
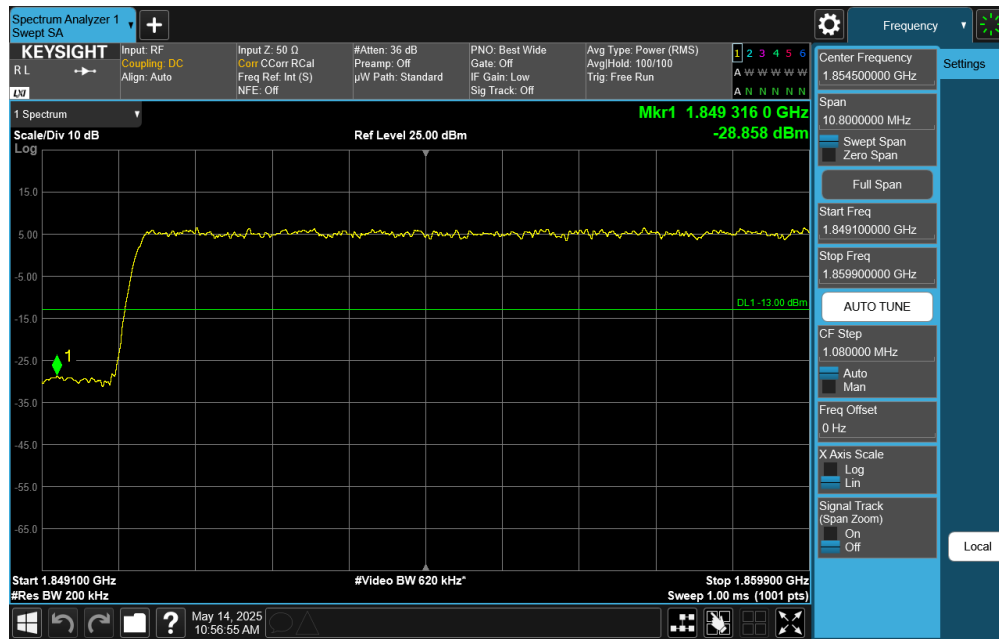


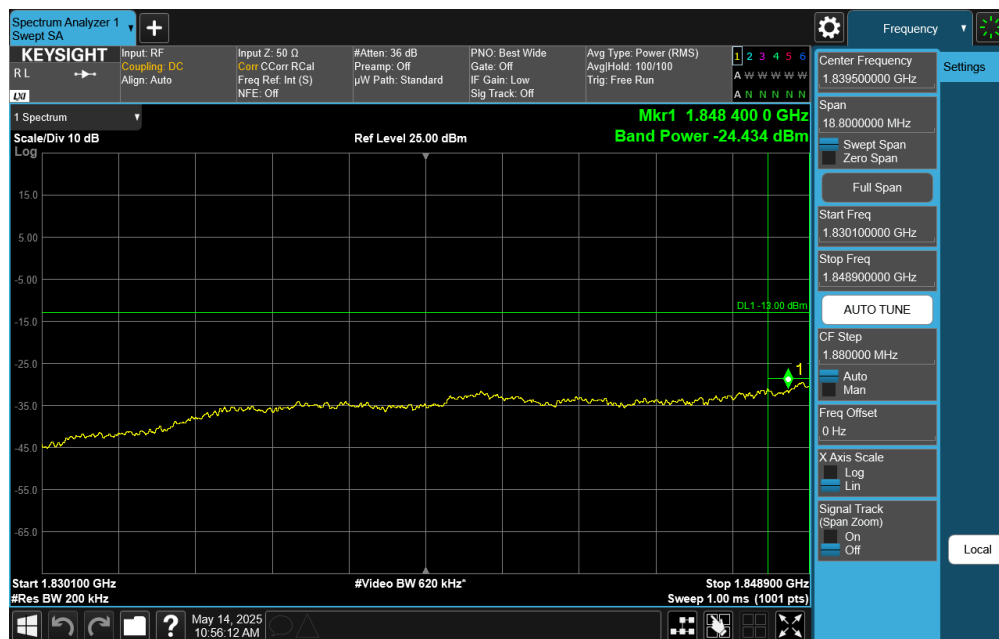
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-107. Lower Band Edge Plot (NR Band n25 – 20MHz DFT-s-OFDM $\pi/2$ BPSK – Full RB Configuration)

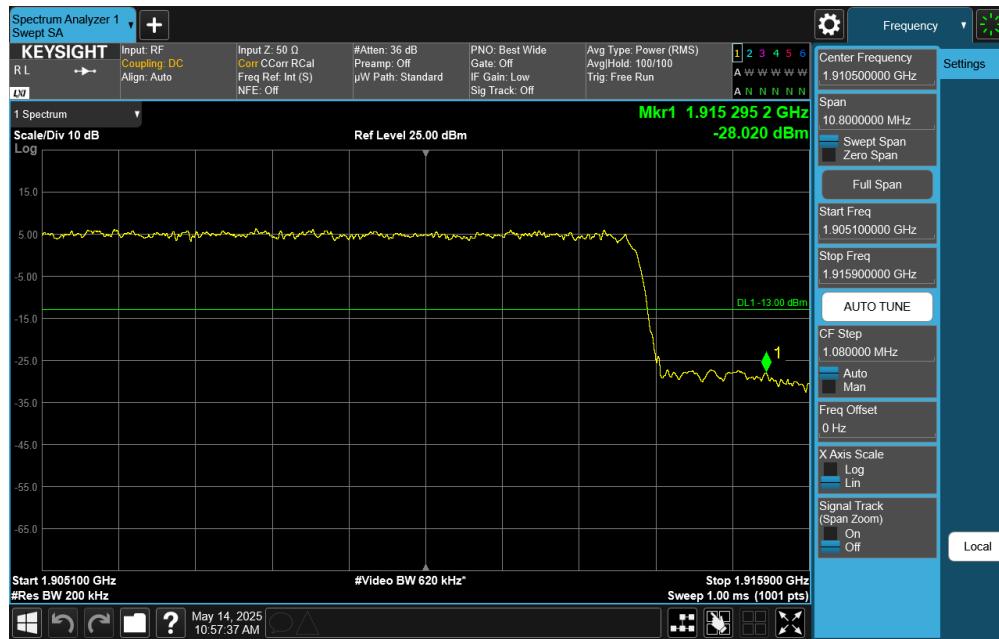


Plot 7-108. Extended Lower Band Edge Plot (NR Band n25 – 20MHz DFT-s-OFDM $\pi/2$ BPSK – Full RB Configuration)

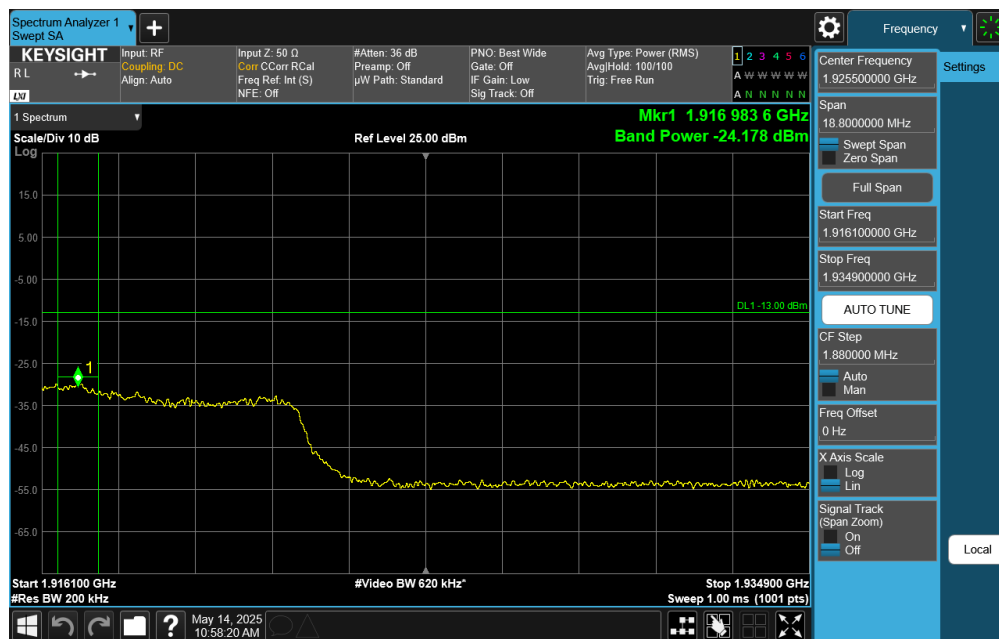
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-109. Upper Band Edge Plot (NR Band n25 – 20MHz DFT-s-OFDM $\pi/2$ BPSK – Full RB Configuration)



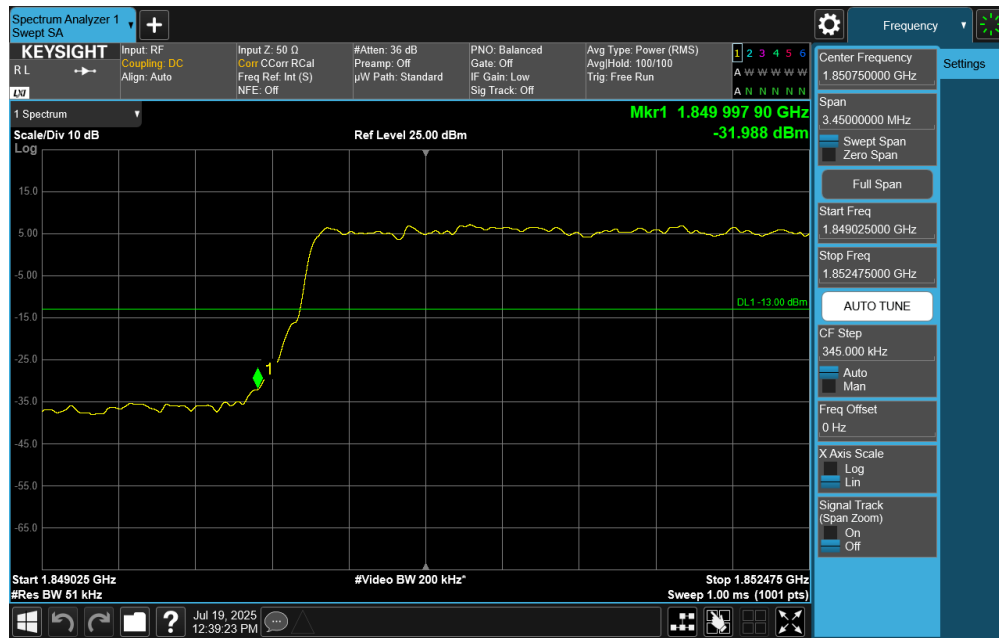
Plot 7-110. Extended Upper Band Edge Plot (NR Band n25 – 20MHz DFT-s-OFDM $\pi/2$ BPSK – Full RB Configuration)

