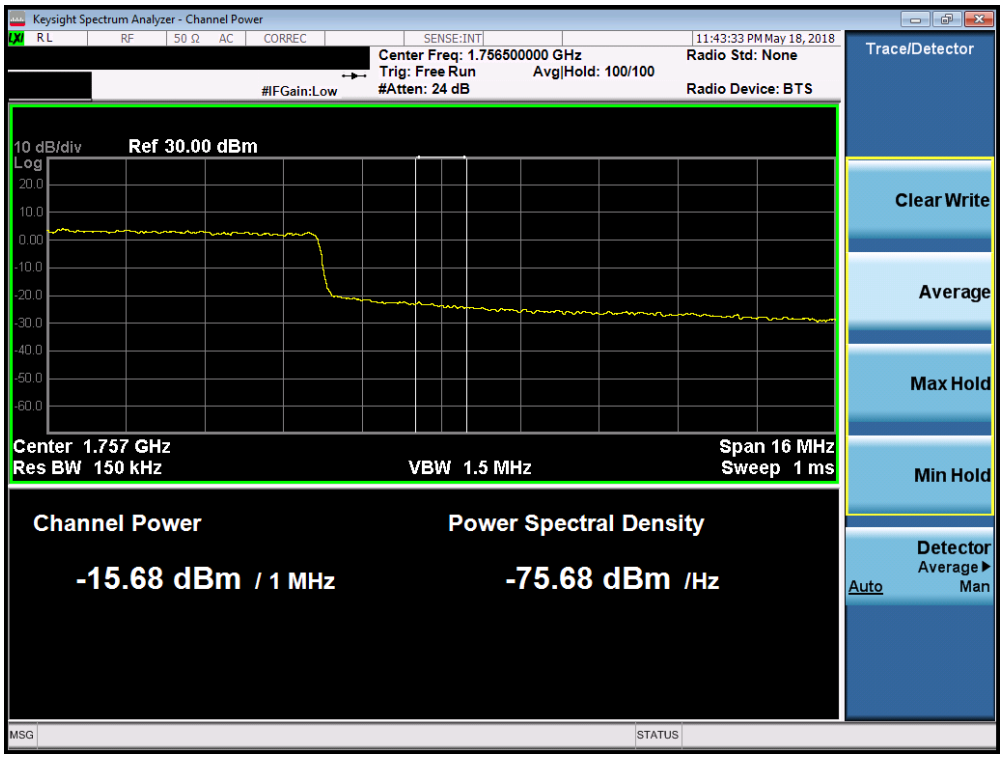
Plot 7-171. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-172. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



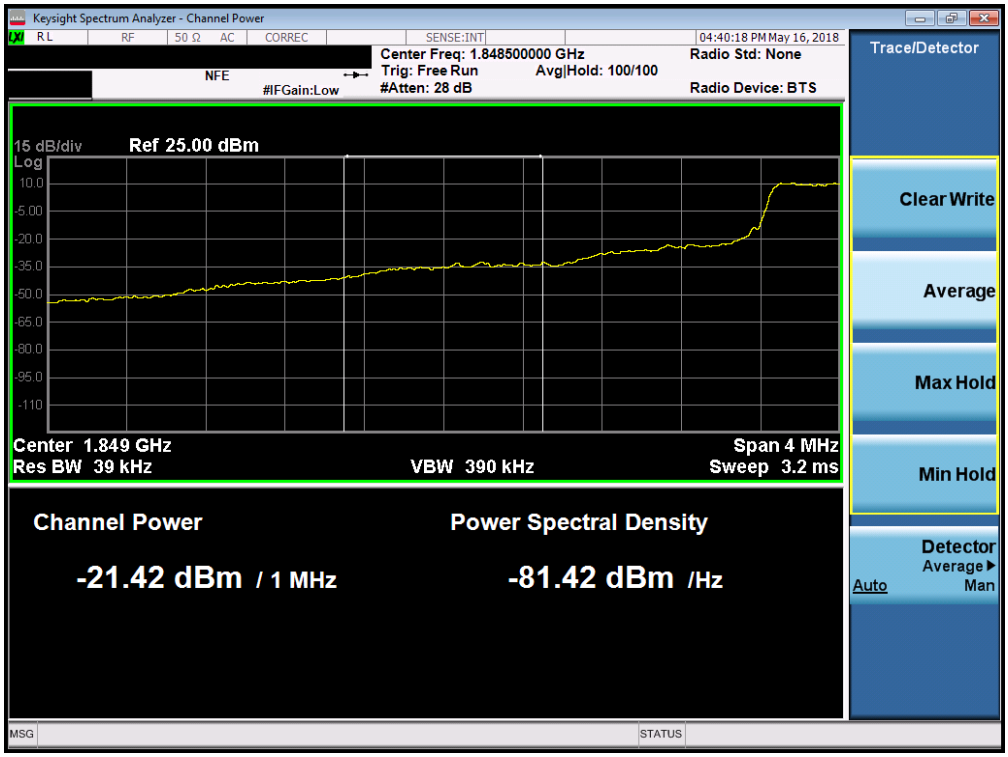
Plot 7-173. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



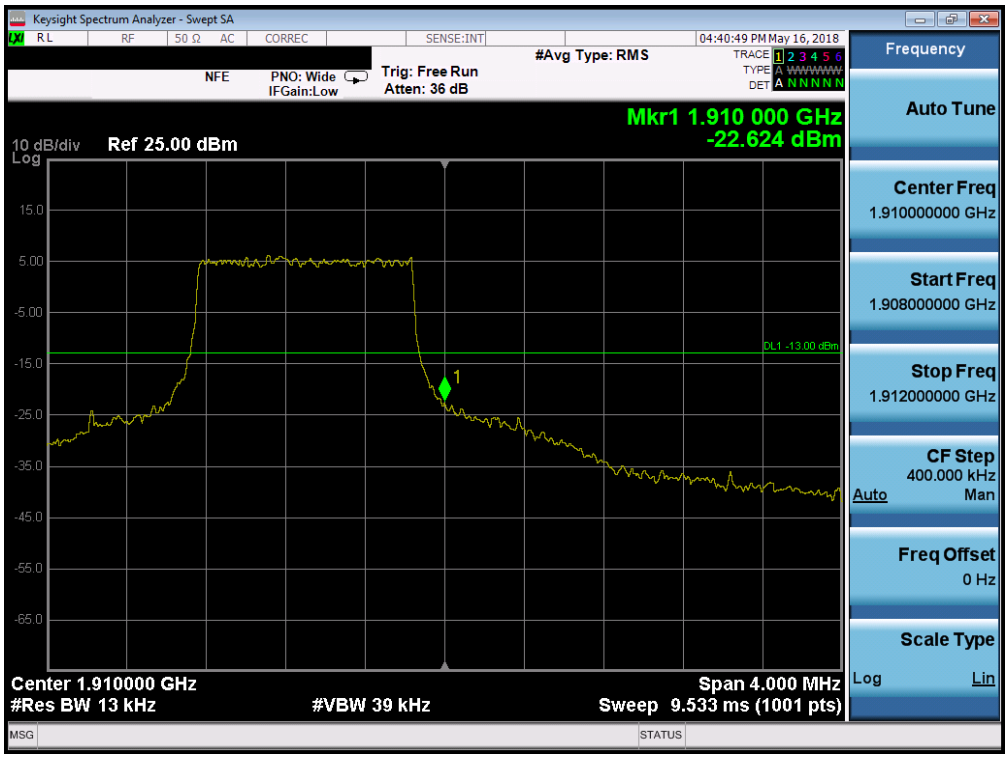
Plot 7-174. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

Band 2

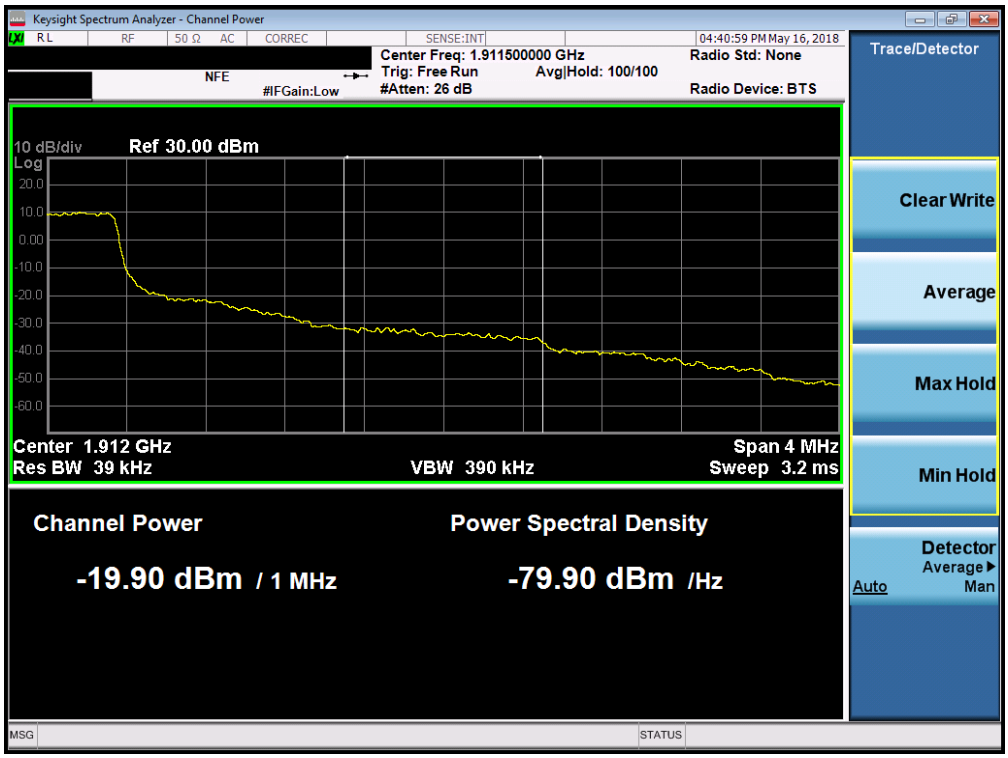
Plot 7-175. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



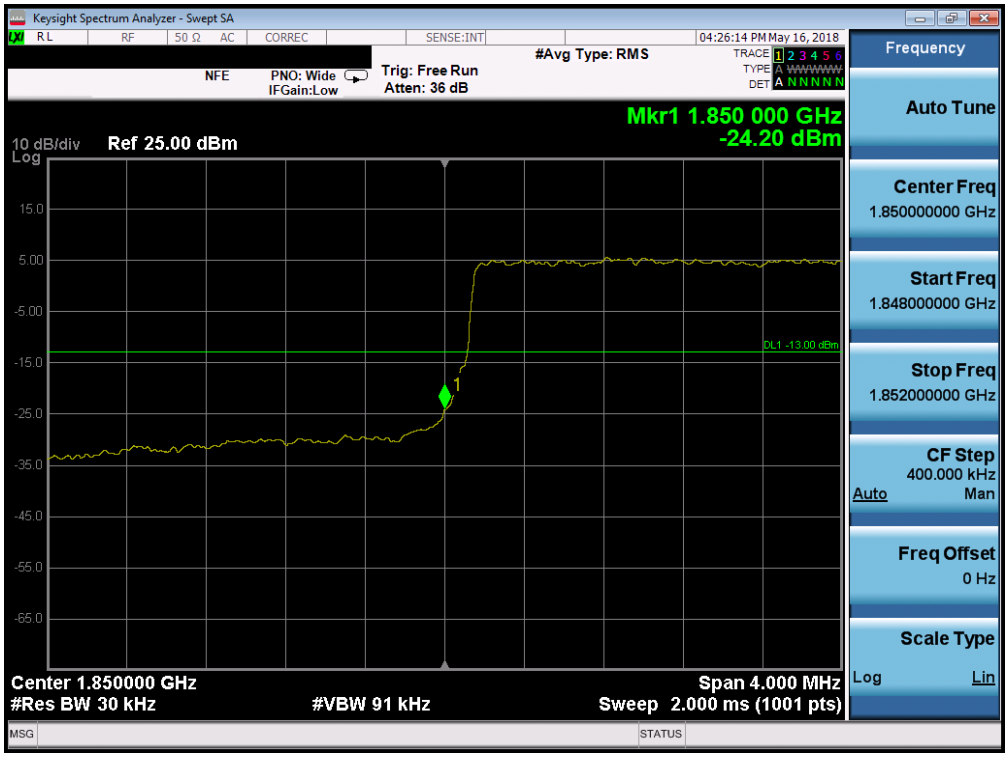
Plot 7-176. Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



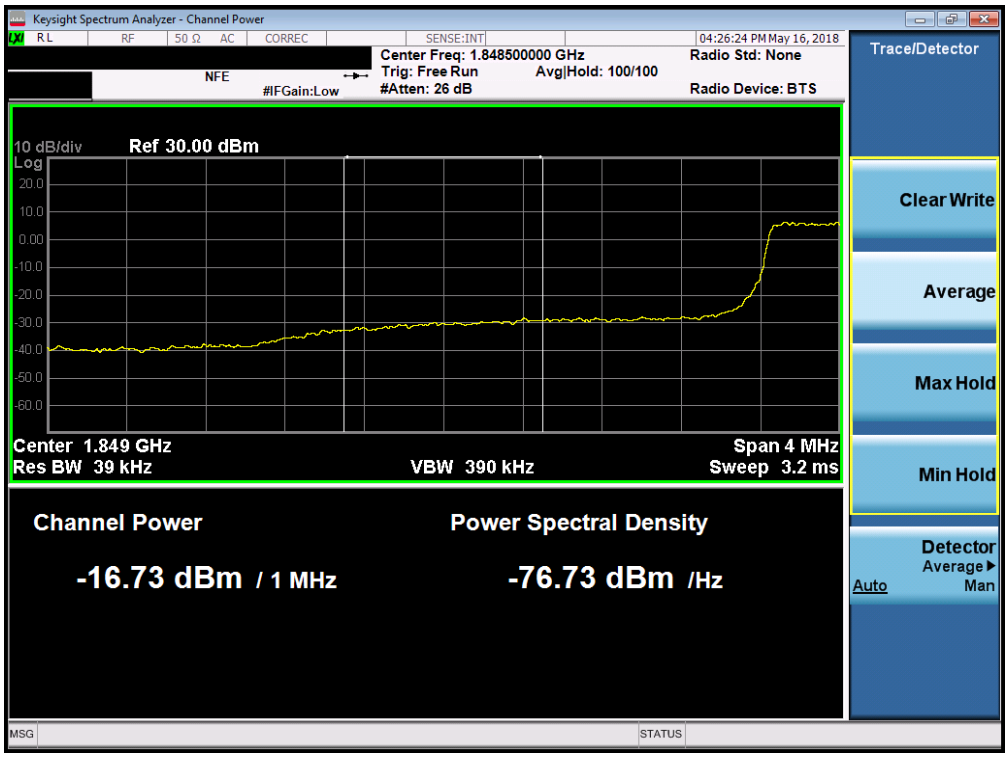
Plot 7-177. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-178. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

