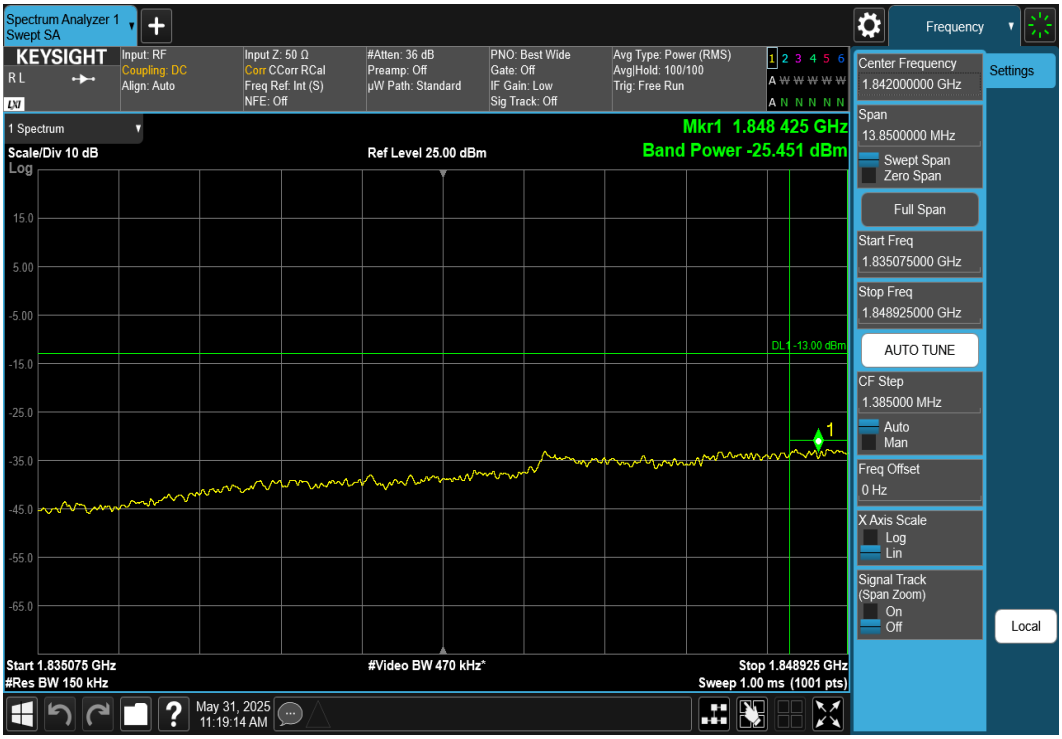
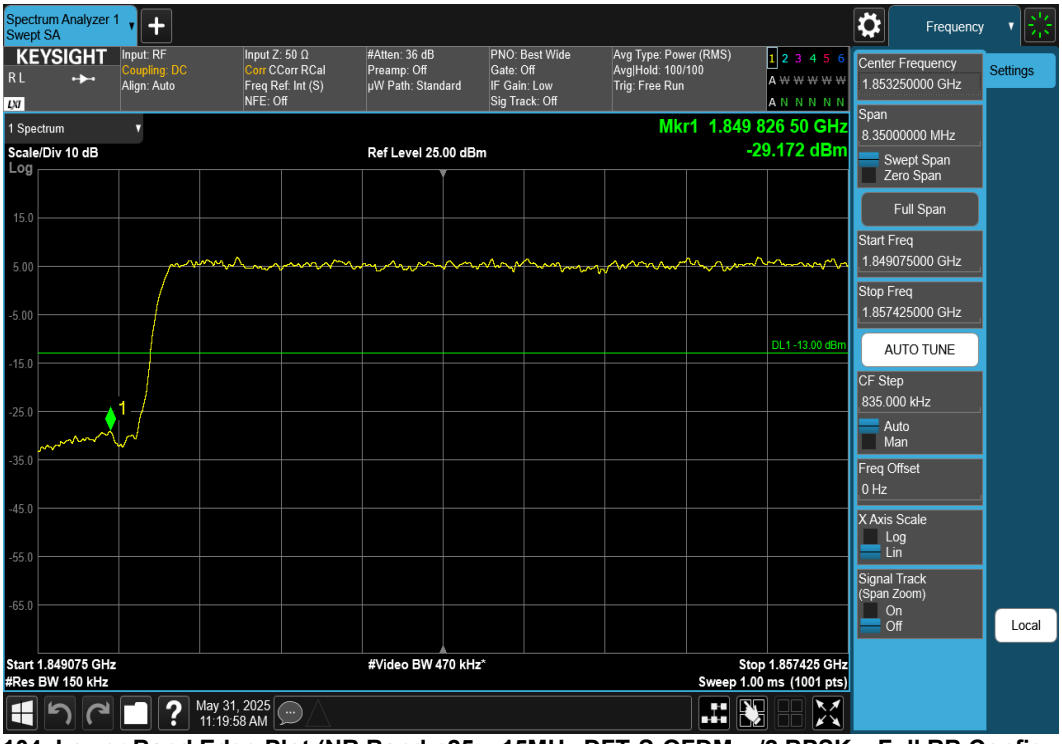
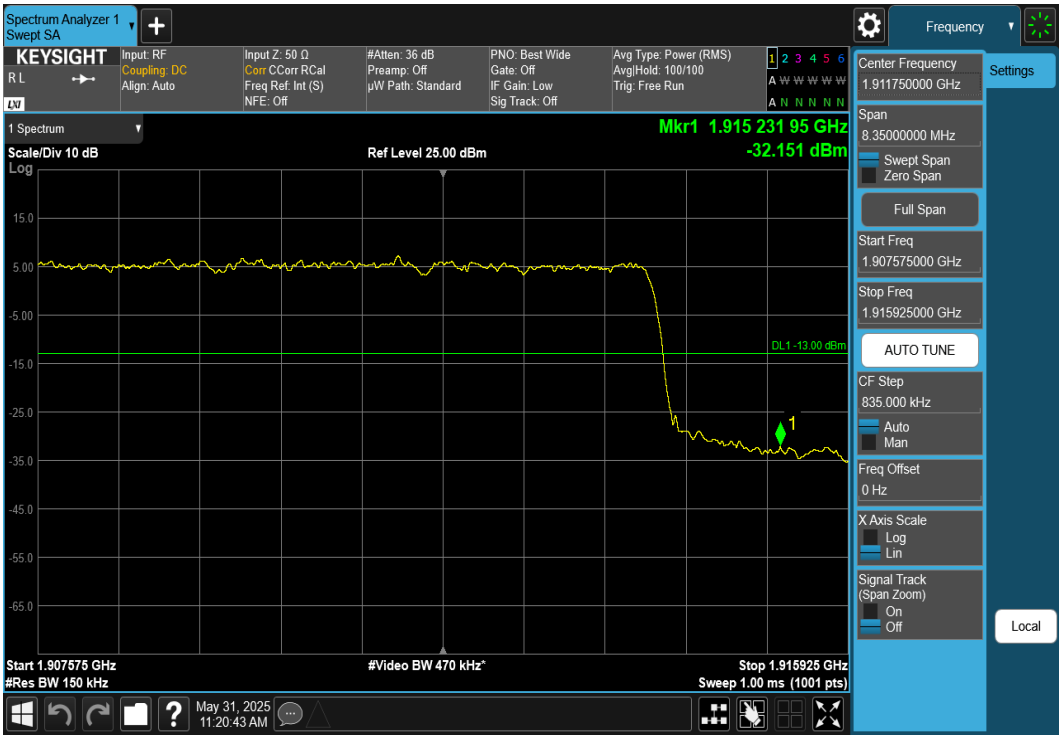


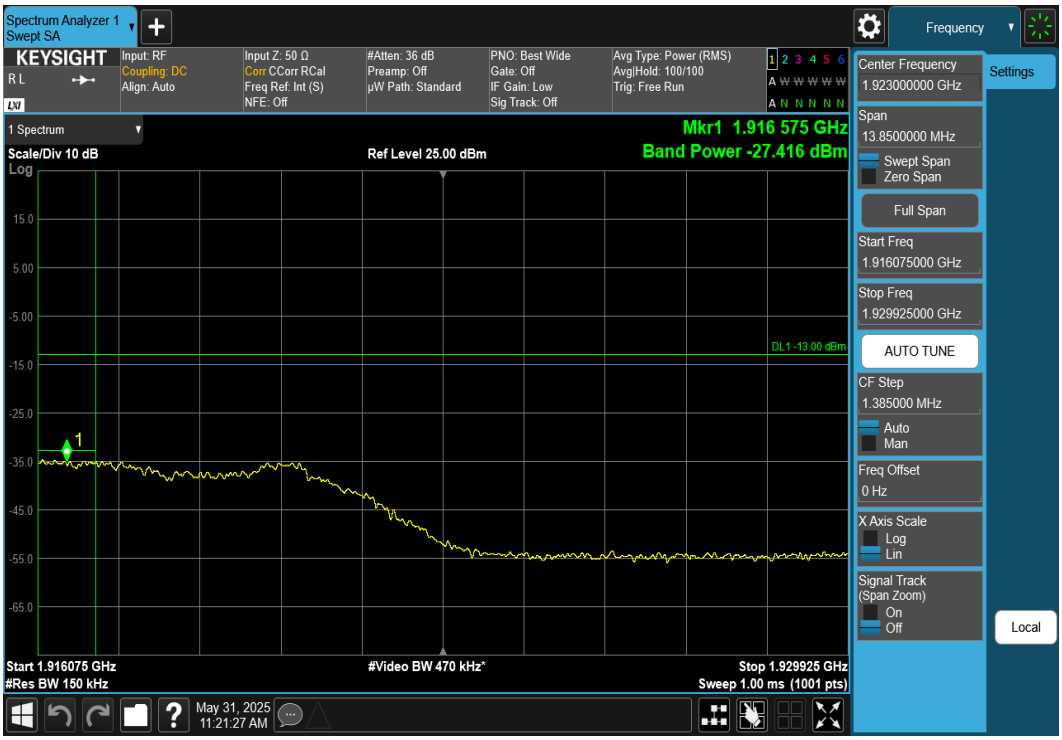
Plot 7-103. Extended Lower Band Edge Plot (NR Band n25 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



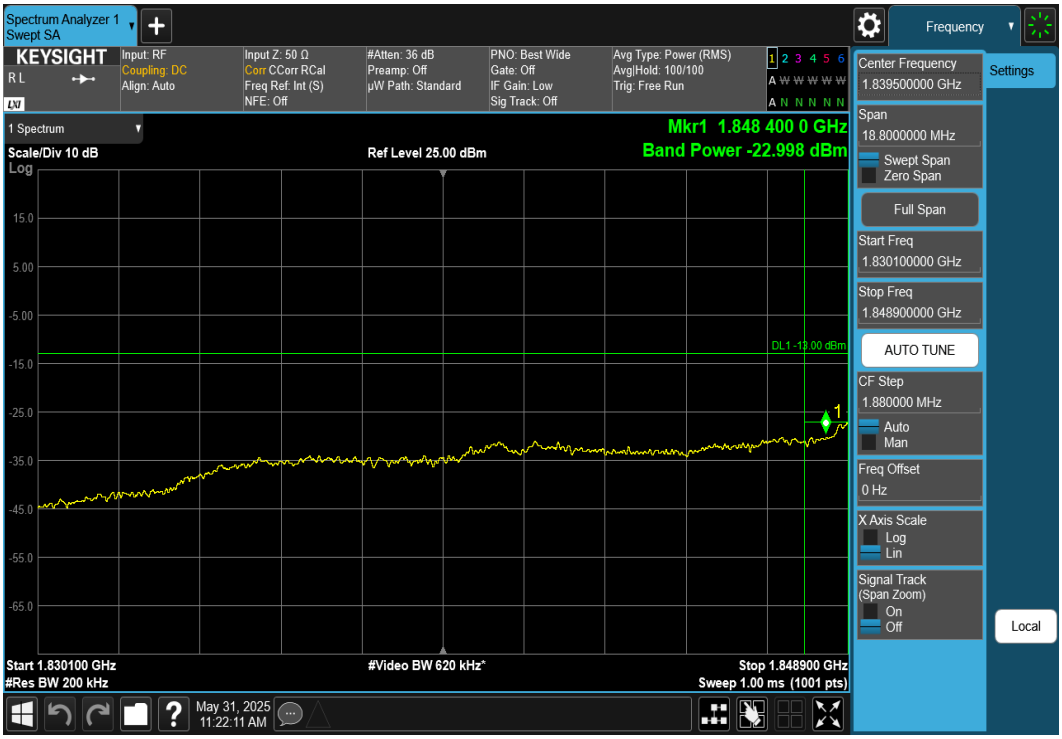
Plot 7-104. Lower Band Edge Plot (NR Band n25 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



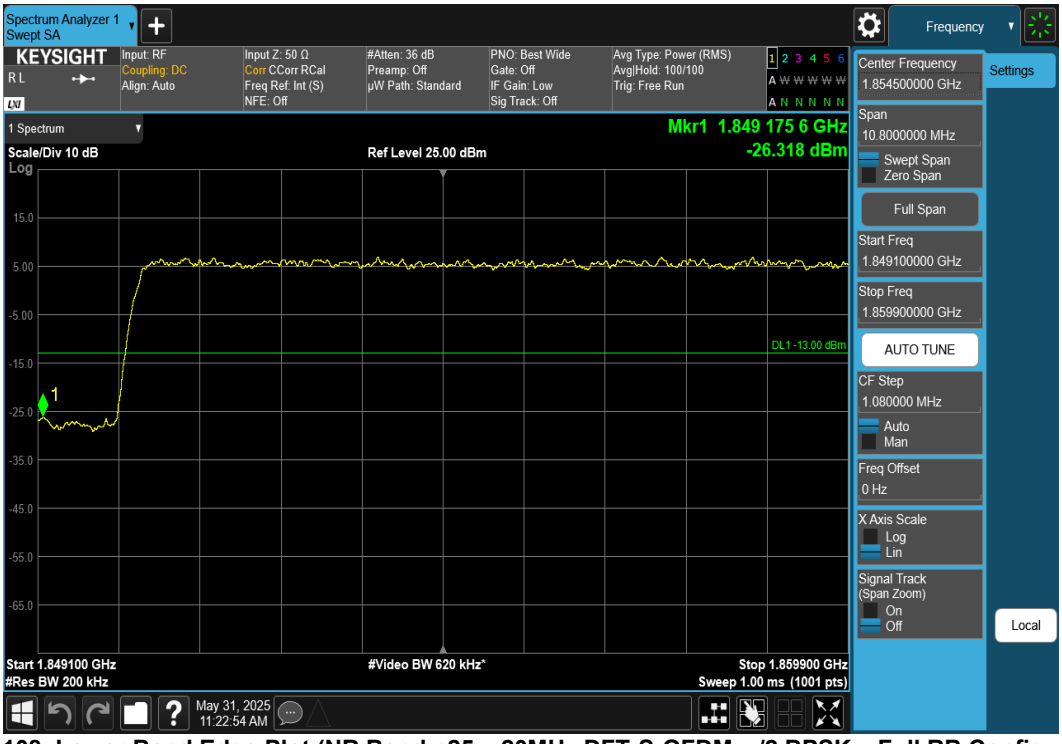
Plot 7-105. Upper Band Edge Plot (NR Band n25 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



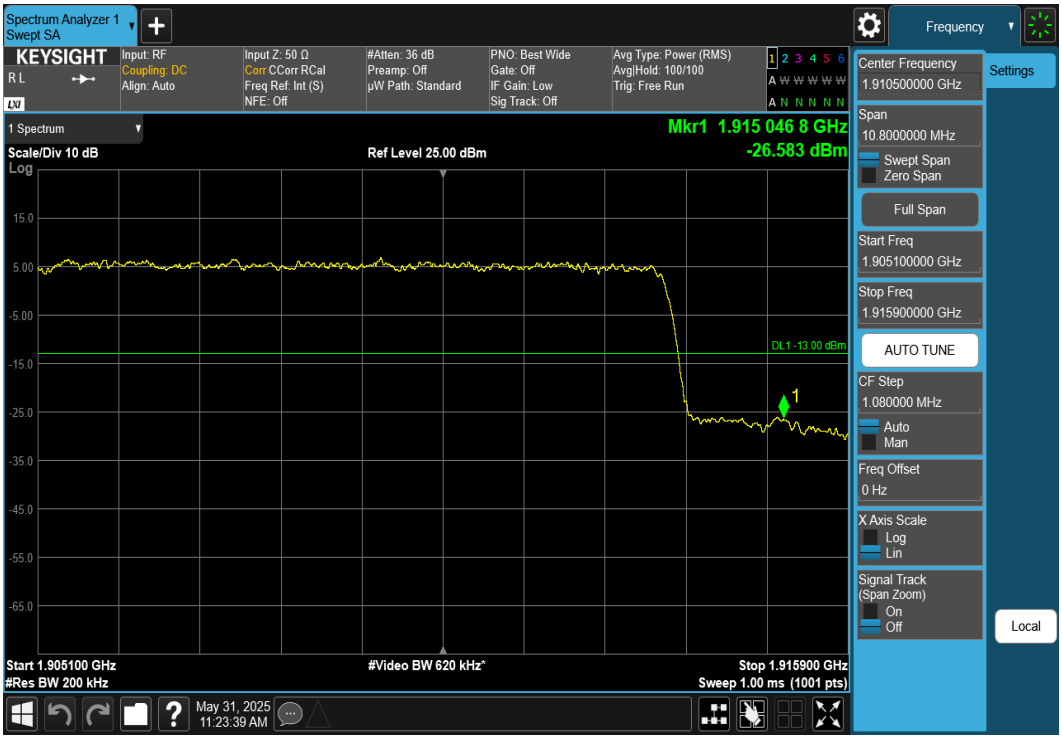
Plot 7-106. Extended Upper Band Edge Plot (NR Band n25 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



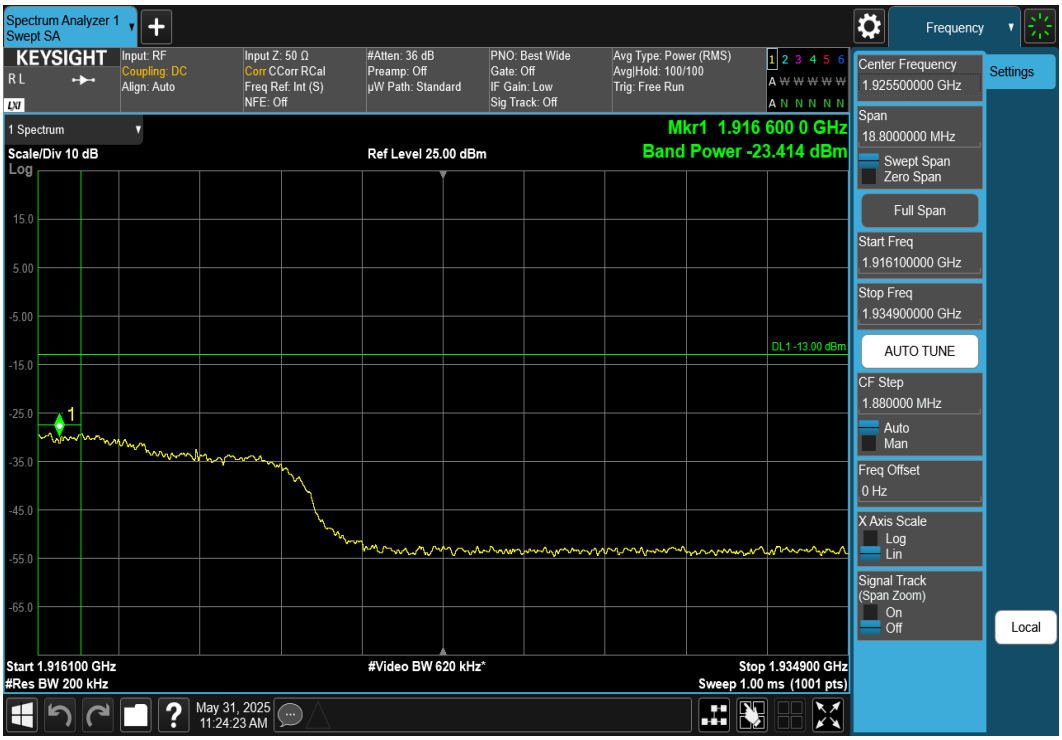
Plot 7-107. Extended Lower Band Edge Plot (NR Band n25 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



Plot 7-108. Lower Band Edge Plot (NR Band n25 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



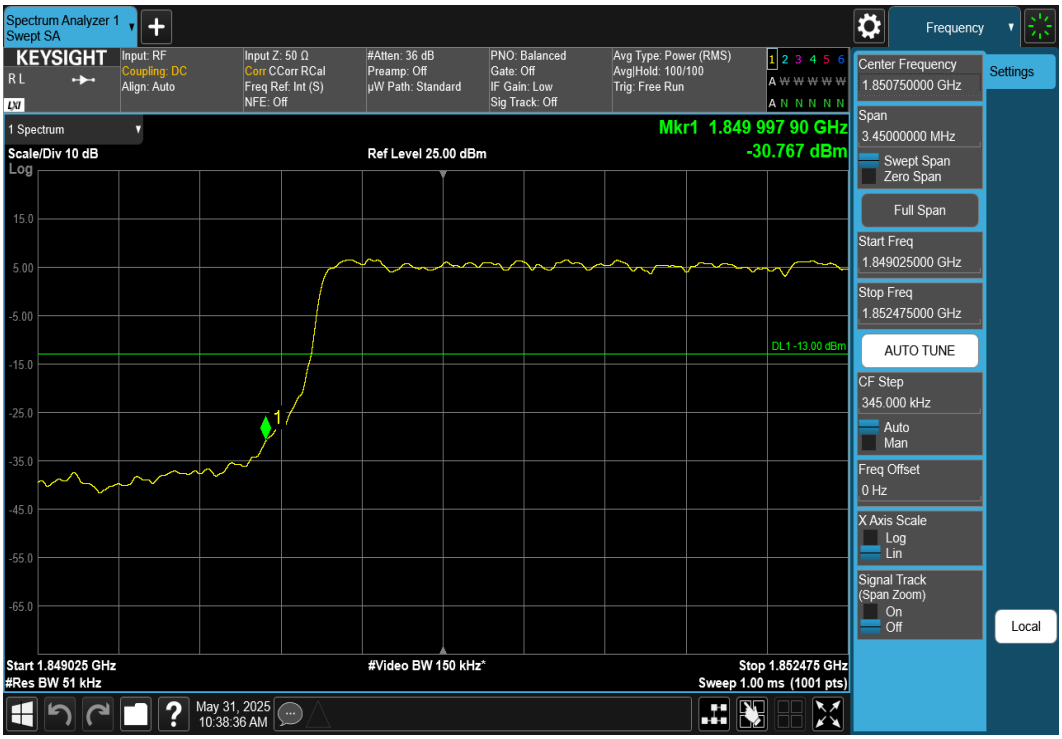
Plot 7-109. Upper Band Edge Plot (NR Band n25 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



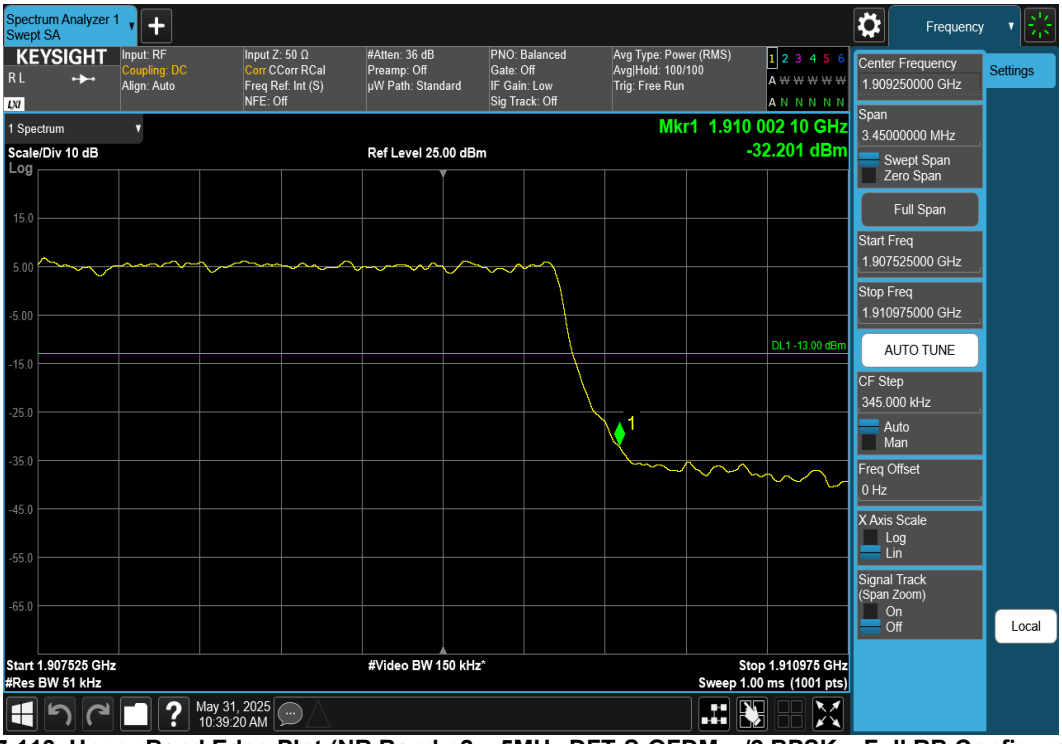
Plot 7-110. Extended Upper Band Edge Plot (NR Band n25 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)

NR Band n2

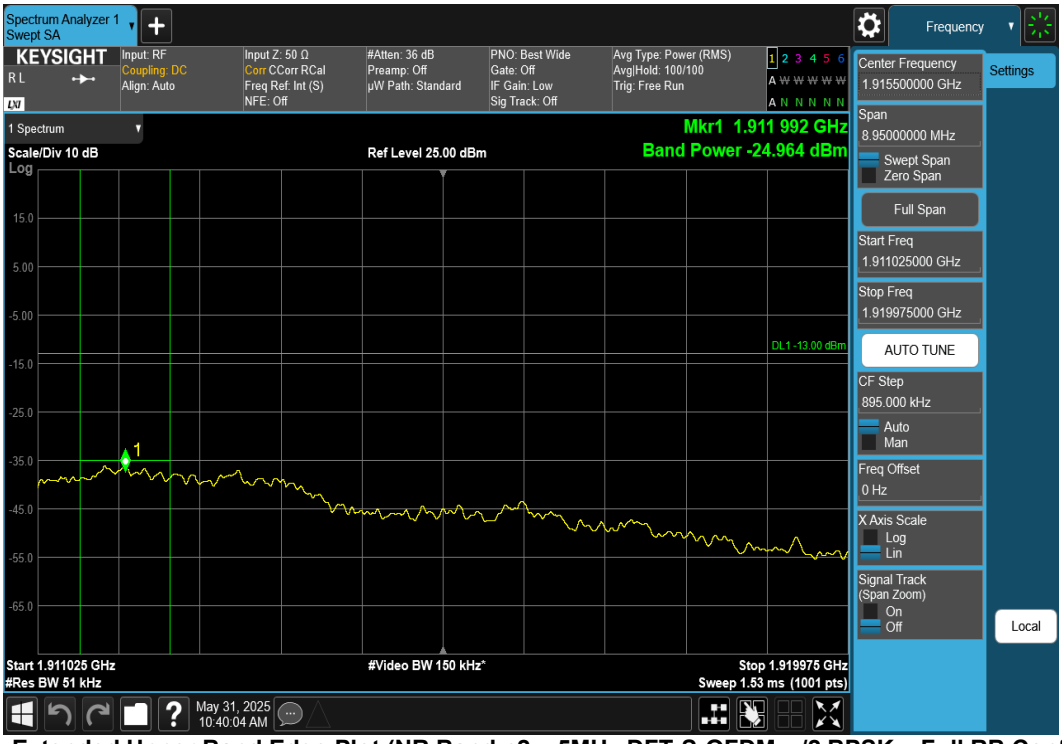
Plot 7-111. Extended Lower Band Edge Plot (NR Band n2 – 5MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