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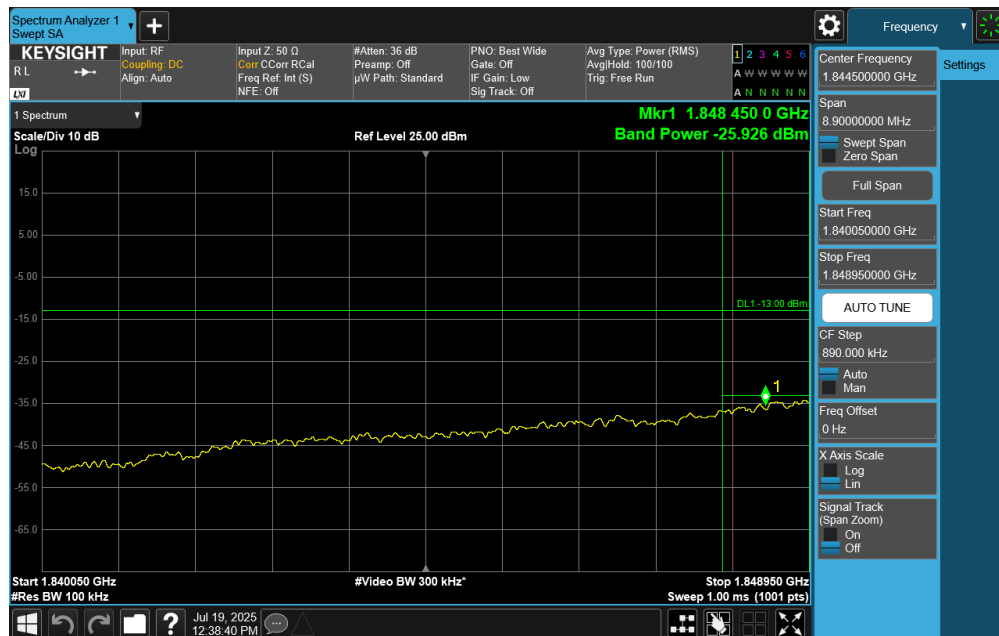
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NR Band n2



Plot 7-111. Lower Band Edge Plot (NR Band n2 – 5MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)

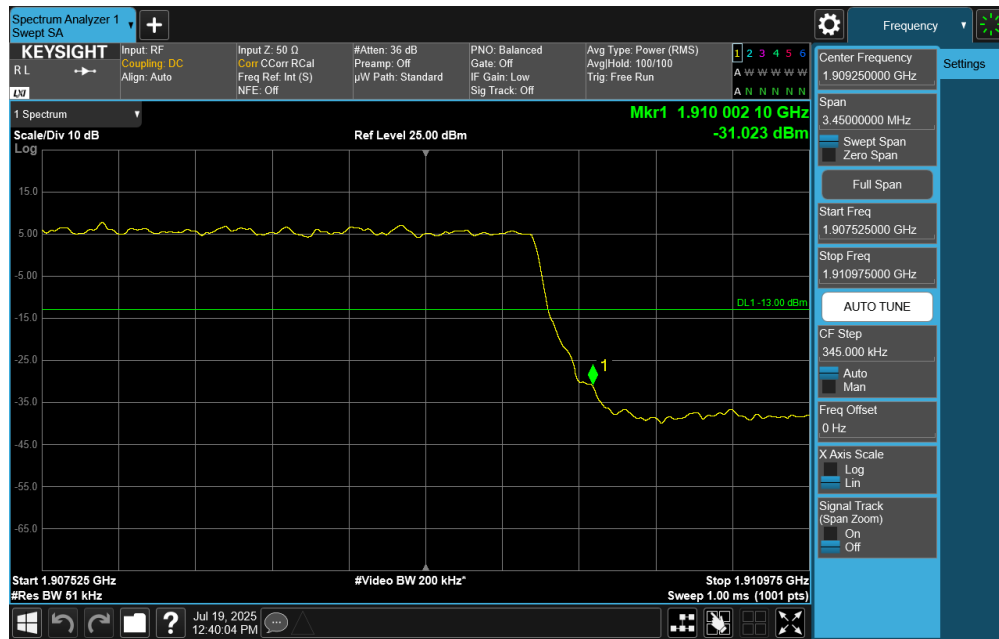


Plot 7-112. Extended Lower Band Edge Plot (NR Band n2 – 5MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)

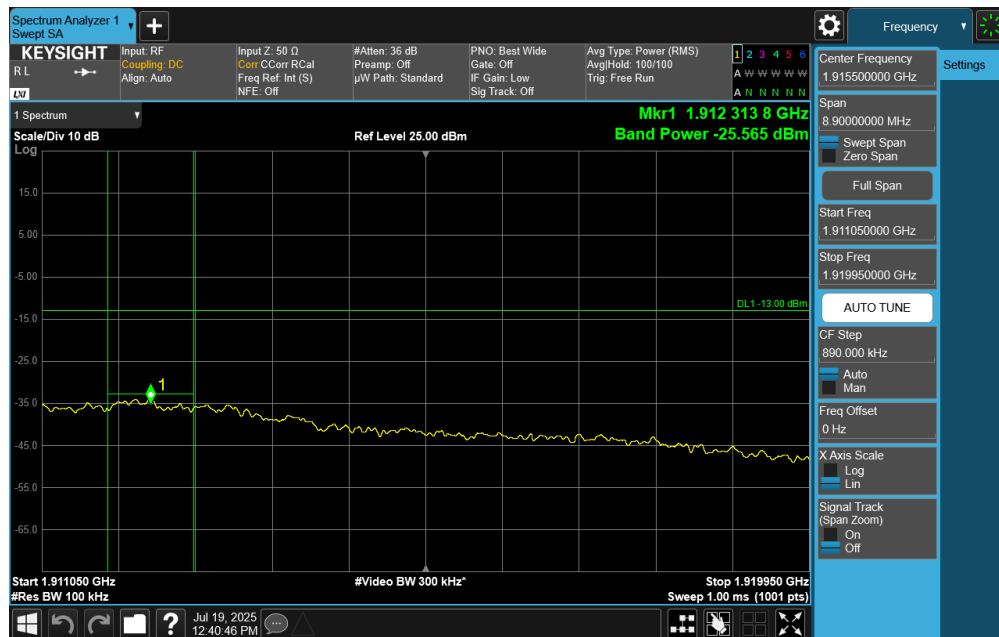
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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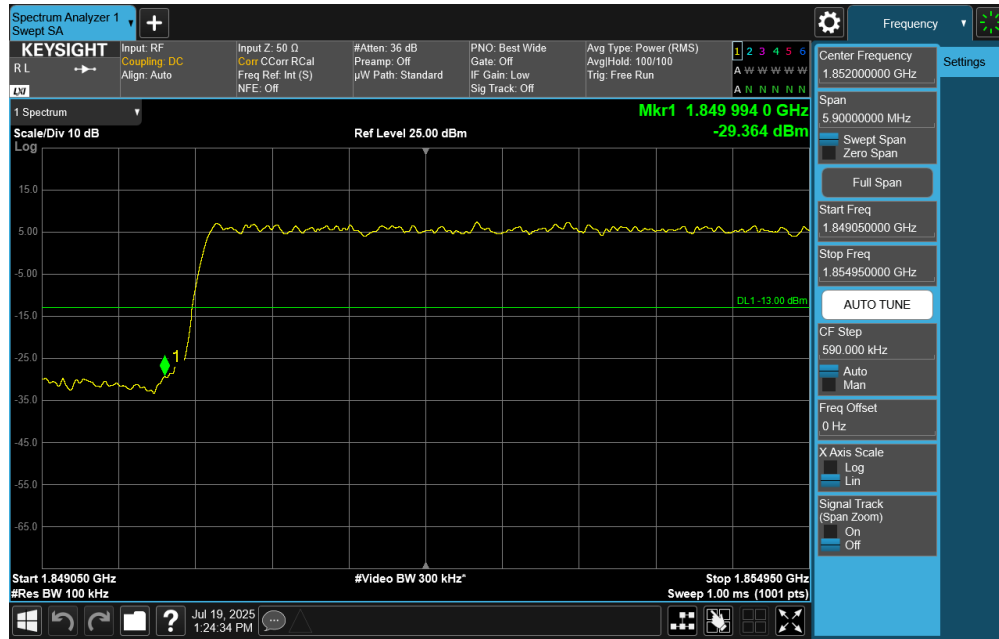
Plot 7-113. Upper Band Edge Plot (NR Band n2 – 5MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)



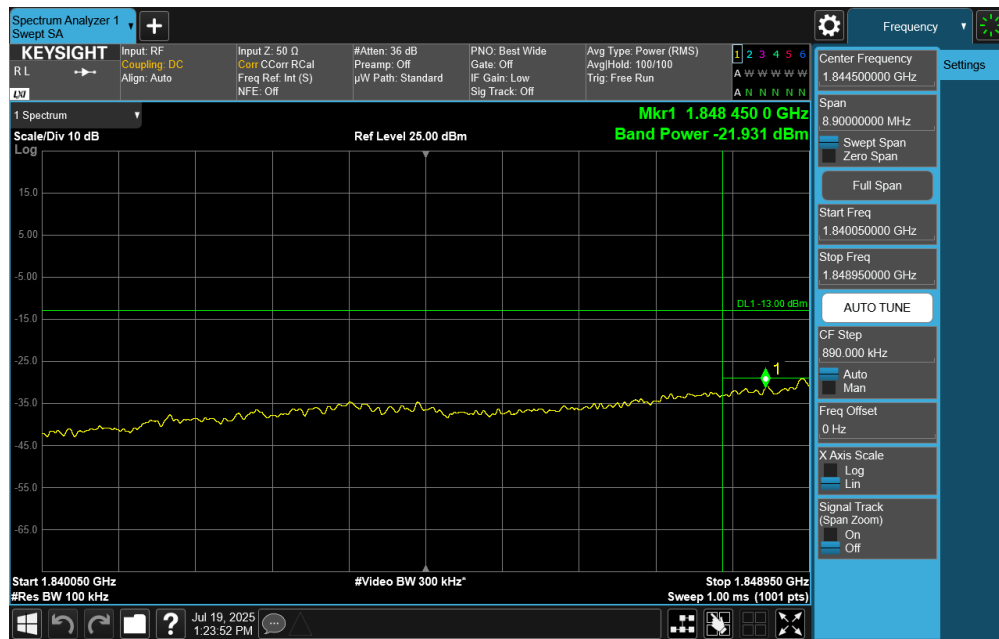
Plot 7-114. Extended Upper Band Edge Plot (NR Band n2 – 5MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)