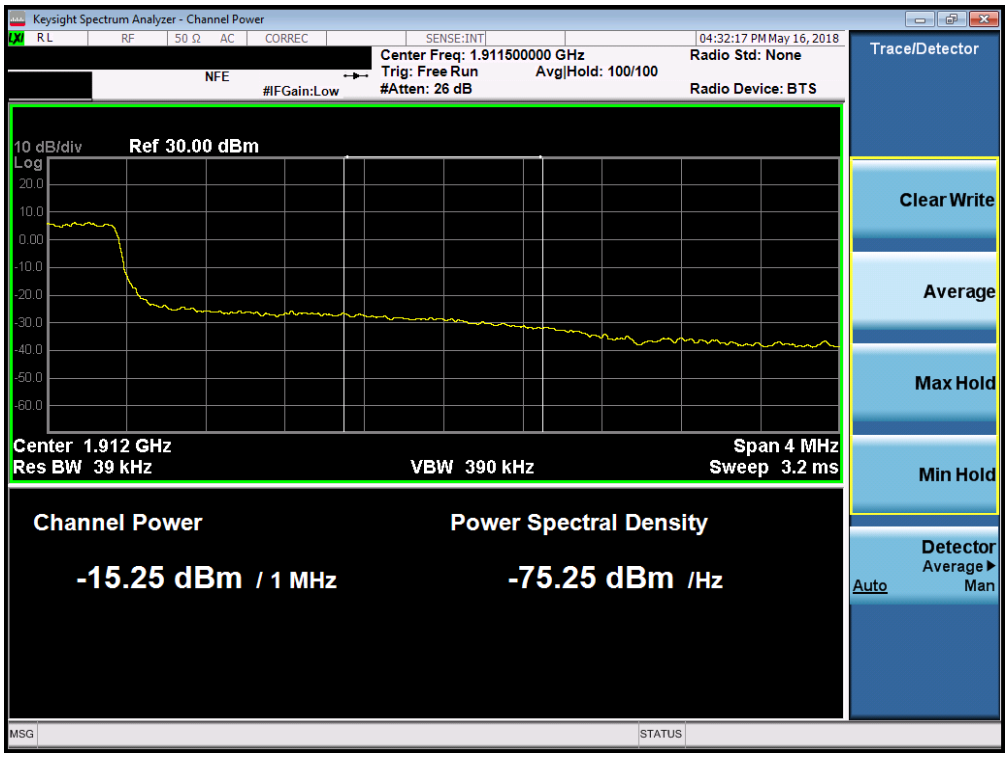


Plot 7-179. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

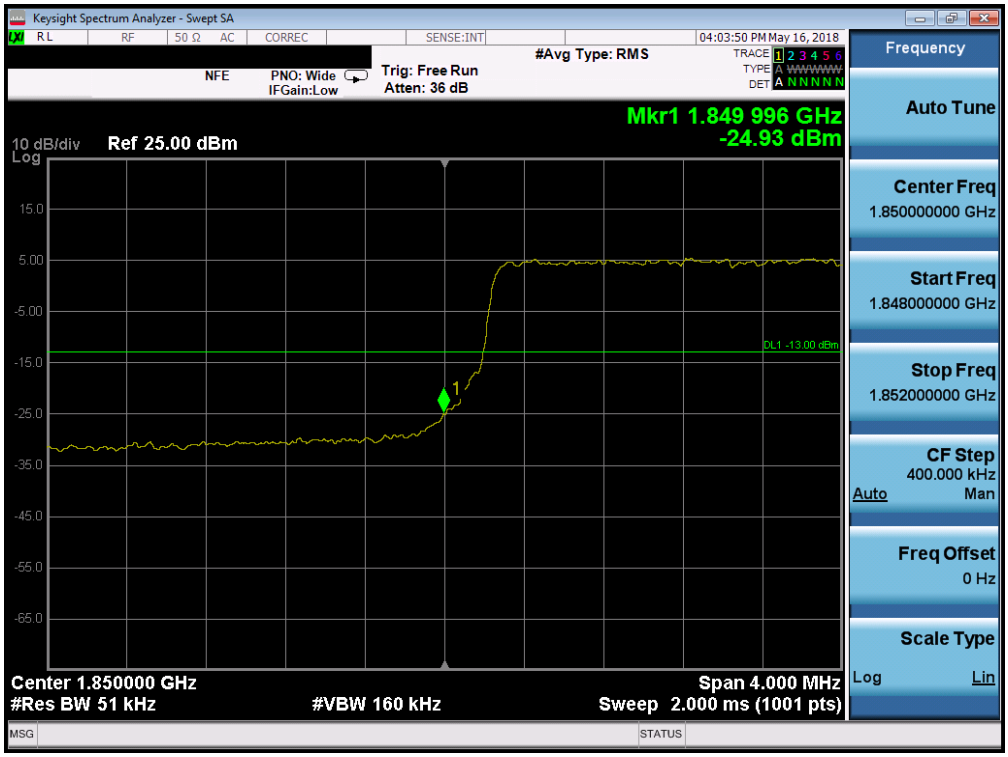


Plot 7-180. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

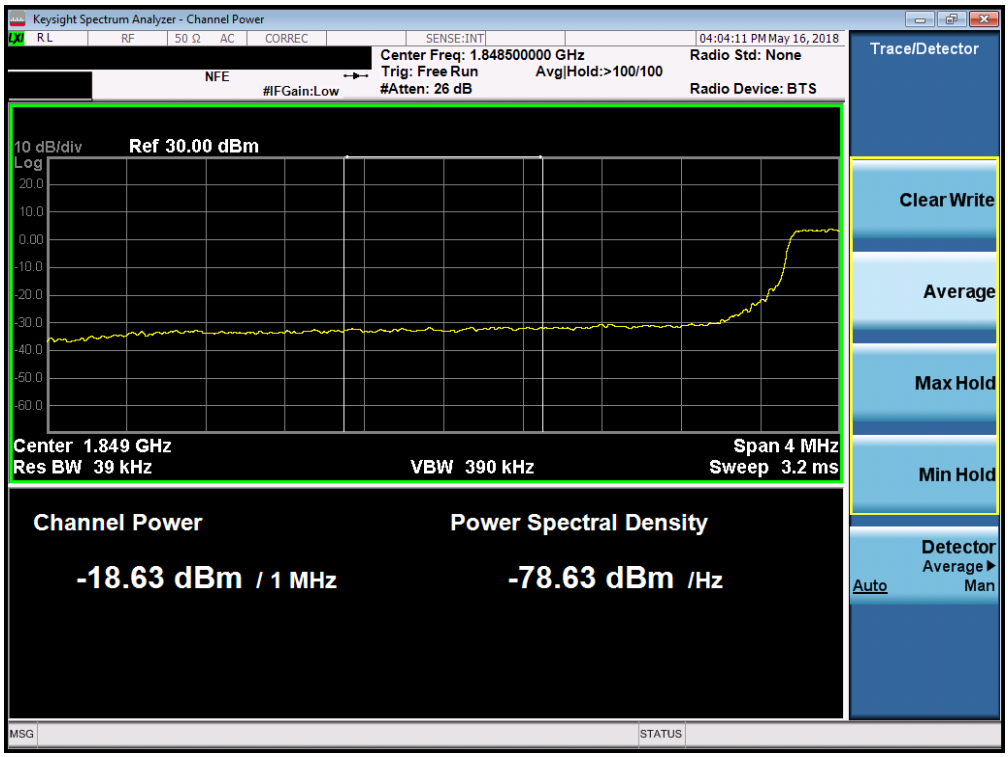
Plot 7-181. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-182. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