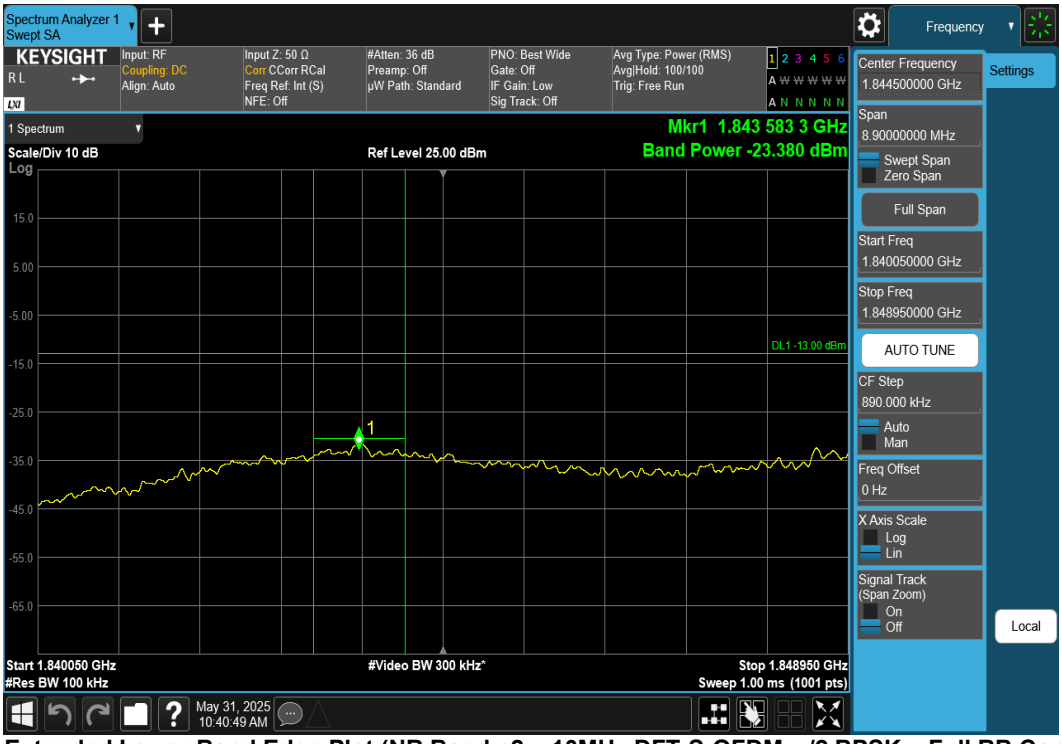
Plot 7-112. Lower Band Edge Plot (NR Band n2 – 5MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



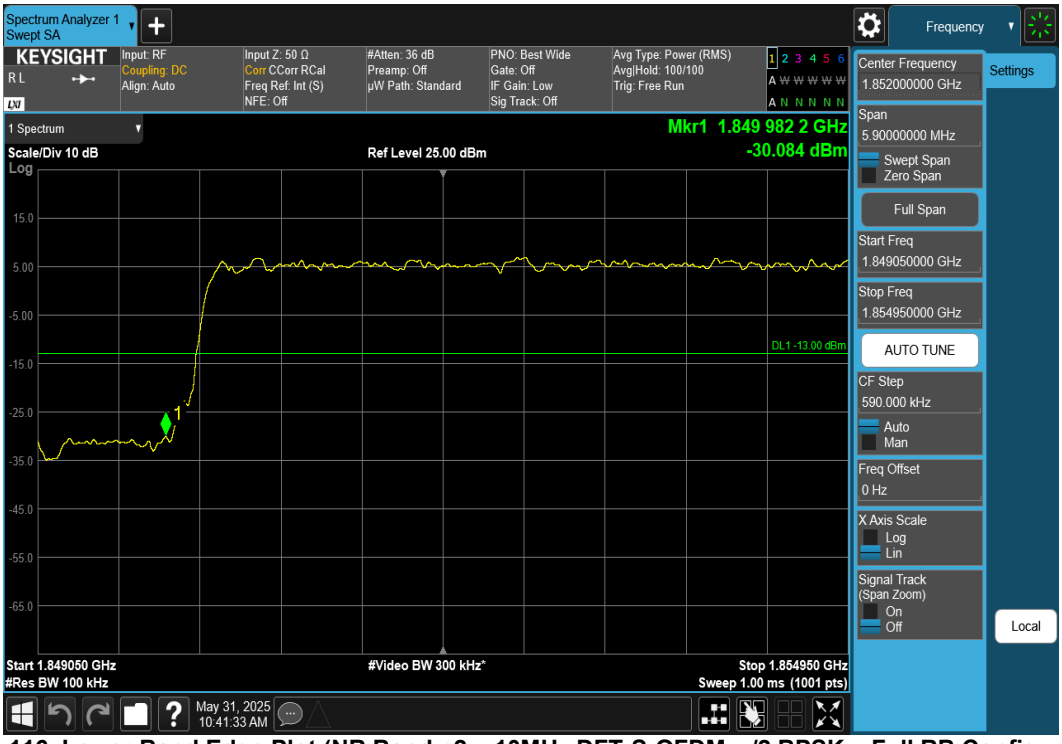
Plot 7-113. Upper Band Edge Plot (NR Band n2 – 5MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



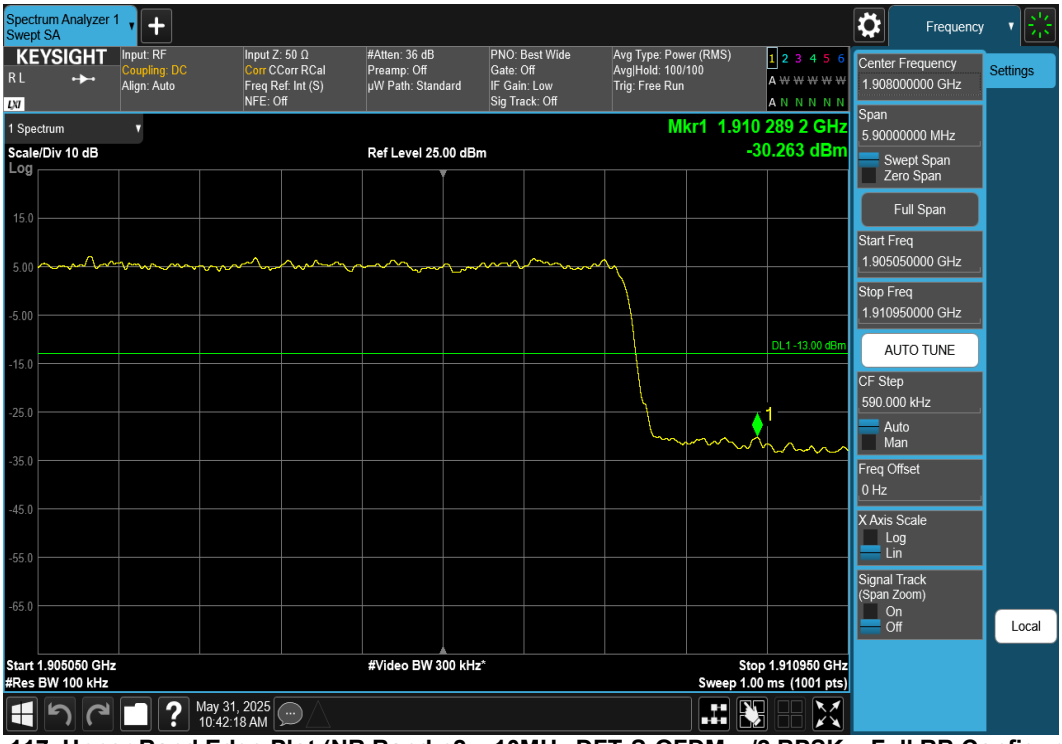
Plot 7-114. Extended Upper Band Edge Plot (NR Band n2 – 5MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



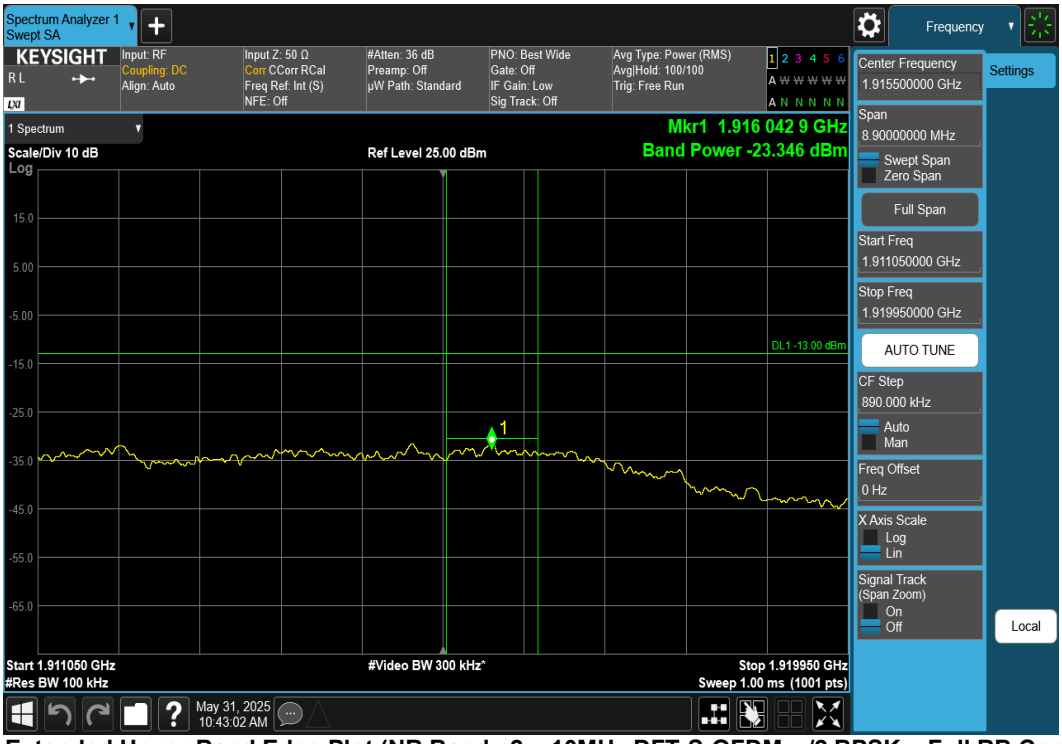
Plot 7-115. Extended Lower Band Edge Plot (NR Band n2 – 10MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



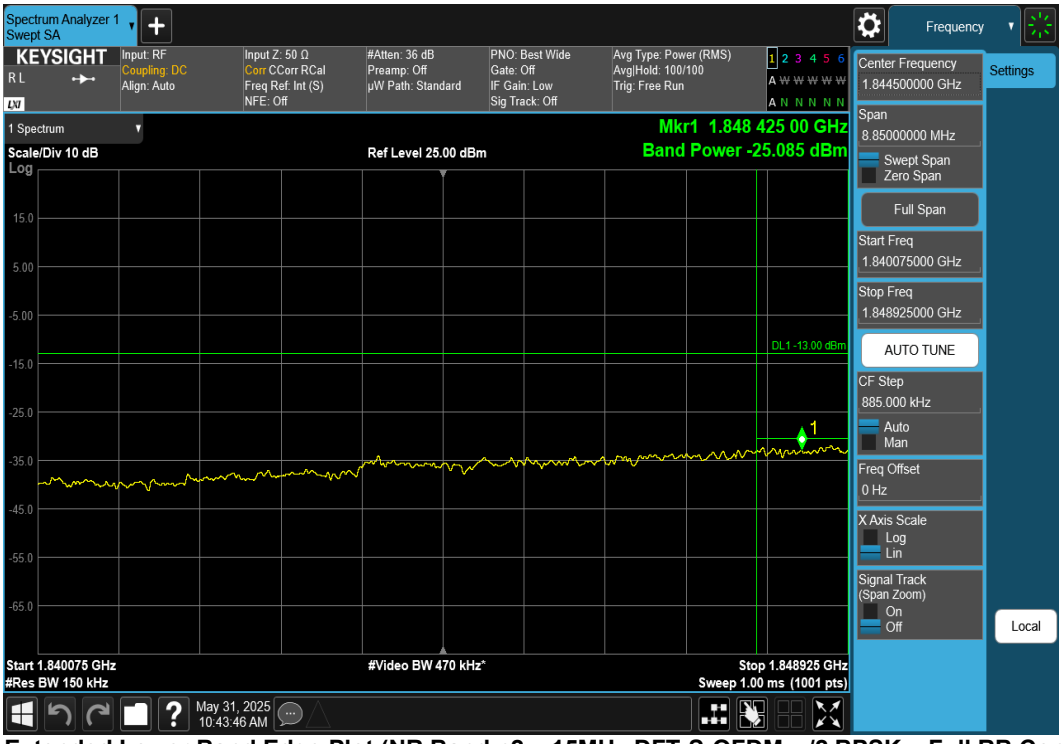
Plot 7-116. Lower Band Edge Plot (NR Band n2 – 10MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



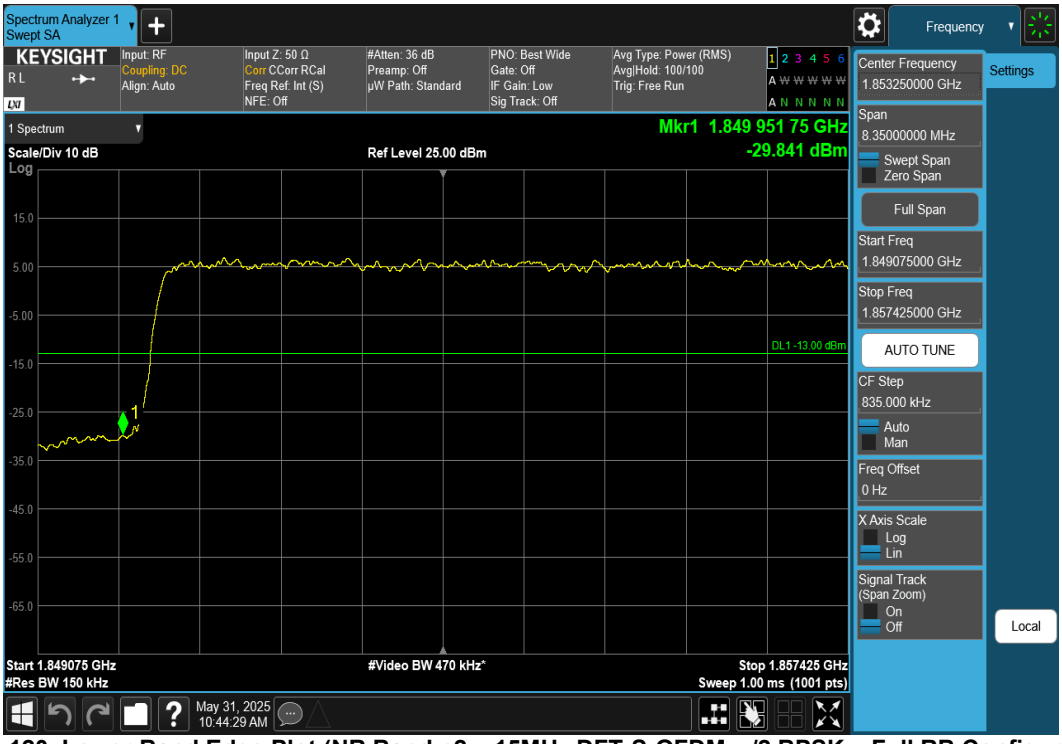
Plot 7-117. Upper Band Edge Plot (NR Band n2 – 10MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



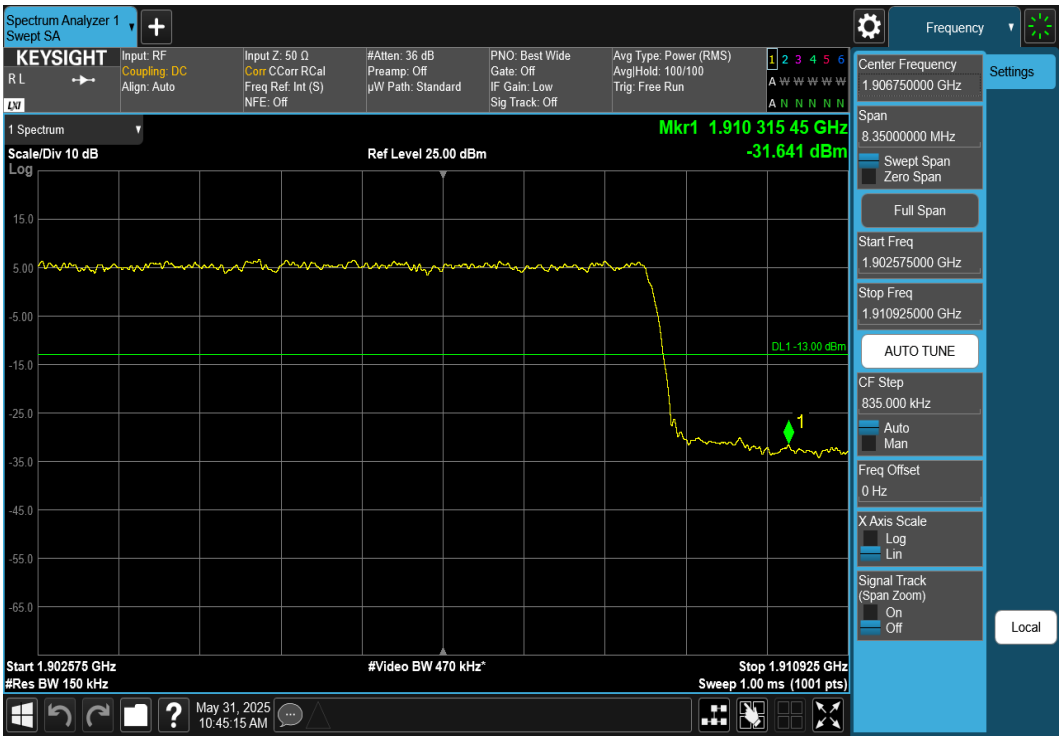
Plot 7-118. Extended Upper Band Edge Plot (NR Band n2 – 10MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



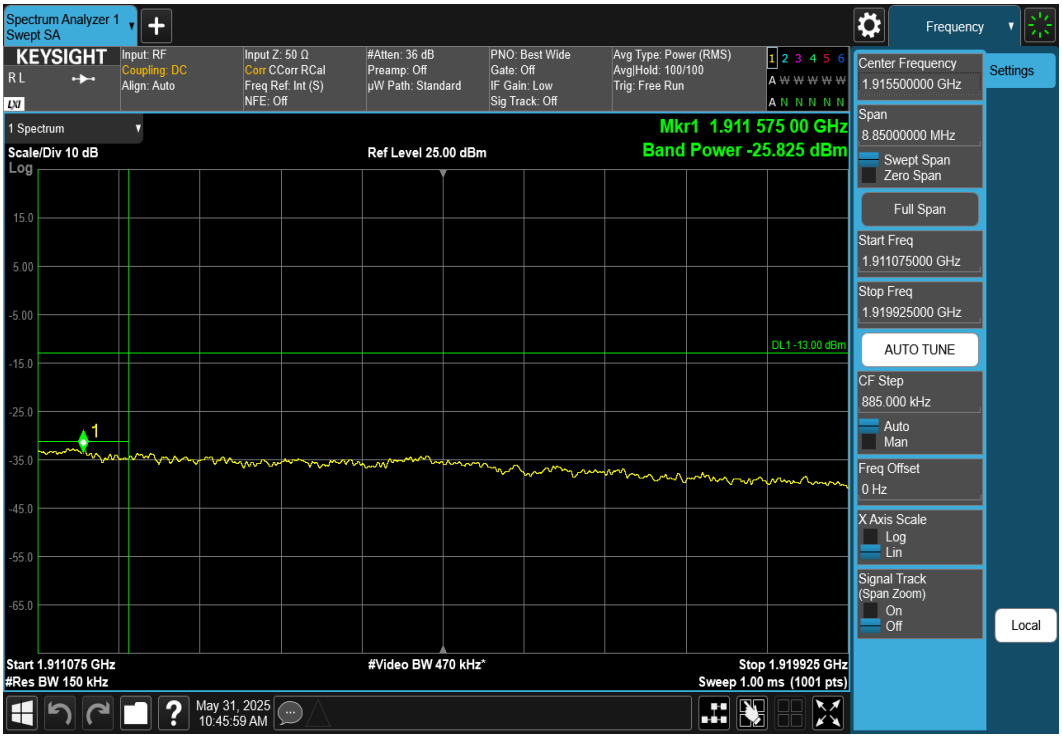
Plot 7-119. Extended Lower Band Edge Plot (NR Band n2 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



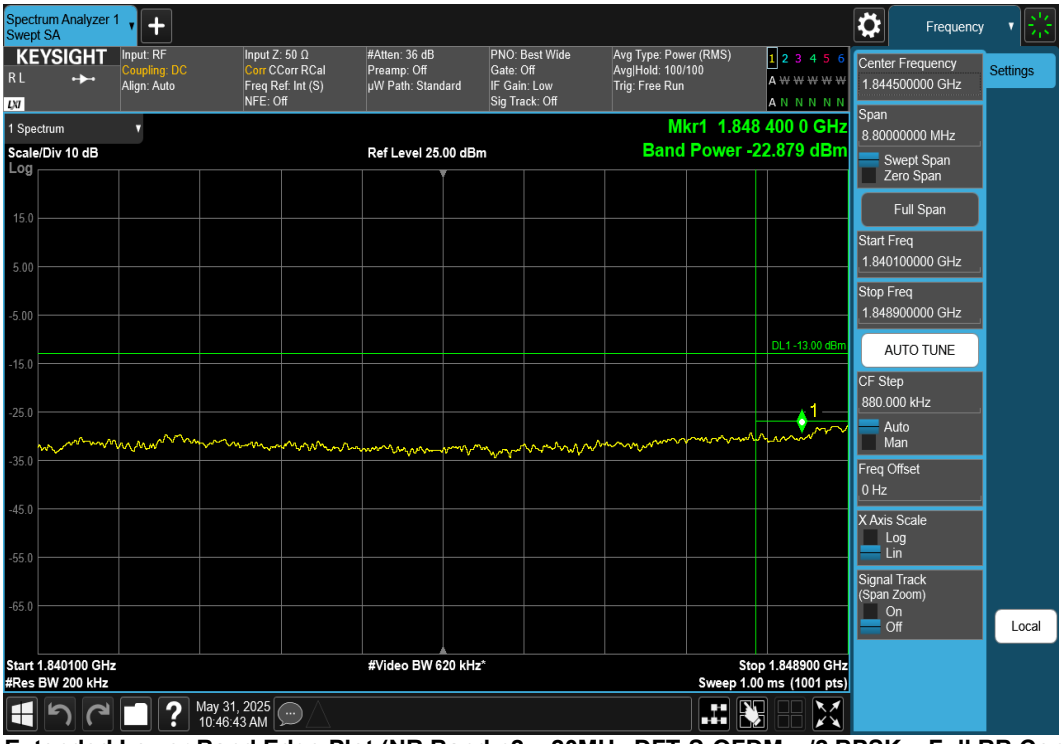
Plot 7-120. Lower Band Edge Plot (NR Band n2 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



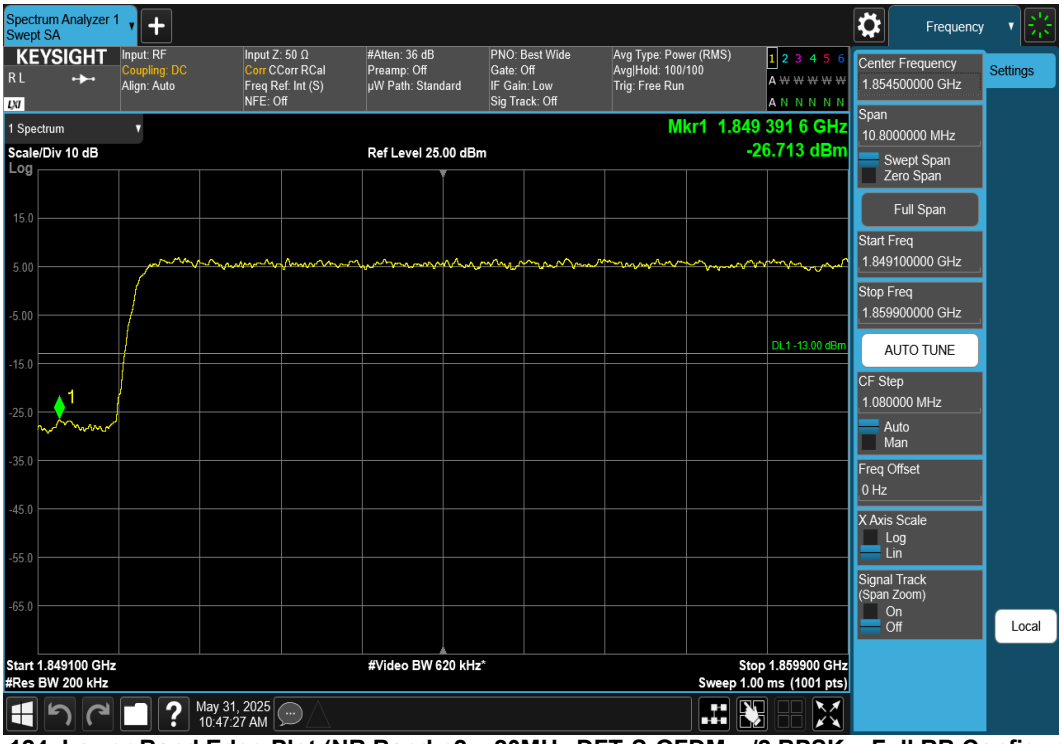
Plot 7-121. Upper Band Edge Plot (NR Band n2 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



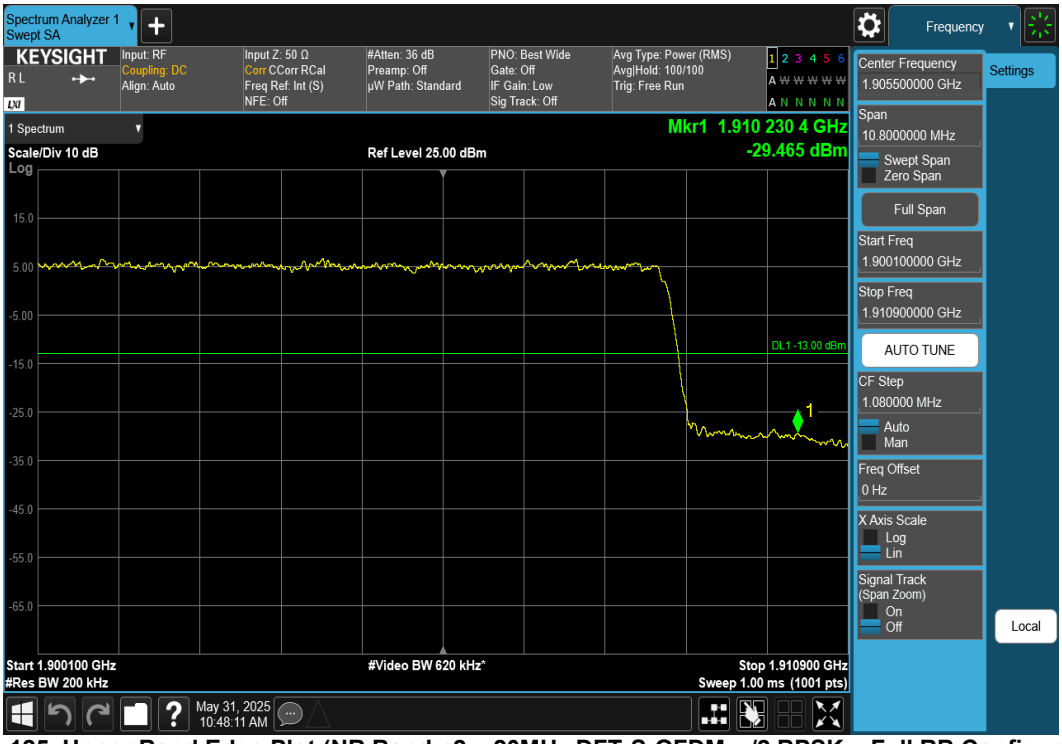
Plot 7-122. Extended Upper Band Edge Plot (NR Band n2 – 15MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



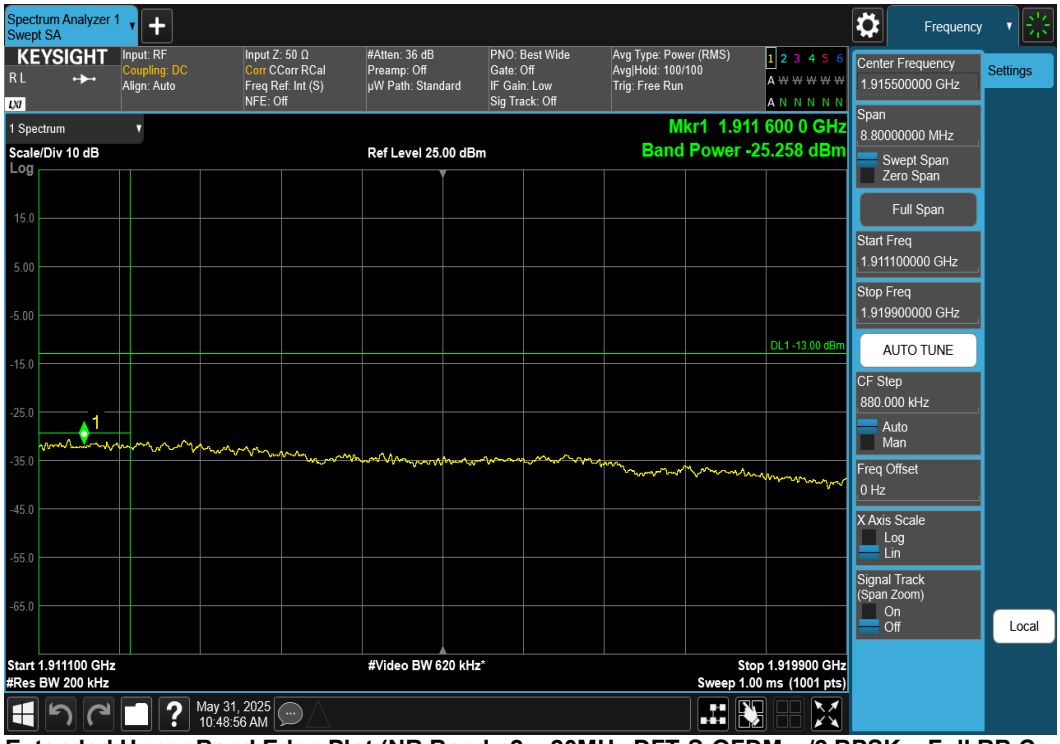
Plot 7-123. Extended Lower Band Edge Plot (NR Band n2 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



Plot 7-124. Lower Band Edge Plot (NR Band n2 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



Plot 7-125. Upper Band Edge Plot (NR Band n2 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)



Plot 7-126. Extended Upper Band Edge Plot (NR Band n2 – 20MHz DFT-S-OFDM π/2 BPSK – Full RB Configuration)

7.5 Peak-Average Ratio

§24.232(d)

Test Overview and Limit

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.

The peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time.

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 ≥ OBW or specified reference bandwidth
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.

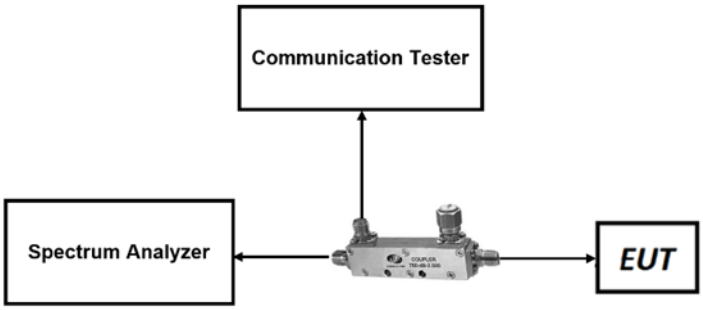


Figure 7-7. LTE Test Instrument & Measurement Setup

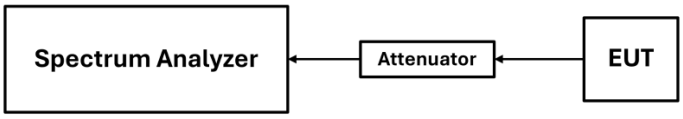
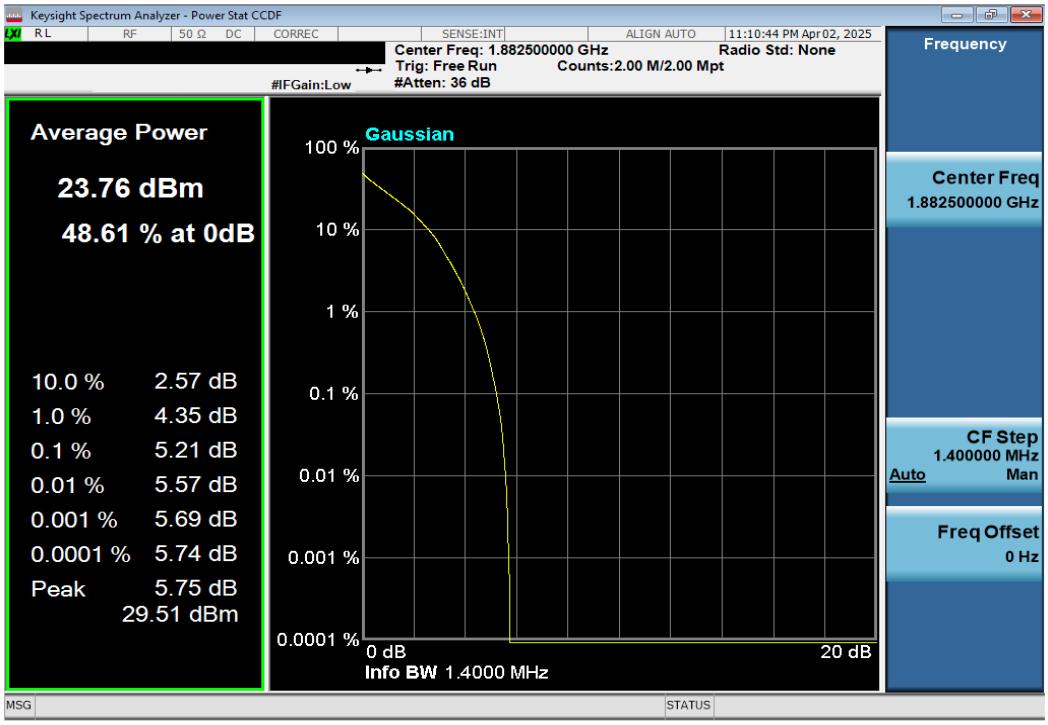


Figure 7-8. FR1 Test Instrument & Measurement Setup

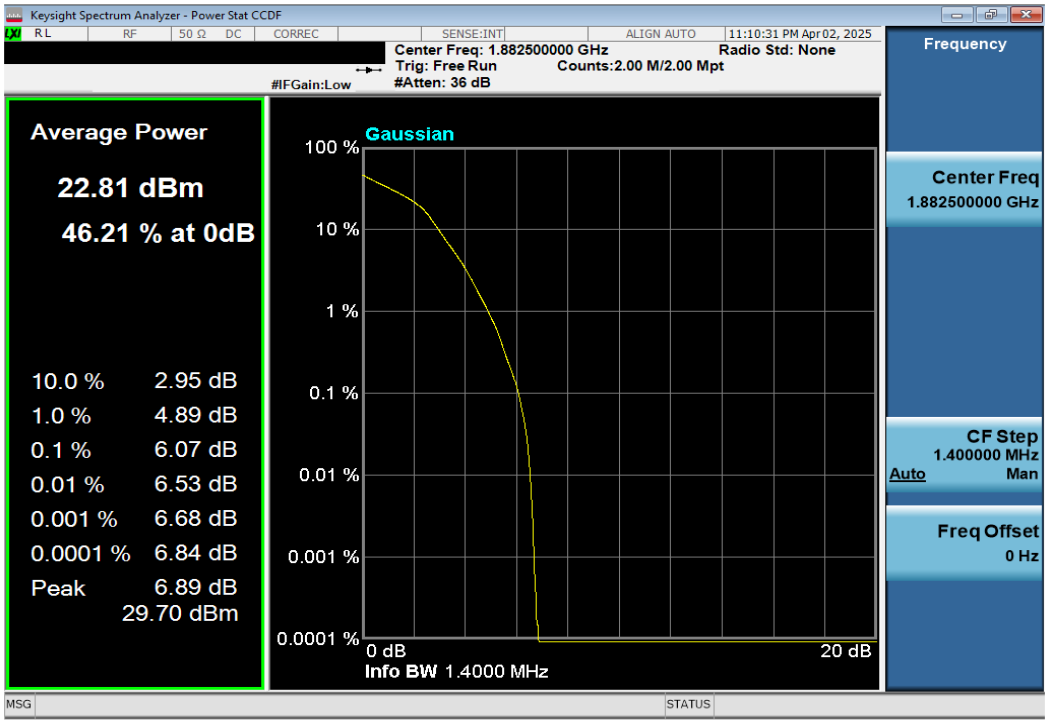
Test Notes

None.

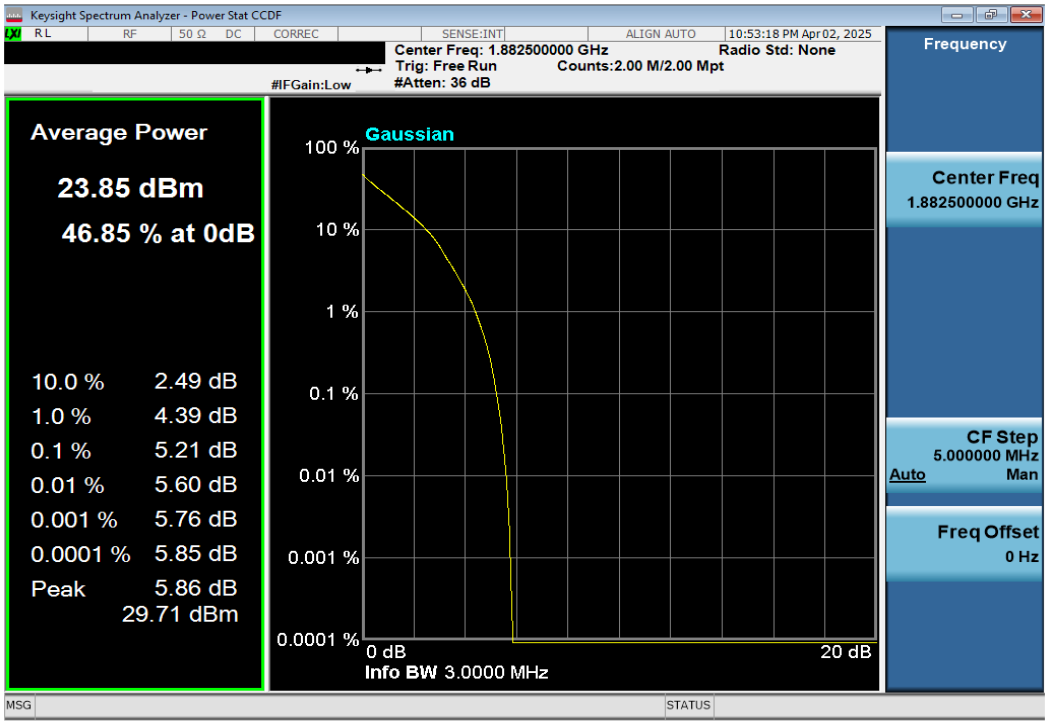
LTE Band 25



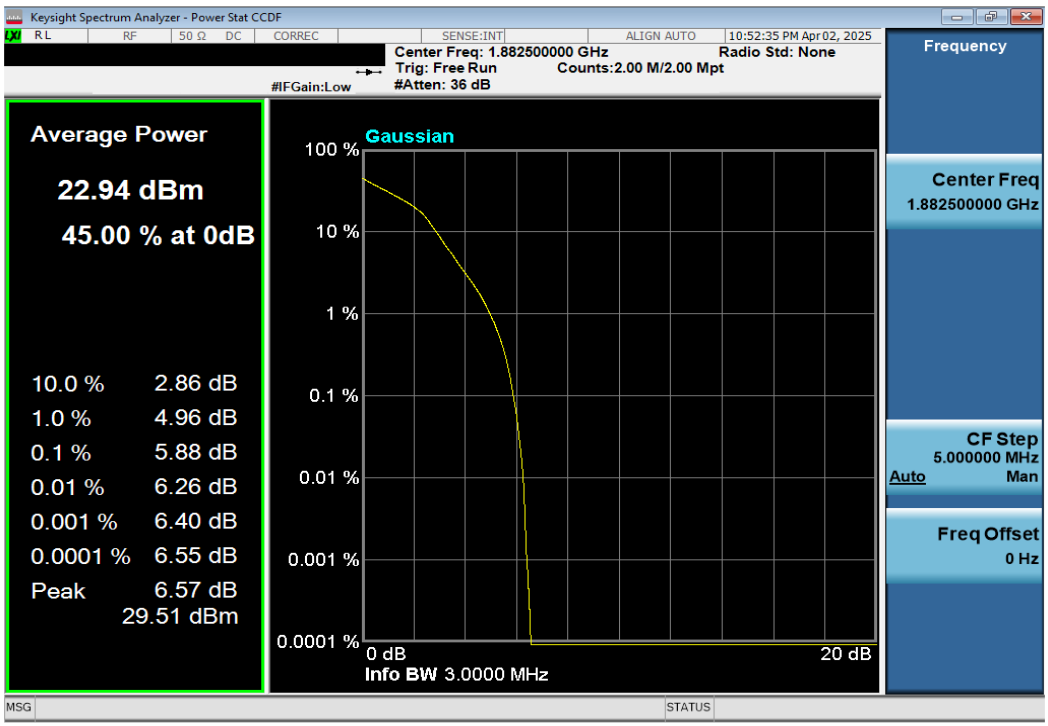
Plot 7-127. PAR Plot (LTE Band 25 - 1.4MHz QPSK - Full RB Configuration)



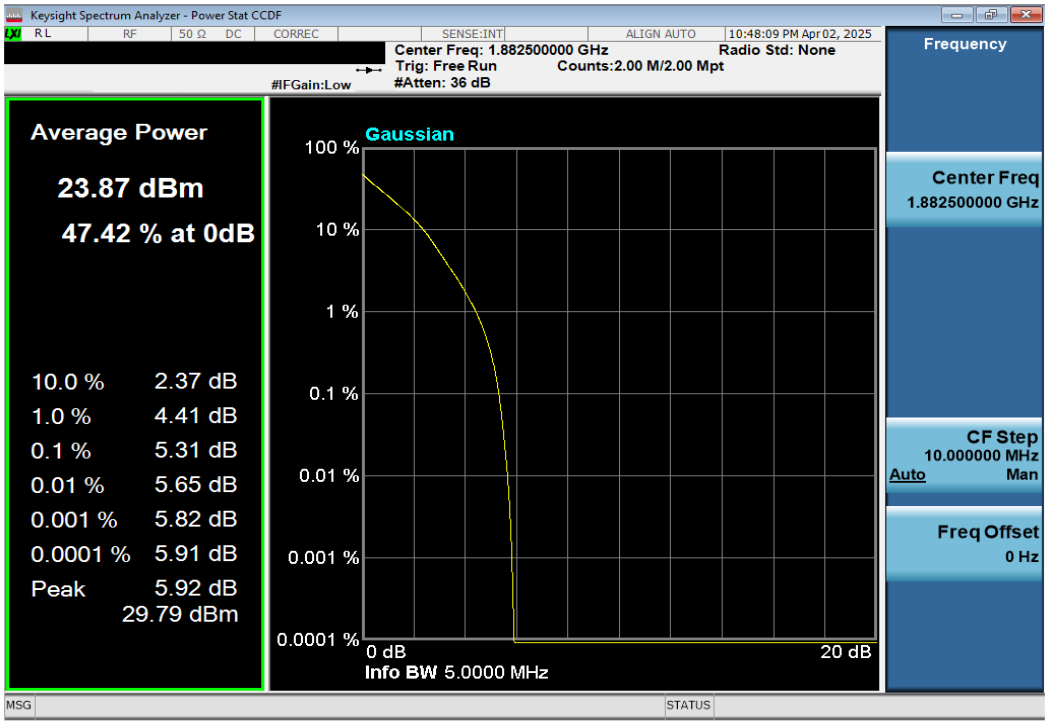
Plot 7-128. PAR Plot (LTE Band 25 - 1.4MHz 16-QAM - Full RB Configuration)



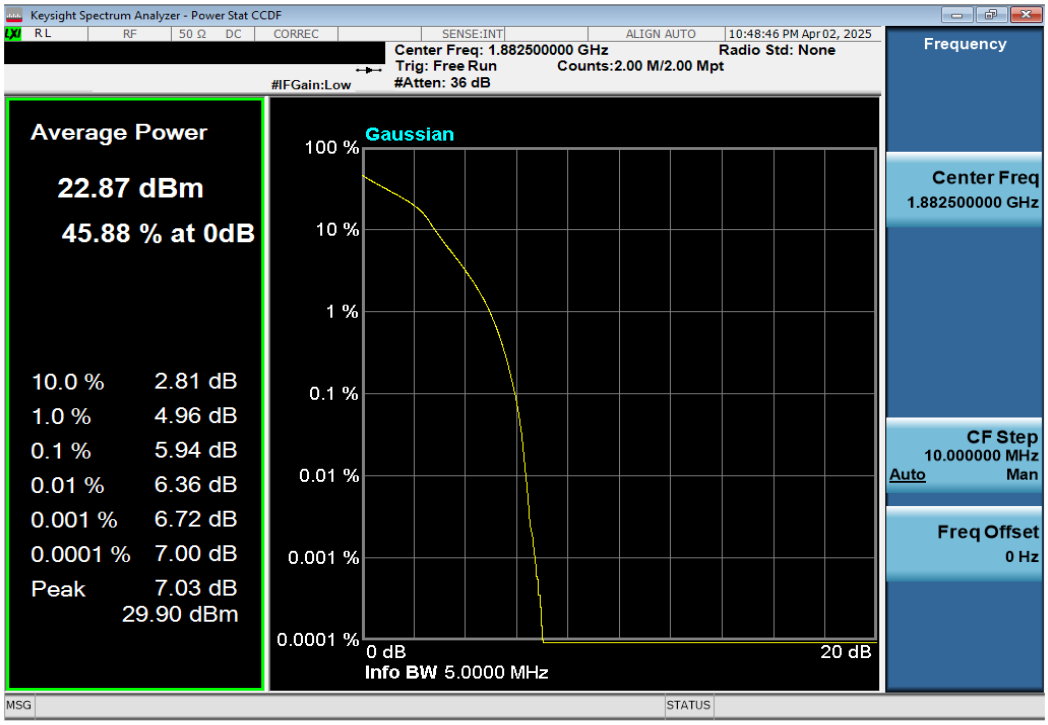
Plot 7-129. PAR Plot (LTE Band 25 - 3MHz QPSK - Full RB Configuration)



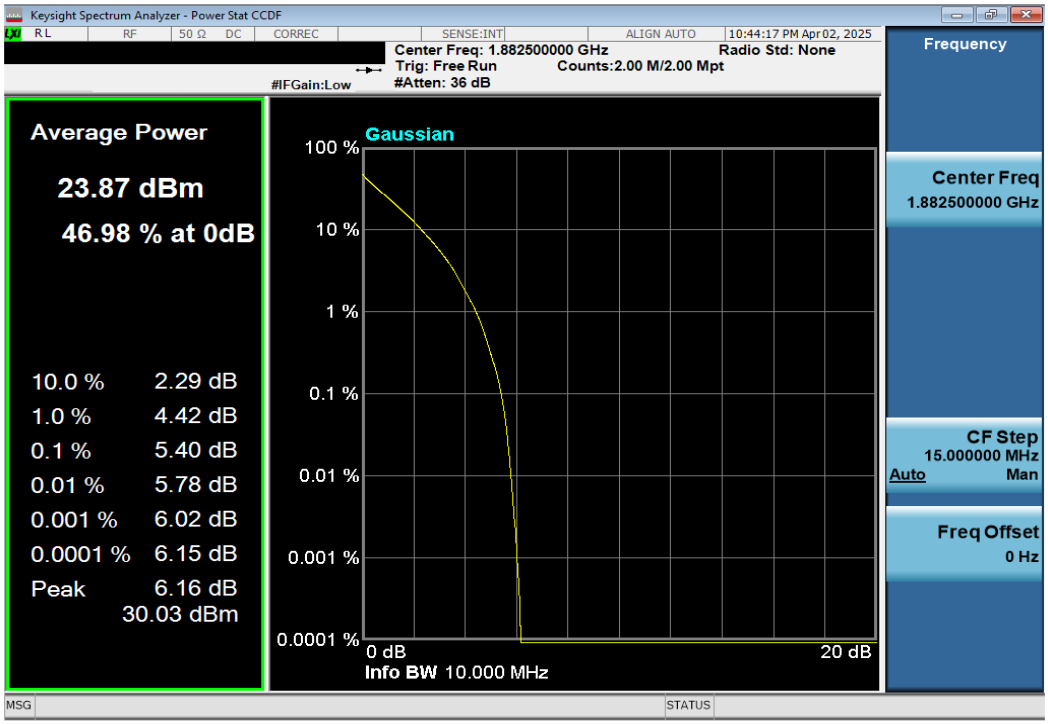
Plot 7-130. PAR Plot (LTE Band 25 - 3MHz 16-QAM - Full RB Configuration)



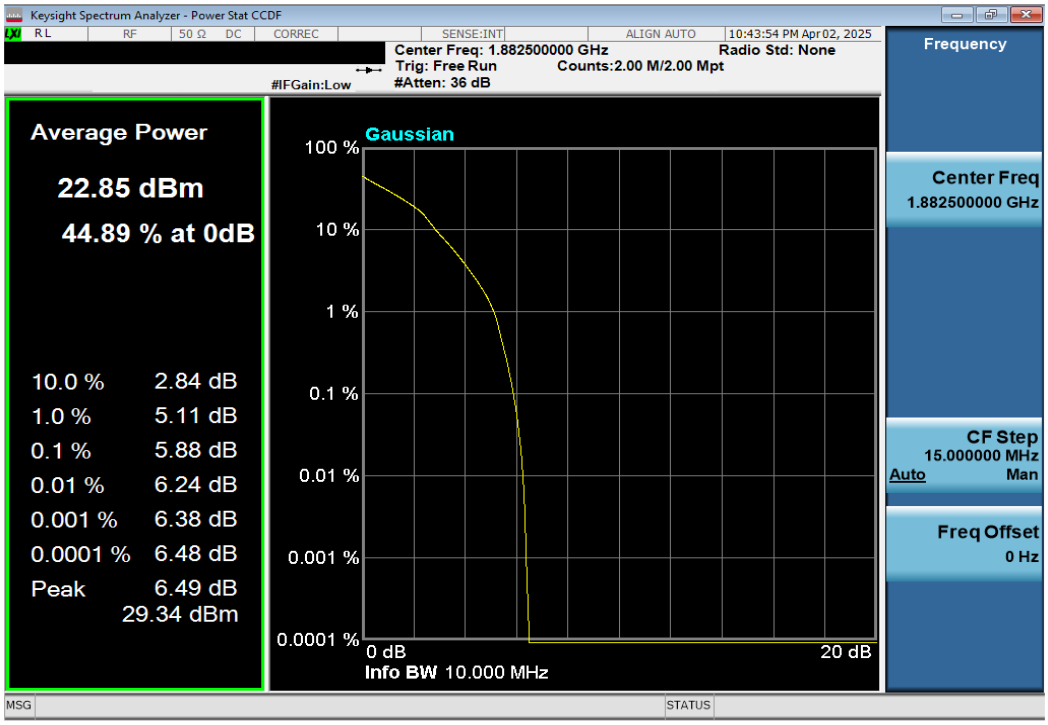
Plot 7-131. PAR Plot (LTE Band 25 - 5MHz QPSK - Full RB Configuration)



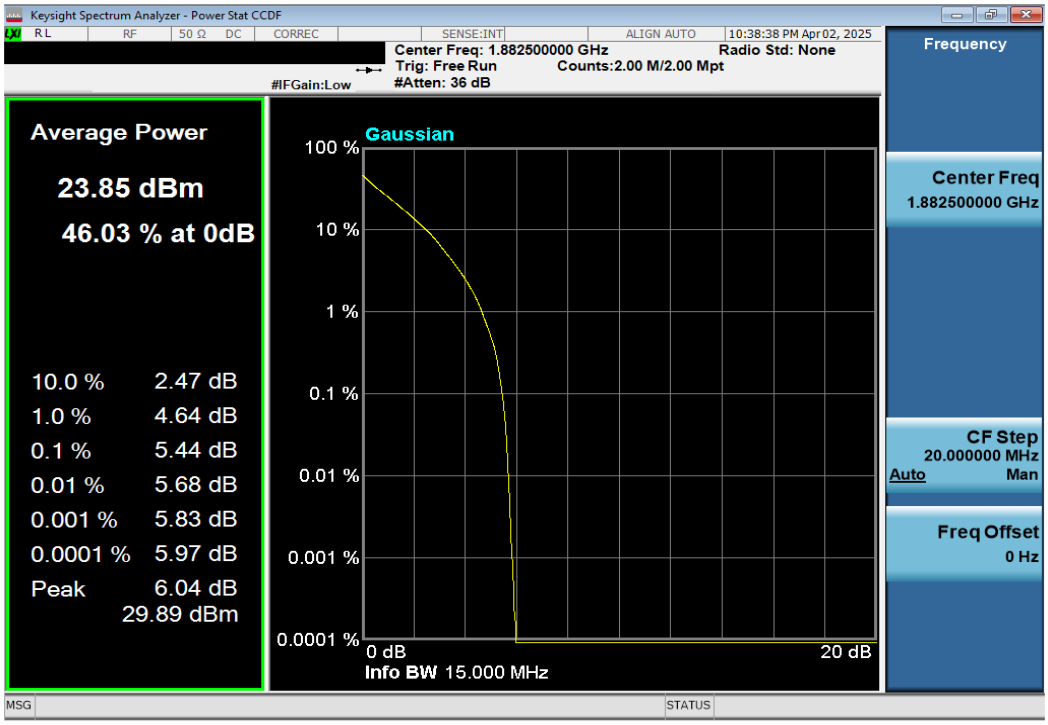
Plot 7-132. PAR Plot (LTE Band 25 - 5MHz 16-QAM - Full RB Configuration)



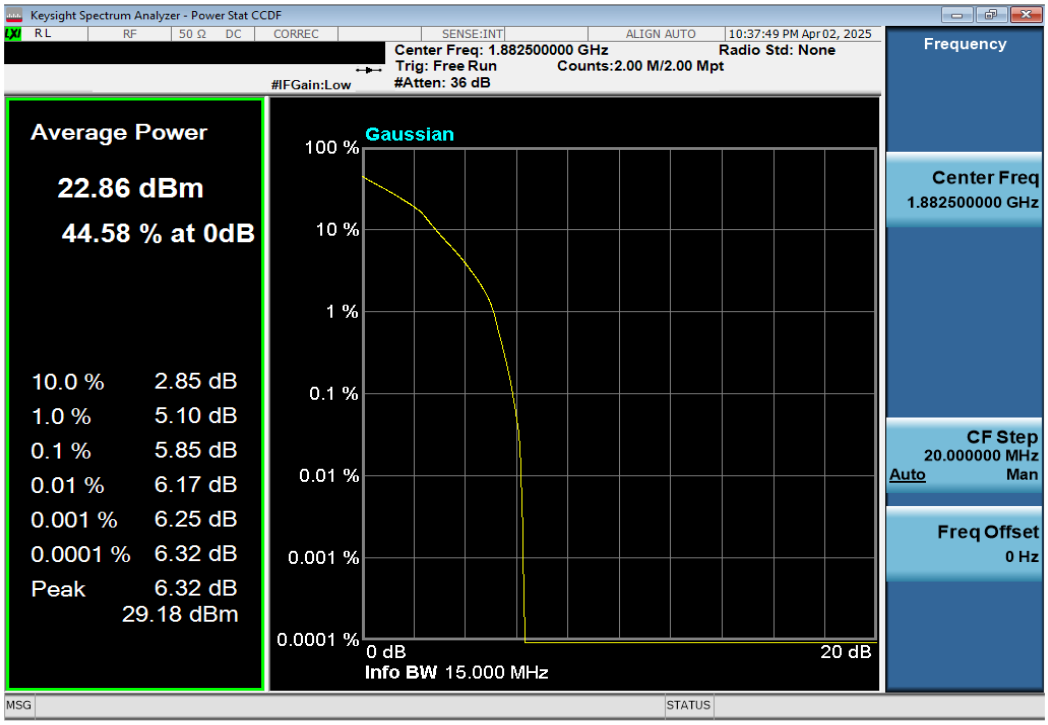
Plot 7-133. PAR Plot (LTE Band 25 - 10MHz QPSK - Full RB Configuration)