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Plot 7-115. Lower Band Edge Plot (NR Band n2 – 10MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)

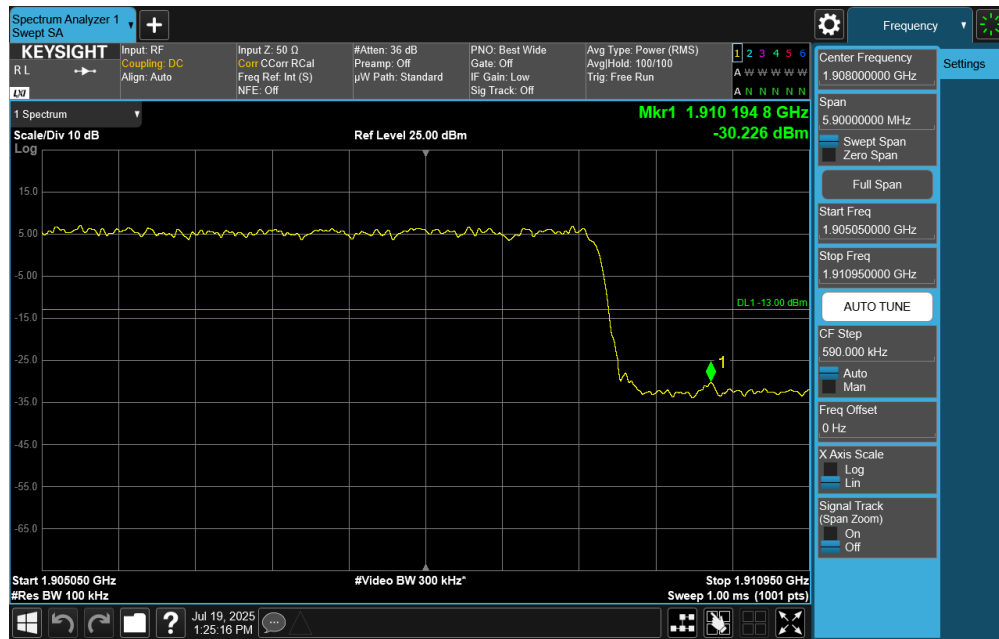


Plot 7-116. Extended Lower Band Edge Plot (NR Band n2 – 10MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)

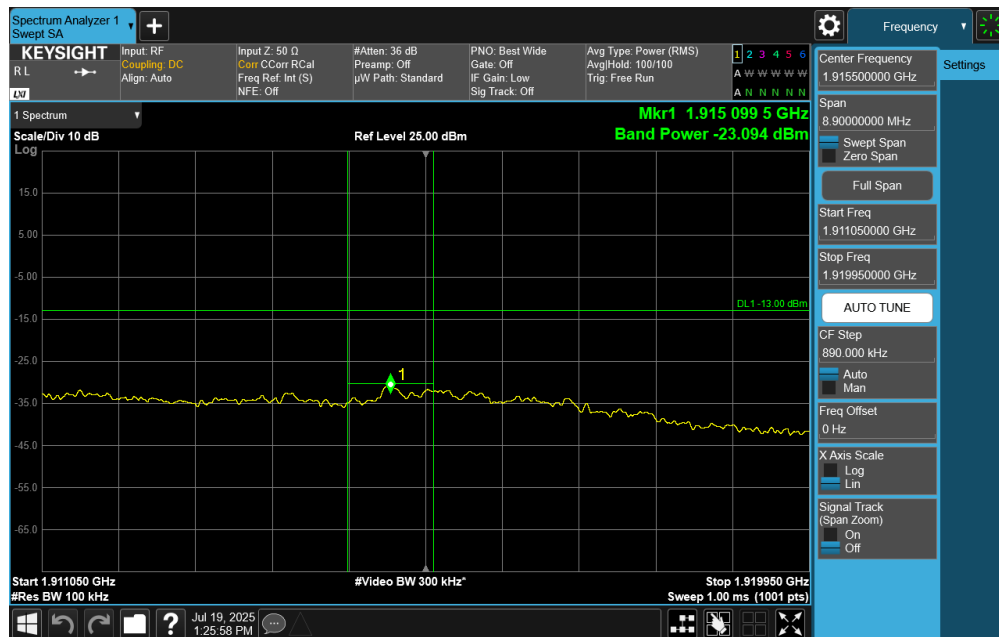
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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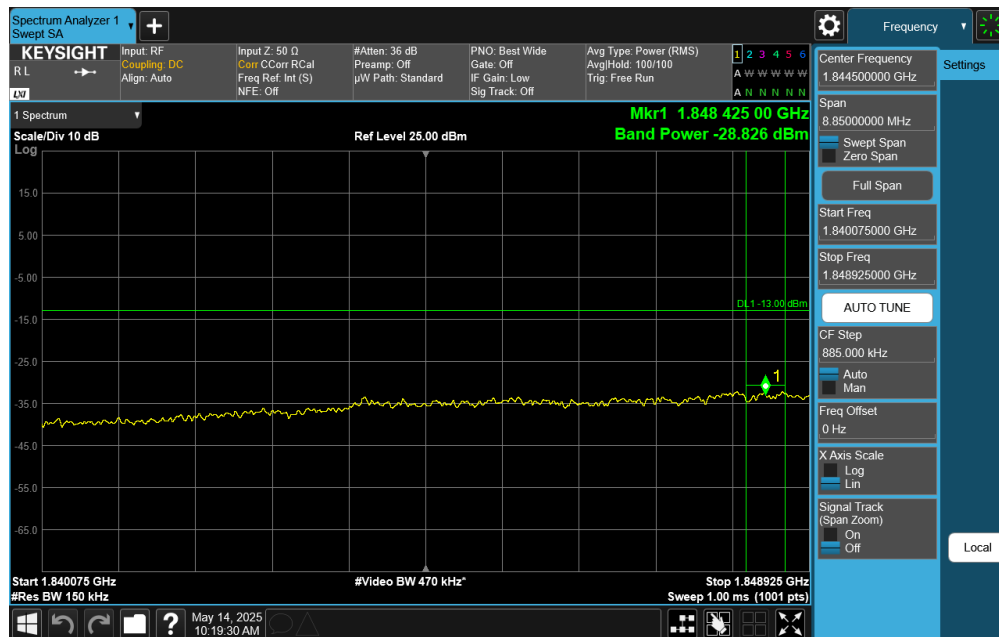
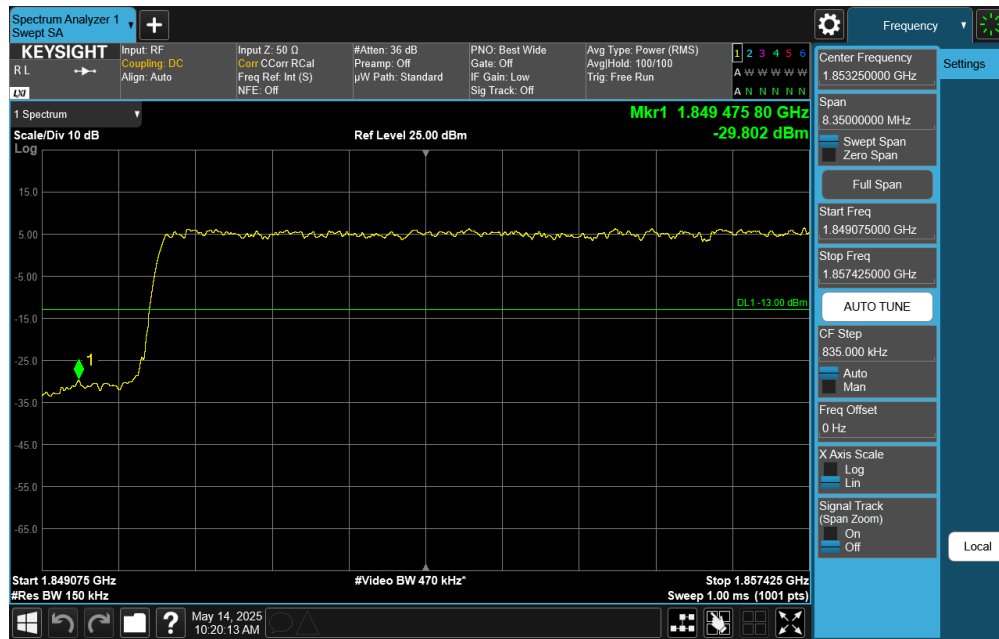
Plot 7-117. Upper Band Edge Plot (NR Band n2 – 10MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)




Plot 7-118. Extended Upper Band Edge Plot (NR Band n2 – 10MHz DFT-s-OFDM $\pi/2$ QPSK – Full RB Configuration)