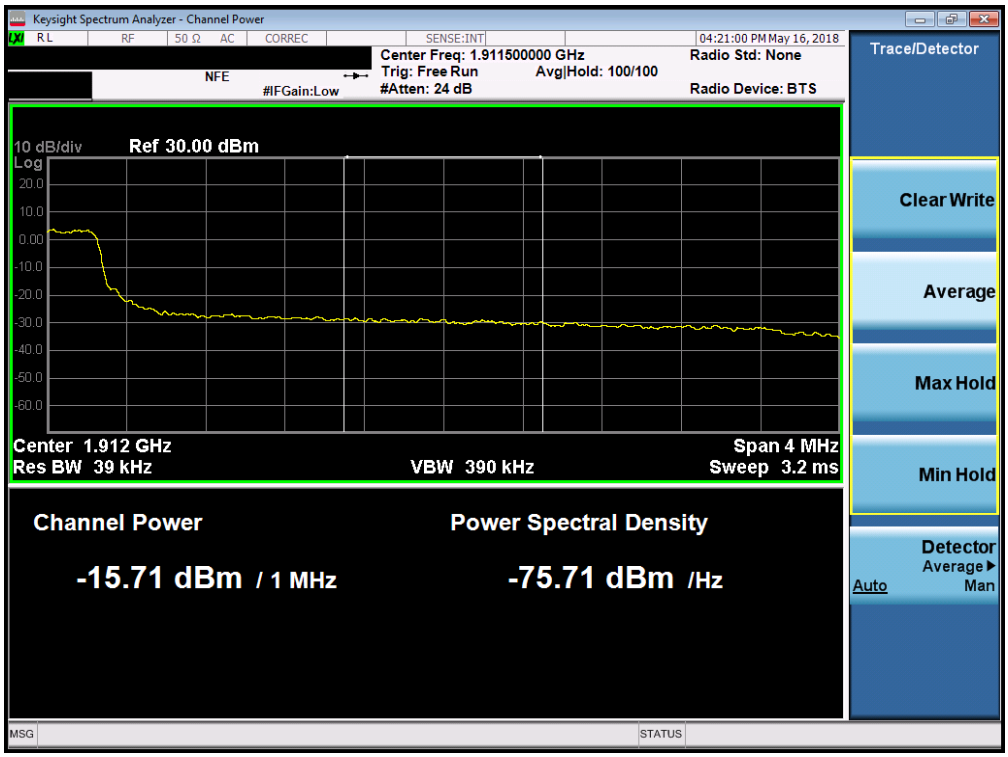


Plot 7-183. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

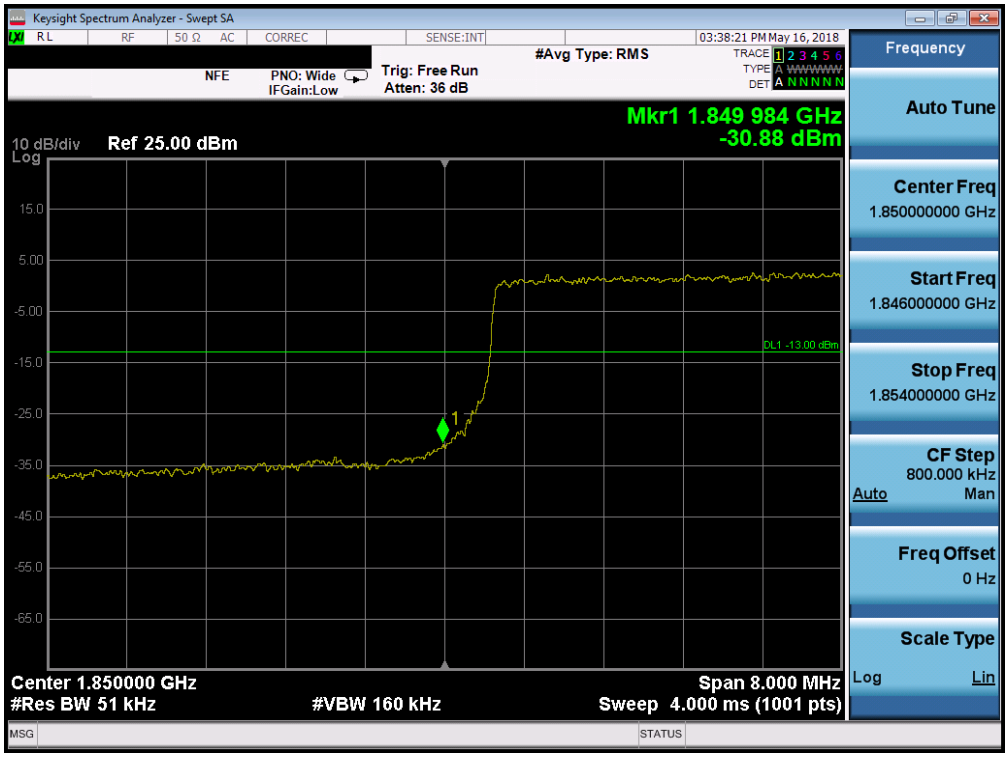


Plot 7-184. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

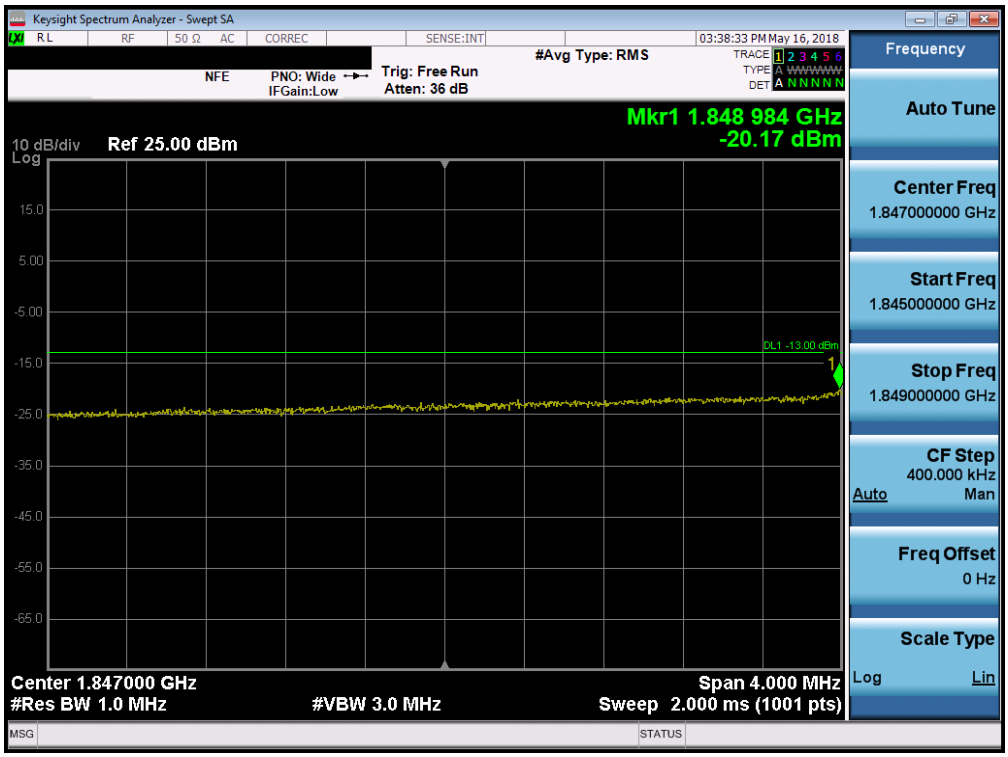
Plot 7-185. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-186. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

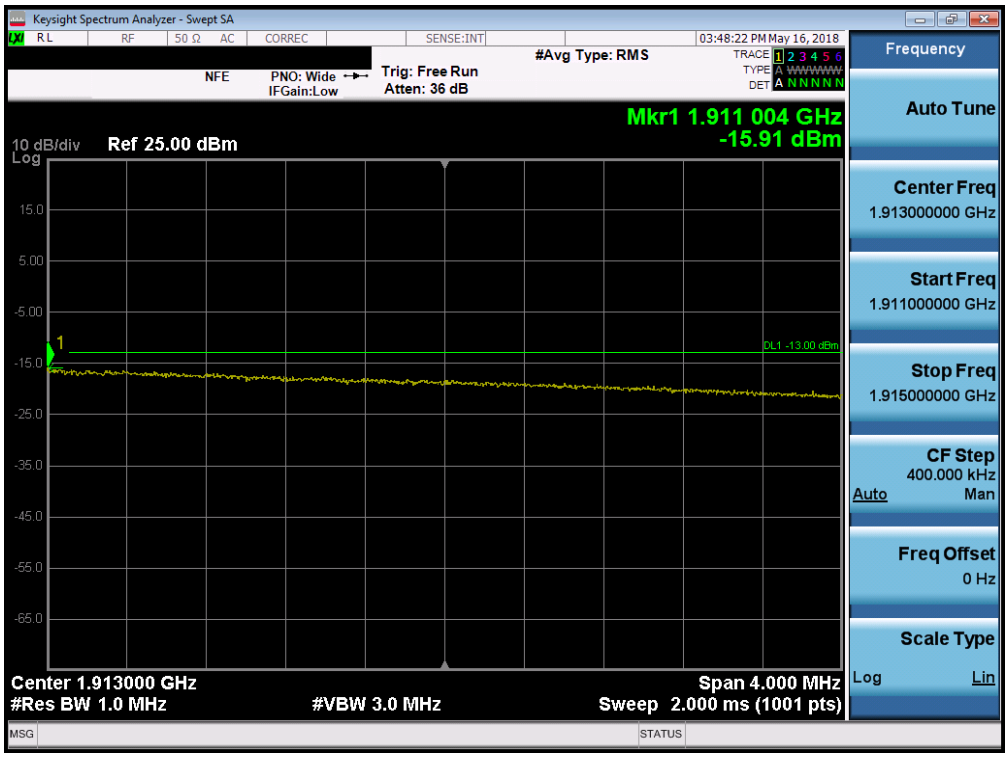


Plot 7-187. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

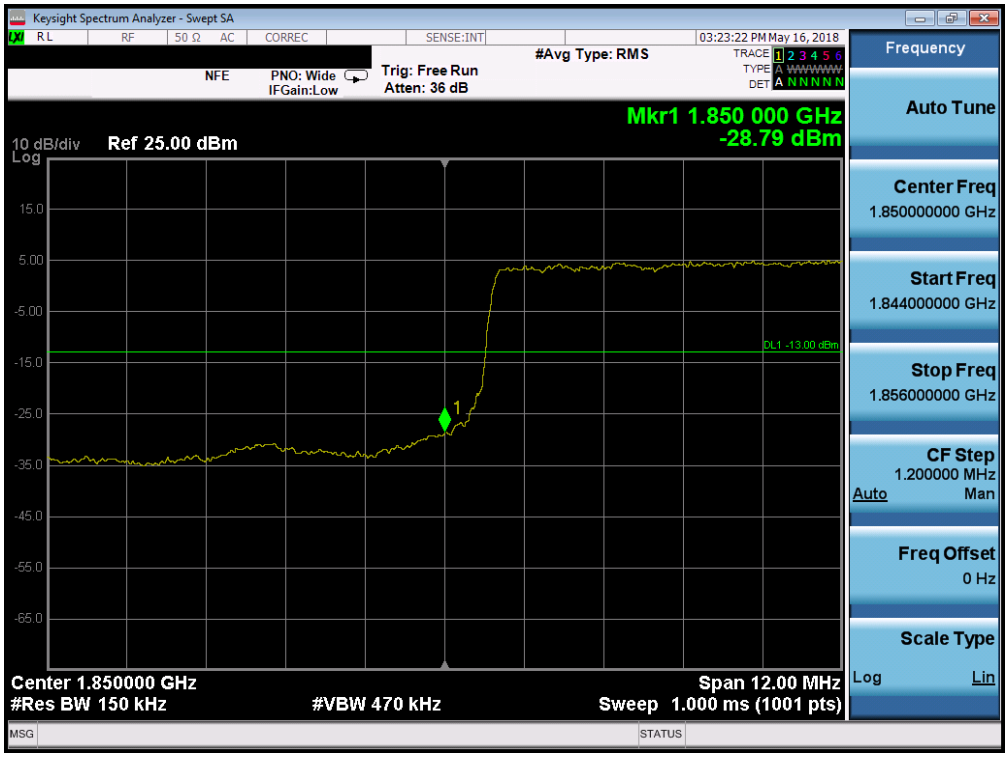


Plot 7-188. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

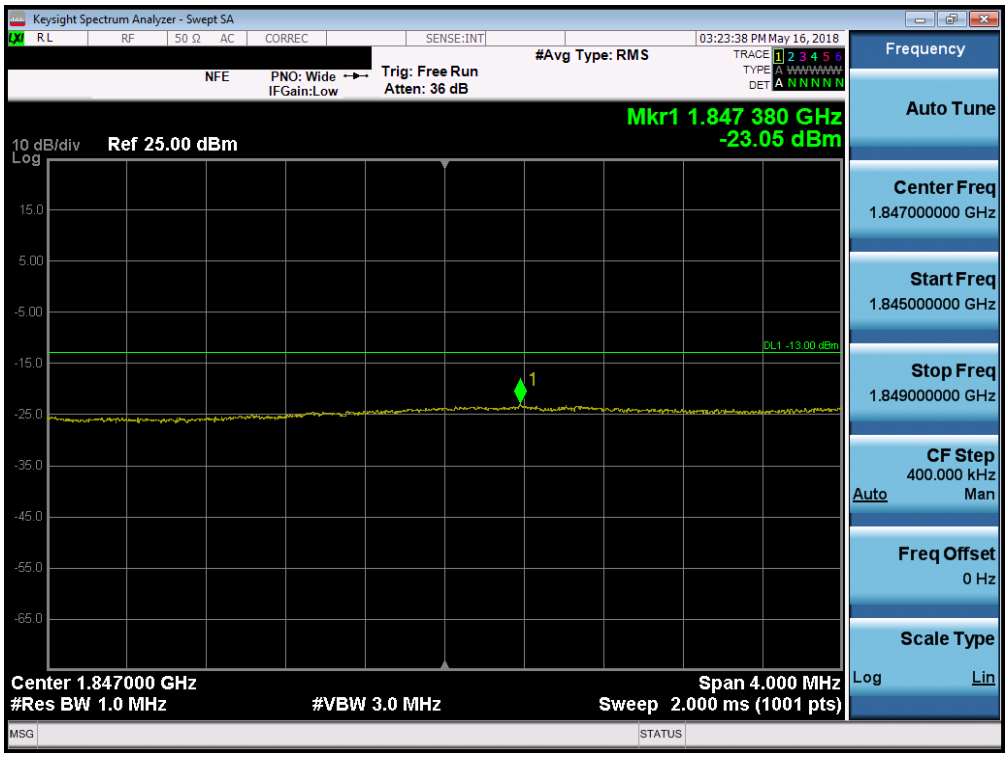
Plot 7-189. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-190. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