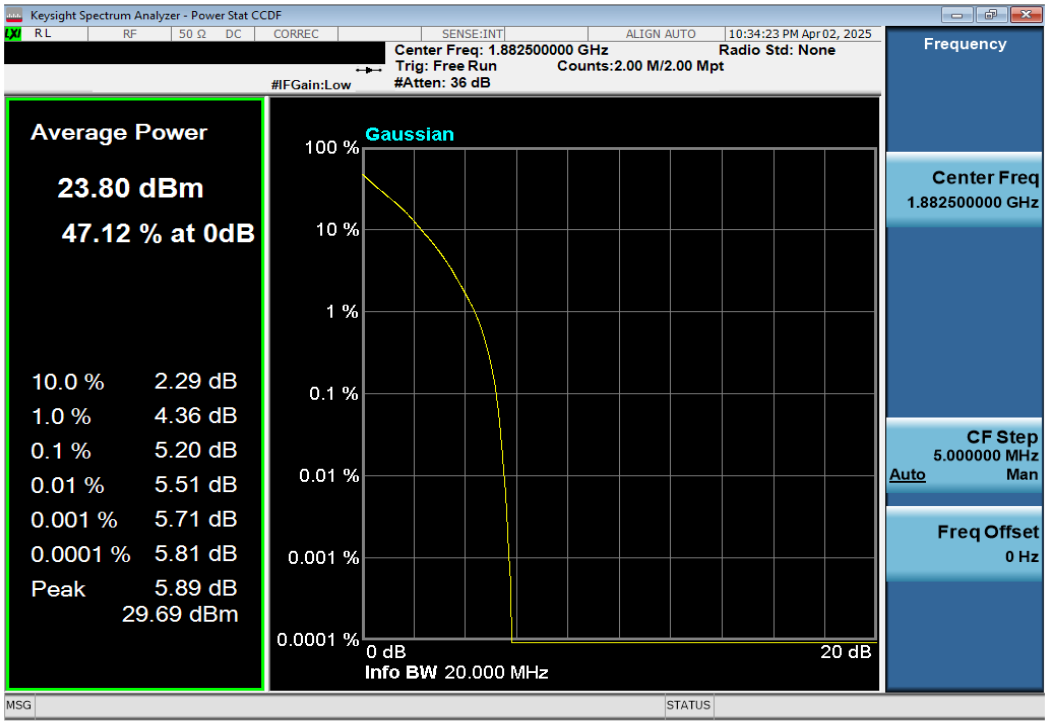
Plot 7-134. PAR Plot (LTE Band 25 - 10MHz 16-QAM - Full RB Configuration)



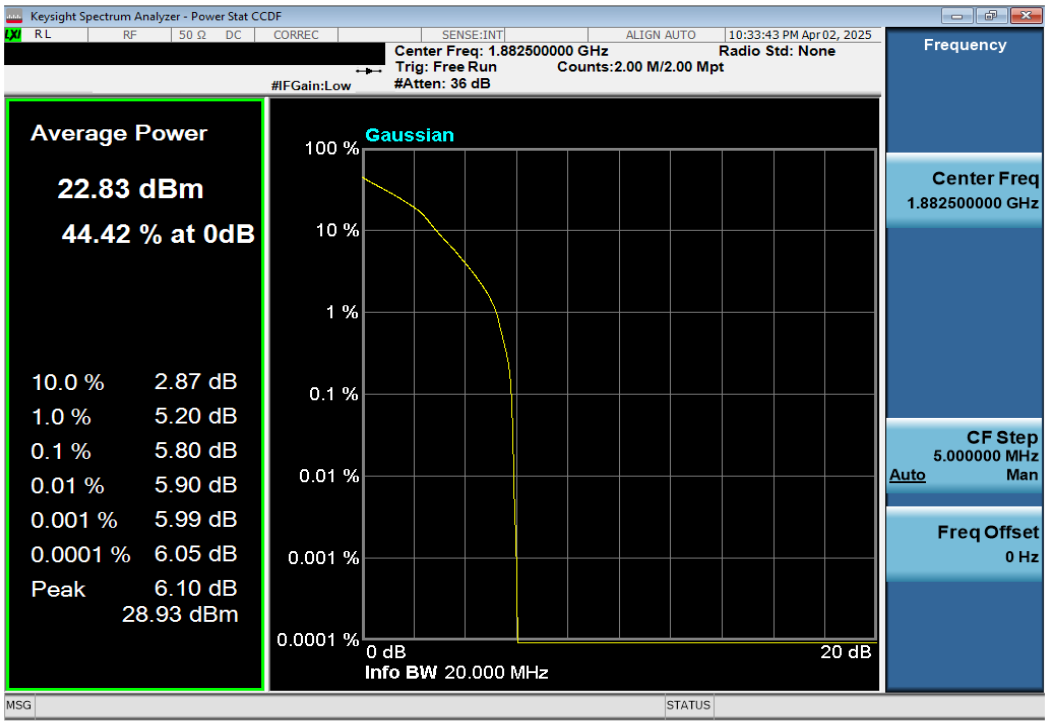
Plot 7-135. PAR Plot (LTE Band 25 - 15MHz QPSK - Full RB Configuration)



Plot 7-136. PAR Plot (LTE Band 25 - 15MHz 16-QAM - Full RB Configuration)

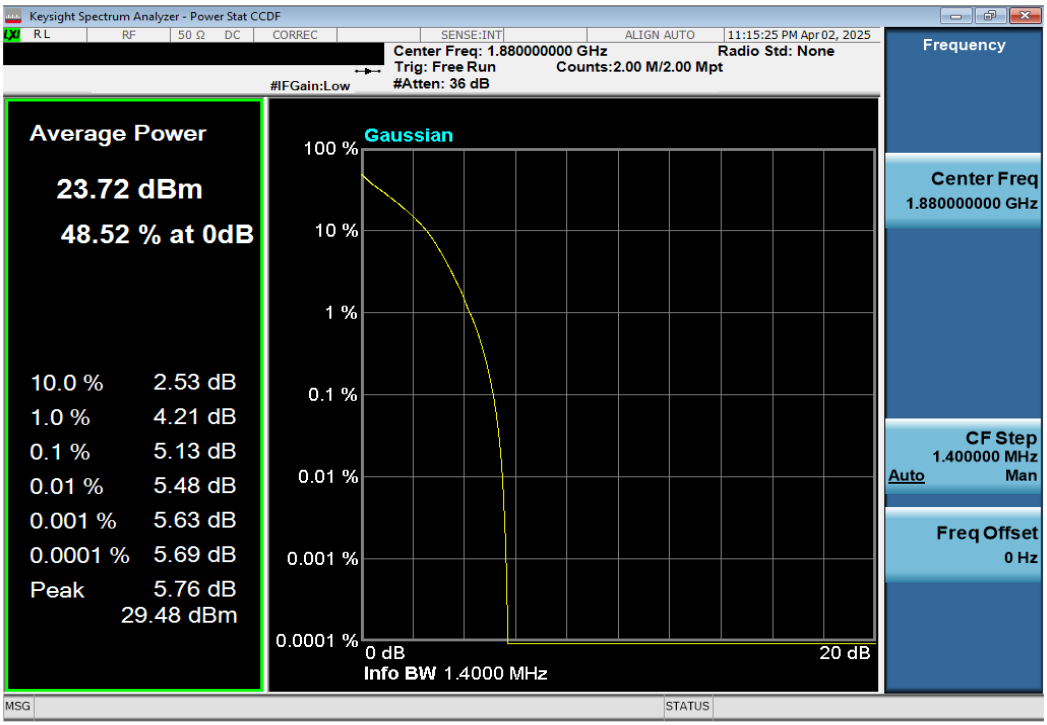


Plot 7-137. PAR Plot (LTE Band 25 - 20MHz QPSK - Full RB Configuration)

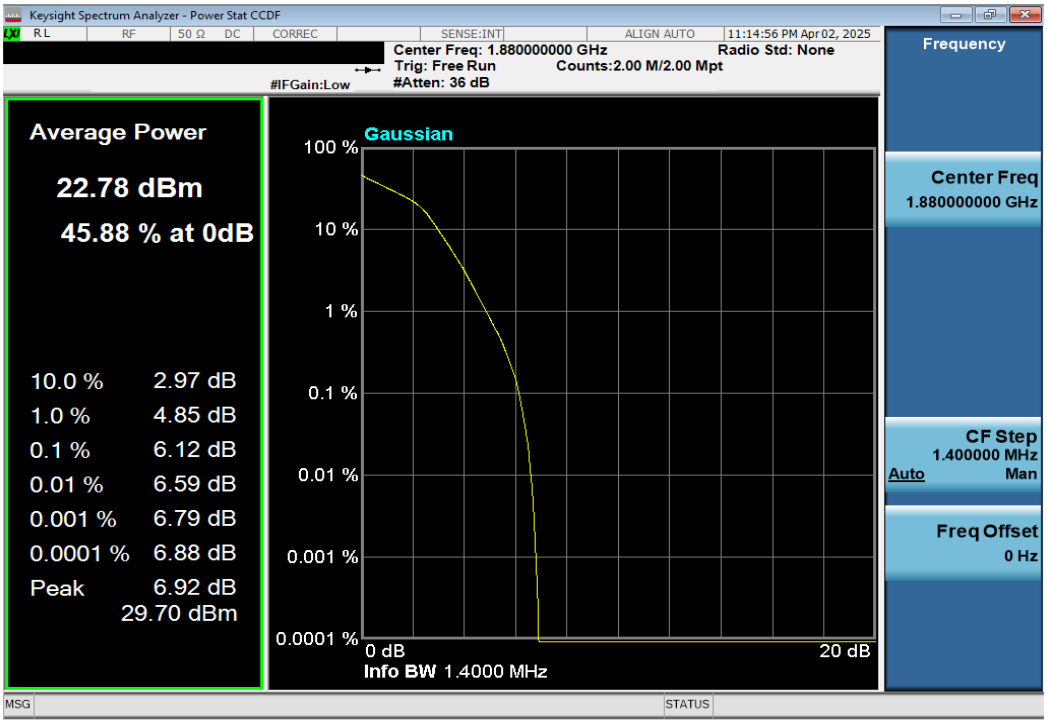


Plot 7-138. PAR Plot (LTE Band 25 - 20MHz 16-QAM - Full RB Configuration)

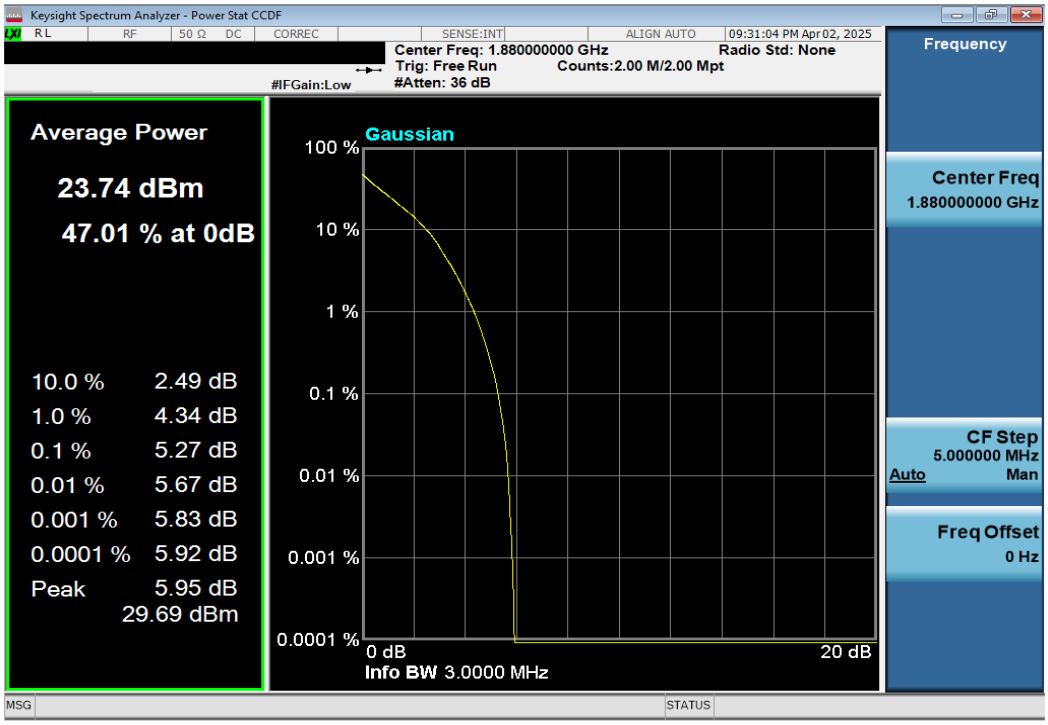
LTE Band 2



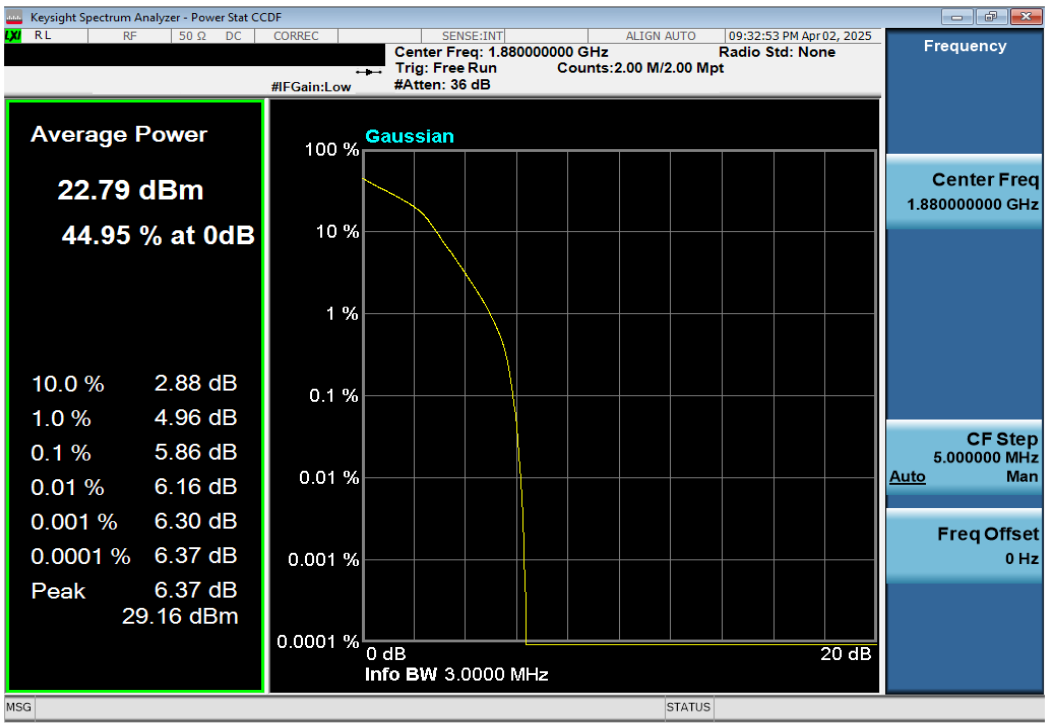
Plot 7-139. PAR Plot (LTE Band 2 - 1.4MHz QPSK - Full RB Configuration)



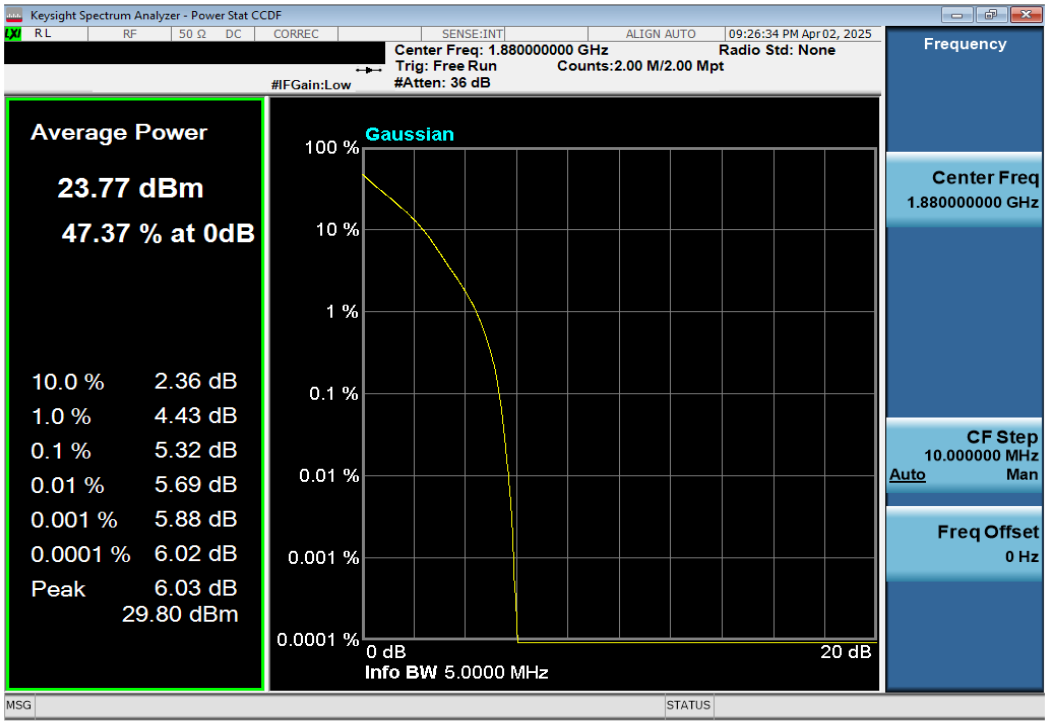
Plot 7-140. PAR Plot (LTE Band 2 - 1.4MHz 16-QAM - Full RB Configuration)



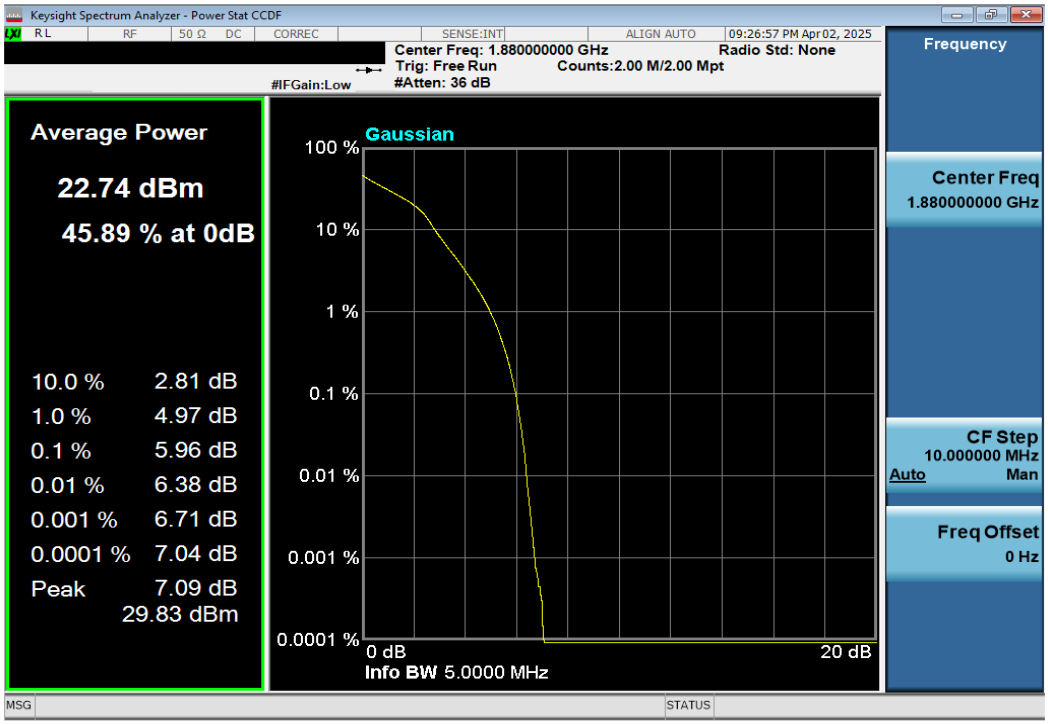
Plot 7-141. PAR Plot (LTE Band 2 - 3MHz QPSK - Full RB Configuration)



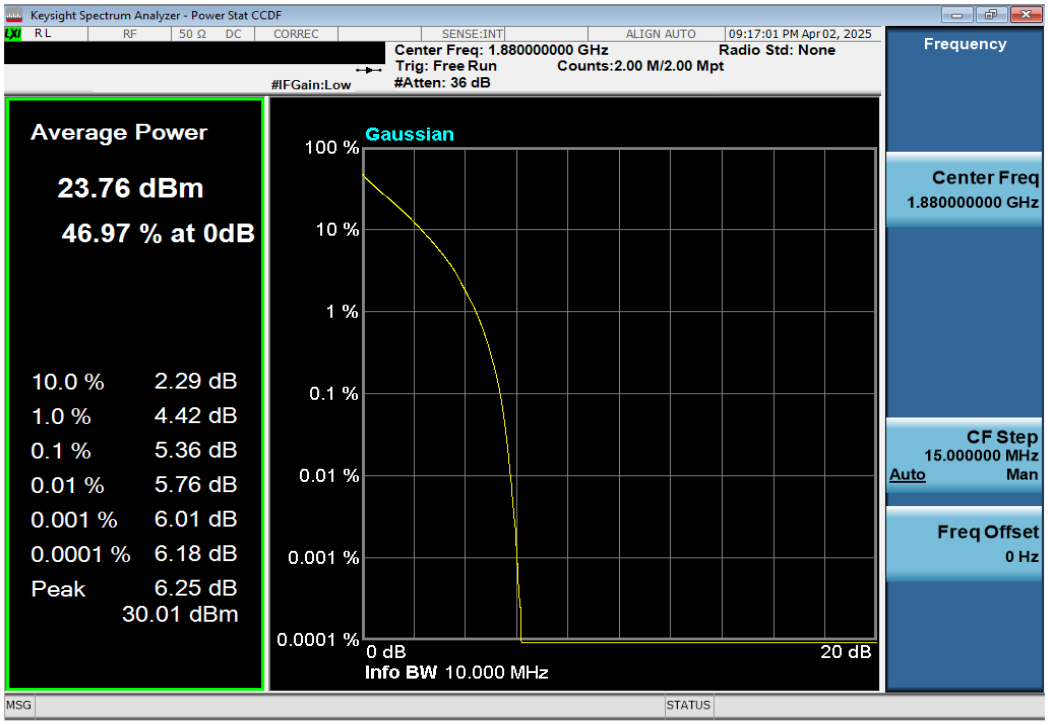
Plot 7-142. PAR Plot (LTE Band 2 - 3MHz 16-QAM - Full RB Configuration)



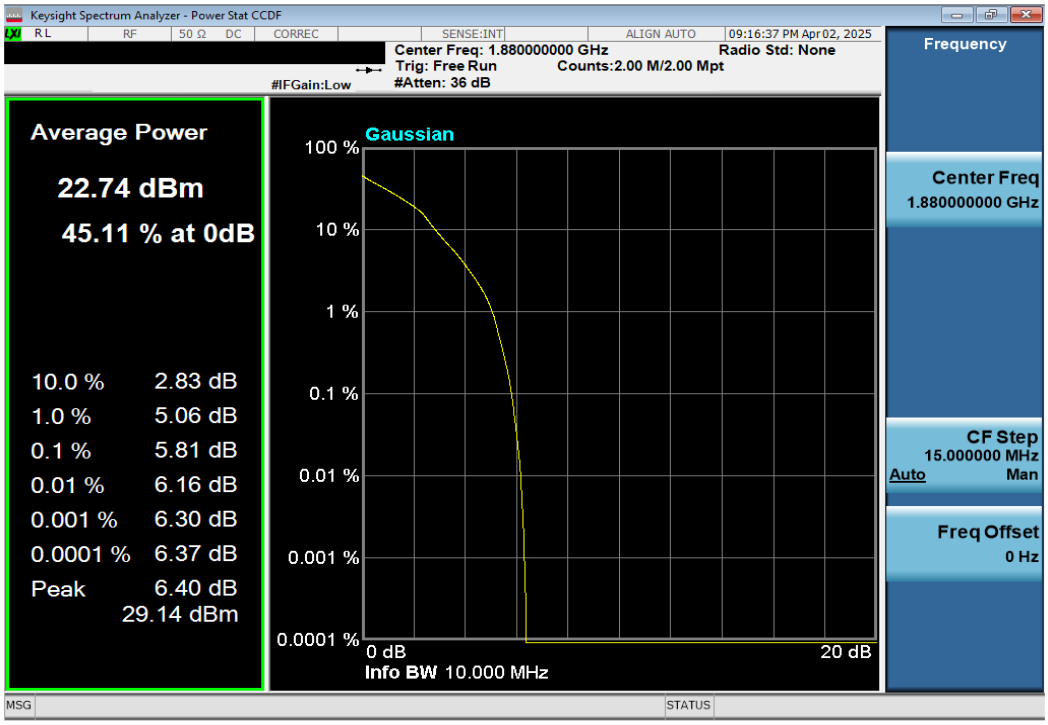
Plot 7-143. PAR Plot (LTE Band 2 - 5MHz QPSK - Full RB Configuration)



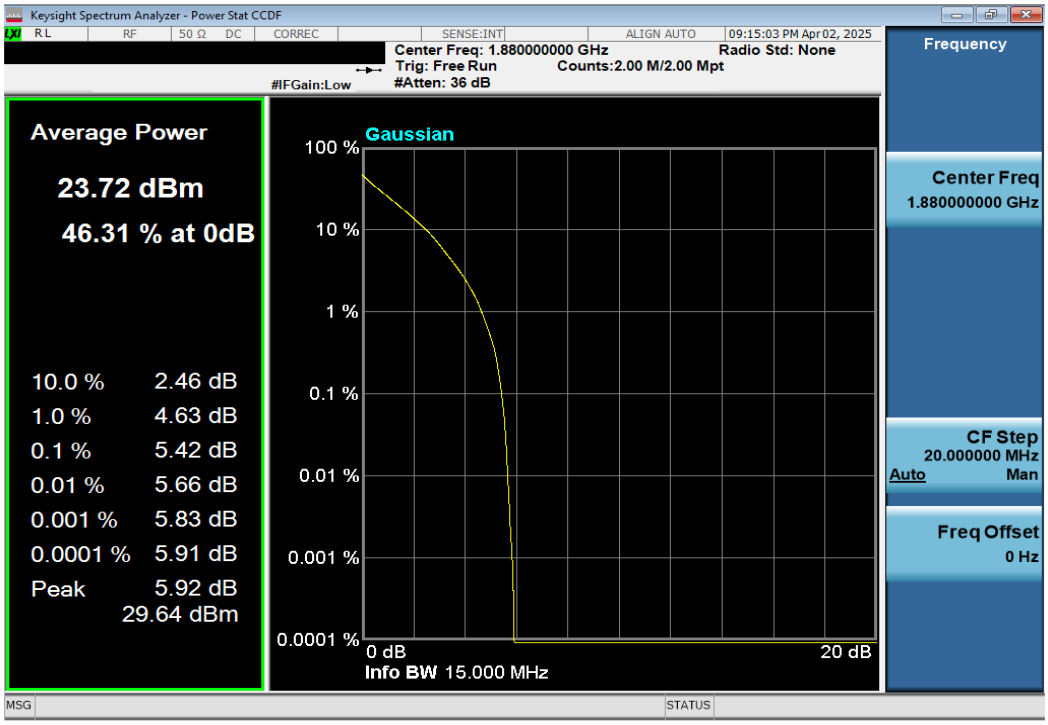
Plot 7-144. PAR Plot (LTE Band 2 - 5MHz 16-QAM - Full RB Configuration)