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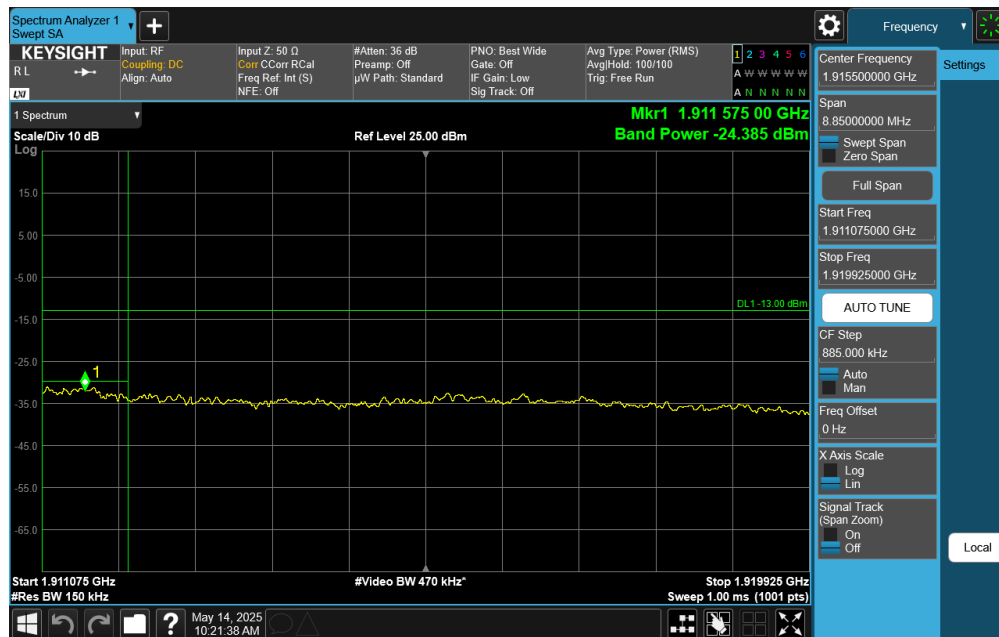
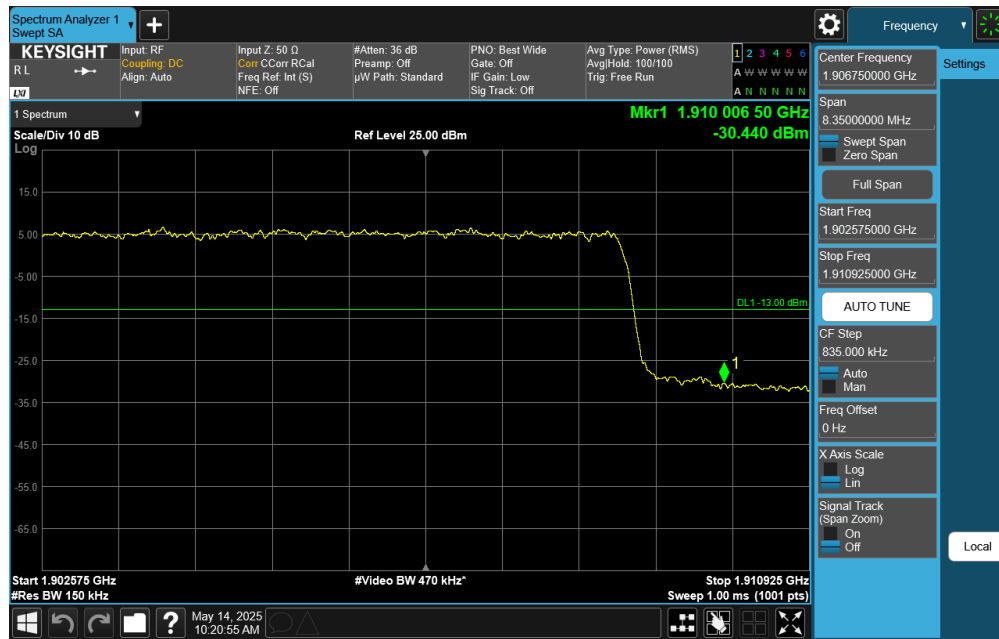
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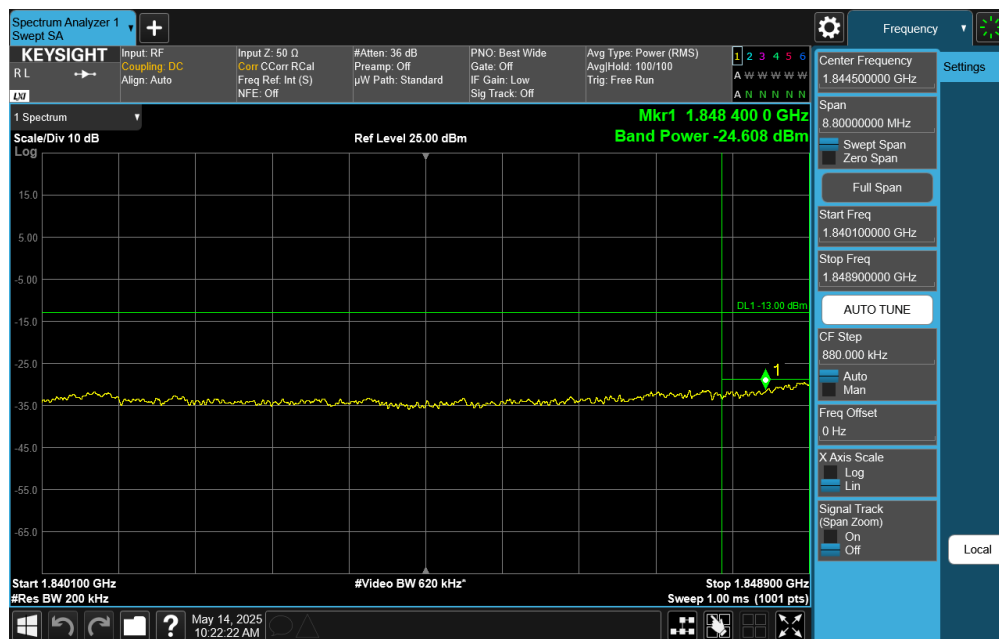
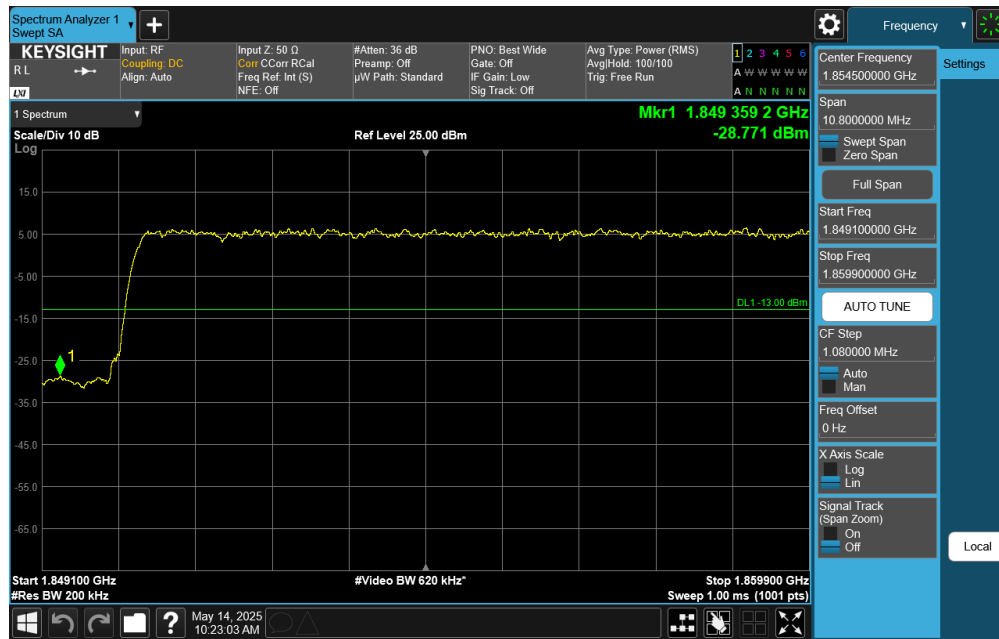
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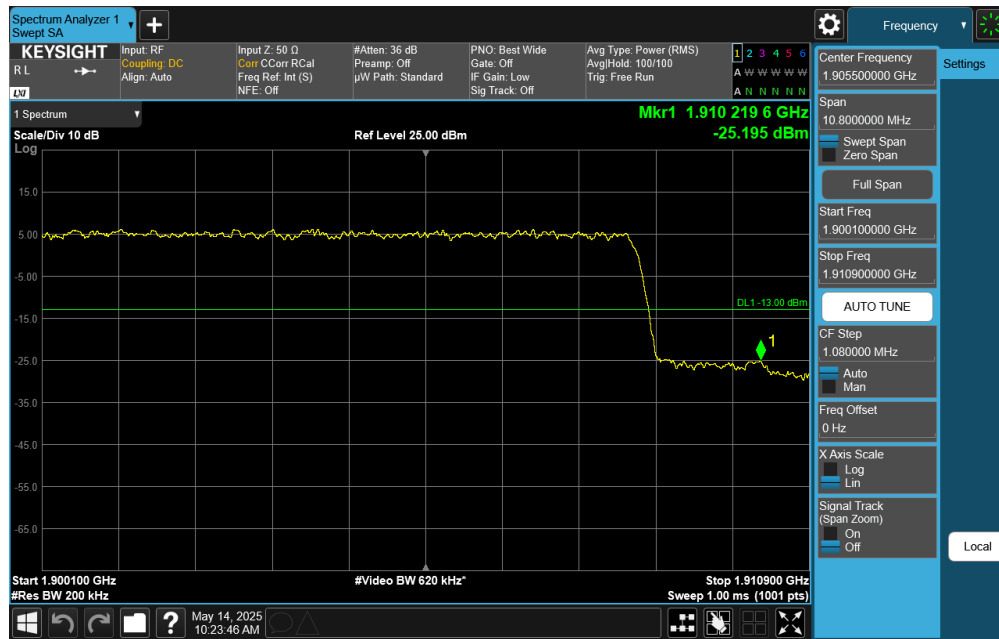
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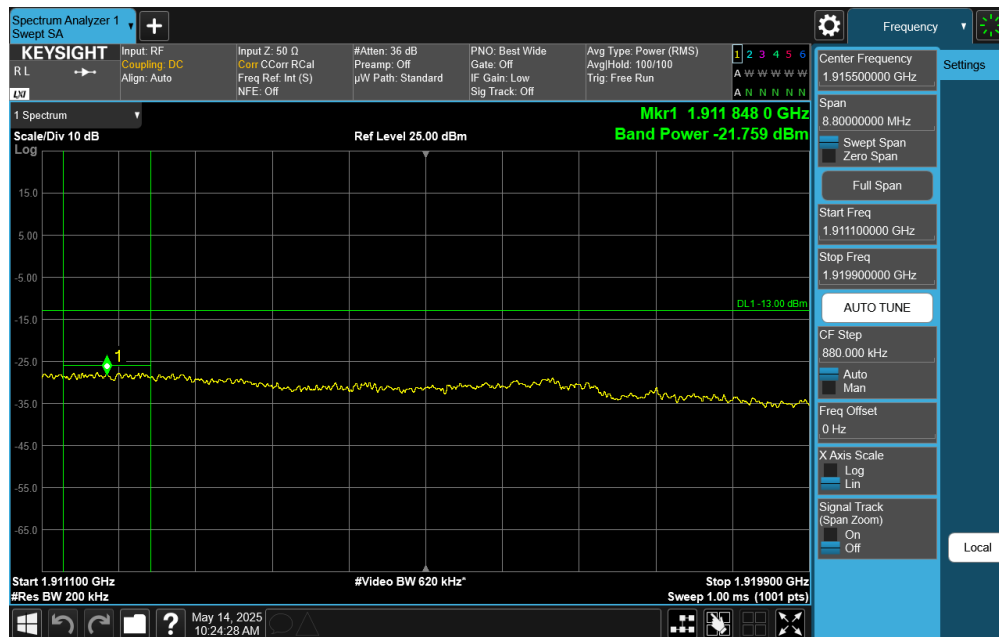
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-125. Upper Band Edge Plot (NR Band n2 – 20MHz DFT-s-OFDM $\pi/2$ BPSK – Full RB Configuration)