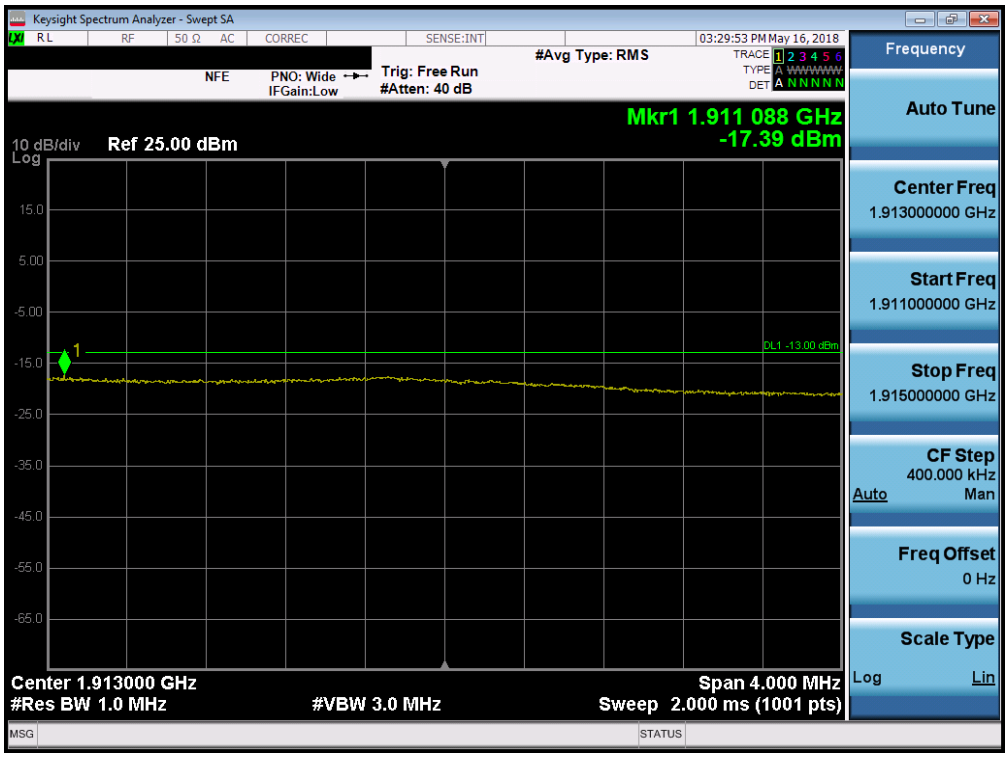


Plot 7-191. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

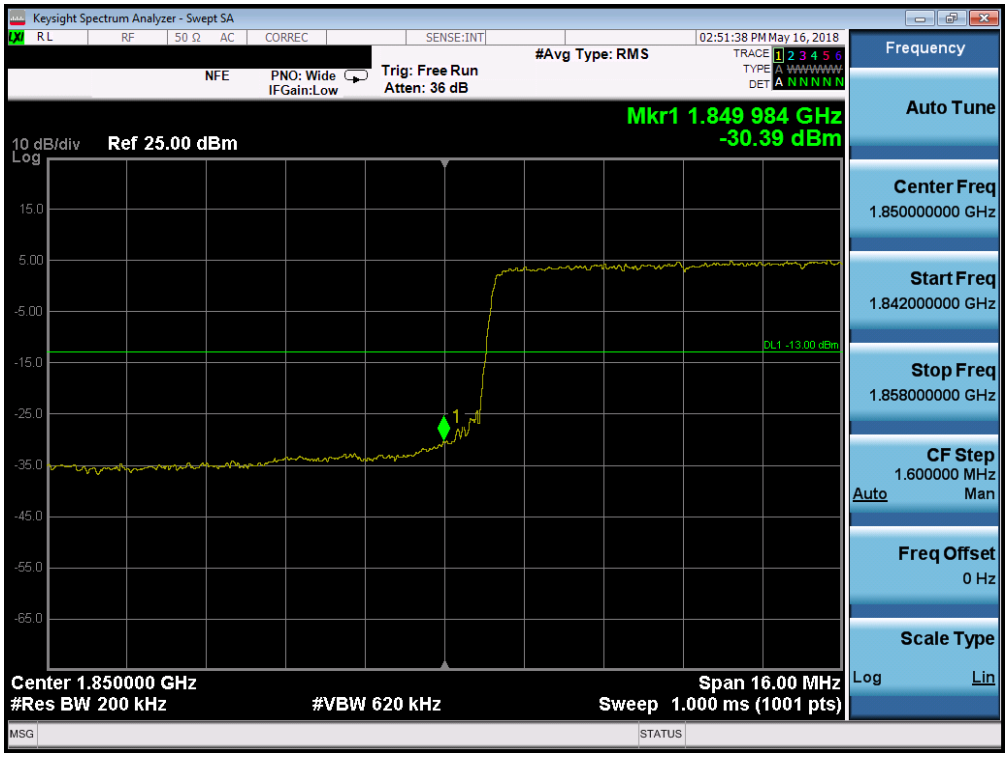


Plot 7-192. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

Plot 7-193. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

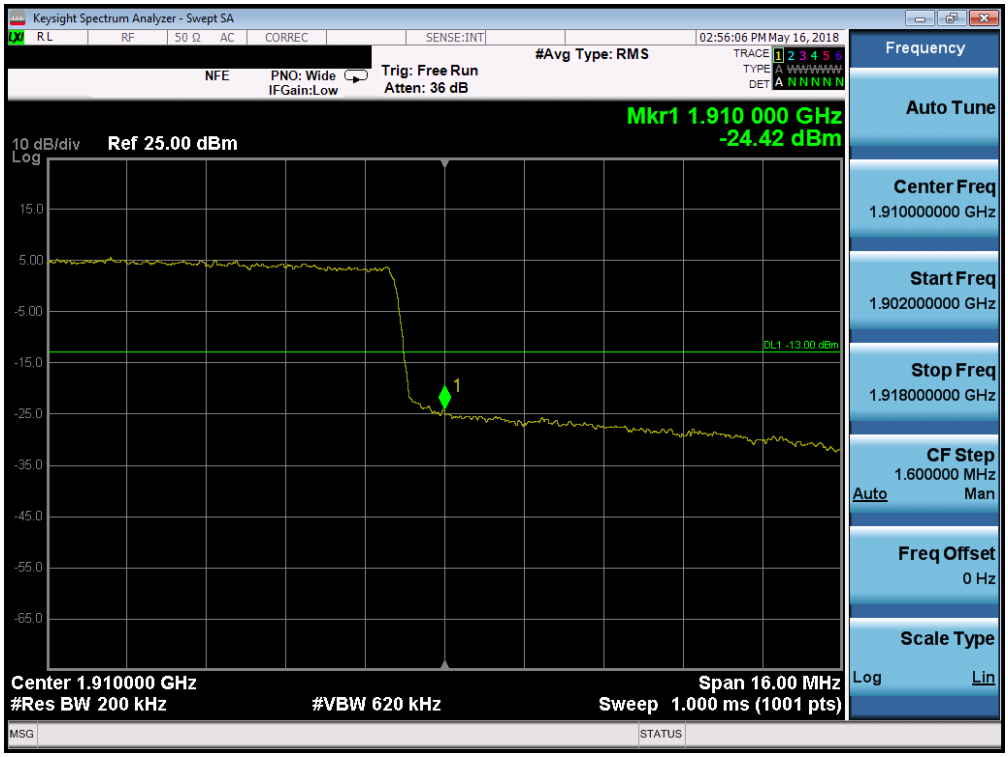


Plot 7-194. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

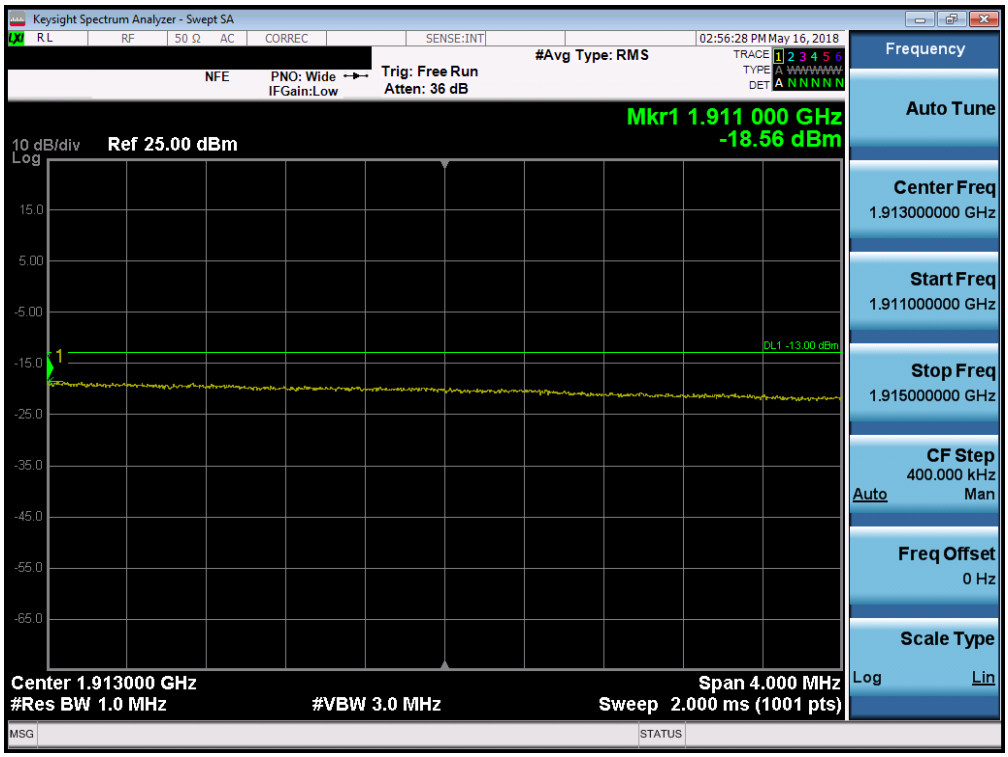


Plot 7-195. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

Plot 7-196. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-197. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-198. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > 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.

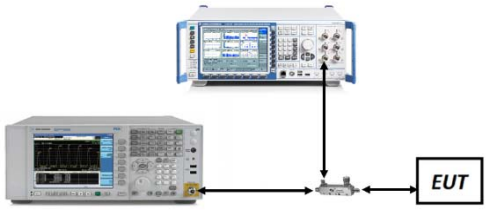
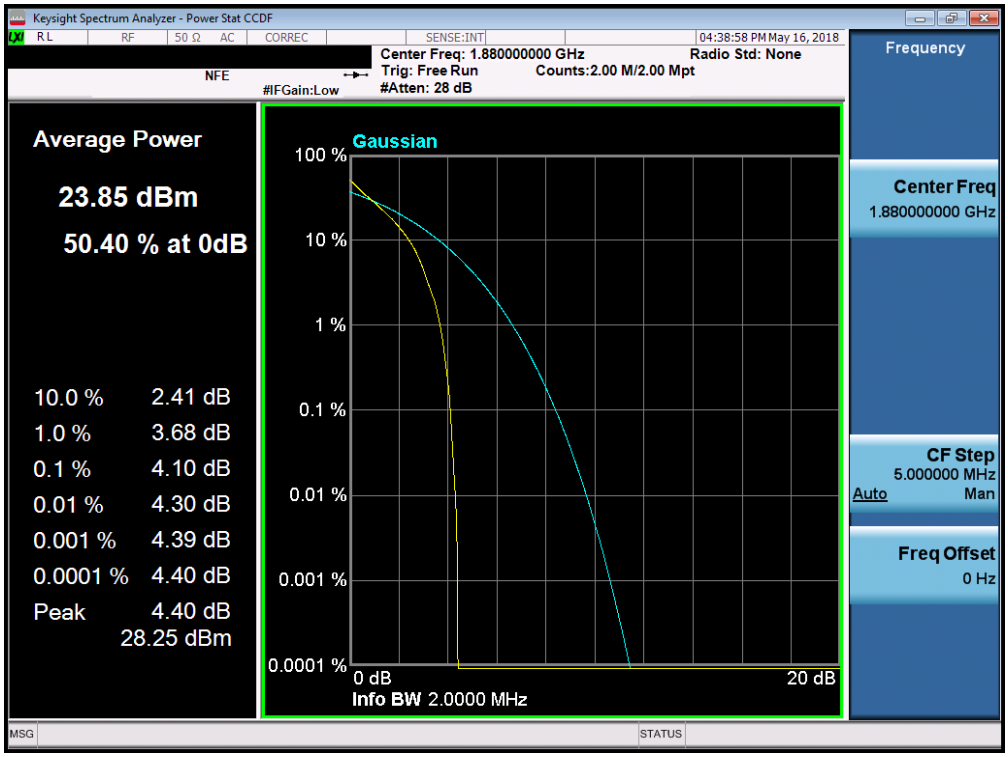


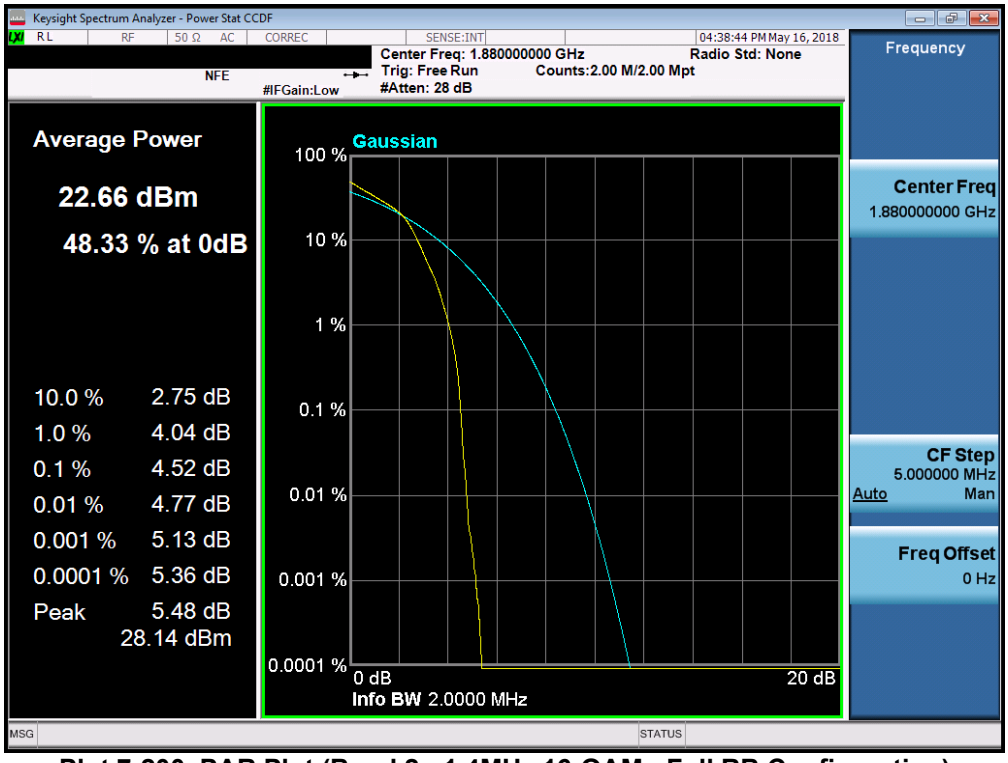
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

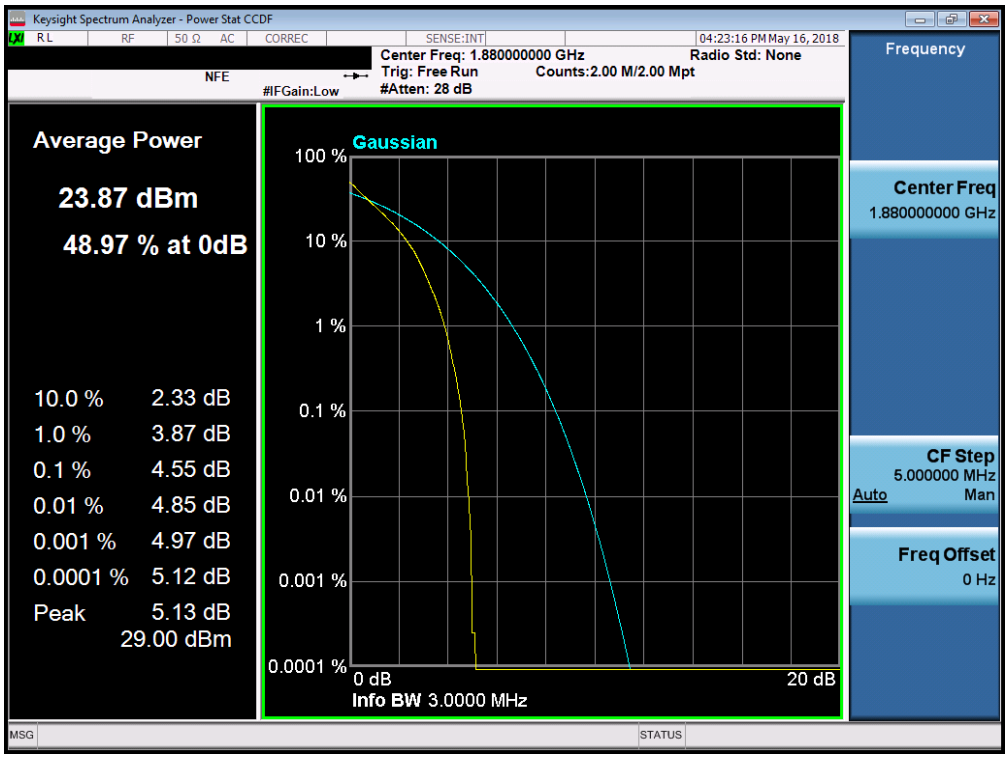
None.