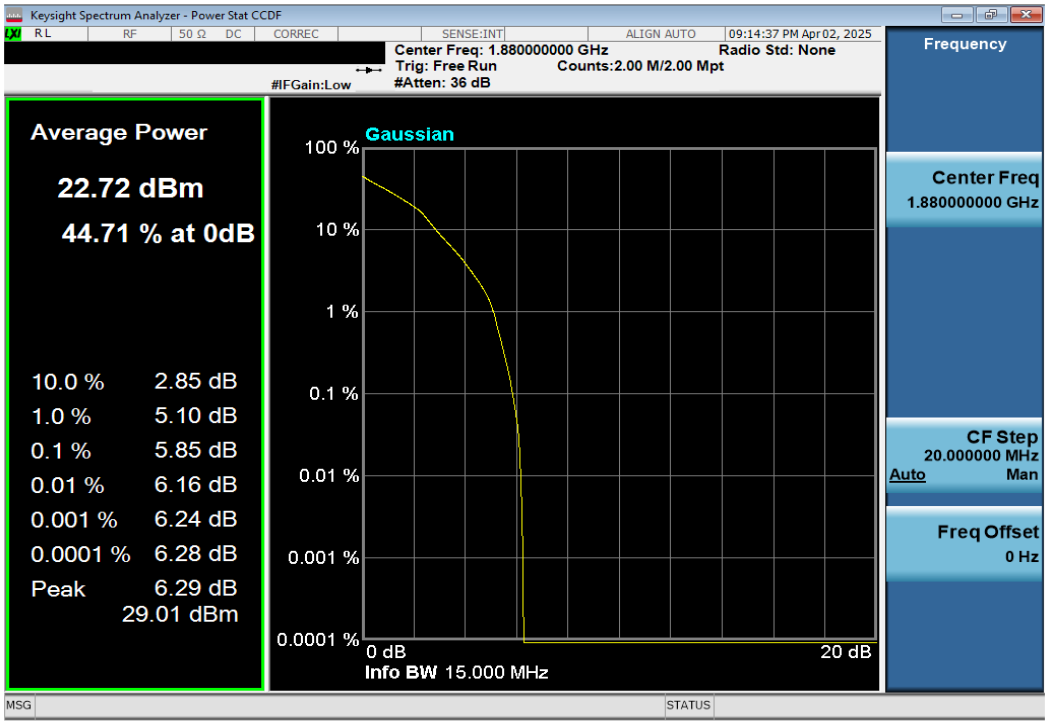
Plot 7-145. PAR Plot (LTE Band 2 - 10MHz QPSK - Full RB Configuration)



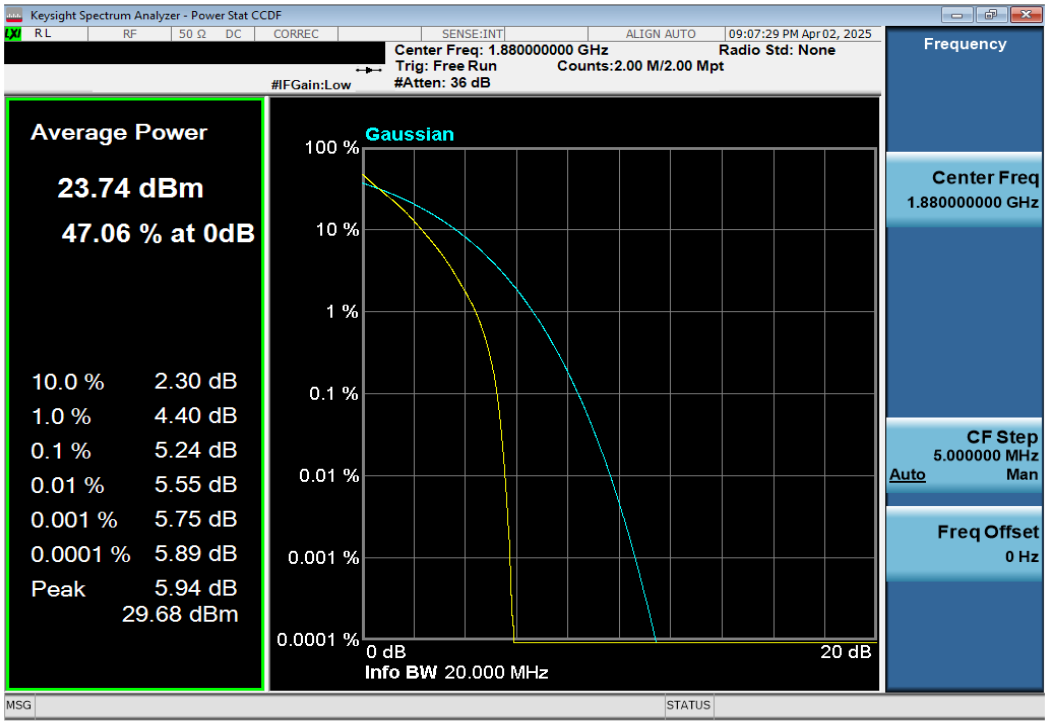
Plot 7-146. PAR Plot (LTE Band 2 - 10MHz 16-QAM - Full RB Configuration)



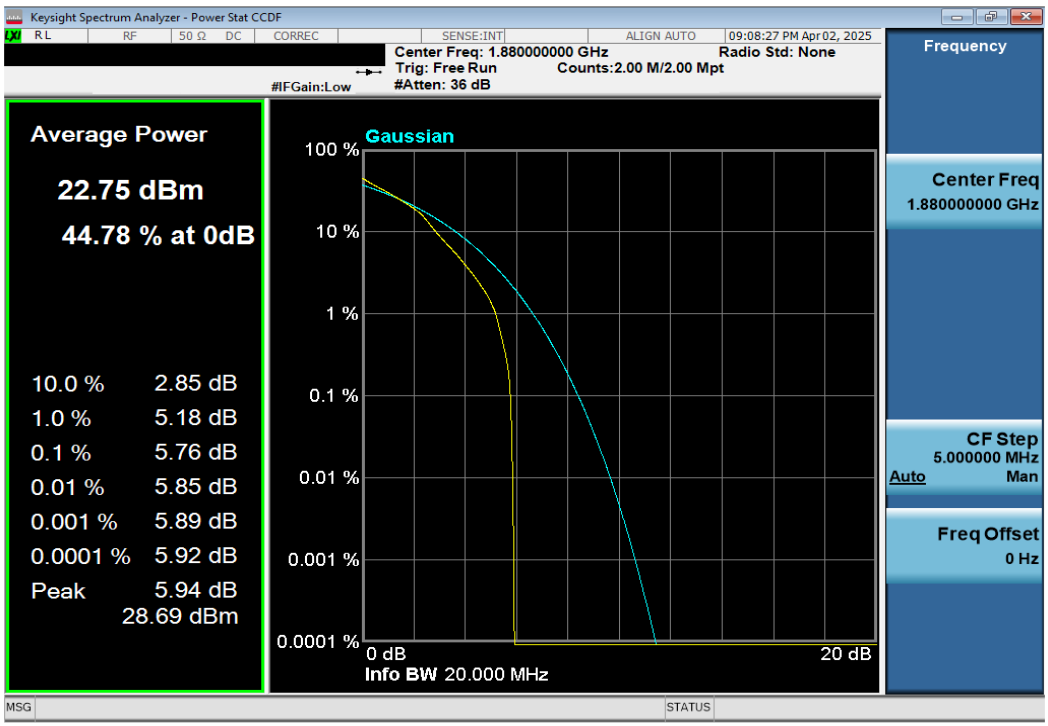
Plot 7-147. PAR Plot (LTE Band 2 - 15MHz QPSK - Full RB Configuration)



Plot 7-148. PAR Plot (LTE Band 2 - 15MHz 16-QAM - Full RB Configuration)

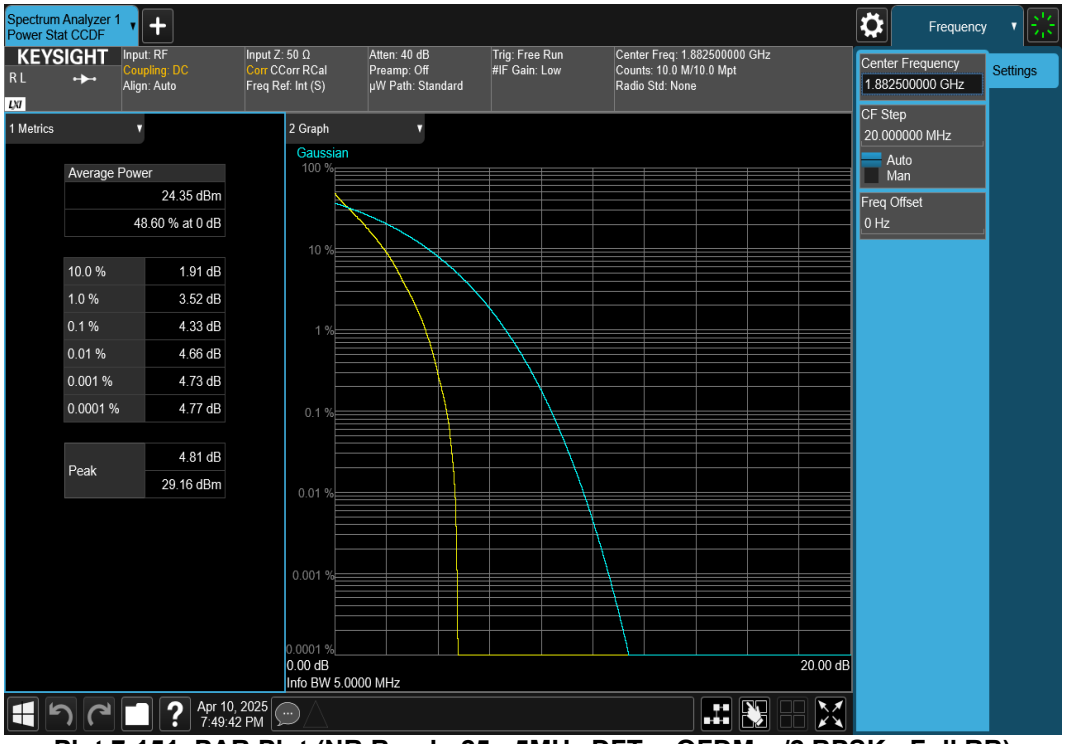


Plot 7-149. PAR Plot (LTE Band 2 - 20MHz QPSK - Full RB Configuration)

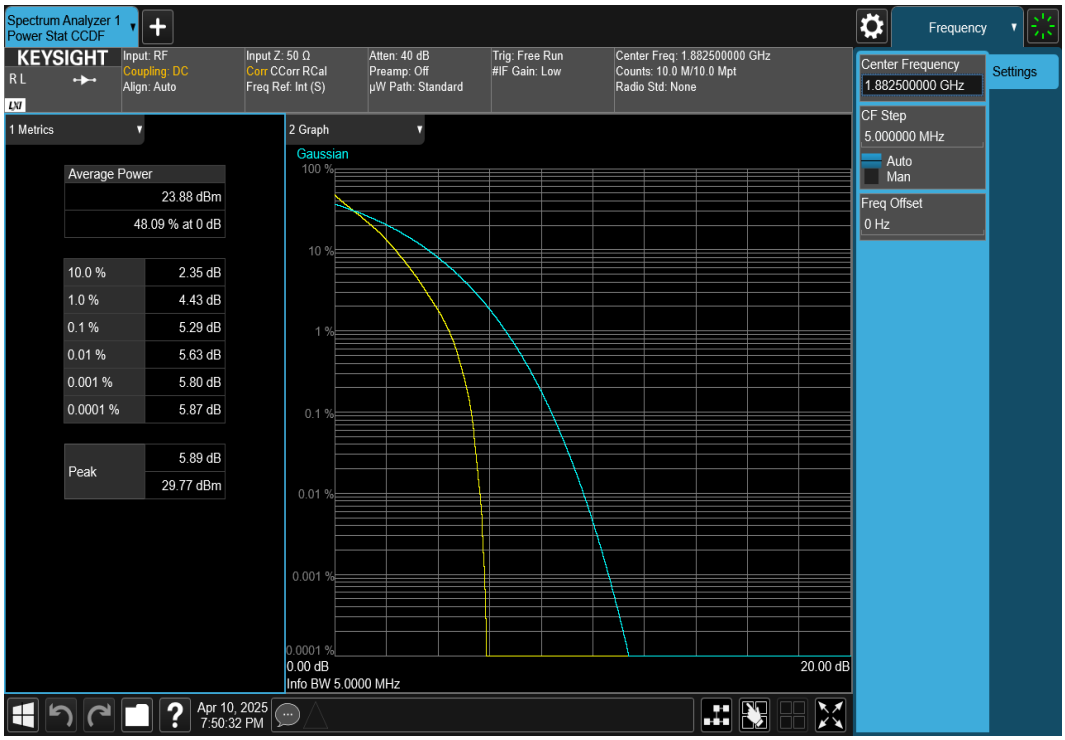


Plot 7-150. PAR Plot (LTE Band 2 - 20MHz 16-QAM - Full RB Configuration)

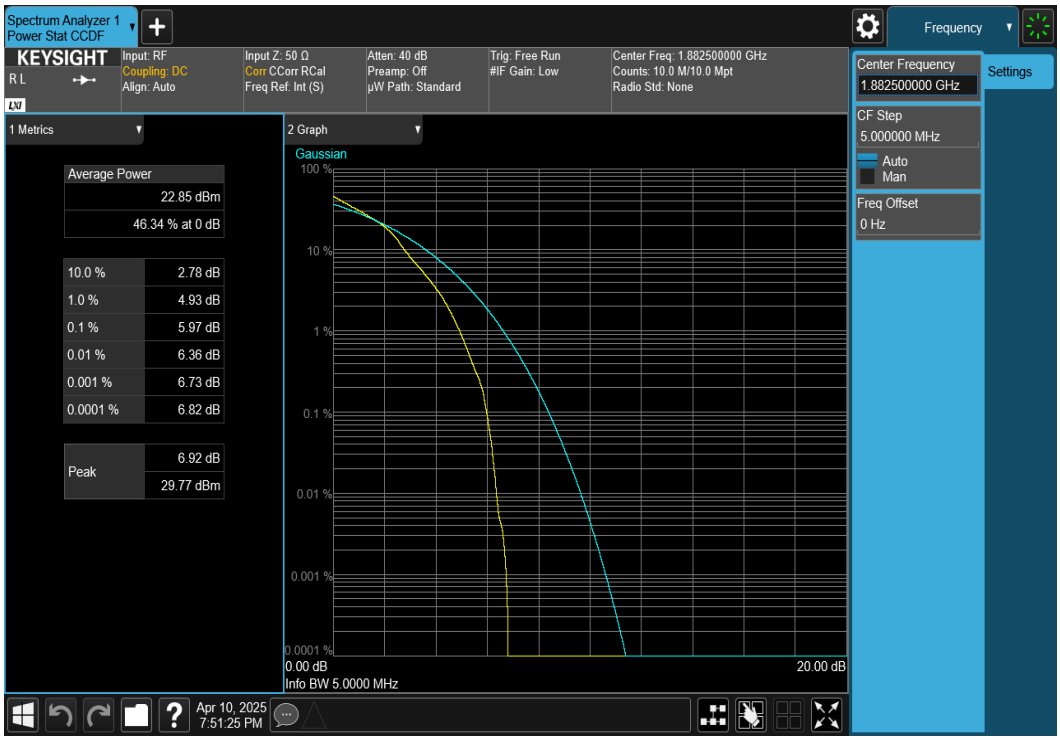
NR Band n25



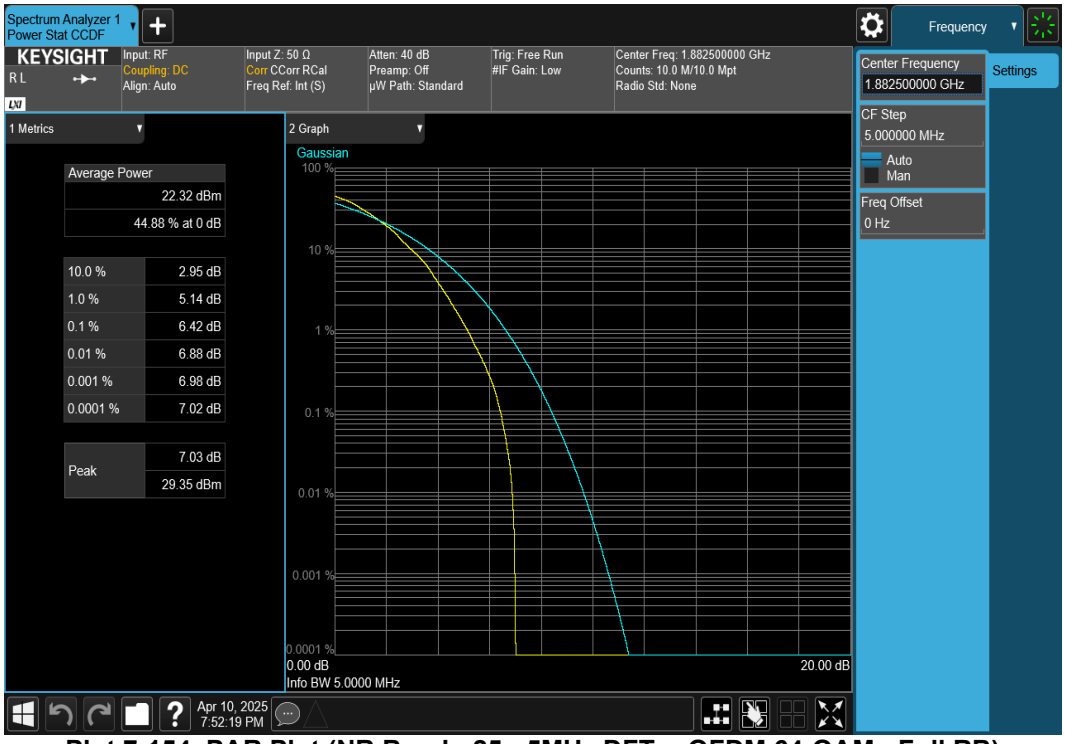
Plot 7-151. PAR Plot (NR Band n25 - 5MHz DFT-s-OFDM π/2 BPSK - Full RB)



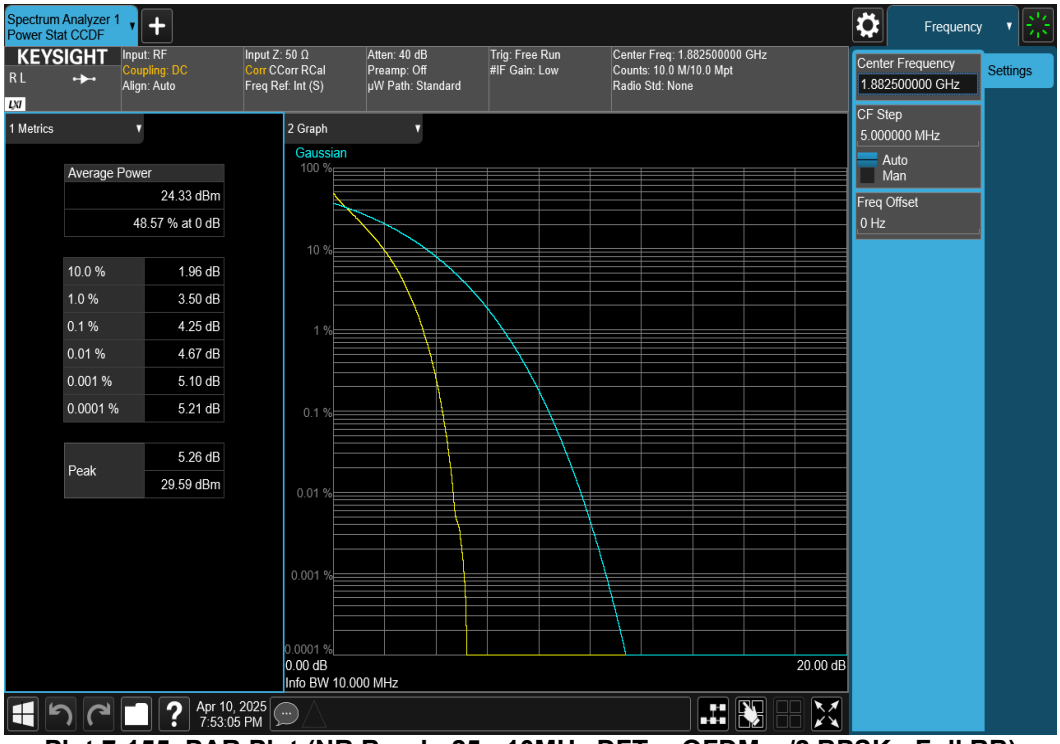
Plot 7-152. PAR Plot (NR Band n25 - 5MHz DFT-s-OFDM QPSK - Full RB)



Plot 7-153. PAR Plot (NR Band n25 - 5MHz DFT-s-OFDM 16-QAM - Full RB)

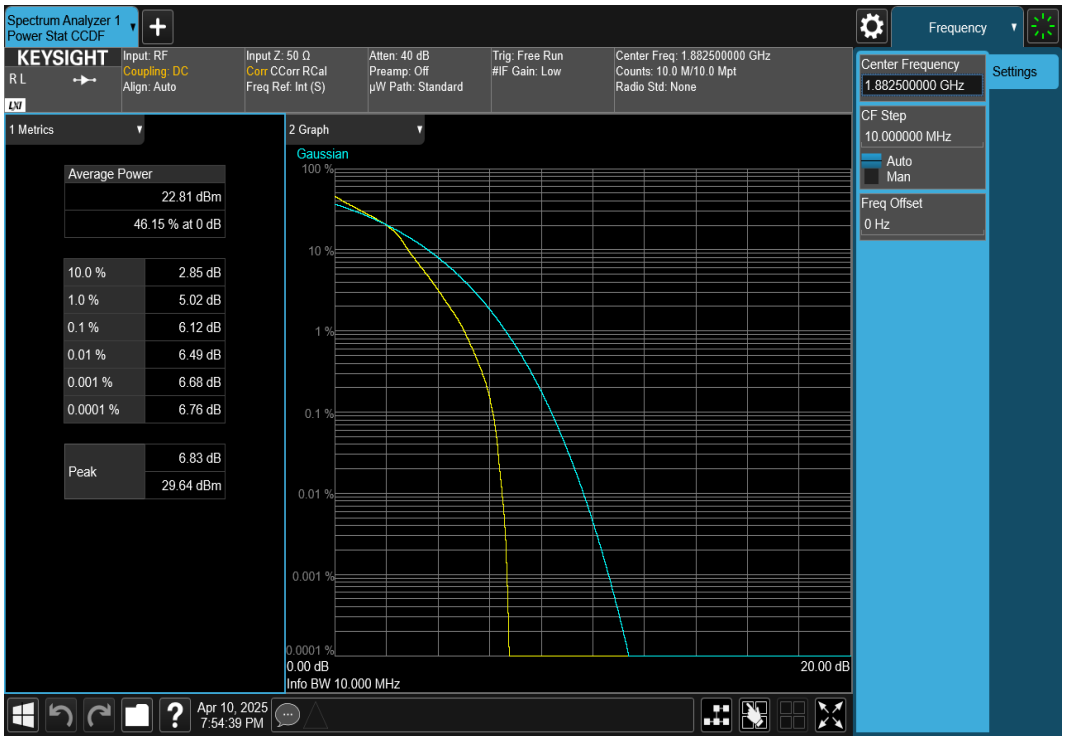


Plot 7-154. PAR Plot (NR Band n25 - 5MHz DFT-s-OFDM 64-QAM - Full RB)

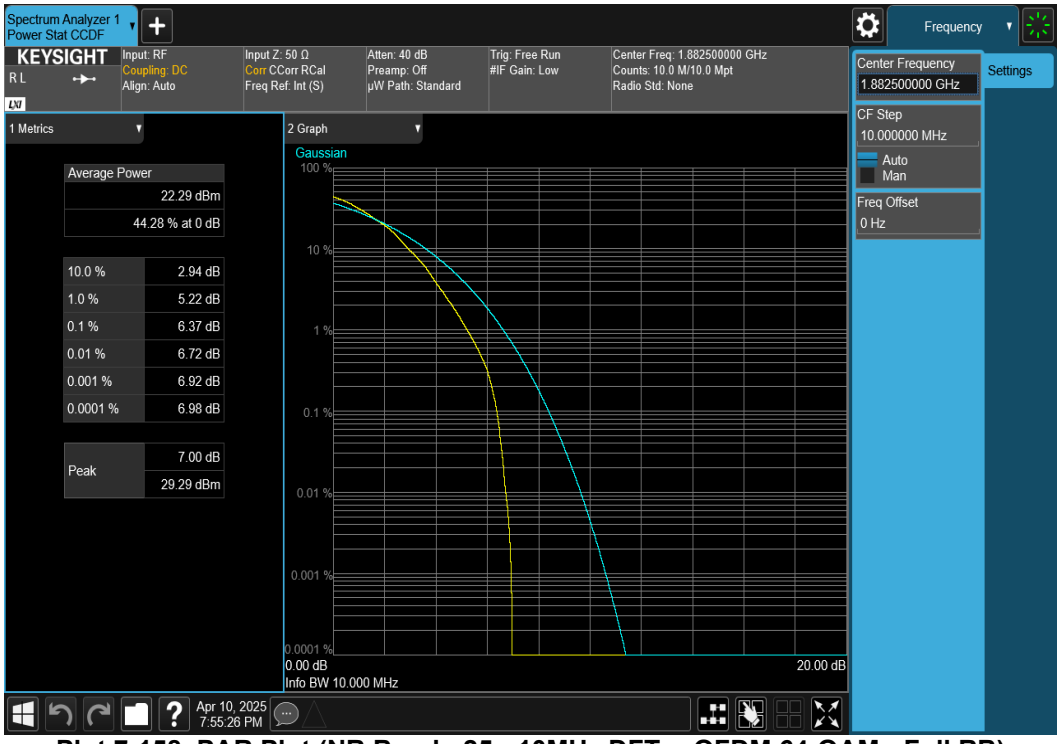


Plot 7-155. PAR Plot (NR Band n25 - 10MHz DFT-s-OFDM π/2 BPSK - Full RB)

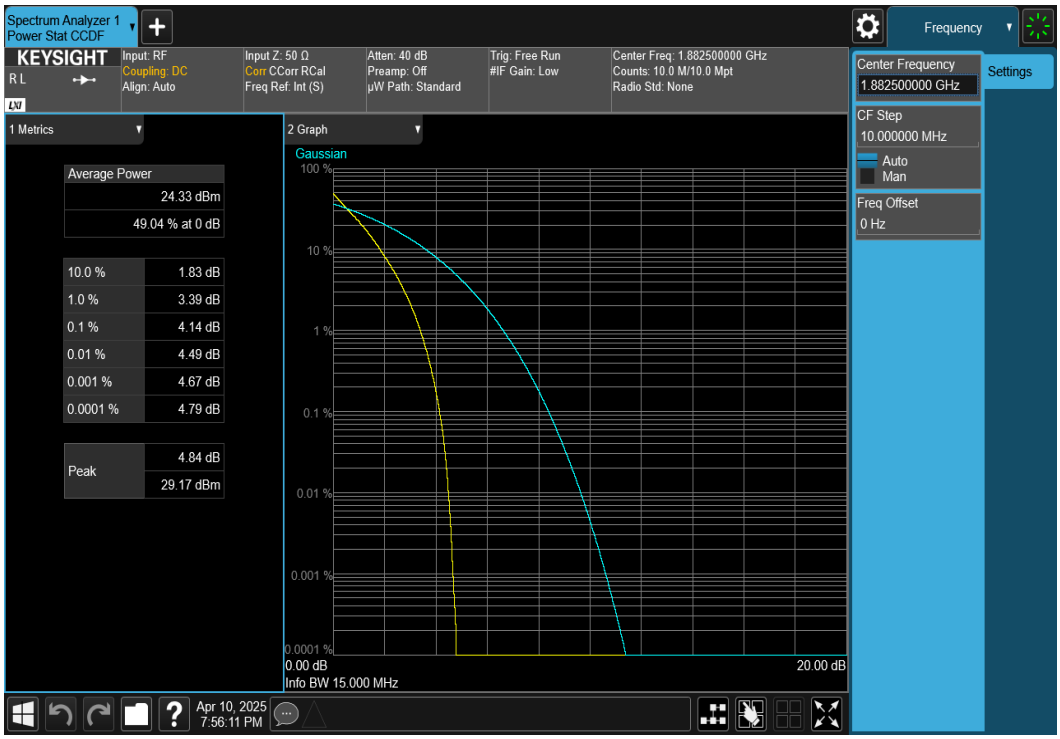
Plot 7-156. PAR Plot (NR Band n25 - 10MHz DFT-s-OFDM QPSK - Full RB)