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

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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

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Test Setup

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

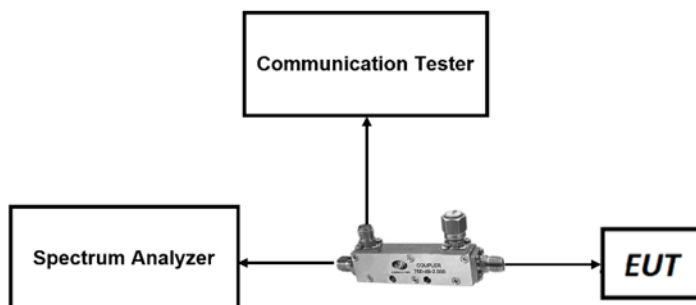


Figure 7-7. LTE Test Instrument & Measurement Setup

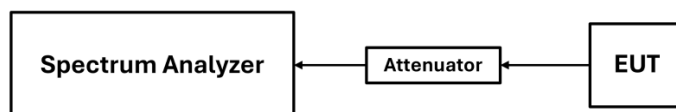



Figure 7-8. FR1 Test Instrument & Measurement Setup

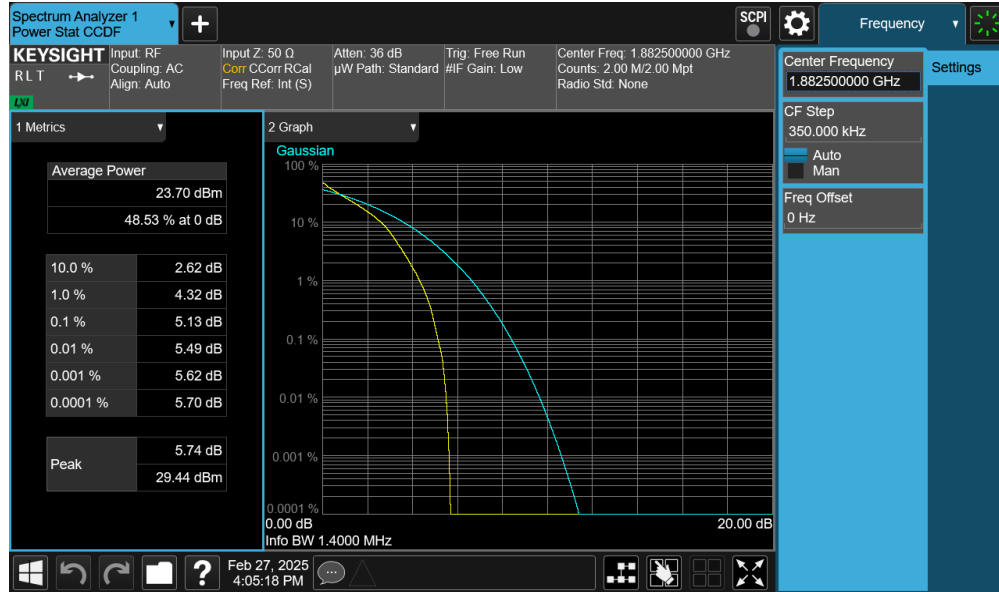
Test Notes

1. 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.

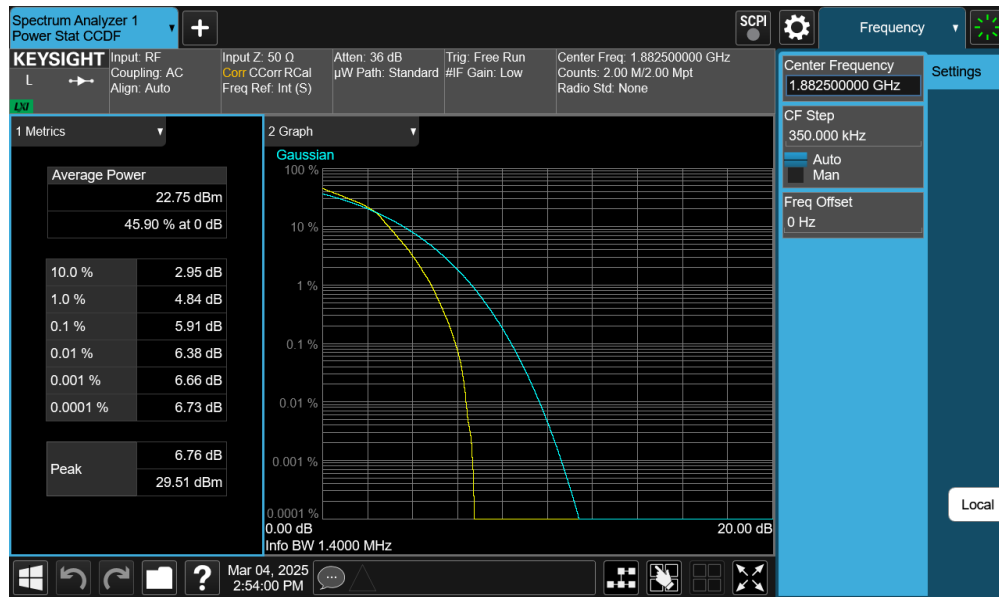
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LTE Band 25



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

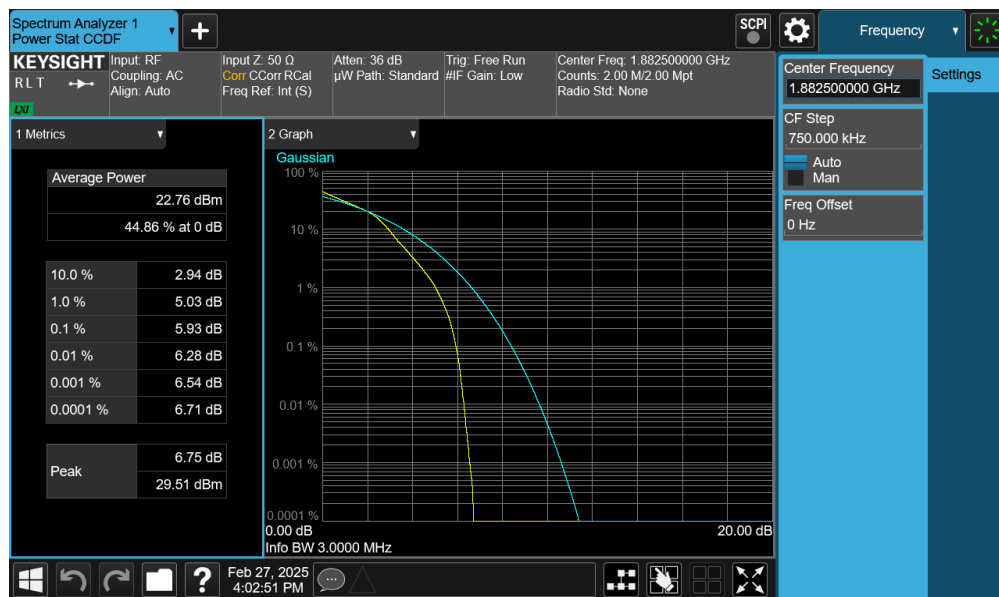
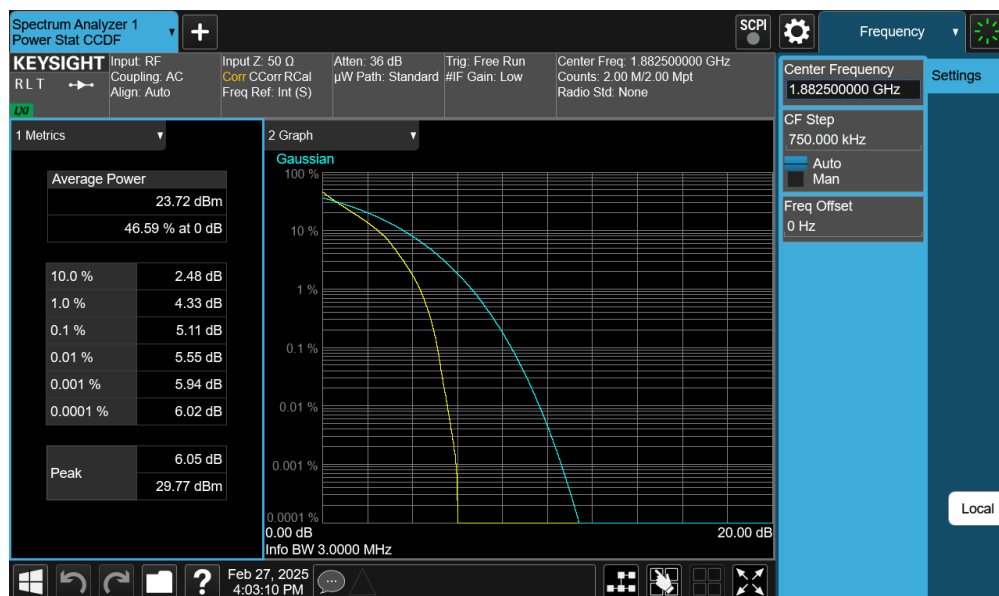



Plot 7-128. PAR Plot (LTE Band 25 - 1.4MHz 16-QAM - Full RB Configuration)