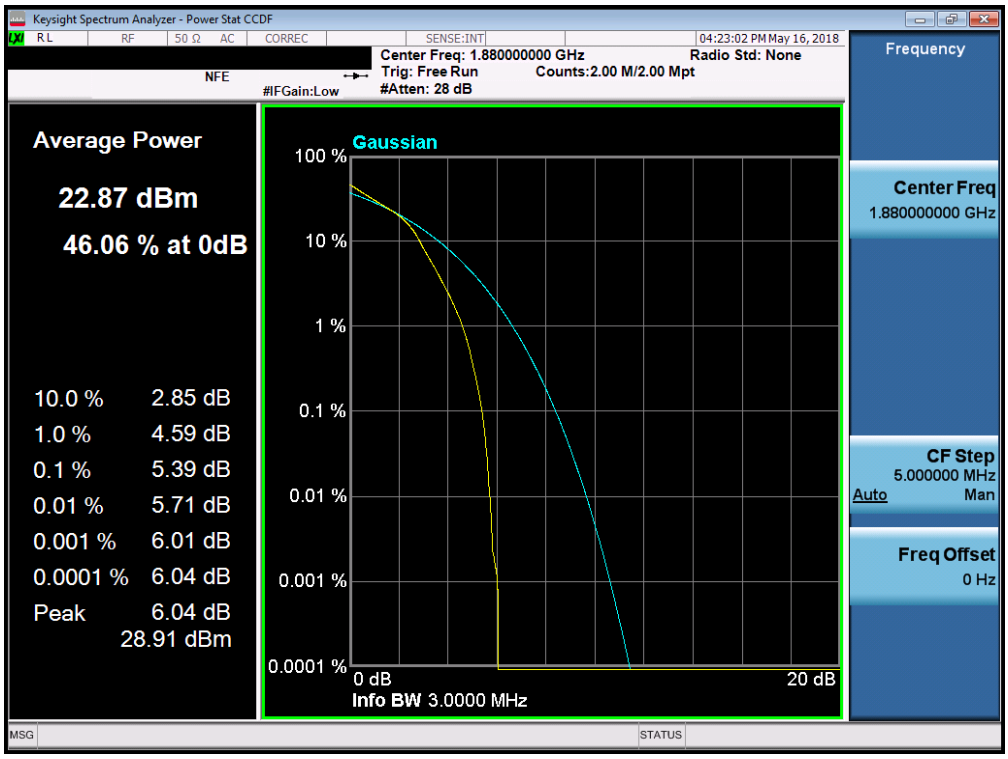
Plot 7-199. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



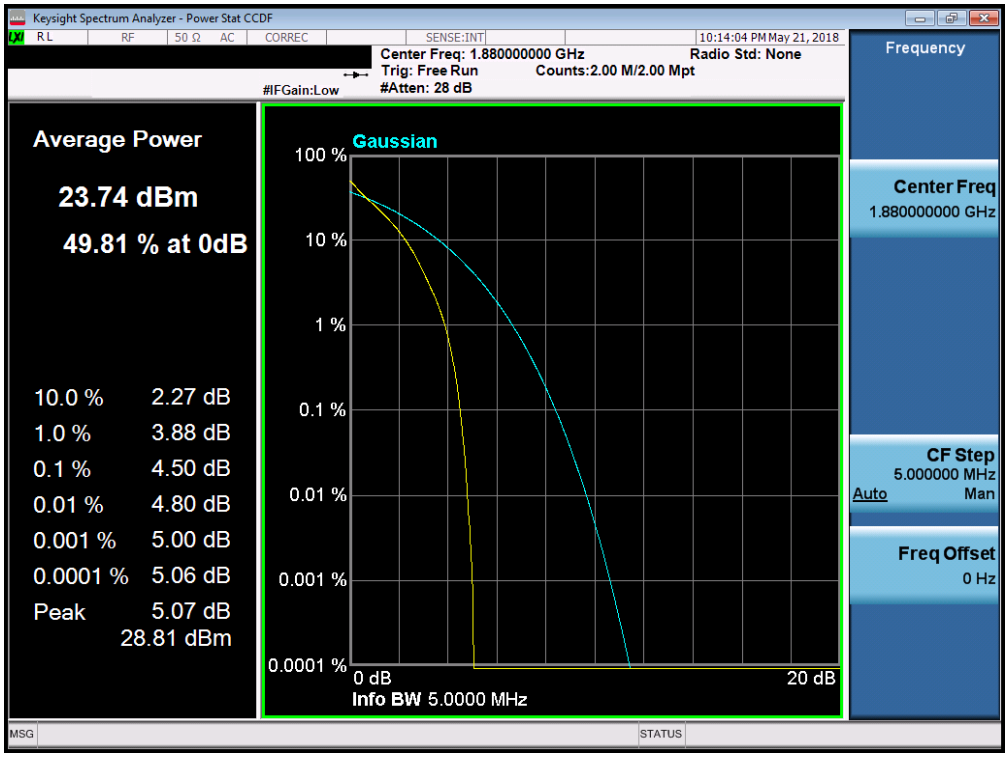
Plot 7-200. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)



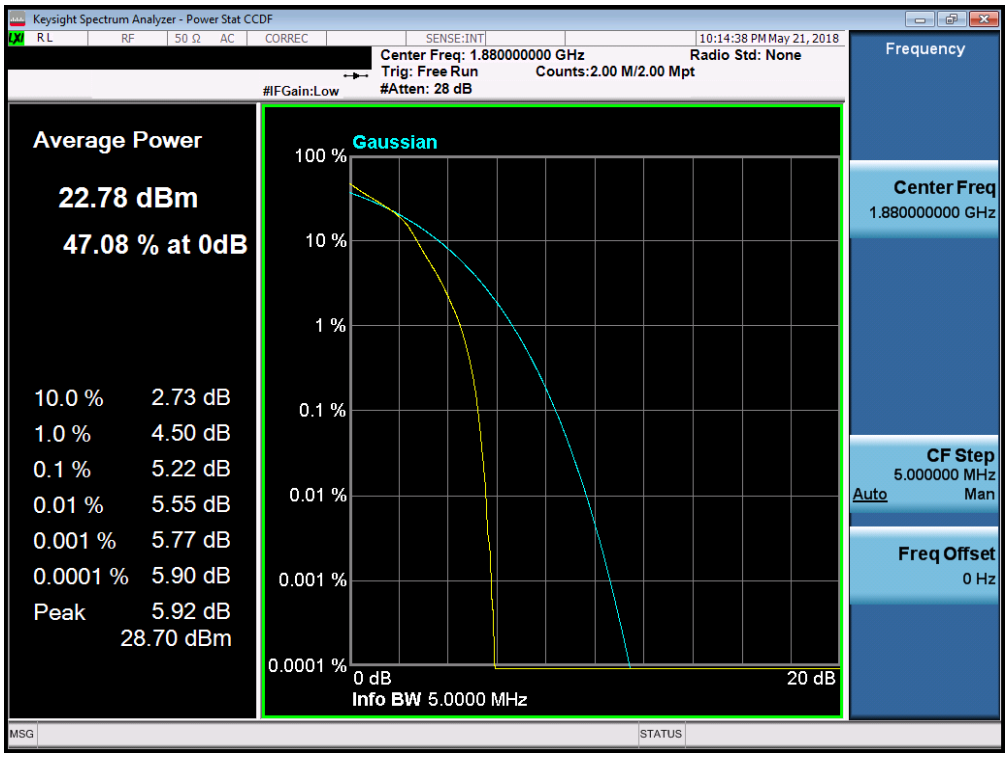
Plot 7-201. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



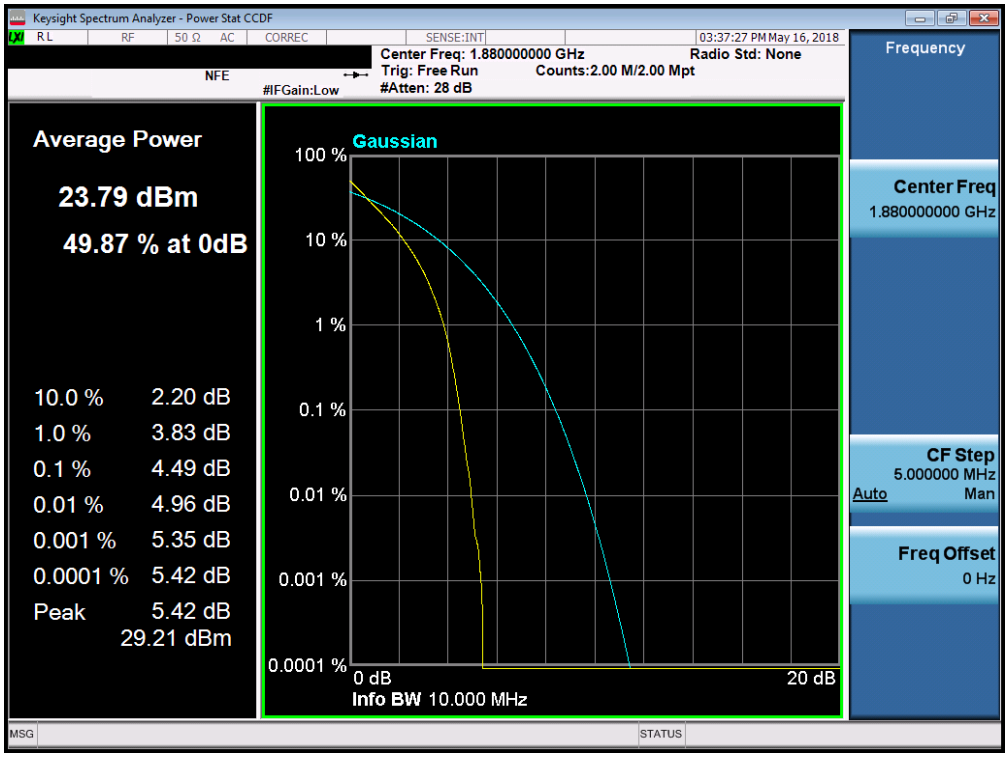
Plot 7-202. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



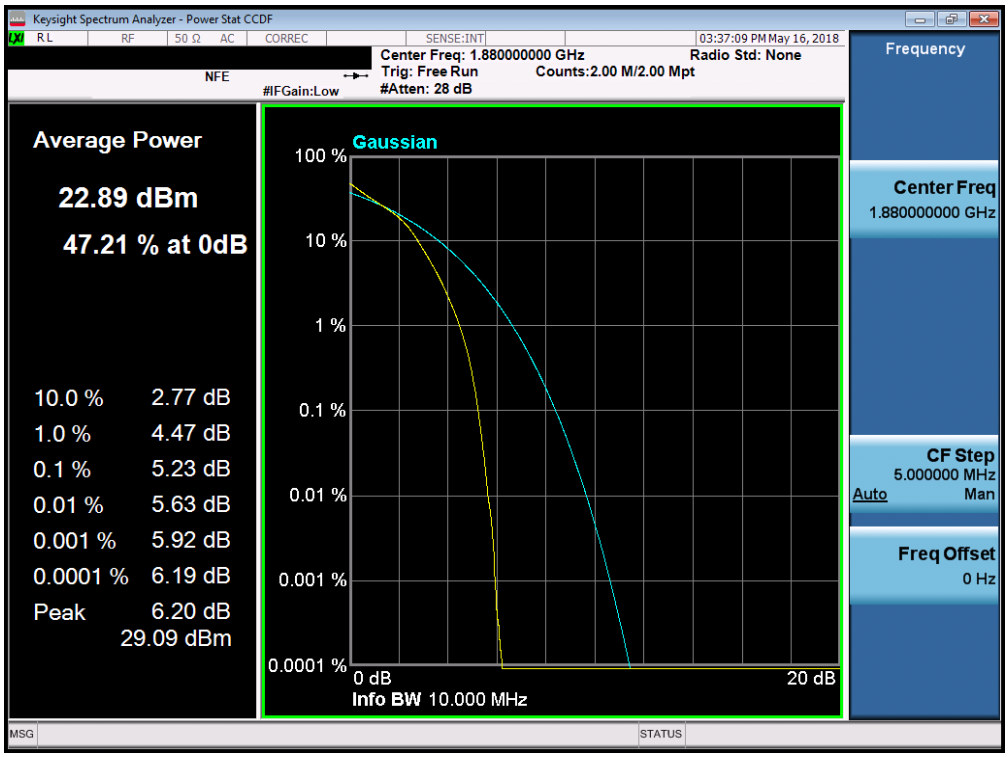
Plot 7-203. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



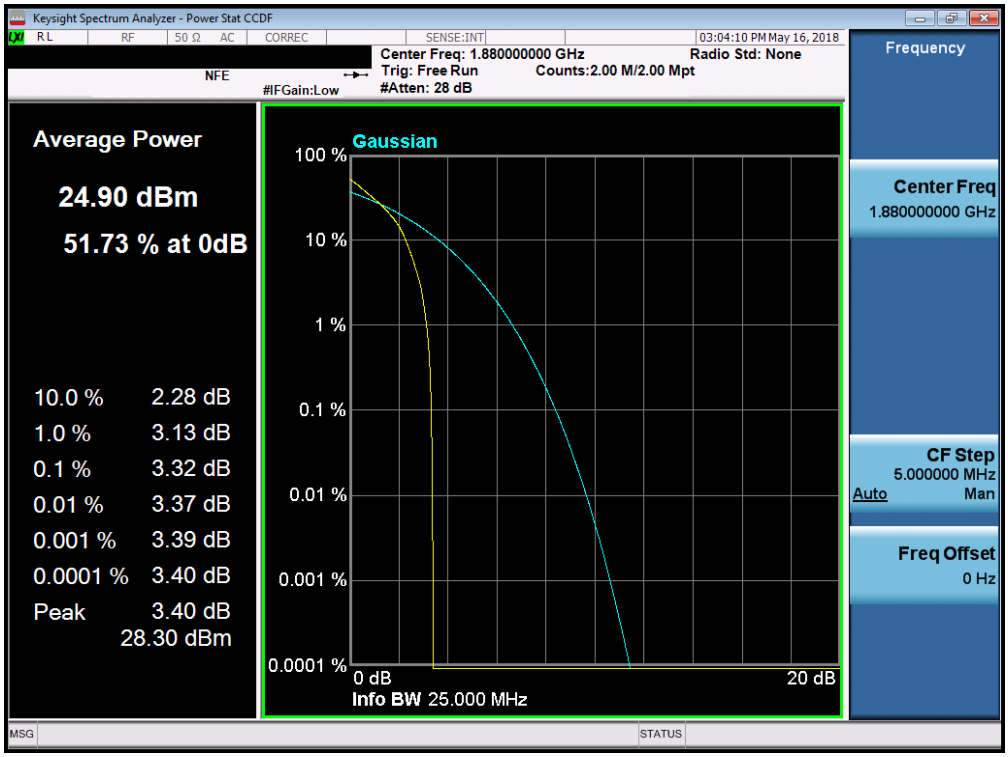
Plot 7-204. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)