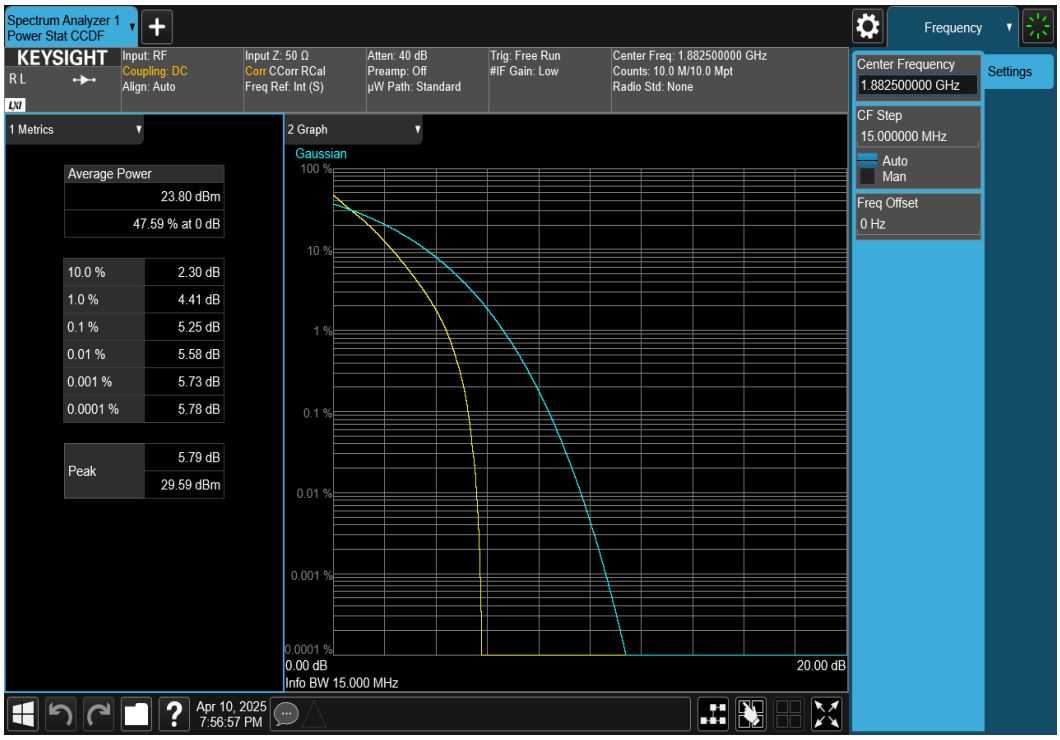
Plot 7-157. PAR Plot (NR Band n25 - 10MHz DFT-s-OFDM 16-QAM - Full RB)



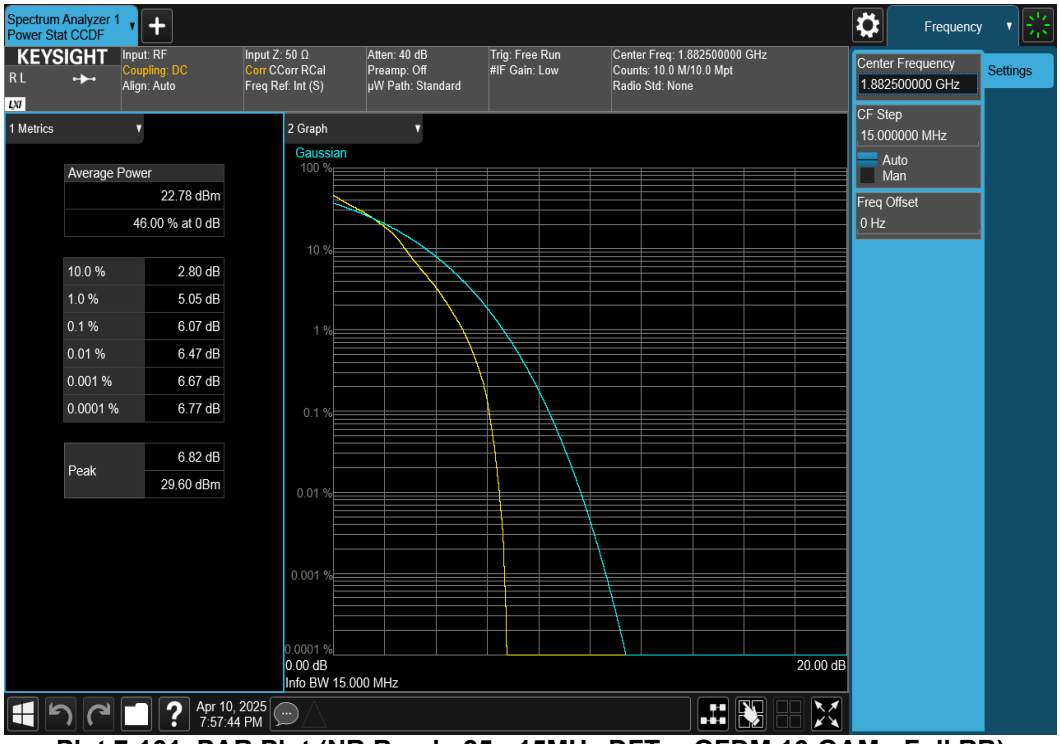
Plot 7-158. PAR Plot (NR Band n25 - 10MHz DFT-s-OFDM 64-QAM - Full RB)



Plot 7-159. PAR Plot (NR Band n25 - 15MHz DFT-s-OFDM π/2 BPSK - Full RB)

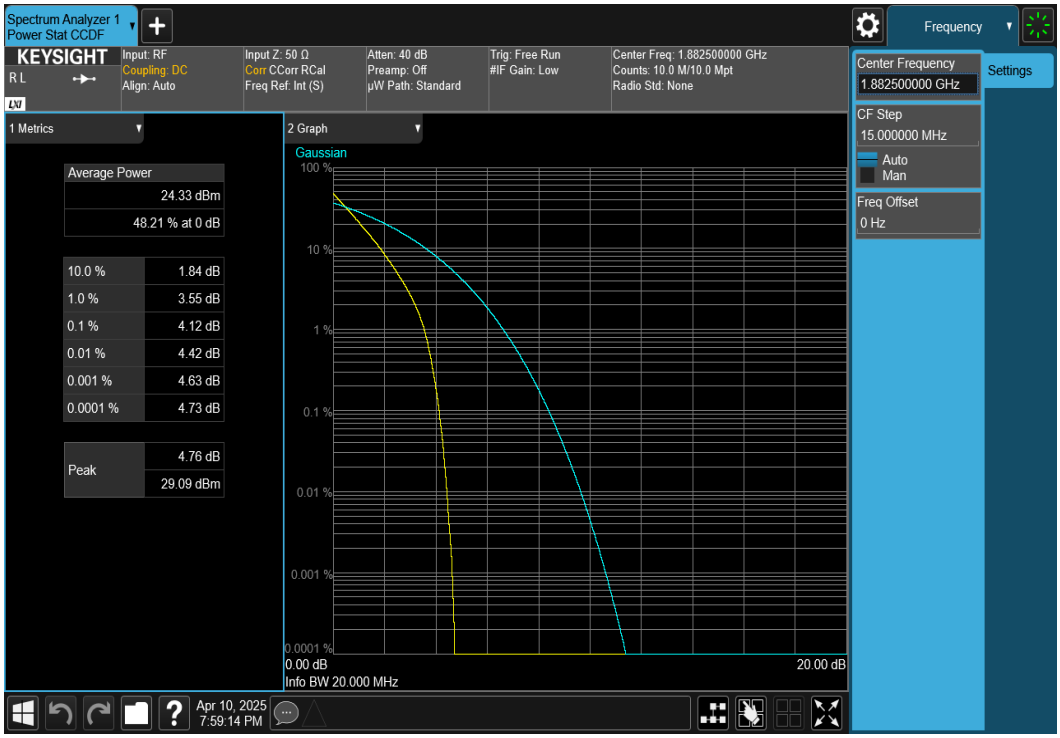


Plot 7-160. PAR Plot (NR Band n25 - 15MHz DFT-s-OFDM QPSK - Full RB)

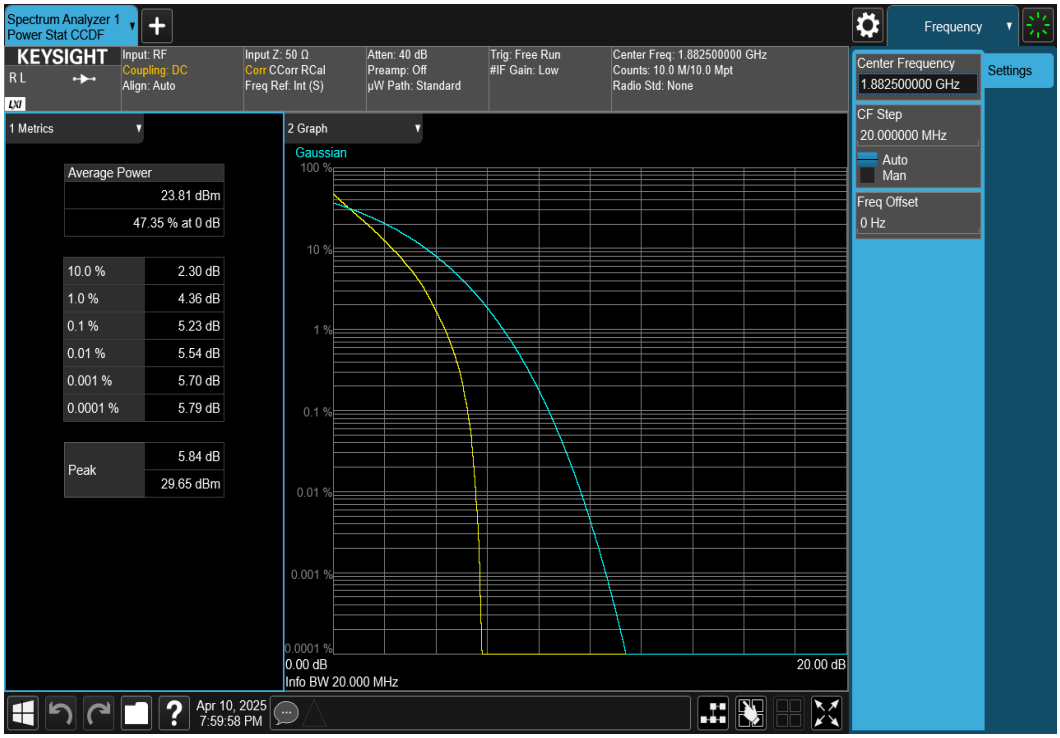


Plot 7-161. PAR Plot (NR Band n25 - 15MHz DFT-s-OFDM 16-QAM - Full RB)

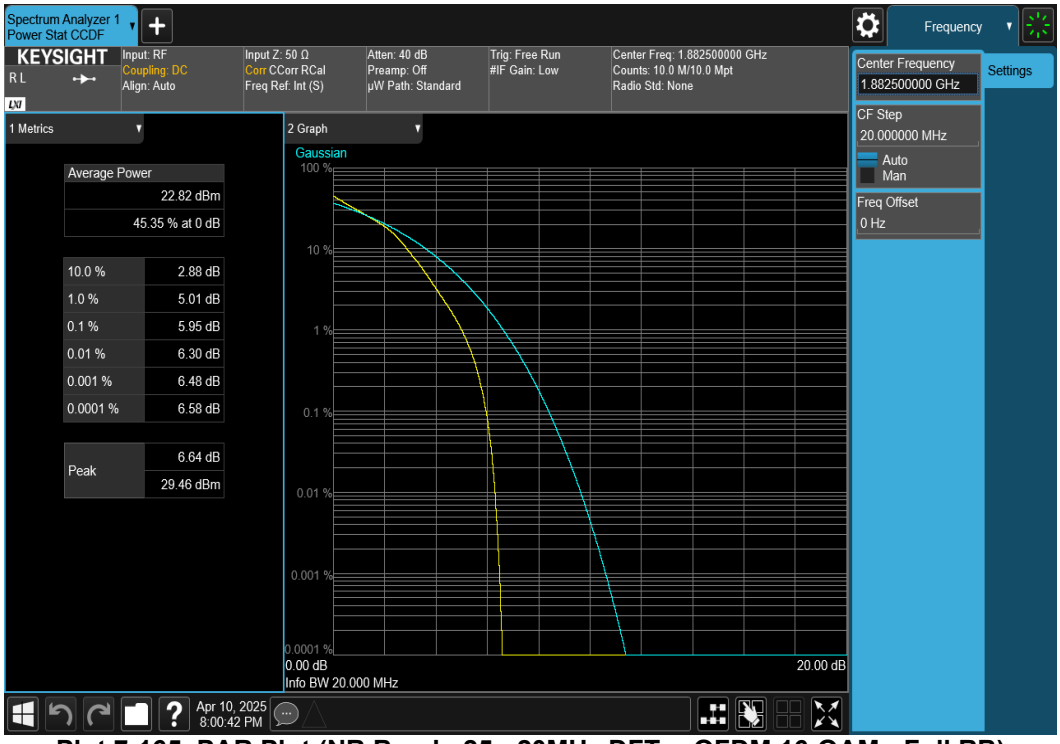
Plot 7-162. PAR Plot (NR Band n25 - 15MHz DFT-s-OFDM 64-QAM - Full RB)



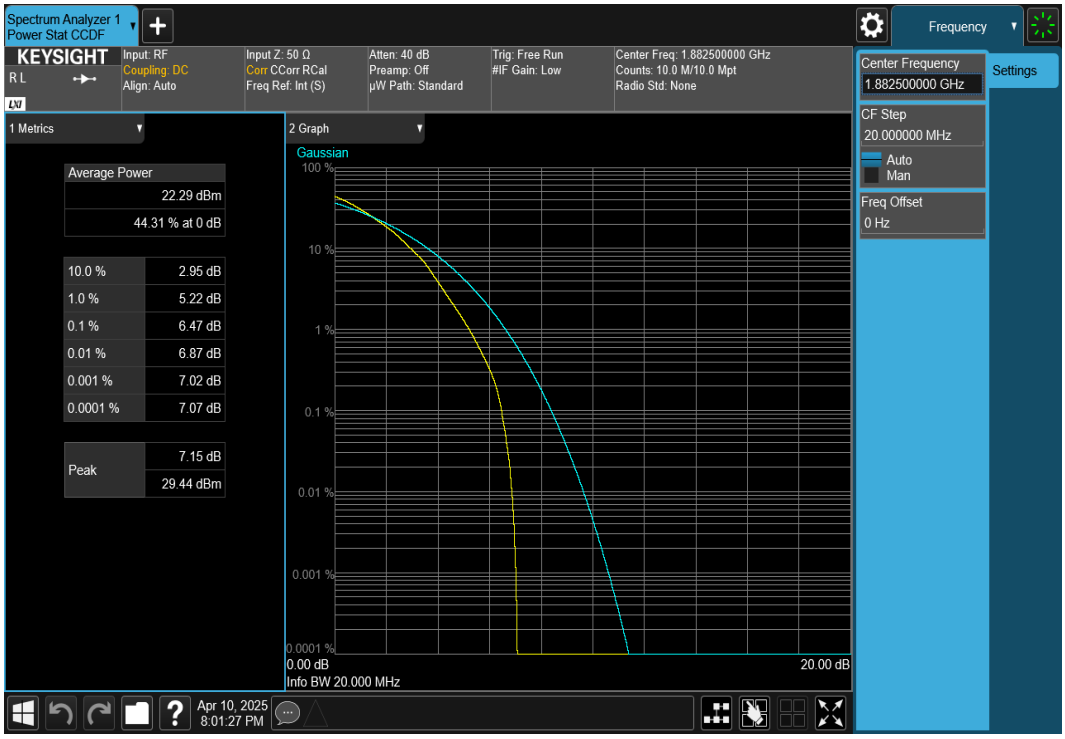
Plot 7-163. PAR Plot (NR Band n25 - 20MHz DFT-s-OFDM π/2 BPSK - Full RB)



Plot 7-164. PAR Plot (NR Band n25 - 20MHz DFT-s-OFDM QPSK - Full RB)

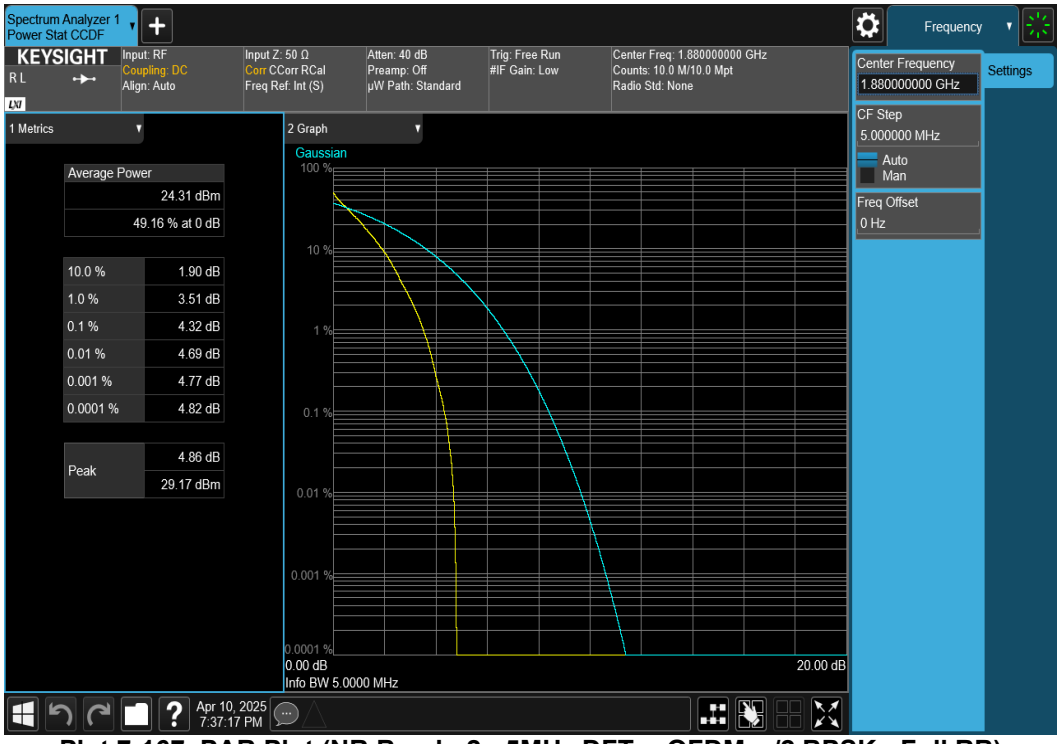


Plot 7-165. PAR Plot (NR Band n25 - 20MHz DFT-s-OFDM 16-QAM - Full RB)

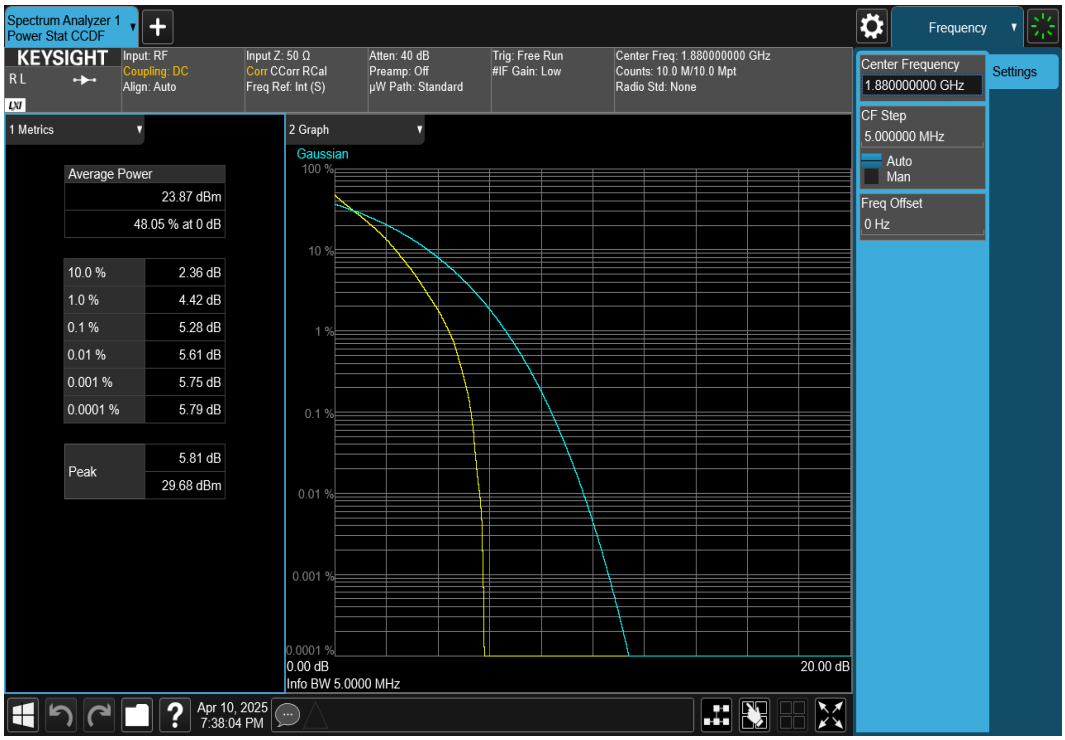


Plot 7-166. PAR Plot (NR Band n25 - 20MHz DFT-s-OFDM 64-QAM - Full RB)

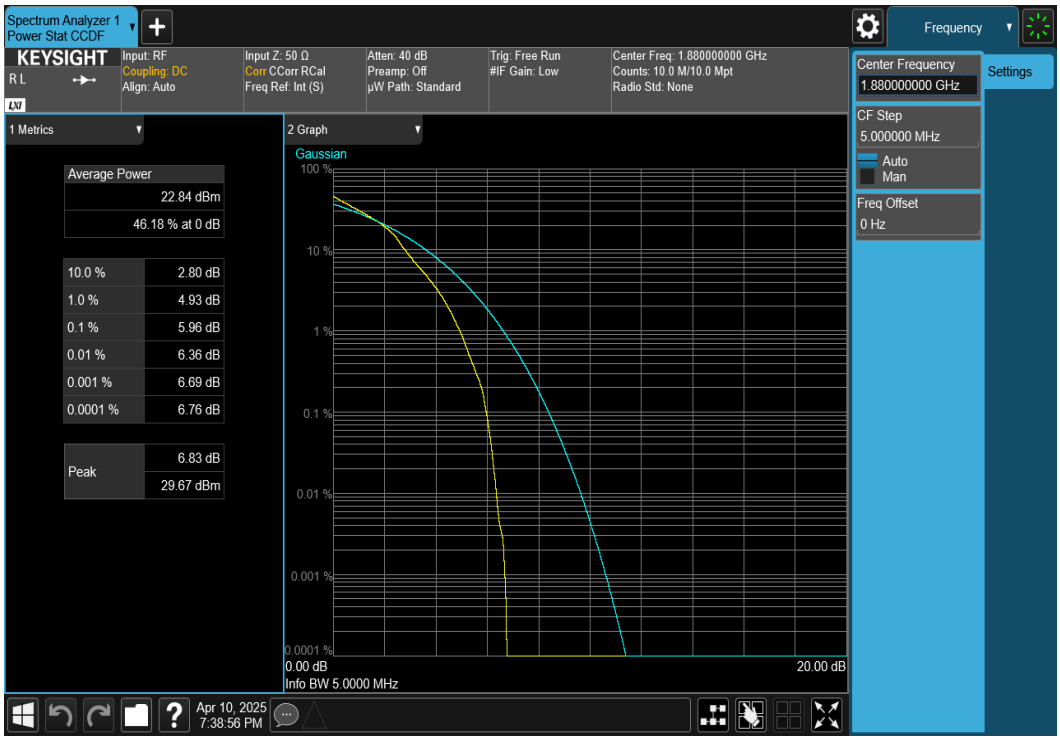
NR Band n2



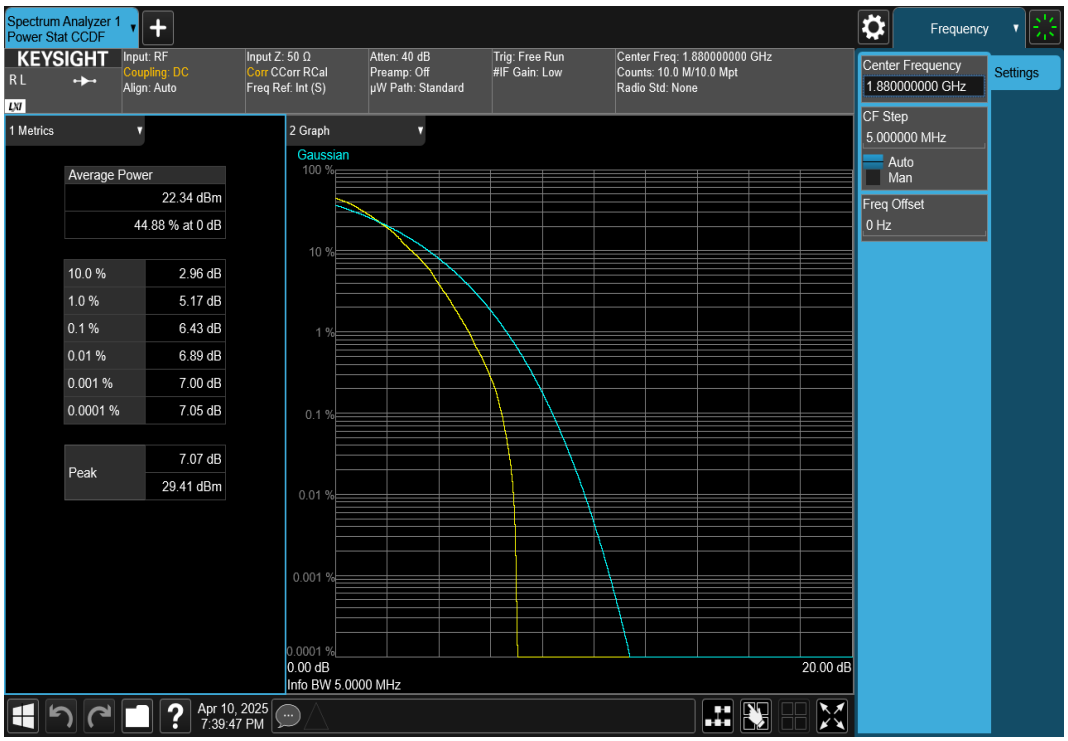
Plot 7-167. PAR Plot (NR Band n2 - 5MHz DFT-s-OFDM π/2 BPSK - Full RB)