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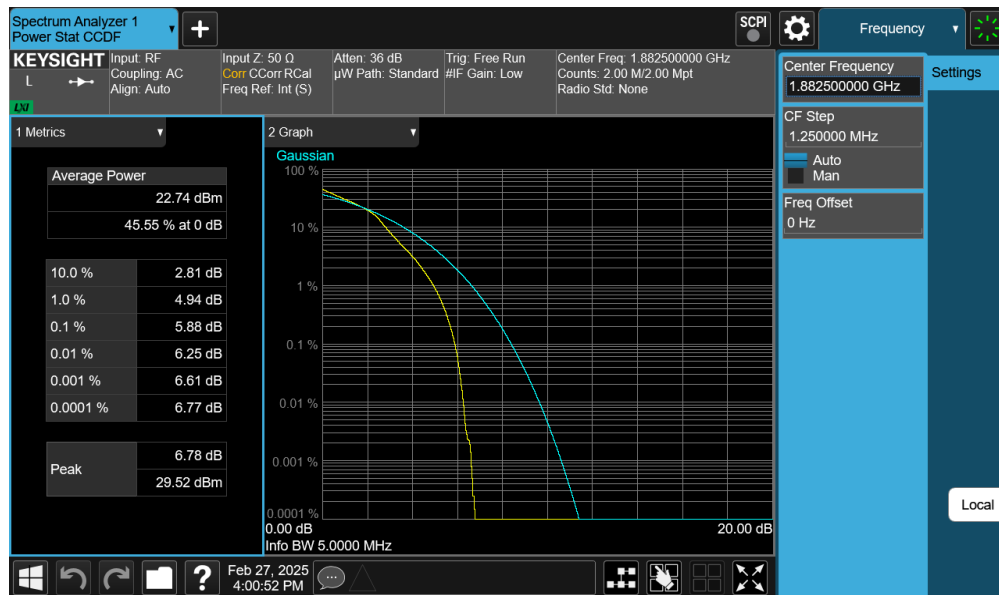
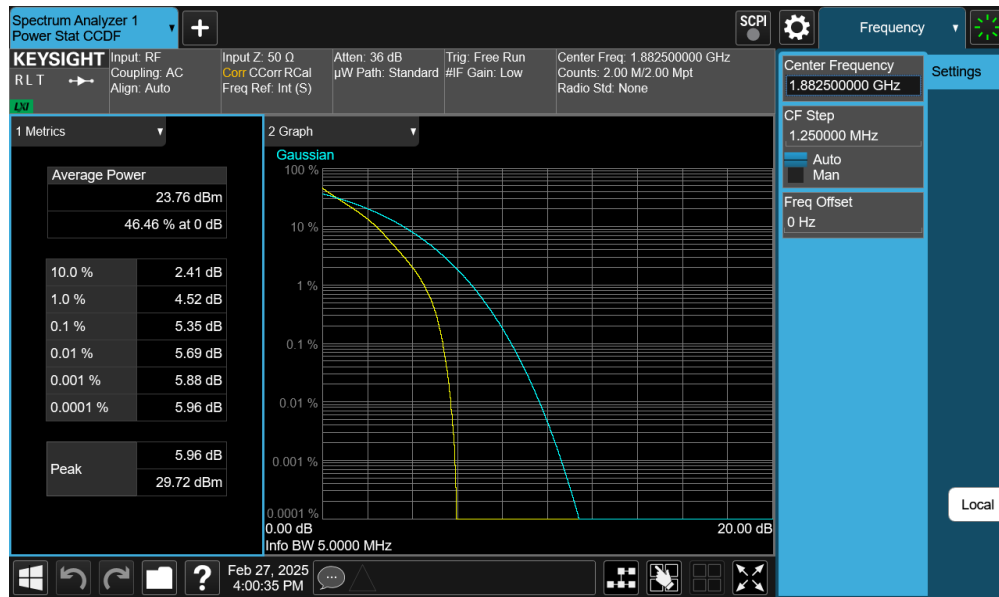
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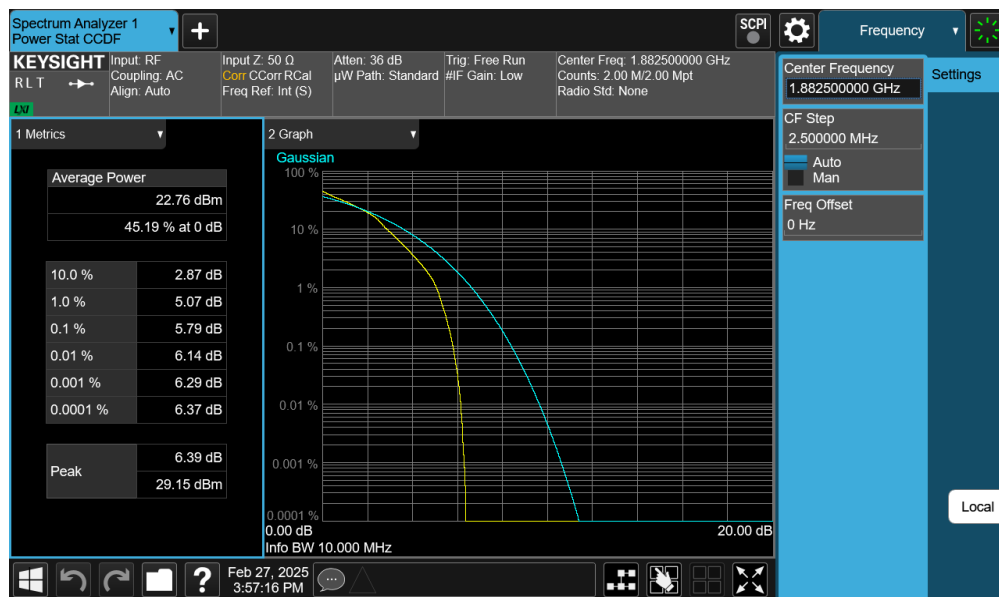
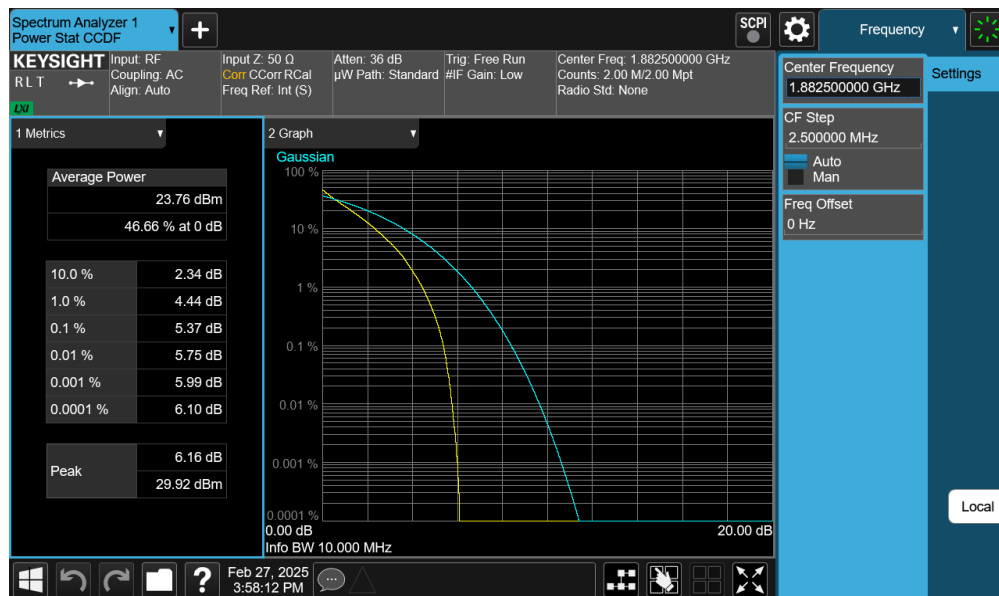
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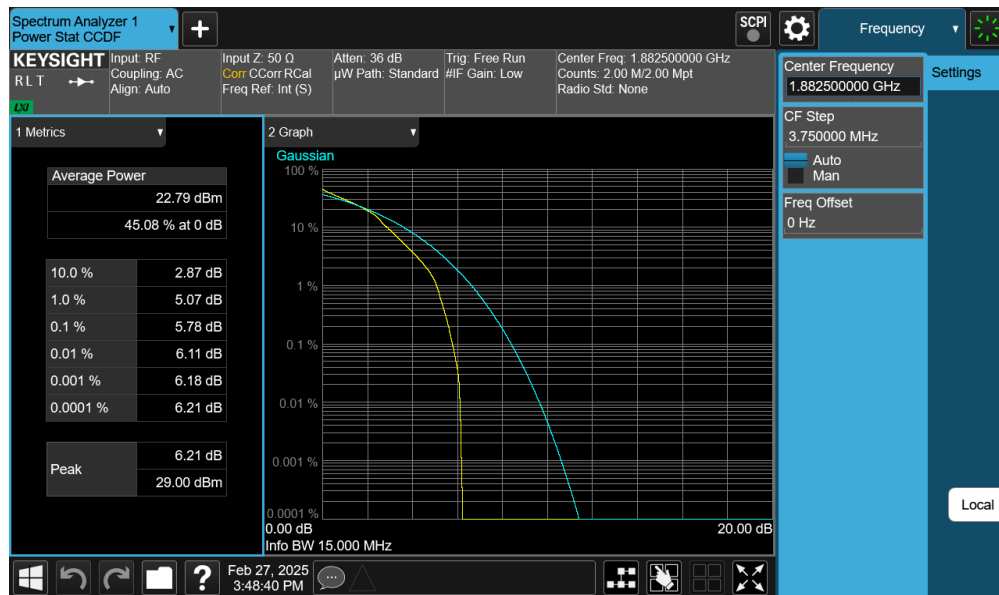
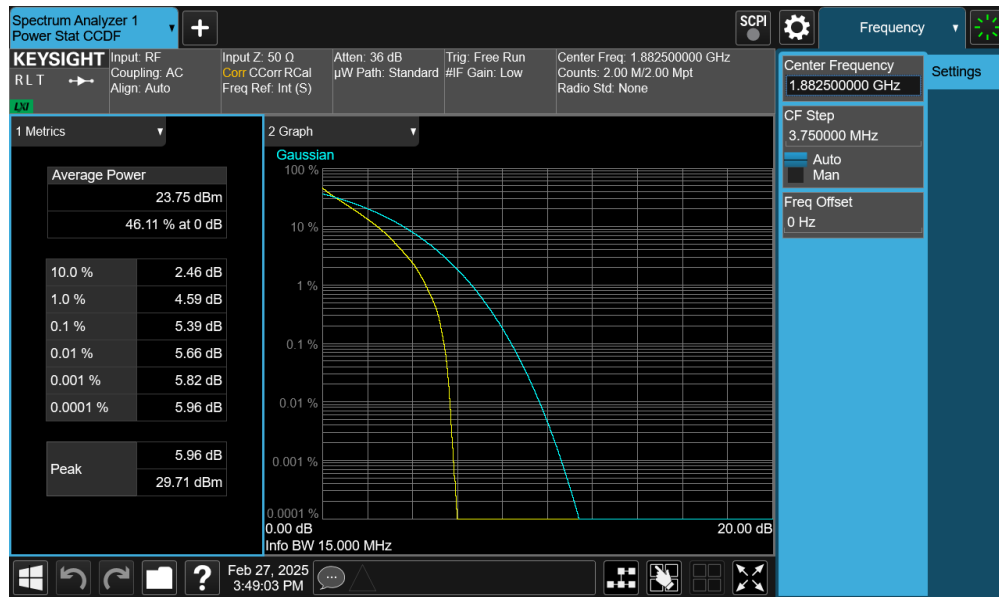
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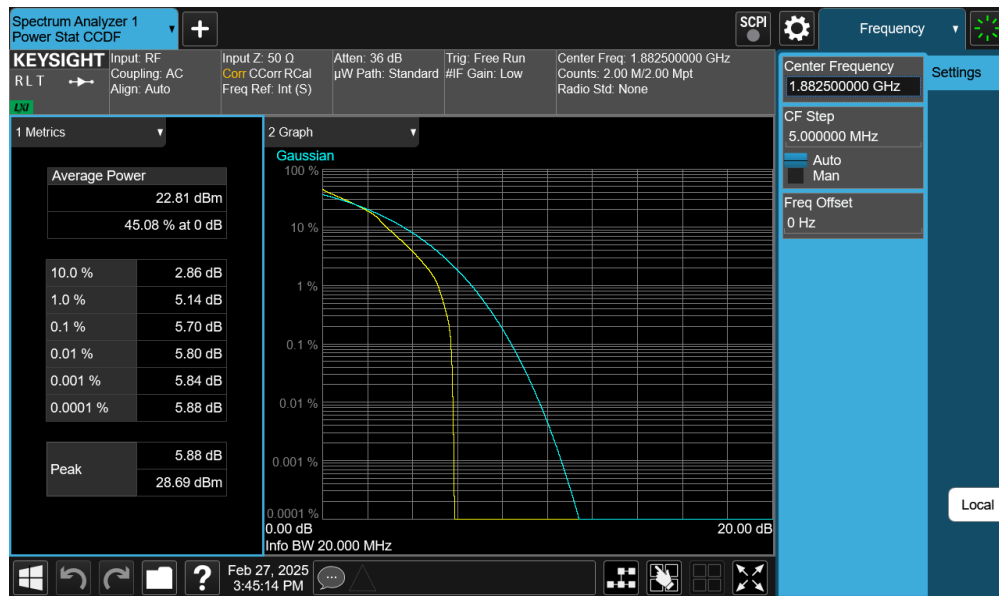
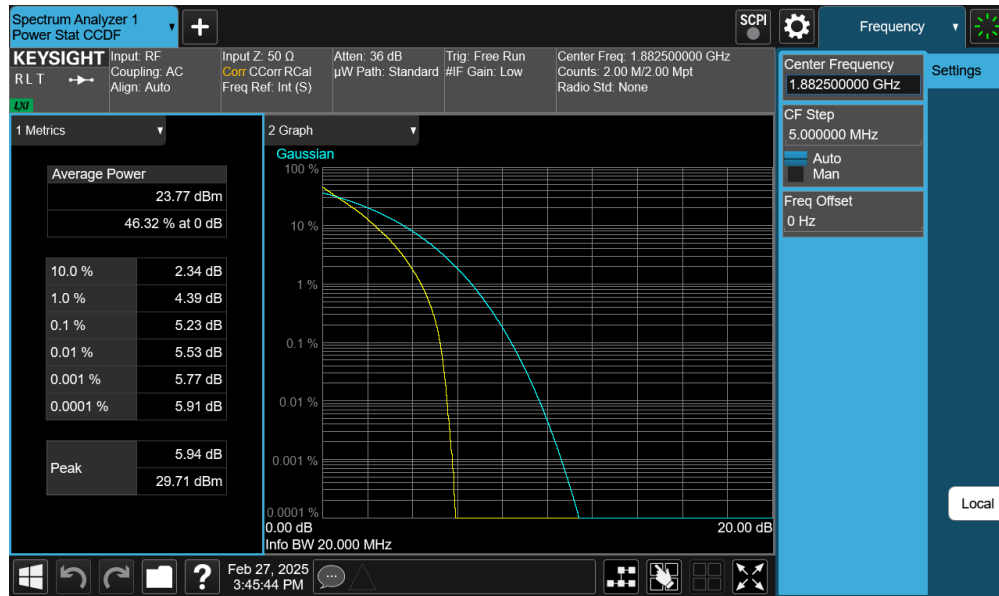
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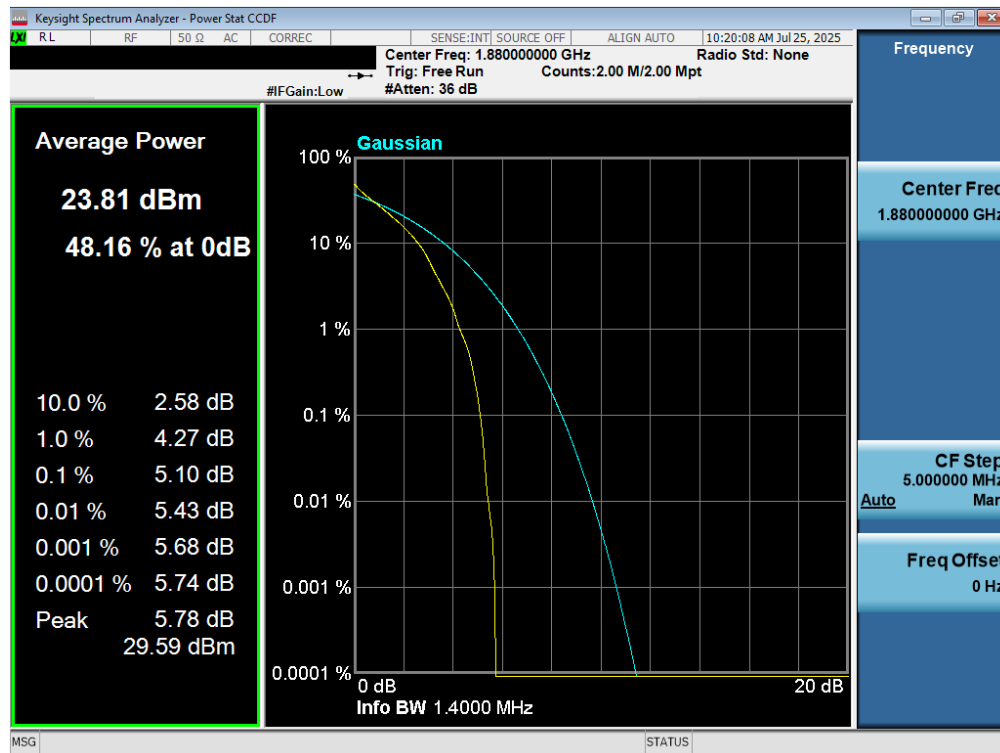