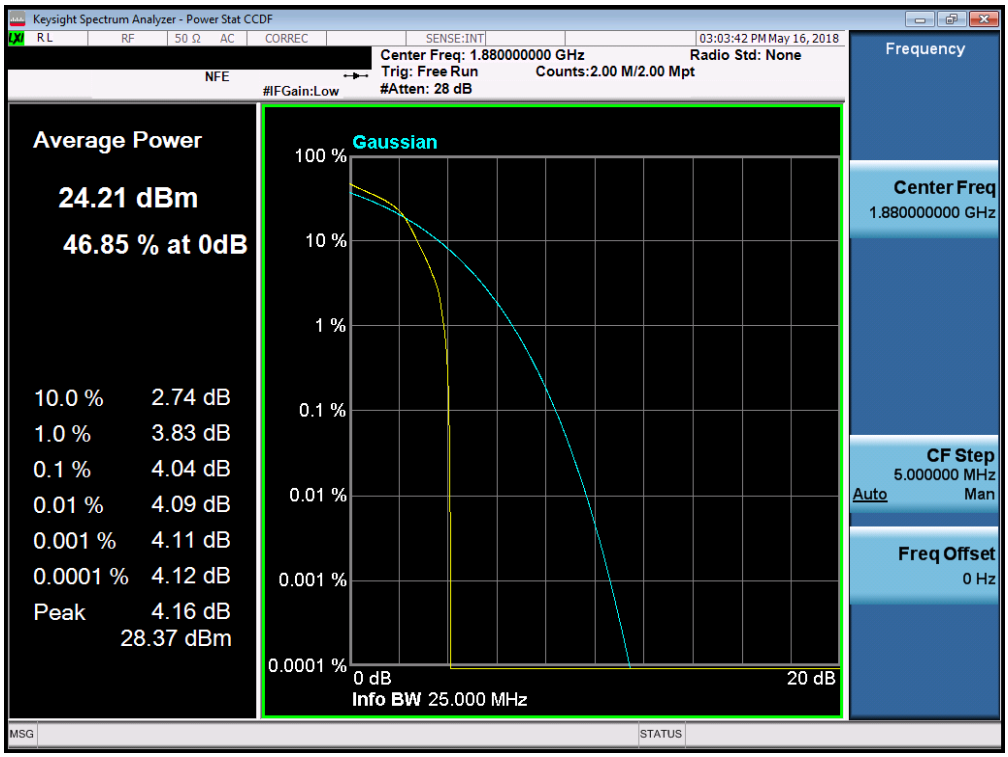
Plot 7-205. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



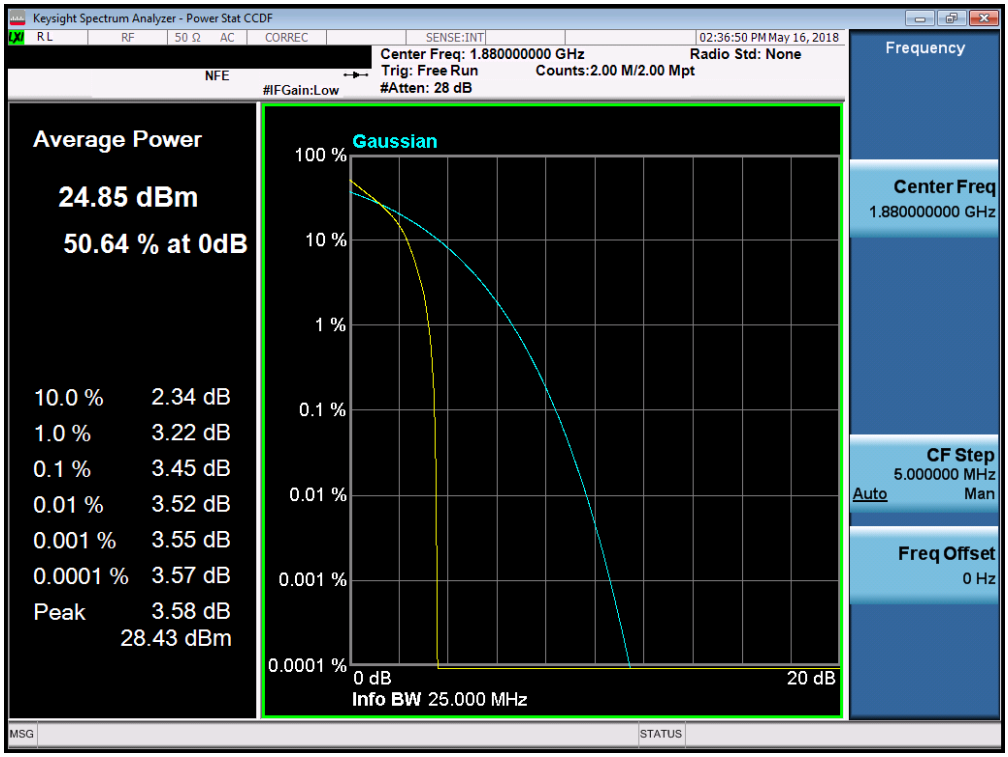
Plot 7-206. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



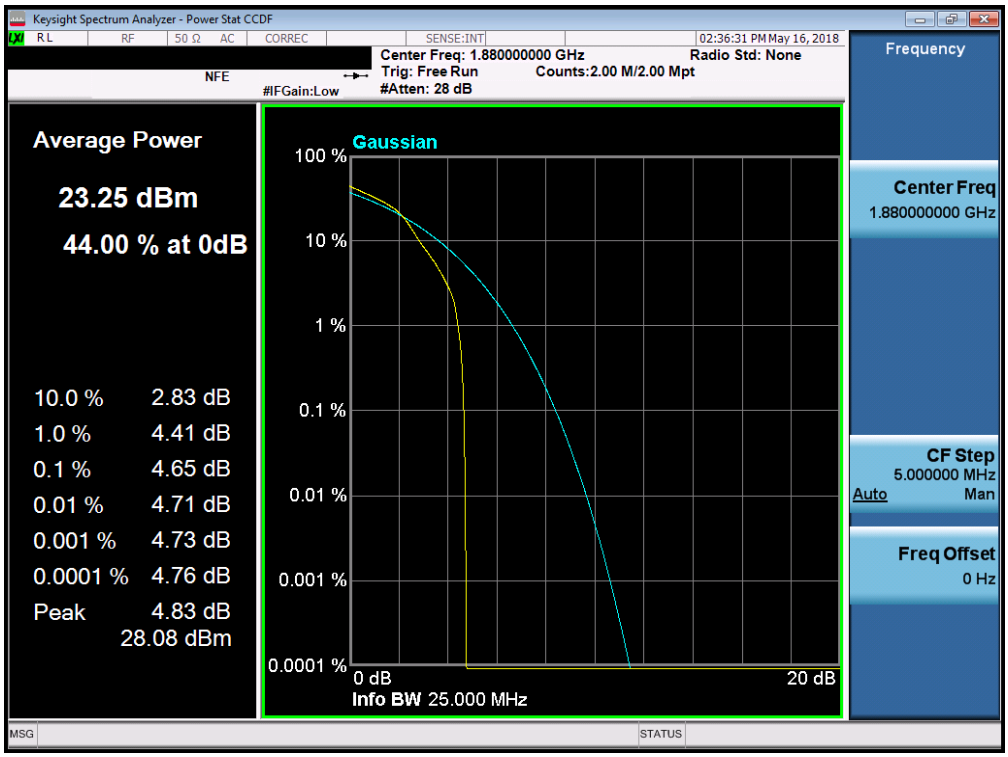
Plot 7-207. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-208. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)



Plot 7-209. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-210. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
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.

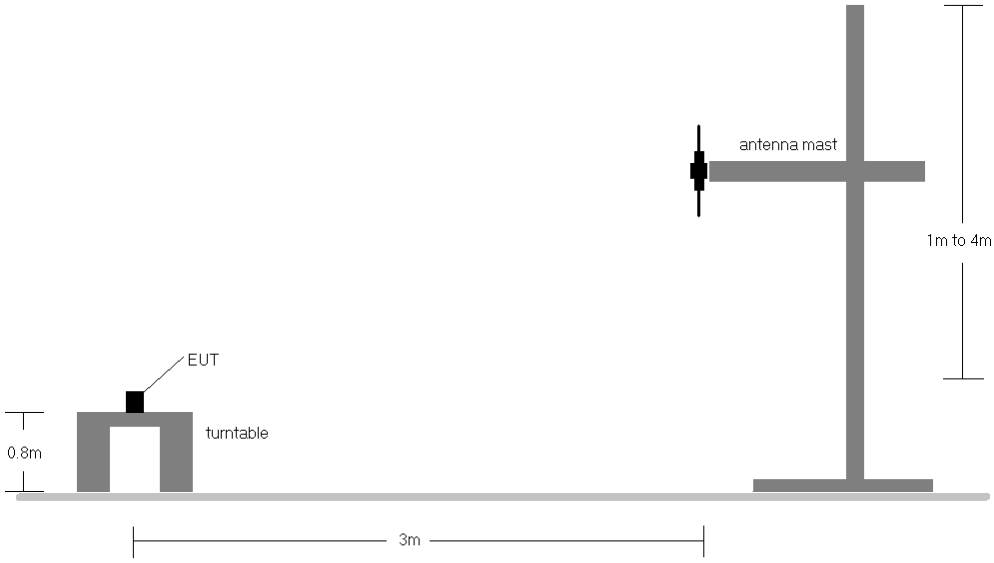


Figure 7-5. Radiated Test Setup <1GHz

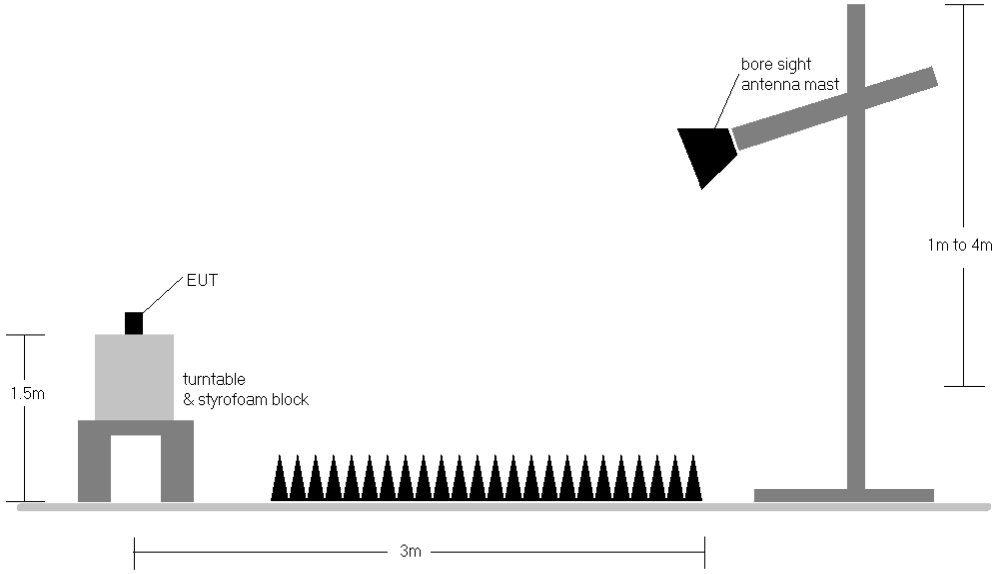


Figure 7-6. Radiated Test Setup >1GHz

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 [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
665.50	5	QPSK	H	150	3	1 / 0	19.26	1.10	18.21	0.066	34.77	-16.56
680.50	5	QPSK	H	150	3	1 / 0	19.33	1.10	18.28	0.067	34.77	-16.49
695.50	5	QPSK	H	150	3	1 / 0	19.72	1.10	**18.67**	0.074	34.77	-16.10
695.50	5	16-QAM	H	150	3	1 / 0	19.04	1.10	**17.99**	0.063	34.77	-16.78
668.00	10	QPSK	H	150	359	1 / 0	19.38	1.10	18.33	0.068	34.77	-16.44
680.50	10	QPSK	H	150	359	1 / 0	19.67	1.10	18.62	0.073	34.77	-16.15
693.00	10	QPSK	H	150	359	1 / 0	19.89	1.10	**18.84**	0.077	34.77	-15.93
693.00	10	16-QAM	H	150	359	1 / 0	18.96	1.10	**17.91**	0.062	34.77	-16.86
670.50	15	QPSK	H	150	4	1 / 0	19.49	1.10	18.44	0.070	34.77	-16.33
680.50	15	QPSK	H	150	4	1 / 0	19.70	1.10	18.65	0.073	34.77	-16.12
690.50	15	QPSK	H	150	4	1 / 0	19.92	1.10	**18.87**	**0.077**	34.77	-15.90
690.50	15	16-QAM	H	150	4	1 / 0	19.05	1.10	**18.00**	0.063	34.77	-16.77
673.00	20	QPSK	H	150	13	1 / 0	18.71	1.10	17.66	0.058	34.77	-17.11
680.50	20	QPSK	H	150	13	1 / 0	19.09	1.10	18.04	0.064	34.77	-16.73
688.00	20	QPSK	H	150	13	1 / 0	19.26	1.10	**18.21**	0.066	34.77	-16.56
688.00	20	16-QAM	H	150	13	1 / 0	18.50	1.10	**17.45**	0.056	34.77	-17.32
690.50	15	QPSK	V	150	54	1 / 0	18.96	1.10	17.91	0.062	34.77	-16.86