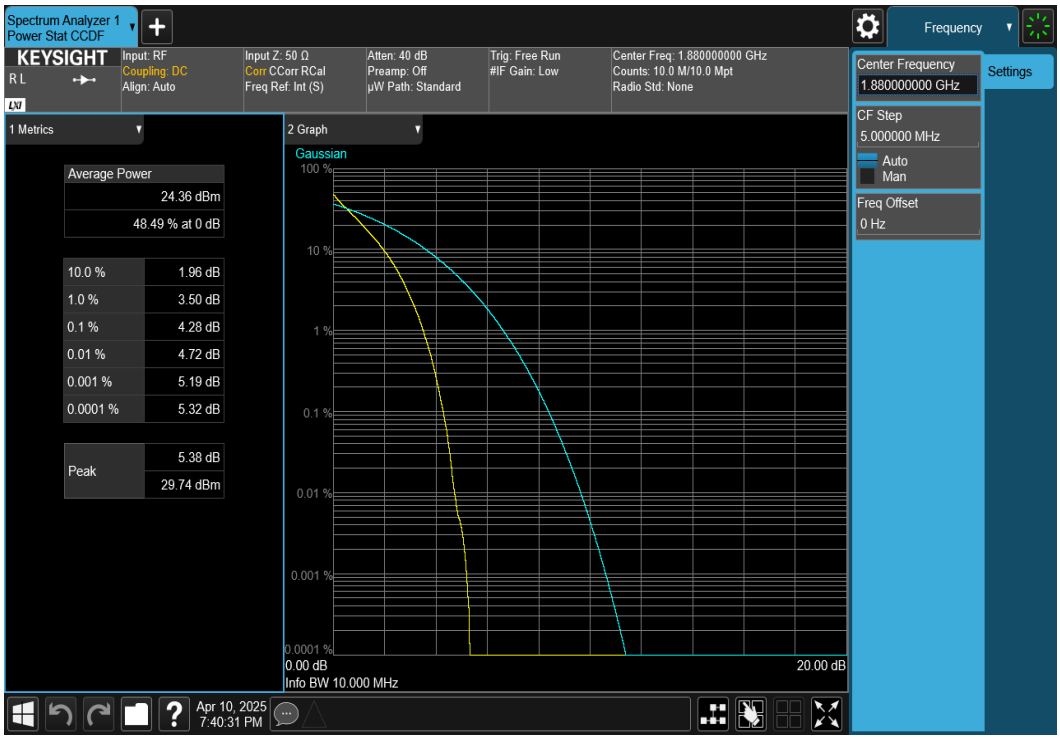
Plot 7-168. PAR Plot (NR Band n2 - 5MHz DFT-s-OFDM QPSK - Full RB)



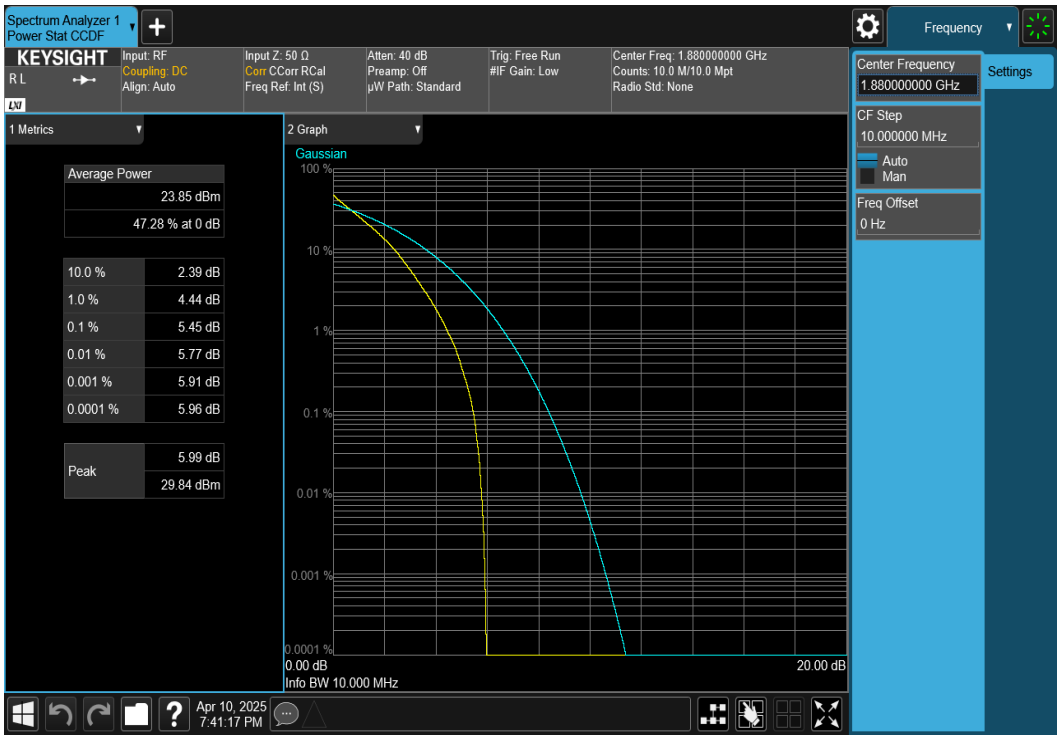
Plot 7-169. PAR Plot (NR Band n2 - 5MHz DFT-s-OFDM 16-QAM - Full RB)



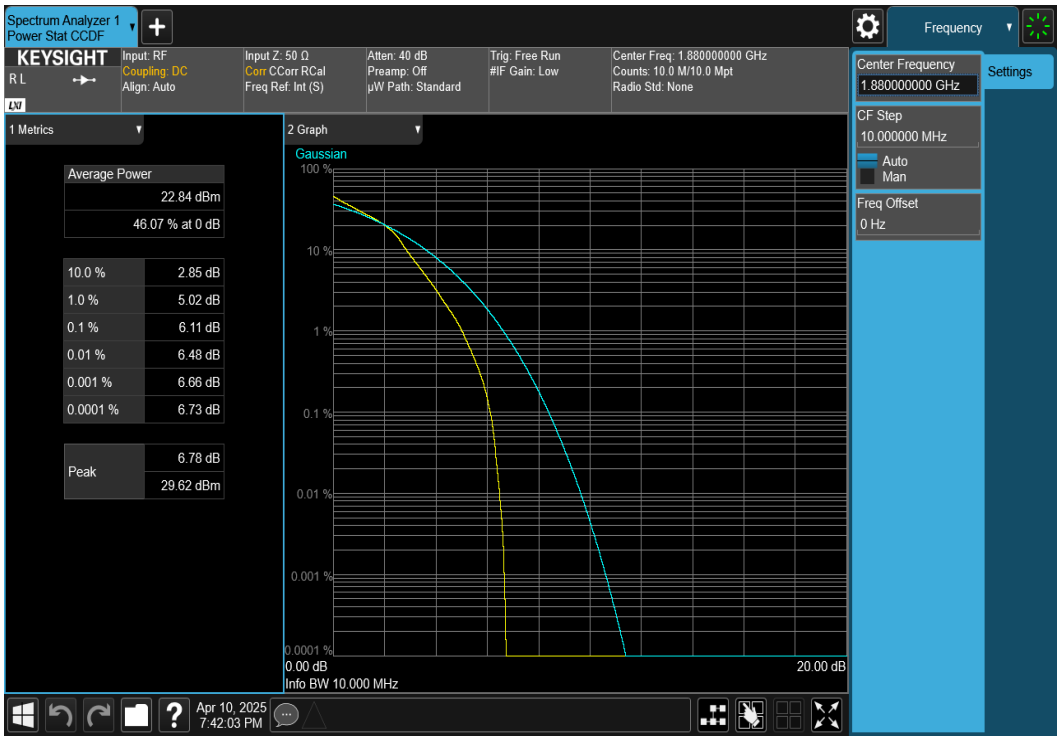
Plot 7-170. PAR Plot (NR Band n2 - 5MHz DFT-s-OFDM 64-QAM - Full RB)



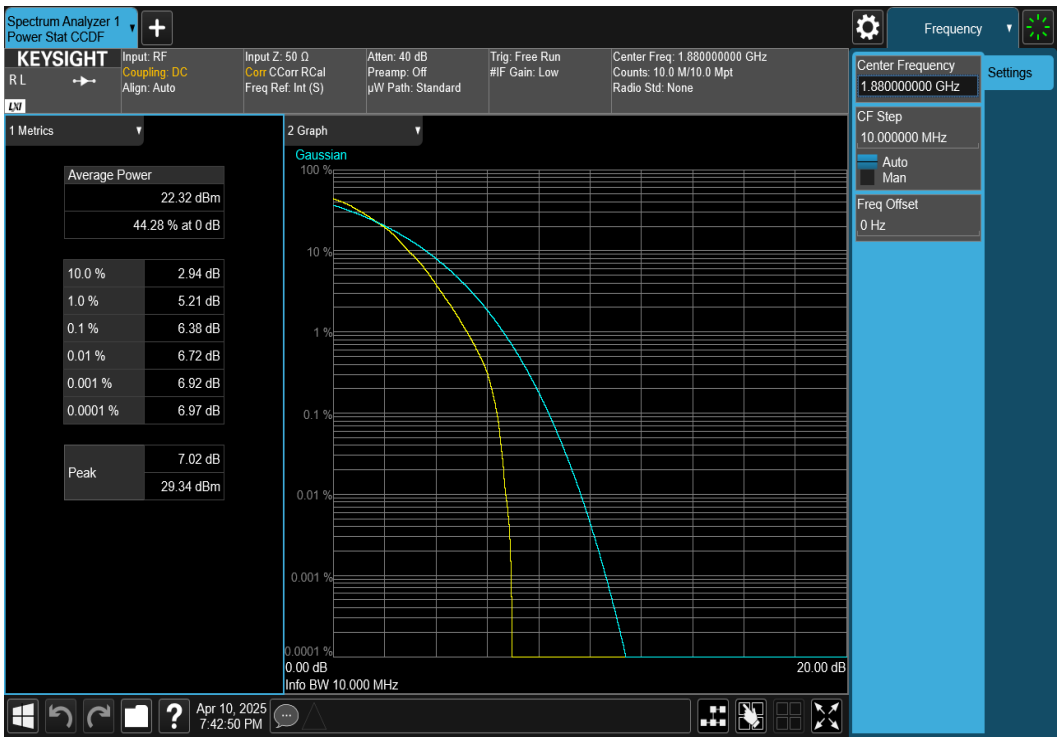
Plot 7-171. PAR Plot (NR Band n2 - 10MHz DFT-s-OFDM π/2 BPSK - Full RB)



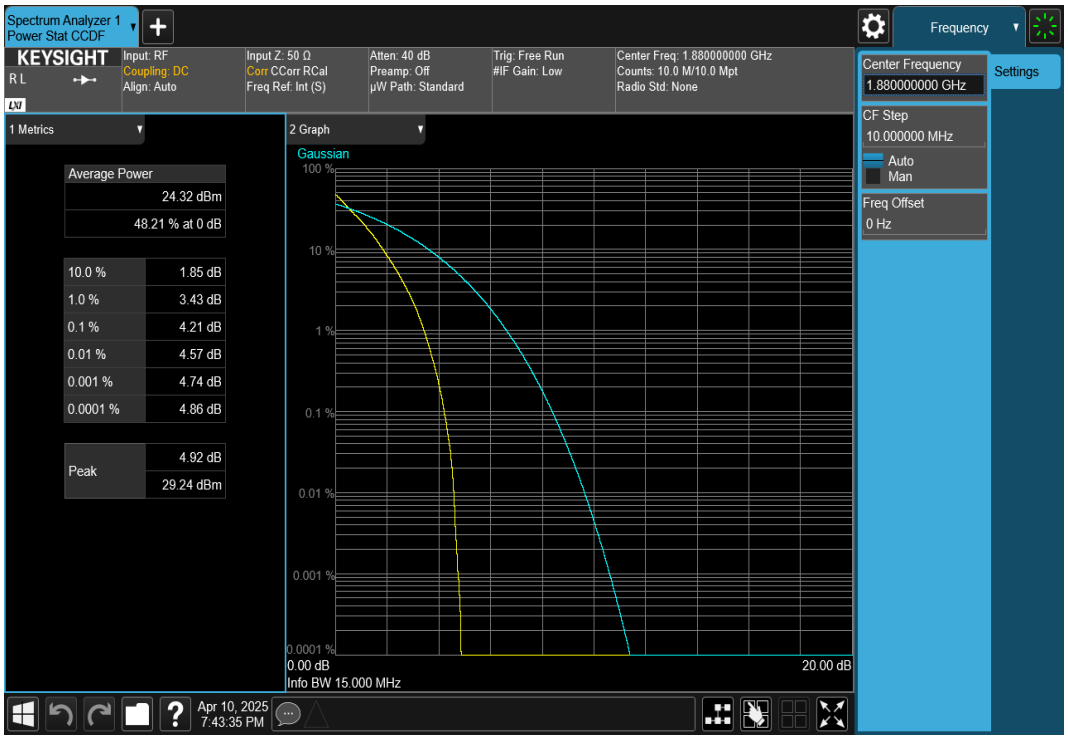
Plot 7-172. PAR Plot (NR Band n2 - 10MHz DFT-s-OFDM QPSK - Full RB)



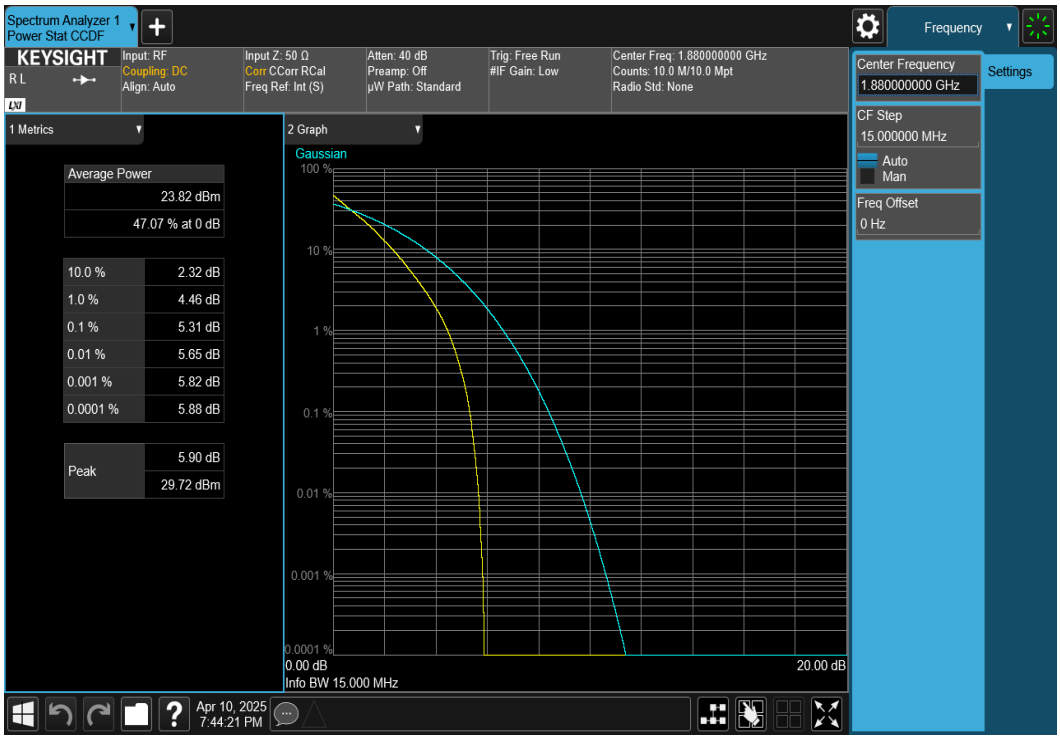
Plot 7-173. PAR Plot (NR Band n2 - 10MHz DFT-s-OFDM 16-QAM - Full RB)



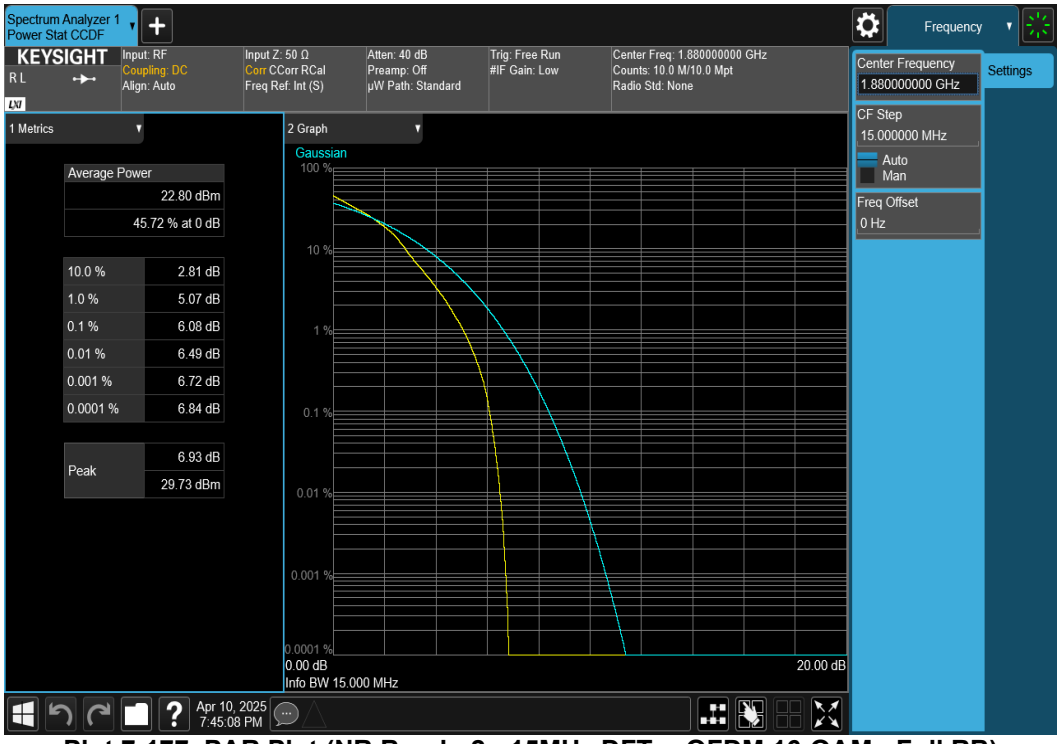
Plot 7-174. PAR Plot (NR Band n2 - 10MHz DFT-s-OFDM 64-QAM - Full RB)



Plot 7-175. PAR Plot (NR Band n2 - 15MHz DFT-s-OFDM π/2 BPSK - Full RB)

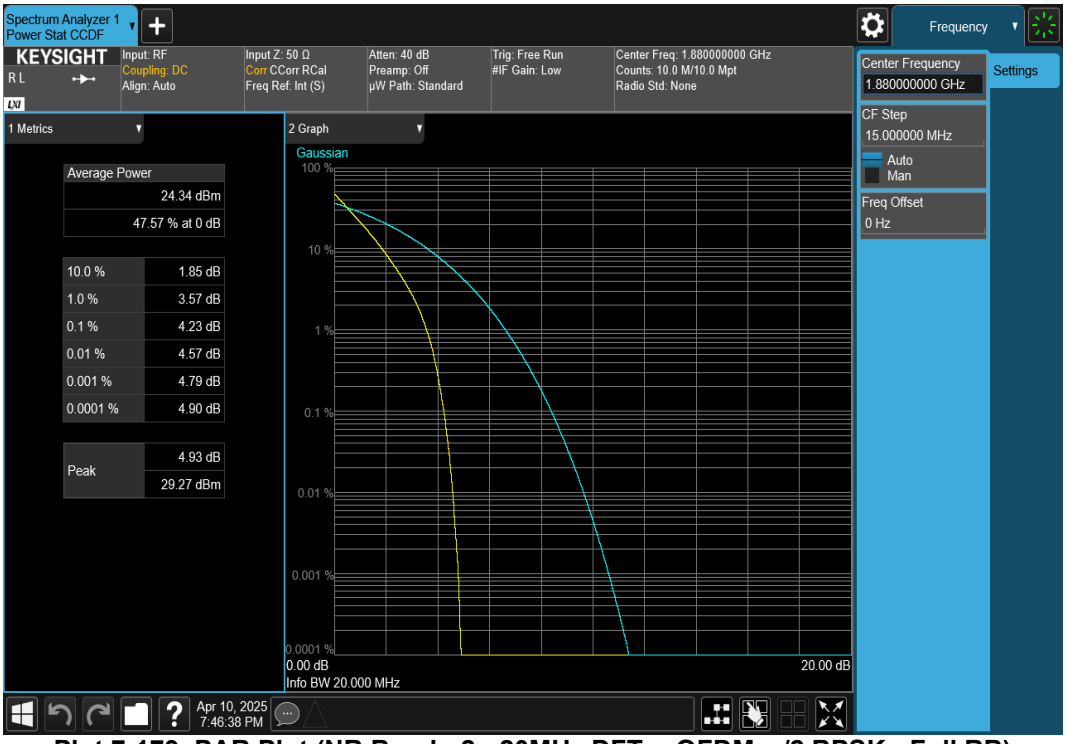


Plot 7-176. PAR Plot (NR Band n2 - 15MHz DFT-s-OFDM QPSK - Full RB)

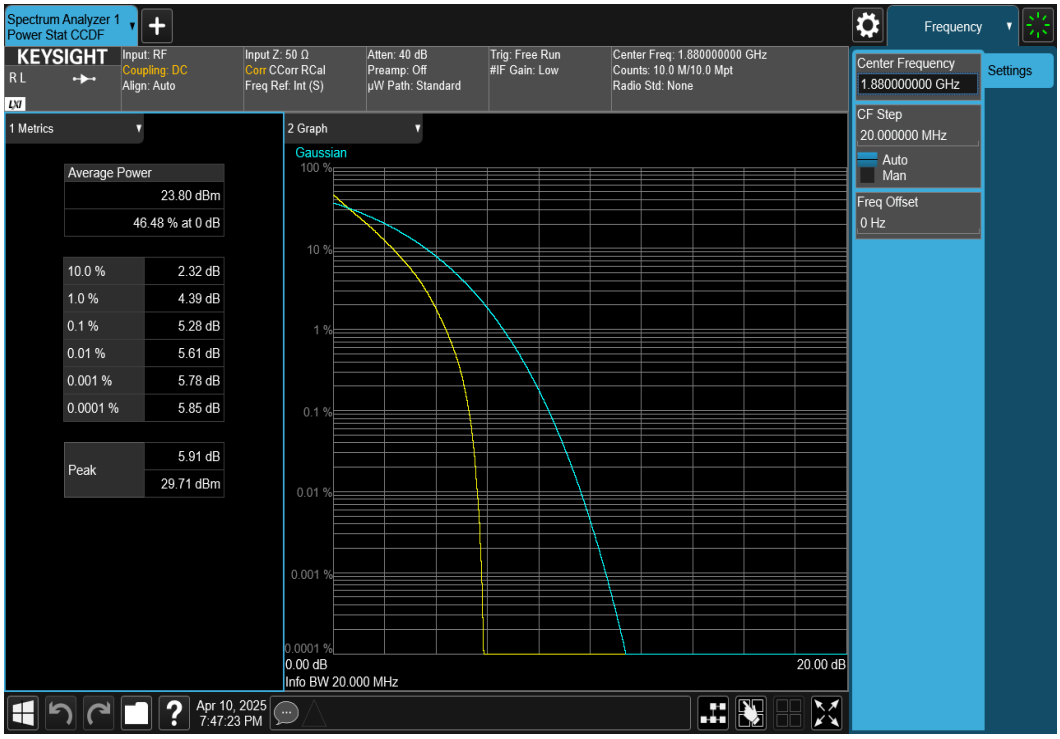


Plot 7-177. PAR Plot (NR Band n2 - 15MHz DFT-s-OFDM 16-QAM - Full RB)

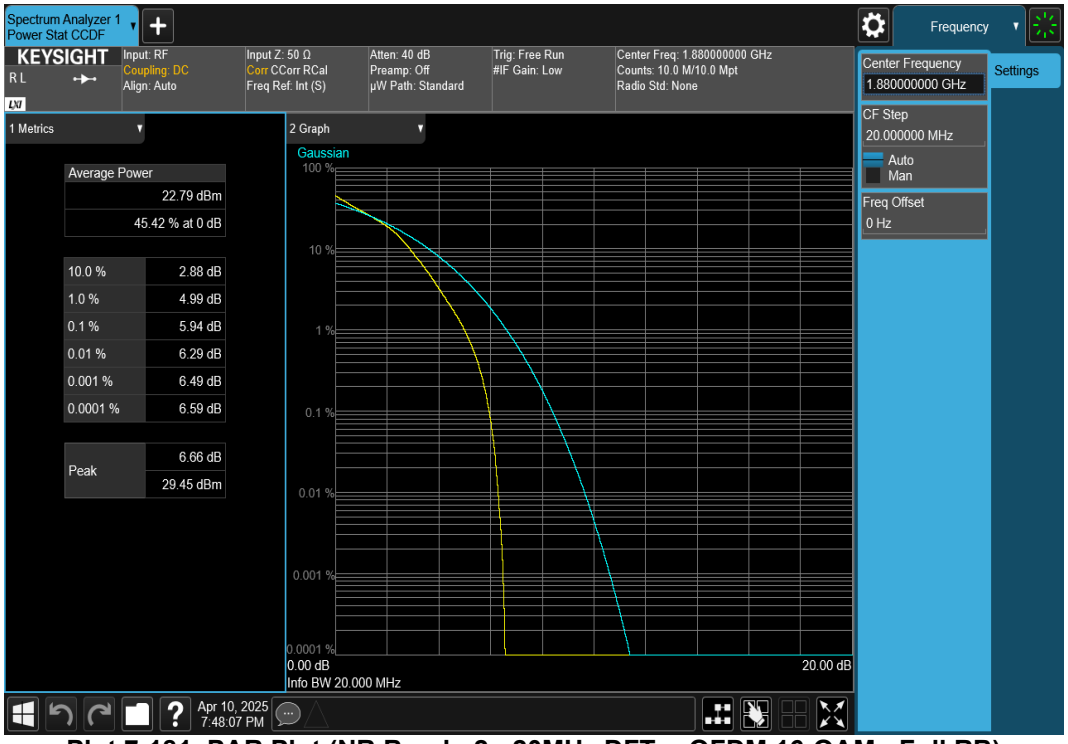
Plot 7-178. PAR Plot (NR Band n2 - 15MHz DFT-s-OFDM 64-QAM - Full RB)



Plot 7-179. PAR Plot (NR Band n2 - 20MHz DFT-s-OFDM π/2 BPSK - Full RB)



Plot 7-180. PAR Plot (NR Band n2 - 20MHz DFT-s-OFDM QPSK - Full RB)



Plot 7-181. PAR Plot (NR Band n2 - 20MHz DFT-s-OFDM 16-QAM - Full RB)

Plot 7-182. PAR Plot (NR Band n2 - 20MHz DFT-s-OFDM 64-QAM - Full RB)

7.6 Radiated Power (EIRP)

§24.232(c)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are calculated by adding highest antenna gain to maximum measured conducted output power. 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 C63.26-2015 – Section 5.2.5.5

Test Settings

The relevant equation for determining the EIRP from the conducted RF output power measured is:

EIRP = PMeas – LC + GT

Where:

EIRP = Equivalent Isotropic Radiated Power (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBi (EIRP)

Test Setup

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

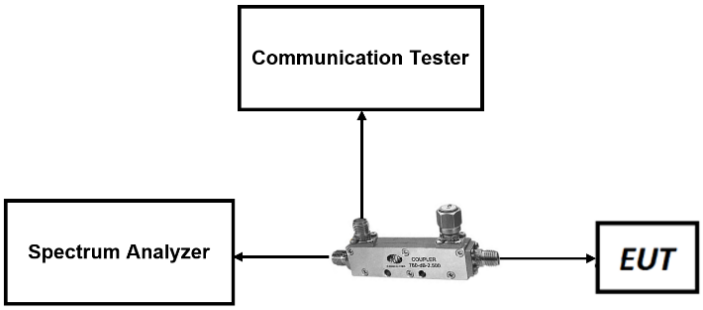


Figure 7-9. LTE Test Instrument & Measurement Setup

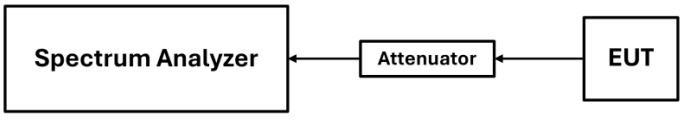


Figure 7-10. FR1 Test Instrument & Measurement Setup

Test Notes

1. The EUT was tested in all possible test configurations. The worst case emissions are reported with the EUT 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 Level (dBm) readings in the table were taken with a correction table loaded into the base station simulator. The correction table was used to account for the signal attenuation in the connecting cable between the transmitter and antenna.