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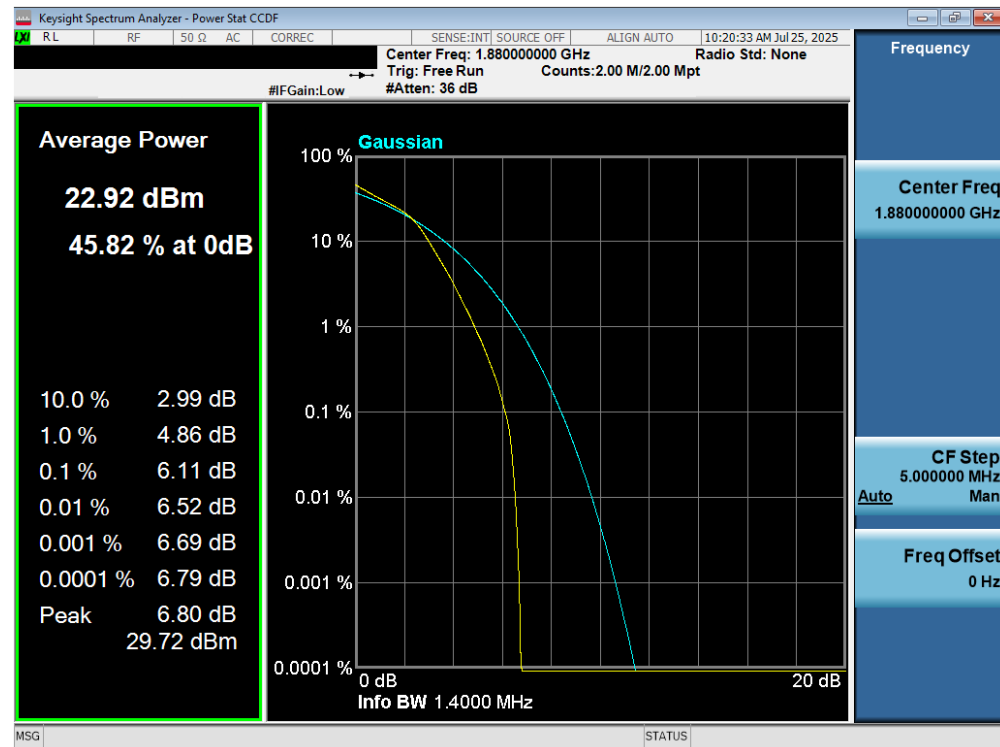
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LTE Band 2