Table 7-3. ERP Data (Band 71)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	150	10	1 / 5	19.58	1.10	18.53	0.071	34.77	-16.24	20.68	0.117	36.99	-16.31
707.50	1.4	QPSK	H	150	10	1 / 5	20.02	1.13	**19.00**	**0.079**	34.77	-15.77	**21.15**	**0.130**	36.99	-15.84
715.30	1.4	QPSK	H	150	10	1 / 5	19.45	1.16	18.46	0.070	34.77	-16.31	20.61	0.115	36.99	-16.38
707.50	1.4	16-QAM	H	150	10	1 / 5	18.71	1.13	**17.69**	0.059	34.77	-17.08	**19.84**	0.096	36.99	-17.15
700.50	3	QPSK	H	150	9	1 / 14	19.39	1.10	18.34	0.068	34.77	-16.43	20.49	0.112	36.99	-16.50
707.50	3	QPSK	H	150	9	1 / 14	19.60	1.13	**18.58**	0.072	34.77	-16.19	**20.73**	0.118	36.99	-16.26
714.50	3	QPSK	H	150	9	1 / 14	19.27	1.16	18.28	0.067	34.77	-16.49	20.43	0.110	36.99	-16.56
707.50	3	16-QAM	H	150	9	1 / 14	18.15	1.13	**17.13**	0.052	34.77	-17.64	**19.28**	0.085	36.99	-17.71
701.50	5	QPSK	H	150	18	1 / 24	19.16	1.11	18.12	0.065	34.77	-16.66	20.27	0.106	36.99	-16.72
707.50	5	QPSK	H	150	18	1 / 24	19.29	1.13	**18.27**	0.067	34.77	-16.50	**20.42**	0.110	36.99	-16.57
713.50	5	QPSK	H	150	18	1 / 24	18.86	1.15	17.86	0.061	34.77	-16.91	20.01	0.100	36.99	-16.98
707.50	5	16-QAM	H	150	18	1 / 24	17.60	1.13	**16.58**	0.046	34.77	-18.19	**18.73**	0.075	36.99	-18.26
704.00	10	QPSK	H	150	10	1 / 49	19.56	1.12	18.53	0.071	34.77	-16.24	20.68	0.117	36.99	-16.31
707.50	10	QPSK	H	150	10	1 / 49	19.68	1.13	**18.66**	0.073	34.77	-16.11	**20.81**	0.121	36.99	-16.18
711.00	10	QPSK	H	150	10	1 / 49	19.29	1.14	18.28	0.067	34.77	-16.49	20.43	0.111	36.99	-16.56
707.50	10	16-QAM	H	150	10	1 / 49	18.22	1.13	**17.20**	0.052	34.77	-17.57	**19.35**	0.086	36.99	-17.64
707.50	1.4	QPSK	V	150	36	1 / 5	19.61	1.13	18.59	0.072	34.77	-16.18	20.74	0.119	36.99	-16.25

Table 7-4. 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 [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	150	339	1 / 0	19.47	1.32	18.64	0.073	34.77	-16.13	20.79	0.120	36.99	-16.20
782.00	5	QPSK	V	150	339	1 / 0	20.07	1.33	19.25	0.084	34.77	-15.52	21.40	0.138	36.99	-15.59
784.50	5	QPSK	V	150	339	1 / 0	20.28	1.34	**19.47**	0.088	34.77	-15.30	**21.62**	0.145	36.99	-15.37
784.50	5	16-QAM	V	150	339	1 / 0	18.92	1.34	**18.11**	0.065	34.77	-16.66	**20.26**	0.106	36.99	-16.73
782.00	10	QPSK	V	150	348	1 / 0	20.31	1.33	**19.49**	**0.089**	34.77	-15.28	**21.64**	**0.146**	36.99	-15.35
782.00	10	16-QAM	V	150	348	1 / 0	19.32	1.33	**18.50**	0.071	34.77	-16.27	**20.65**	0.116	36.99	-16.34
782.00	10	QPSK	H	150	348	1 / 0	18.02	1.33	17.20	0.052	34.77	-17.57	19.35	0.086	36.99	-17.64

Table 7-5. ERP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	150	354	1 / 0	20.50	1.50	19.85	0.097	38.45	-18.60	22.00	0.158	40.61	-18.61
836.50	1.4	QPSK	H	150	354	1 / 0	20.80	1.50	**20.15**	0.104	38.45	-18.30	**22.30**	0.170	40.61	-18.31
848.30	1.4	QPSK	H	150	354	1 / 0	20.47	1.50	19.82	0.096	38.45	-18.63	21.97	0.157	40.61	-18.64
836.50	1.4	16-QAM	H	150	354	1 / 0	19.91	1.50	**19.26**	0.084	38.45	-19.19	**21.41**	0.138	40.61	-19.20
825.50	3	QPSK	H	150	353	1 / 0	20.73	1.50	20.08	0.102	38.45	-18.37	22.23	0.167	40.61	-18.38
836.50	3	QPSK	H	150	353	1 / 0	20.91	1.50	**20.26**	**0.106**	38.45	-18.19	**22.41**	**0.174**	40.61	-18.20
847.50	3	QPSK	H	150	353	1 / 0	20.79	1.50	20.14	0.103	38.45	-18.31	22.29	0.169	40.61	-18.32
836.50	3	16-QAM	H	150	353	1 / 0	19.96	1.50	**19.31**	0.085	38.45	-19.14	**21.46**	0.140	40.61	-19.15
826.50	5	QPSK	H	150	355	1 / 0	20.53	1.50	19.88	0.097	38.45	-18.57	22.03	0.160	40.61	-18.58
836.50	5	QPSK	H	150	355	1 / 0	20.73	1.50	**20.08**	0.102	38.45	-18.37	**22.23**	0.167	40.61	-18.38
846.50	5	QPSK	H	150	355	1 / 0	20.59	1.50	19.94	0.099	38.45	-18.51	22.09	0.162	40.61	-18.52
836.50	5	16-QAM	H	150	355	1 / 0	19.78	1.50	**19.13**	0.082	38.45	-19.32	**21.28**	0.134	40.61	-19.33
829.00	10	QPSK	H	150	357	1 / 0	20.23	1.50	19.58	0.091	38.45	-18.87	21.73	0.149	40.61	-18.88
836.50	10	QPSK	H	150	357	1 / 0	20.54	1.50	**19.89**	0.097	38.45	-18.56	**22.04**	0.160	40.61	-18.57
844.00	10	QPSK	H	150	357	1 / 0	20.39	1.50	19.74	0.094	38.45	-18.71	21.89	0.155	40.61	-18.72
836.50	10	16-QAM	H	150	357	1 / 0	19.54	1.50	**18.89**	0.077	38.45	-19.56	**21.04**	0.127	40.61	-19.57
836.50	3	QPSK	V	150	27	1 / 0	19.39	1.50	18.74	0.075	38.45	-19.71	20.89	0.123	40.61	-19.72

Table 7-6. 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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	3	1 / 0	18.47	5.56	24.03	0.253	30.00	-5.97
1745.00	1.4	QPSK	H	150	3	1 / 0	18.95	5.32	**24.27**	0.267	30.00	-5.73
1779.30	1.4	QPSK	H	150	3	1 / 0	18.52	5.09	23.61	0.230	30.00	-6.39
1745.00	1.4	16-QAM	H	150	3	1 / 0	18.28	5.32	**23.60**	0.229	30.00	-6.40
1711.50	3	QPSK	H	150	1	1 / 0	18.17	5.55	23.72	0.236	30.00	-6.28
1745.00	3	QPSK	H	150	1	1 / 0	18.82	5.32	**24.14**	0.260	30.00	-5.86
1778.50	3	QPSK	H	150	1	1 / 0	18.45	5.10	23.55	0.226	30.00	-6.45
1745.00	3	16-QAM	H	150	1	1 / 0	17.94	5.32	**23.26**	0.212	30.00	-6.74
1712.50	5	QPSK	H	150	5	1 / 0	17.75	5.55	23.30	0.214	30.00	-6.70
1745.00	5	QPSK	H	150	5	1 / 0	18.51	5.32	**23.83**	0.242	30.00	-6.17
1777.50	5	QPSK	H	150	5	1 / 0	18.09	5.10	23.19	0.209	30.00	-6.81
1745.00	5	16-QAM	H	150	5	1 / 0	17.32	5.32	**22.64**	0.184	30.00	-7.36
1715.00	10	QPSK	H	150	6	1 / 0	18.61	5.53	24.14	0.259	30.00	-5.86
1745.00	10	QPSK	H	150	6	1 / 0	19.15	5.32	**24.47**	0.280	30.00	-5.53
1775.00	10	QPSK	H	150	6	1 / 0	18.75	5.12	23.87	0.244	30.00	-6.13
1745.00	10	16-QAM	H	150	6	1 / 0	18.01	5.32	**23.33**	0.215	30.00	-6.67
1717.50	15	QPSK	H	150	3	1 / 0	18.73	5.51	24.24	0.266	30.00	-5.76
1745.00	15	QPSK	H	150	3	1 / 0	19.40	5.32	**24.72**	**0.297**	30.00	-5.28
1772.50	15	QPSK	H	150	3	1 / 0	18.91	5.14	24.05	0.254	30.00	-5.95
1745.00	15	16-QAM	H	150	3	1 / 0	18.72	5.32	**24.04**	0.254	30.00	-5.96
1720.00	20	QPSK	H	150	3	1 / 0	18.57	5.49	24.06	0.255	30.00	-5.94
1745.00	20	QPSK	H	150	3	1 / 0	19.15	5.32	**24.47**	0.280	30.00	-5.53
1770.00	20	QPSK	H	150	3	1 / 0	18.77	5.15	23.92	0.247	30.00	-6.08
1745.00	20	16-QAM	H	150	3	1 / 0	17.49	5.32	**22.81**	0.191	30.00	-7.19
1745.00	15	QPSK	V	150	72	1 / 0	17.49	5.32	22.81	0.191	30.00	-7.19

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

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	150	3	1 / 5	19.91	4.82	24.73	0.297	33.01	-8.28
1880.00	1.4	QPSK	H	150	3	1 / 0	20.48	4.74	25.22	0.333	33.01	-7.79
1909.30	1.4	QPSK	H	150	3	1 / 5	20.61	4.68	**25.29**	0.338	33.01	-7.72
1909.30	1.4	16-QAM	H	150	3	1 / 5	19.47	4.68	**24.15**	0.260	33.01	-8.86
1851.50	3	QPSK	H	150	359	1 / 14	20.58	4.82	25.40	0.346	33.01	-7.61
1880.00	3	QPSK	H	150	359	1 / 14	20.27	4.74	25.01	0.317	33.01	-8.00
1908.50	3	QPSK	H	150	359	1 / 14	20.87	4.68	**25.55**	0.359	33.01	-7.46
1908.50	3	16-QAM	H	150	359	1 / 14	19.84	4.68	**24.52**	0.283	33.01	-8.49
1852.50	5	QPSK	H	150	359	1 / 24	20.35	4.81	25.16	0.328	33.01	-7.85
1880.00	5	QPSK	H	150	359	1 / 24	20.03	4.74	24.77	0.300	33.01	-8.24
1907.50	5	QPSK	H	150	359	1 / 24	20.80	4.68	**25.48**	0.353	33.01	-7.53
1907.50	5	16-QAM	H	150	359	1 / 24	19.69	4.68	**24.37**	0.274	33.01	-8.64
1855.00	10	QPSK	H	150	359	1 / 49	20.82	4.81	25.63	0.365	33.01	-7.38
1880.00	10	QPSK	H	150	359	1 / 49	20.51	4.74	25.25	0.335	33.01	-7.76
1905.00	10	QPSK	H	150	359	1 / 49	21.19	4.68	**25.87**	0.387	33.01	-7.14
1905.00	10	16-QAM	H	150	359	1 / 49	20.40	4.68	**25.08**	0.322	33.01	-7.93
1857.50	15	QPSK	H	150	3	1 / 74	20.67	4.80	25.47	0.352	33.01	-7.54
1880.00	15	QPSK	H	150	3	1 / 74	20.83	4.74	25.57	0.361	33.01	-7.44
1902.50	15	QPSK	H	150	3	1 / 74	21.27	4.69	**25.96**	**0.394**	33.01	-7.05
1860.00	20	QPSK	H	150	3	1 / 99	20.53	4.79	25.32	0.341	33.01	-7.69
1880.00	20	QPSK	H	150	3	1 / 99	20.47	4.74	25.21	0.332	33.01	-7.80
1900.00	20	QPSK	H	150	3	1 / 99	20.80	4.69	**25.49**	0.354	33.01	-7.52
1900.00	20	16-QAM	H	150	3	1 / 99	19.89	4.69	**24.58**	0.287	33.01	-8.43
1902.50	15	QPSK	V	150	53	1 / 74	18.29	4.69	22.98	0.198	33.01	-10.03

Table 7-8. EIRP Data (Band 2)

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

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

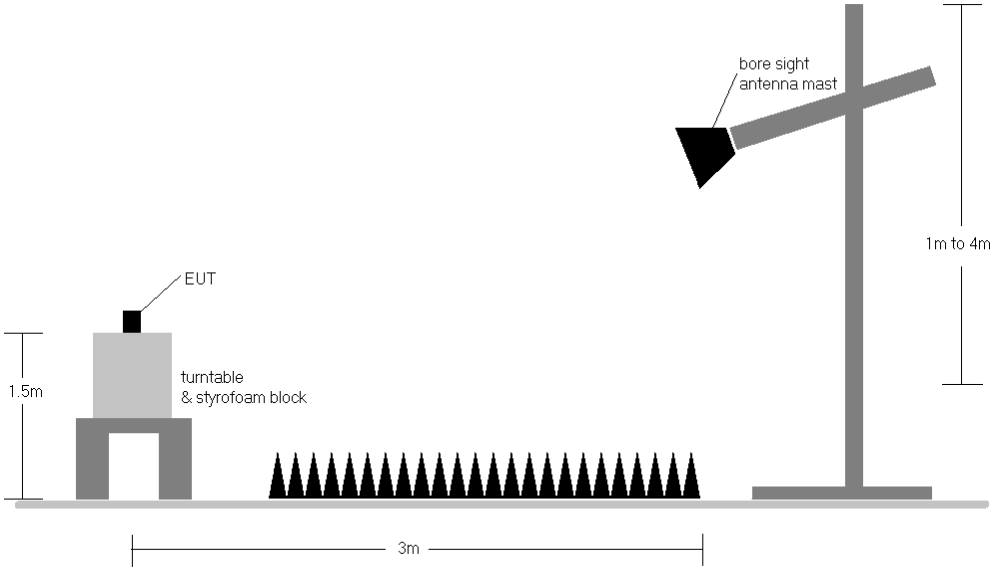


Figure 7-7. Test Instrument & Measurement Setup

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.