4. The Ant. Gains (GT) are listed in dBi.

7.6.1 Antenna FCM – EIRP

LTE Band 25

Bandwidth	Modulation	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
1.4 MHz	QPSK	1850.7	-11.00	1 / 5	24.98	13.98	25.003	33.01	-19.03
		1882.5	-11.00	1 / 5	25.06	14.06	25.468	33.01	-18.95
		1914.3	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1882.5	-11.00	1 / 0	24.50	13.50	22.387	33.01	-19.51
3 MHz	QPSK	1851.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
		1882.5	-11.00	1 / 7	25.18	14.18	26.182	33.01	-18.83
		1913.5	-11.00	1 / 14	25.09	14.09	25.645	33.01	-18.92
	16-QAM	1882.5	-11.00	1 / 14	24.61	13.61	22.961	33.01	-19.40
5 MHz	QPSK	1852.5	-11.00	1 / 24	25.17	14.17	26.122	33.01	-18.84
		1882.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
		1912.5	-11.00	1 / 0	25.02	14.02	25.235	33.01	-18.99
	16-QAM	1882.5	-11.00	1 / 12	24.72	13.72	23.550	33.01	-19.29
10 MHz	QPSK	1855.0	-11.00	1 / 0	25.17	14.17	26.122	33.01	-18.84
		1882.5	-11.00	1 / 49	25.20	**14.20**	26.303	33.01	-18.81
		1910.0	-11.00	1 / 0	25.14	14.14	25.942	33.01	-18.87
	16-QAM	1882.5	-11.00	1 / 25	24.53	13.53	22.542	33.01	-19.48
15 MHz	QPSK	1857.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
		1882.5	-11.00	1 / 0	25.08	14.08	25.586	33.01	-18.93
		1907.5	-11.00	1 / 0	24.99	13.99	25.061	33.01	-19.02
	16-QAM	1882.5	-11.00	1 / 0	24.43	13.43	22.029	33.01	-19.58
20 MHz	QPSK	1860.0	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
		1882.5	-11.00	1 / 0	25.04	14.04	25.351	33.01	-18.97
		1905.0	-11.00	1 / 0	25.19	14.19	26.242	33.01	-18.82
	16-QAM	1905.0	-11.00	1 / 0	24.72	13.72	23.550	33.01	-19.29

Table 7-2. Antenna FCM EIRP Data (LTE Band 25)

LTE Band 2

Bandwidth	Modulation	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
1.4 MHz	QPSK	1850.7	-11.00	1 / 5	24.82	13.82	24.099	33.01	-19.19
		1880.0	-11.00	1 / 0	24.85	13.85	24.266	33.01	-19.16
		1909.3	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1880.0	-11.00	1 / 0	24.30	13.30	21.380	33.01	-19.71
3 MHz	QPSK	1851.5	-11.00	1 / 14	25.16	14.16	26.062	33.01	-18.85
		1880.0	-11.00	1 / 14	25.11	14.11	25.763	33.01	-18.90
		1908.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1880.0	-11.00	1 / 14	24.54	13.54	22.594	33.01	-19.47
5 MHz	QPSK	1852.5	-11.00	1 / 24	25.20	**14.20**	26.303	33.01	-18.81
		1880.0	-11.00	1 / 12	25.10	14.10	25.704	33.01	-18.91
		1907.5	-11.00	1 / 0	25.10	14.10	25.704	33.01	-18.91
	16-QAM	1880.0	-11.00	1 / 12	24.68	13.68	23.335	33.01	-19.33
10 MHz	QPSK	1855.0	-11.00	1 / 25	25.19	14.19	26.242	33.01	-18.82
		1880.0	-11.00	1 / 0	25.15	14.15	26.002	33.01	-18.86
		1905.0	-11.00	1 / 25	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1880.0	-11.00	1 / 0	24.55	13.55	22.646	33.01	-19.46
15 MHz	QPSK	1857.5	-11.00	1 / 37	25.20	**14.20**	26.303	33.01	-18.81
		1880.0	-11.00	1 / 0	25.08	14.08	25.586	33.01	-18.93
		1902.5	-11.00	1 / 0	25.00	14.00	25.119	33.01	-19.01
	16-QAM	1880.0	-11.00	1 / 0	24.45	13.45	22.131	33.01	-19.56
20 MHz	QPSK	1860.0	-11.00	1 / 99	25.20	**14.20**	26.303	33.01	-18.81
		1880.0	-11.00	1 / 99	24.97	13.97	24.946	33.01	-19.04
		1900.0	-11.00	1 / 50	25.11	14.11	25.763	33.01	-18.90
	16-QAM	1900.0	-11.00	1 / 50	24.64	13.64	23.121	33.01	-19.37

Table 7-3. Antenna FCM EIRP Data (LTE Band 2)

NR Band n25

Bandwidth	Modulation	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
5 MHz	π/2 BPSK	1852.5	-11.00	1 / 12	25.04	14.04	25.351	33.01	-18.97
		1882.5	-11.00	1 / 0	25.02	14.02	25.235	33.01	-18.99
		1912.5	-11.00	1 / 0	25.01	14.01	25.177	33.01	-19.00
	QPSK	1852.5	-11.00	1 / 12	25.06	14.06	25.468	33.01	-18.95
		1882.5	-11.00	1 / 0	25.00	14.00	25.119	33.01	-19.01
		1912.5	-11.00	1 / 12	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1912.5	-11.00	1 / 0	24.19	13.19	20.845	33.01	-19.82
	64-QAM	1882.5	-11.00	1 / 0	23.17	12.17	16.482	33.01	-20.84
10 MHz	π/2 BPSK	1855.0	-11.00	1 / 48	24.85	13.85	24.266	33.01	-19.16
		1882.5	-11.00	1 / 25	25.20	**14.20**	26.303	33.01	-18.81
		1910.0	-11.00	1 / 25	25.13	14.13	25.882	33.01	-18.88
	QPSK	1855.0	-11.00	1 / 25	25.18	14.18	26.182	33.01	-18.83
		1882.5	-11.00	1 / 0	25.15	14.15	26.002	33.01	-18.86
		1910.0	-11.00	1 / 48	25.09	14.09	25.645	33.01	-18.92
	16-QAM	1910.0	-11.00	1 / 48	24.19	13.19	20.845	33.01	-19.82
	64-QAM	1855.0	-11.00	1 / 48	23.17	12.17	16.482	33.01	-20.84
15 MHz	π/2 BPSK	1857.5	-11.00	1 / 37	24.91	13.91	24.604	33.01	-19.10
		1882.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
		1907.5	-11.00	1 / 0	25.07	14.07	25.527	33.01	-18.94
	QPSK	1857.5	-11.00	1 / 0	25.19	14.19	26.242	33.01	-18.82
		1882.5	-11.00	1 / 37	25.04	14.04	25.351	33.01	-18.97
		1907.5	-11.00	1 / 0	25.11	14.11	25.763	33.01	-18.90
	16-QAM	1907.5	-11.00	1 / 0	24.08	13.08	20.324	33.01	-19.93
	64-QAM	1882.5	-11.00	1 / 73	23.10	12.10	16.218	33.01	-20.91
20 MHz	π/2 BPSK	1860.0	-11.00	1 / 0	25.12	14.12	25.823	33.01	-18.89
		1882.5	-11.00	1 / 98	24.93	13.93	24.717	33.01	-19.08
		1905.0	-11.00	1 / 98	25.07	14.07	25.527	33.01	-18.94
	QPSK	1860.0	-11.00	1 / 98	25.03	14.03	25.293	33.01	-18.98
		1882.5	-11.00	1 / 0	25.04	14.04	25.351	33.01	-18.97
		1905.0	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1905.0	-11.00	1 / 98	24.22	13.22	20.989	33.01	-19.79
	64-QAM	1860.0	-11.00	1 / 50	23.23	12.23	16.711	33.01	-20.78

Table 7-4. Antenna FCM EIRP Data (NR Band n25)

NR Band n2

Bandwidth	Modulation	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
5 MHz	π/2 BPSK	1852.5	-11.00	1 / 23	25.12	14.12	25.823	33.01	-18.89
		1880.0	-11.00	1 / 23	25.16	14.16	26.062	33.01	-18.85
		1907.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
	QPSK	1852.5	-11.00	1 / 0	25.15	14.15	26.002	33.01	-18.86
		1880.0	-11.00	1 / 23	24.87	13.87	24.378	33.01	-19.14
		1907.5	-11.00	1 / 0	25.19	14.19	26.242	33.01	-18.82
	16-QAM	1907.5	-11.00	1 / 12	24.21	13.21	20.941	33.01	-19.80
	64-QAM	1852.5	-11.00	1 / 0	23.17	12.17	16.482	33.01	-20.84
10 MHz	π/2 BPSK	1855.0	-11.00	1 / 0	24.97	13.97	24.946	33.01	-19.04
		1880.0	-11.00	1 / 48	25.10	14.10	25.704	33.01	-18.91
		1905.0	-11.00	1 / 25	25.20	**14.20**	26.303	33.01	-18.81
	QPSK	1855.0	-11.00	1 / 0	25.12	14.12	25.823	33.01	-18.89
		1880.0	-11.00	1 / 48	25.20	**14.20**	26.303	33.01	-18.81
		1905.0	-11.00	1 / 25	25.18	14.18	26.182	33.01	-18.83
	16-QAM	1905.0	-11.00	1 / 48	24.20	13.20	20.893	33.01	-19.81
	64-QAM	1880.0	-11.00	1 / 25	23.23	12.23	16.711	33.01	-20.78
15 MHz	π/2 BPSK	1857.5	-11.00	1 / 37	25.20	**14.20**	26.303	33.01	-18.81
		1880.0	-11.00	1 / 73	25.17	14.17	26.122	33.01	-18.84
		1902.5	-11.00	1 / 37	25.00	14.00	25.119	33.01	-19.01
	QPSK	1857.5	-11.00	1 / 0	25.20	**14.20**	26.303	33.01	-18.81
		1880.0	-11.00	1 / 73	25.16	14.16	26.062	33.01	-18.85
		1902.5	-11.00	1 / 73	24.97	13.97	24.946	33.01	-19.04
	16-QAM	1857.5	-11.00	1 / 37	24.10	13.10	20.417	33.01	-19.91
	64-QAM	1902.5	-11.00	1 / 73	23.21	12.21	16.634	33.01	-20.80
20 MHz	π/2 BPSK	1860.0	-11.00	1 / 98	25.13	14.13	25.882	33.01	-18.88
		1880.0	-11.00	1 / 50	25.05	14.05	25.410	33.01	-18.96
		1900.0	-11.00	1 / 50	25.11	14.11	25.763	33.01	-18.90
	QPSK	1860.0	-11.00	1 / 0	25.16	14.16	26.062	33.01	-18.85
		1880.0	-11.00	1 / 98	24.82	13.82	24.099	33.01	-19.19
		1900.0	-11.00	1 / 98	25.20	**14.20**	26.303	33.01	-18.81
	16-QAM	1860.0	-11.00	1 / 0	24.21	13.21	20.941	33.01	-19.80
	64-QAM	1900.0	-11.00	1 / 50	23.20	12.20	16.596	33.01	-20.81

Table 7-5. Antenna FCM EIRP Data (NR Band n2)

7.7 Radiated Spurious Emissions

§2.1053, 24.238(a)

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically 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 maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

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.

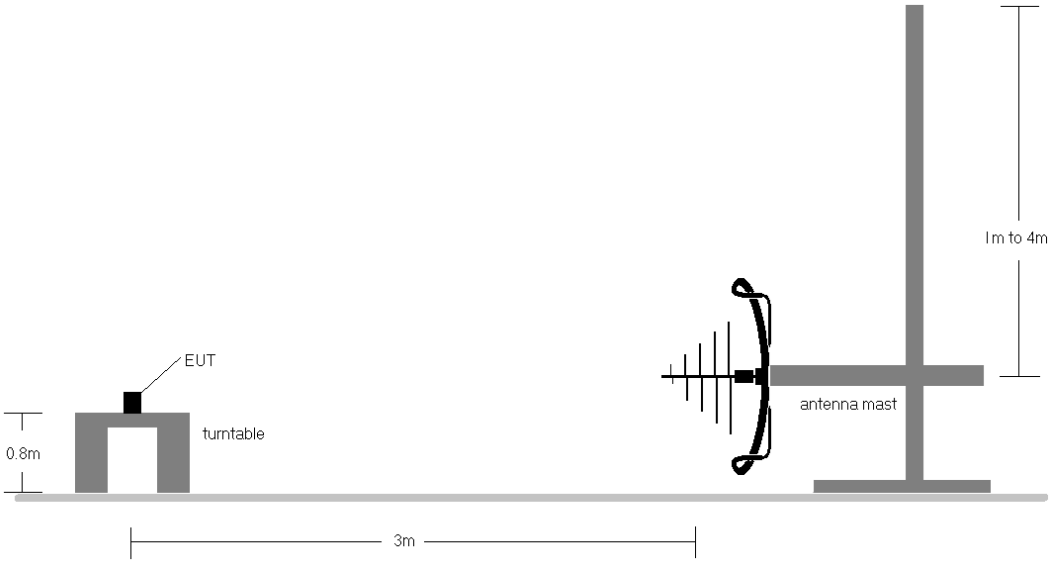


Figure 7-11. Test Instrument & Measurement Setup < 1GHz

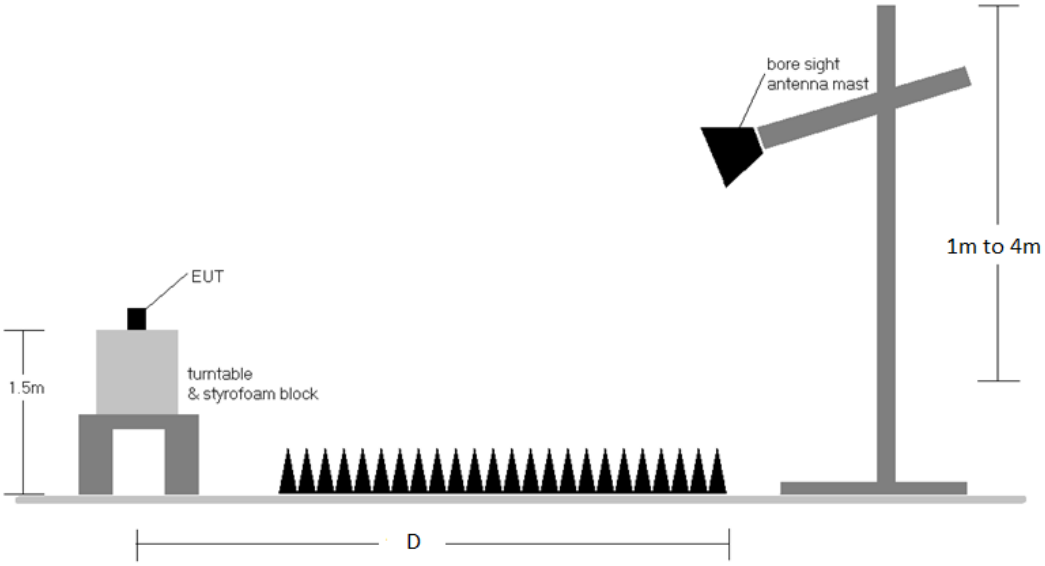


Figure 7-12. Test Instrument & Measurement Setup >1 GHz

Test Notes

1. Field strengths are calculated using the Measurement quantity conversions in KDB 971168 D01 v03r01 Section 5.8.4.
    a. E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
    b. EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2. 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.

3. This unit was tested with its standard battery.

4. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5. D is the measurement test distance and emissions 1-18GHz were measured at a 3 meters test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

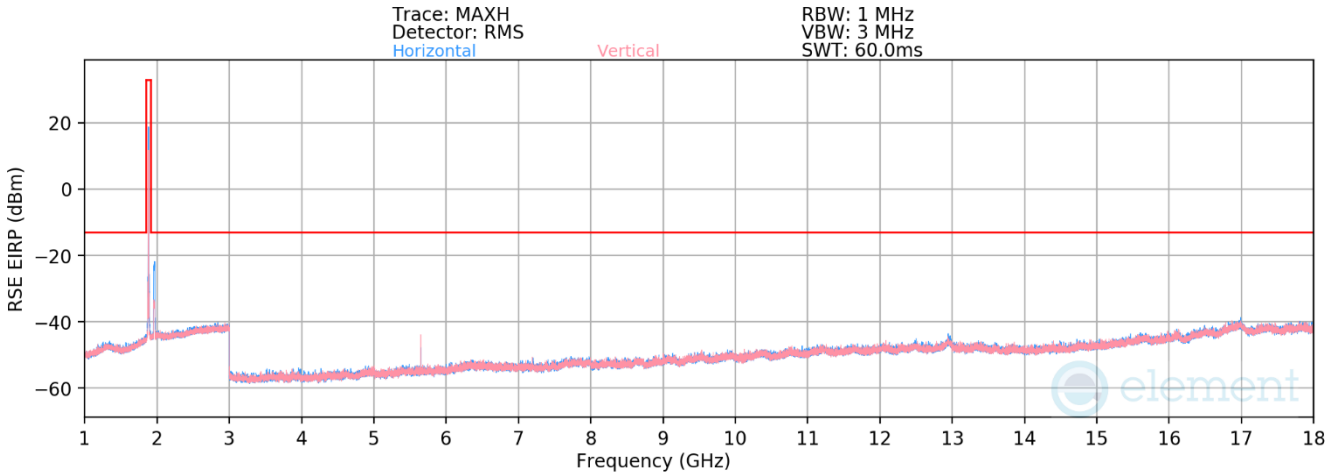
6. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

7. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

8. NR band n25 overlaps the entire frequency range of NR band 2. Therefore, the radiated emissions data of NR band n25 provided in this report covers NR band n2.

7.7.1 Antenna FCM – Radiated Spurious Emission Measurement

LTE Band 25/2



Plot 7-183. Radiated Spurious Plot (LTE Band 25/2)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3720.0	H	121	176	-76.55	5.64	36.09	-59.17	-13.00	-46.17
5580.0	H	106	297	-79.45	9.51	37.06	-58.20	-13.00	-45.20
7440.0	H	-	-	-82.33	11.56	36.23	-59.02	-13.00	-46.02
9300.0	H	-	-	-82.15	12.67	37.52	-57.74	-13.00	-44.74
11160.0	H	-	-	-82.32	15.48	40.16	-55.10	-13.00	-42.10

Table 7-6. Antenna FCM Radiated Spurious Data (LTE Band 25/2 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1882.5
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3765.0	H	-	-	-79.58	5.59	33.01	-62.25	-13.00	-49.25
5647.5	V	272	82	-80.05	9.43	36.39	-58.87	-13.00	-45.87
7530.0	H	-	-	-82.31	11.29	35.98	-59.28	-13.00	-46.28
9412.5	H	-	-	-81.52	12.16	37.63	-57.63	-13.00	-44.63

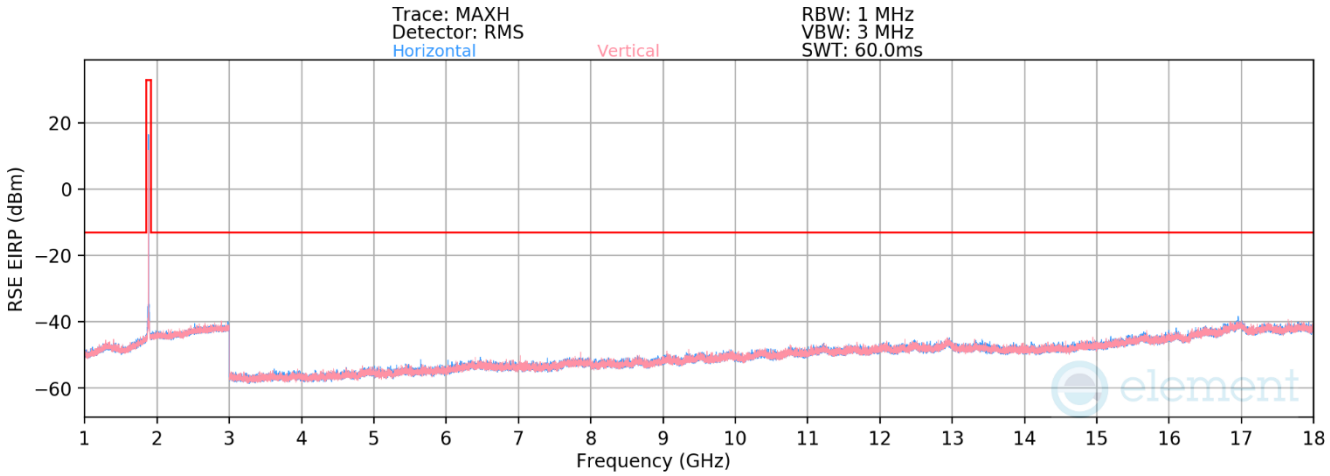
Table 7-7. Antenna FCM Radiated Spurious Data (LTE Band 25/2 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1905.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3810.00	H	-	-	-79.72	5.50	32.77	-62.49	-13.00	-49.49
5715.00	H	-	-	-81.03	9.93	35.90	-59.35	-13.00	-46.35
7620.00	H	-	-	-81.55	11.51	36.96	-58.30	-13.00	-45.30

Table 7-8. Antenna FCM Radiated Spurious Data (LTE Band 25/2 – High Channel)

NR Band n25/n2



Plot 7-184. Radiated Spurious Plot (NR Band n25/n2)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3720.0	H	-	-	-79.29	5.64	33.35	-61.91	-13.00	-48.91
5580.0	V	113	327	-77.03	9.51	39.48	-55.78	-13.00	-42.78
7440.0	H	-	-	-82.51	11.56	36.05	-59.21	-13.00	-46.21
9300.0	H	-	-	-82.13	12.67	37.54	-57.72	-13.00	-44.72
11160.0	H	-	-	-82.33	15.52	40.18	-55.08	-13.00	-42.08

Table 7-9. Antenna FCM Radiated Spurious Data (NR Band n25/n2 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1882.5
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3765.0	H	-	-	-79.73	5.59	32.86	-62.40	-13.00	-49.40
5647.5	H	100	225	-75.75	9.43	40.69	-54.57	-13.00	-41.57
7530.0	H	-	-	-82.97	11.86	35.89	-59.37	-13.00	-46.37
9412.5	H	-	-	-81.49	12.16	37.67	-57.59	-13.00	-44.59
11295.0	H	-	-	-82.71	16.08	40.37	-54.89	-13.00	-41.89

Table 7-10. Antenna FCM Radiated Spurious Data (NR Band n25/n2 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1905.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3810.0	H	-	-	-79.80	5.62	32.81	-62.44	-13.00	-49.44
5715.0	H	-	-	-81.59	9.77	35.18	-60.08	-13.00	-47.08
7620.0	H	-	-	-81.49	11.51	37.03	-58.23	-13.00	-45.23

Table 7-11. Antenna FCM Radiated Spurious Data (NR Band n25/n2 – High Channel)

7.8 Frequency Stability / Temperature Variation

§2.1055, §24.235

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015 and TIA-603-E-2016. 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 24 the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI C63.26-2015

TIA-603-E-2016

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. For LTE testing, in addition, the EUT was connected to a communication tester via an attenuated RF coupler.

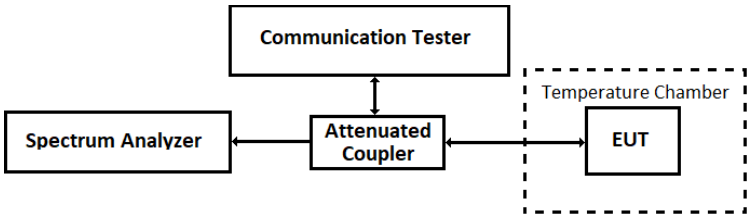


Figure 7-13. LTE Test Instrument & Measurement Setup

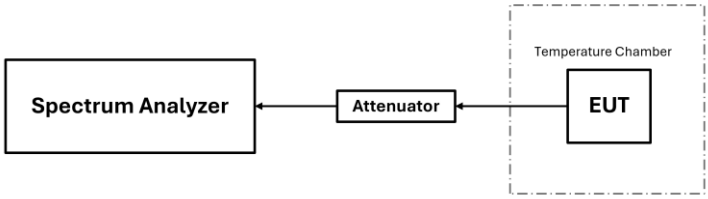


Figure 7-14. FR1 Test Instrument & Measurement Setup

Test Notes

N/A

Frequency Stability / Temperature Variation

LTE Band 25/2				
	Operating Band Lower Boundary (GHz)		1.850	
	Ref. Voltage (VDC):		3.80	
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Measured Freq. (GHz)**	**Freq. Delta from Operating Range (GHz)**
100 %	3.80	- 30	1.85087155	-0.00087155
		- 20	1.85085940	-0.00085940
		- 10	1.85087526	-0.00087525
		0	1.85088669	-0.00088669
		+ 10	1.85088153	-0.00088153
		+ 20 (Ref)	1.85087309	-0.00087309
		+ 30	1.85088818	-0.00088818
		+ 40	1.85088829	-0.00088829
		+ 50	1.85088323	-0.00088323
Battery Endpoint	3.40	+ 20	1.85084470	-0.00084470

Table 7-12. LTE Band 25/2 Lower Boundary Frequency Stability Data

LTE Band 25/2				
	Operating Band Upper Boundary (GHz)		1.915	
	Ref. Voltage (VDC):		3.80	
Voltage (%)	**Power (VDC)**	**Temp (°C)**	**Measured Freq. (GHz)**	**Freq. Delta from Operating Range (GHz)**
100 %	3.80	- 30	1.91411894	-0.00088106
		- 20	1.91414443	-0.00085557
		- 10	1.91411556	-0.00088444
		0	1.91411222	-0.00088778
		+ 10	1.91411840	-0.00088160
		+ 20 (Ref)	1.91411336	-0.00088664
		+ 30	1.91411904	-0.00088096
		+ 40	1.91408386	-0.00091614
		+ 50	1.91411081	-0.00088919
Battery Endpoint	3.40	+ 20	1.91410754	-0.00089246

Table 7-13. LTE Band 25/2 Upper Boundary Frequency Stability Data

NR Band n25/2

NR Band n25/n2	
Operating Band Lower Boundary (GHz)	1.850
Ref. Voltage (VDC):	3.80

Voltage (%)	Power (VDC)	Temp (°C)	Measured Freq. (GHz)	Freq. Delta from Operating Range (GHz)
100 %	3.80	- 30	1.85049007	-0.00049007
		- 20	1.85048286	-0.00048286
		- 10	1.85047572	-0.00047572
		0	1.85046571	-0.00046571
		+ 10	1.85045093	-0.00045093
		+ 20 (Ref)	1.85044532	-0.00044532
		+ 30	1.85031258	-0.00031258
		+ 40	1.85016738	-0.00016738
		+ 50	1.85041112	-0.00041112
Battery Endpoint	3.40	+ 20	1.85032655	-0.00032655

Table 7-14. NR Band n25/n2 Lower Boundary Frequency Stability Data

NR Band n25/n2	
Operating Band Upper Boundary (GHz)	1.915
Ref. Voltage (VDC):	3.80

Voltage (%)	Power (VDC)	Temp (°C)	Measured Freq. (GHz)	Freq. Delta from Operating Range (GHz)
100 %	3.80	- 30	1.91450695	-0.00049305
		- 20	1.91450456	-0.00049544
		- 10	1.91449776	-0.00050224
		0	1.91449216	-0.00050784
		+ 10	1.91448474	-0.00051526
		+ 20 (Ref)	1.91446712	-0.00053288
		+ 30	1.91446755	-0.00053246
		+ 40	1.91446452	-0.00053548
		+ 50	1.91456491	-0.00043510
Battery Endpoint	3.40	+ 20	1.91467550	-0.00032450

Table 7-15. NR Band n25/n2 Upper Boundary Frequency Stability Data

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Apple **Watch FCC ID: BCG-A3335** complies with all the requirements of Part 24 of the FCC rules.