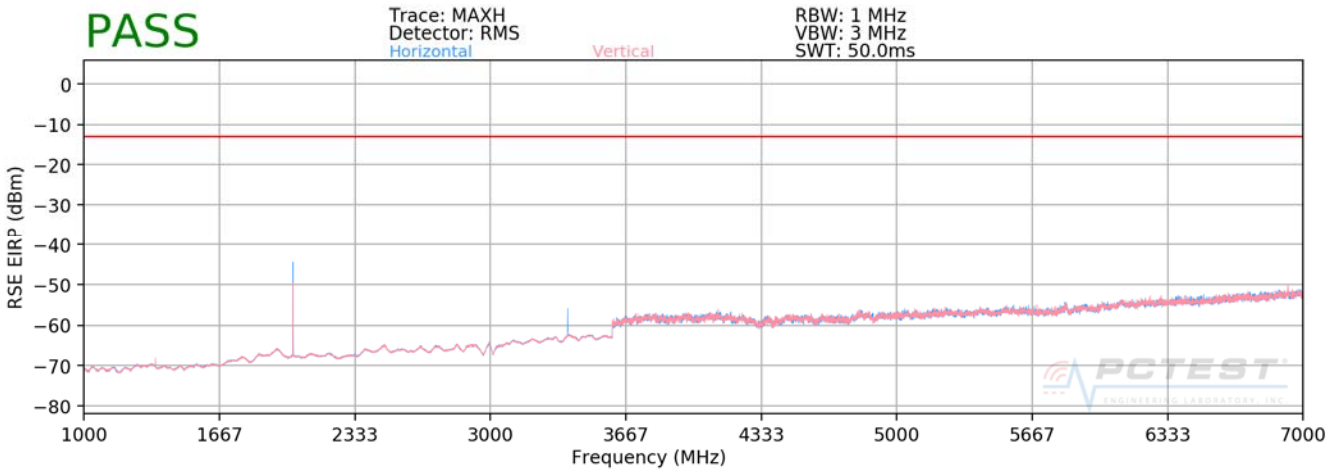
2) This unit was tested with its standard battery.

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.

Band 71



Plot 7-211. Radiated Spurious Plot above 1GHz (Band 71)

OPERATING FREQUENCY:	668.00	MHz
CHANNEL:	133172	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1336.00	H	369	359	-76.97	7.38	-69.59	-56.6
2004.00	H	109	214	-56.24	8.59	-47.65	-34.7
2672.00	H	-	-	-78.45	9.91	-68.55	-55.5
3340.00	H	380	181	-74.45	9.59	-64.85	-51.9
4008.00	H	-	-	-72.04	9.61	-62.43	-49.4

Table 7-9. Radiated Spurious Data (Band 71 – Low Channel)

OPERATING FREQUENCY:	680.50	MHz
CHANNEL:	133297	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1361.00	H	355	344	-72.87	7.48	-65.39	-52.4
2041.50	H	111	216	-52.05	8.76	-43.28	-30.3
2722.00	H	-	-	-77.59	10.08	-67.51	-54.5
3402.50	H	387	177	-72.02	9.80	-62.22	-49.2
4083.00	H	-	-	-73.25	10.05	-63.20	-50.2

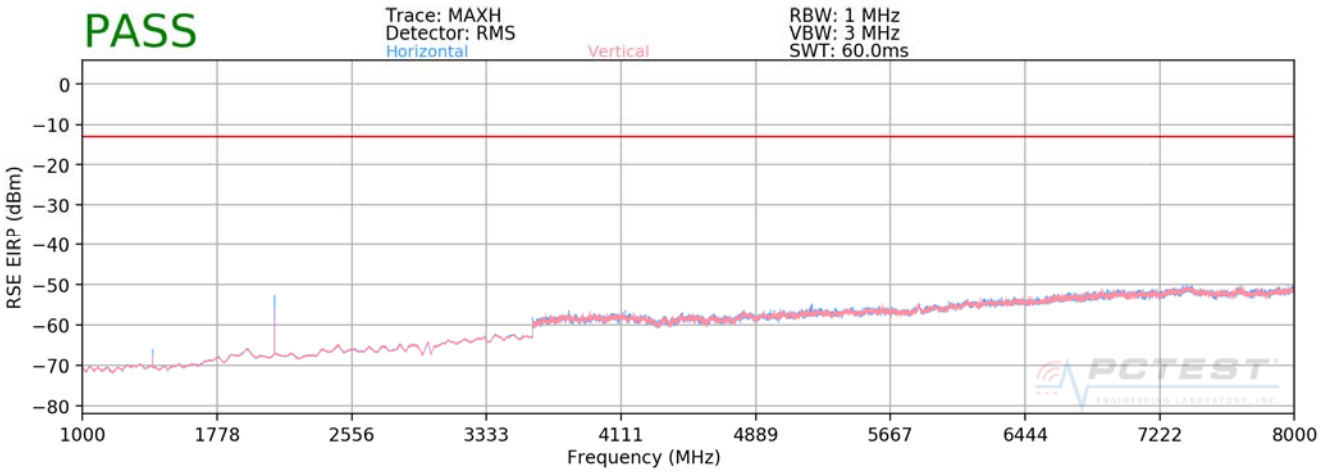
Table 7-10. Radiated Spurious Data (Band 71 – Mid Channel)

OPERATING FREQUENCY:	693.00	MHz
CHANNEL:	133422	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1386.00	H	341	359	-75.76	7.45	-68.31	-55.3
2079.00	H	116	213	-58.40	8.82	-49.58	-36.6
2772.00	H	-	-	-78.14	10.16	-67.99	-55.0
3465.00	H	375	190	-73.26	9.90	-63.37	-50.4
4158.00	H	-	-	-73.34	10.31	-63.04	-50.0

Table 7-11. Radiated Spurious Data (Band 71 – High Channel)

Band 12



Plot 7-212. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	699.70	MHz
CHANNEL:	23017	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1399.40	H	309	2	-73.04	7.44	-65.60	-52.6
2099.10	H	115	342	-71.68	8.83	-62.85	-49.8
2798.80	H	-	-	-78.16	10.15	-68.01	-55.0
3498.50	H	-	-	-74.61	9.92	-64.68	-51.7

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

OPERATING FREQUENCY:	707.50	MHz
CHANNEL:	23095	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	317	358	-72.57	7.63	-64.94	-51.9
2122.50	H	109	350	-69.51	8.86	-60.65	-47.7
2830.00	H	-	-	-77.57	10.10	-67.48	-54.5
3537.50	H	-	-	-75.07	9.90	-65.17	-52.2

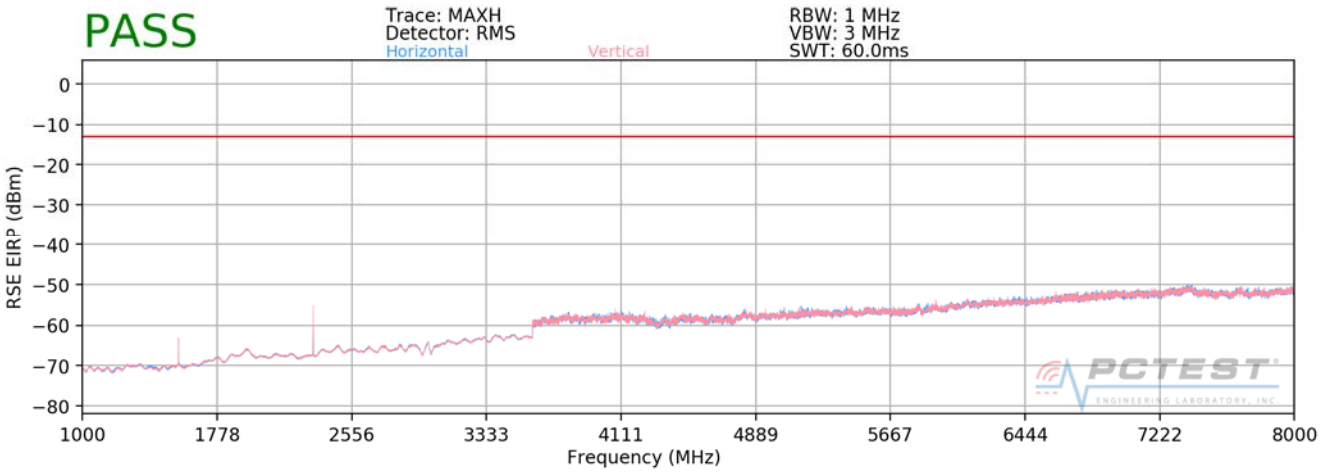
Table 7-13. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	715.30	MHz
CHANNEL:	23173	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1430.60	H	317	145	-71.83	7.83	-63.99	-51.0
2145.90	H	312	0	-68.95	8.89	-60.06	-47.1
2861.20	H	-	-	-77.56	10.04	-67.52	-54.5
3576.50	H	-	-	-75.28	9.93	-65.35	-52.3

Table 7-14. Radiated Spurious Data (Band 12 – High Channel)

Band 13



Plot 7-213. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	779.50	MHz
CHANNEL:	23205	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2338.50	V	141	323	-62.61	9.47	-53.14	-40.1
3118.00	V	-	-	-76.13	9.35	-66.78	-53.8
3897.50	V	-	-	-72.30	9.35	-62.95	-50.0

Table 7-15. Radiated Spurious Data (Band 13 – Low Channel)

OPERATING FREQUENCY:	782.00	MHz
CHANNEL:	23230	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	V	130	330	-64.47	9.43	-55.04	-42.0
3128.00	V	-	-	-75.76	9.34	-66.42	-53.4
3910.00	V	-	-	-72.90	9.37	-63.52	-50.5

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

OPERATING FREQUENCY:	784.50	MHz
CHANNEL:	23255	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2353.50	V	117	329	-64.74	9.41	-55.33	-42.3
3138.00	V	-	-	-75.47	9.33	-66.13	-53.1
3922.50	V	-	-	-71.86	9.40	-62.47	-49.5

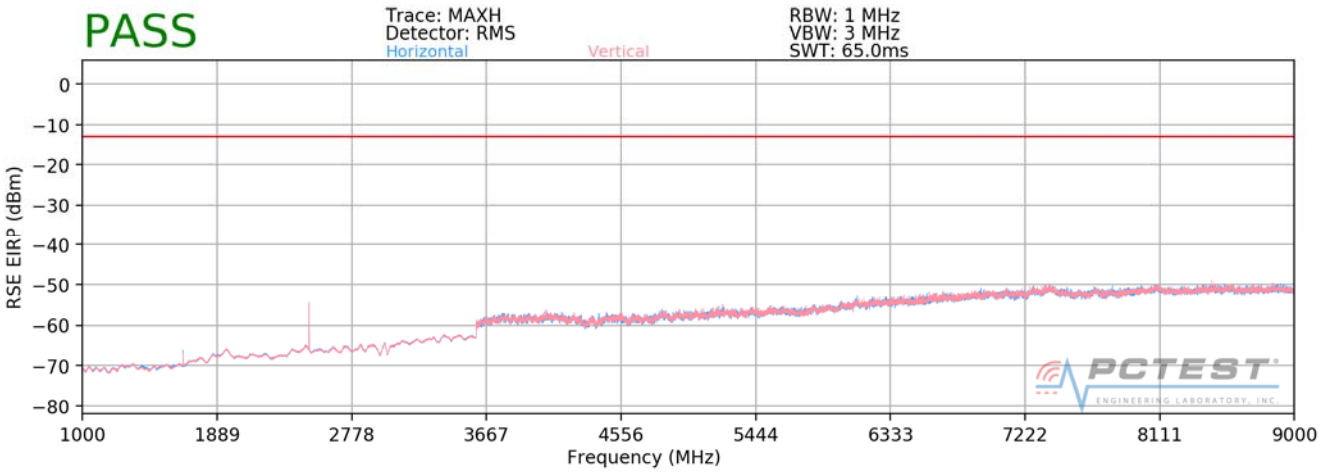
Table 7-17. Radiated Spurious Data (Band 13 – High Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	V	203	363	-67.03	8.51	-58.52	-18.5
1564.00	V	264	159	-70.18	8.53	-61.65	-21.7
1569.00	V	111	176	-71.31	8.55	-62.76	-22.8

Table 7-18. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

Band 5



Plot 7-214. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	825.50	MHz
CHANNEL:	20415	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1651.00	V	333	219	-78.88	8.95	-69.93	-56.9
2476.50	V	121	312	-70.48	9.66	-60.82	-47.8
3302.00	V	-	-	-75.78	9.58	-66.20	-53.2
4127.50	V	-	-	-72.44	10.18	-62.26	-49.3

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