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

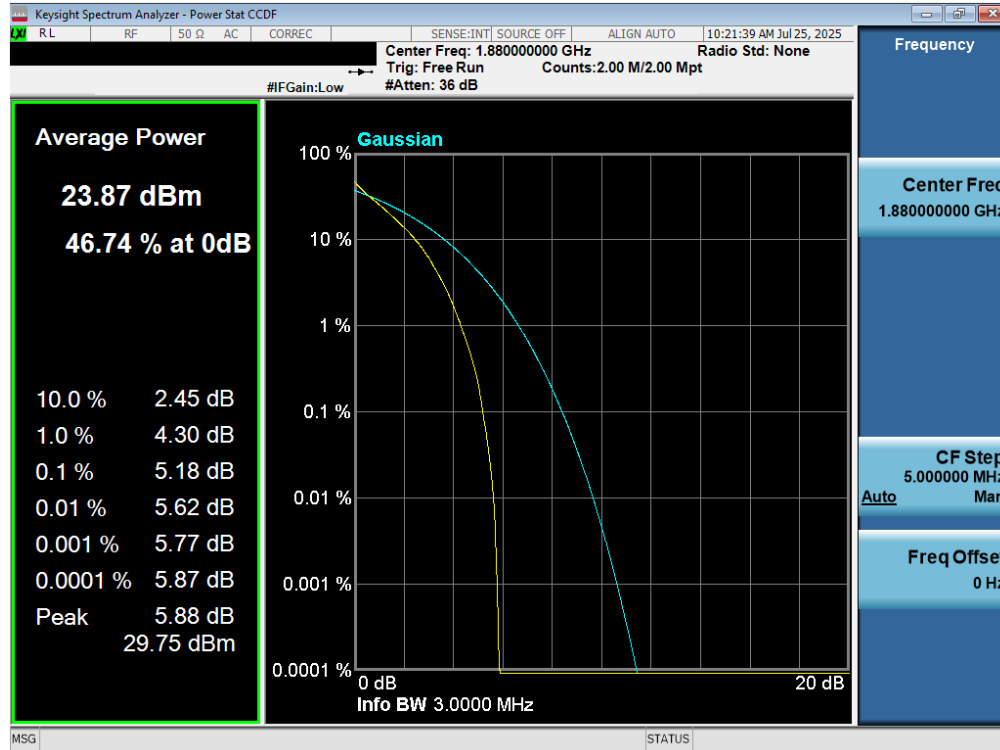


Plot 7-140. PAR Plot (LTE Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

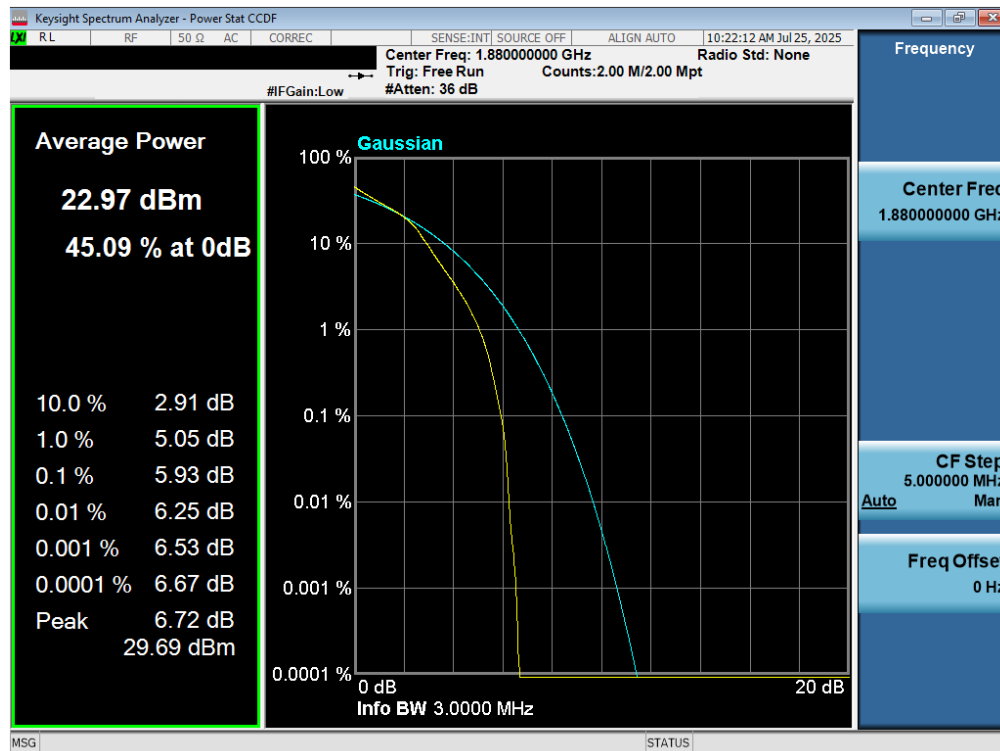
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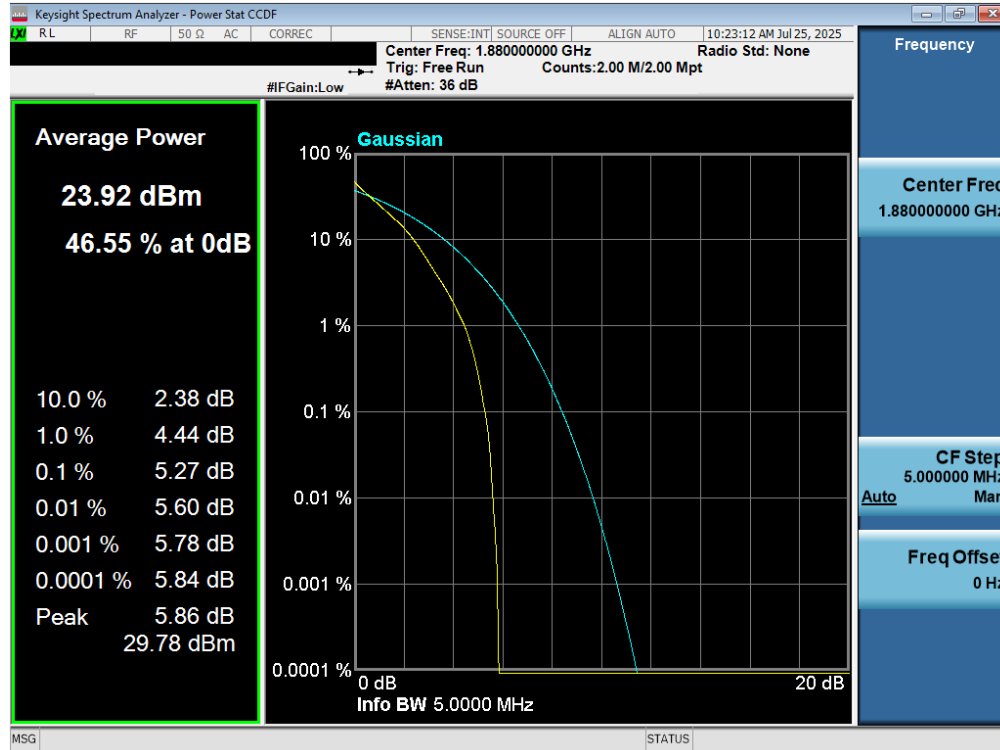
Plot 7-141. PAR Plot (LTE Band 2 - 3MHz QPSK - Full RB Configuration)



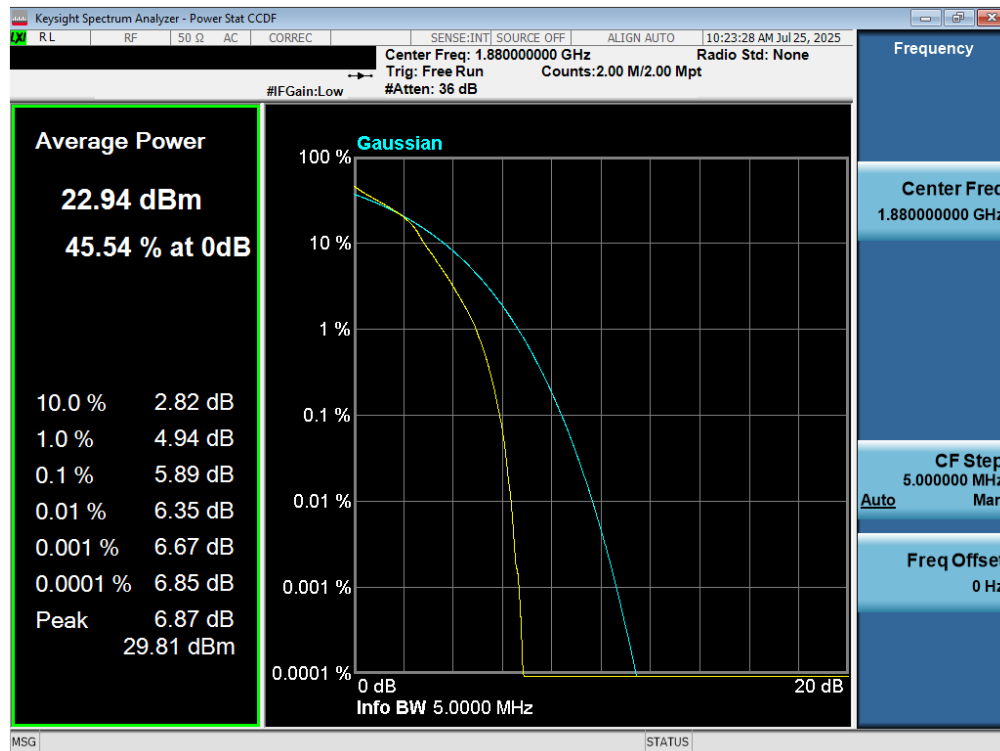
Plot 7-142. PAR Plot (LTE Band 2 - 3MHz 16-QAM - Full RB Configuration)

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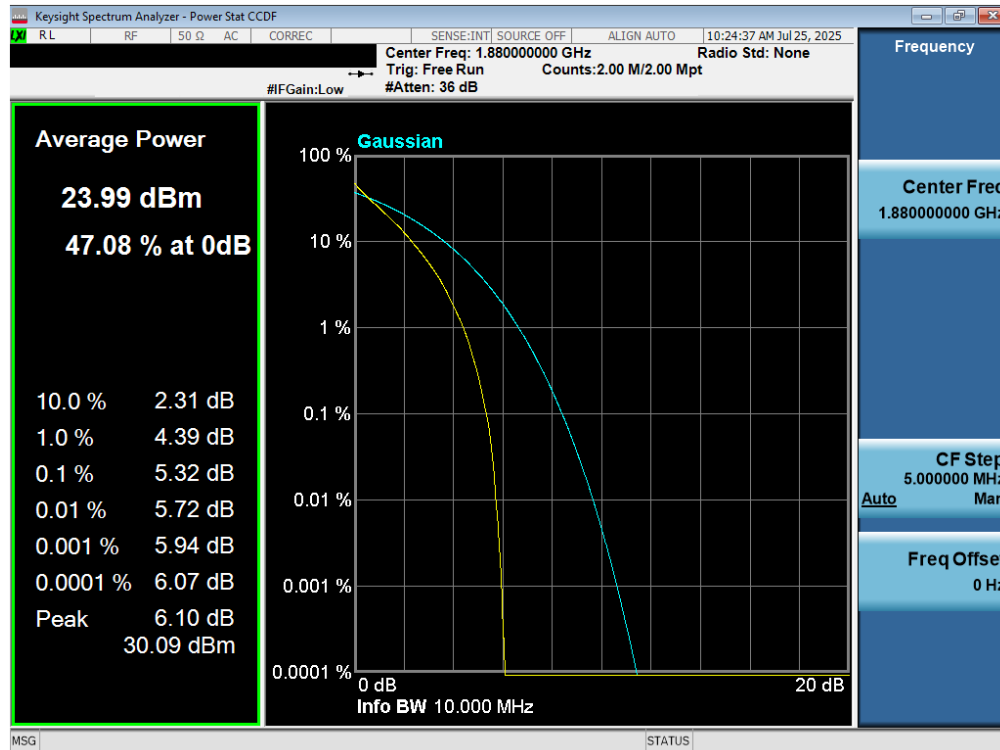
Plot 7-143. PAR Plot (LTE Band 2 - 5MHz QPSK - Full RB Configuration)



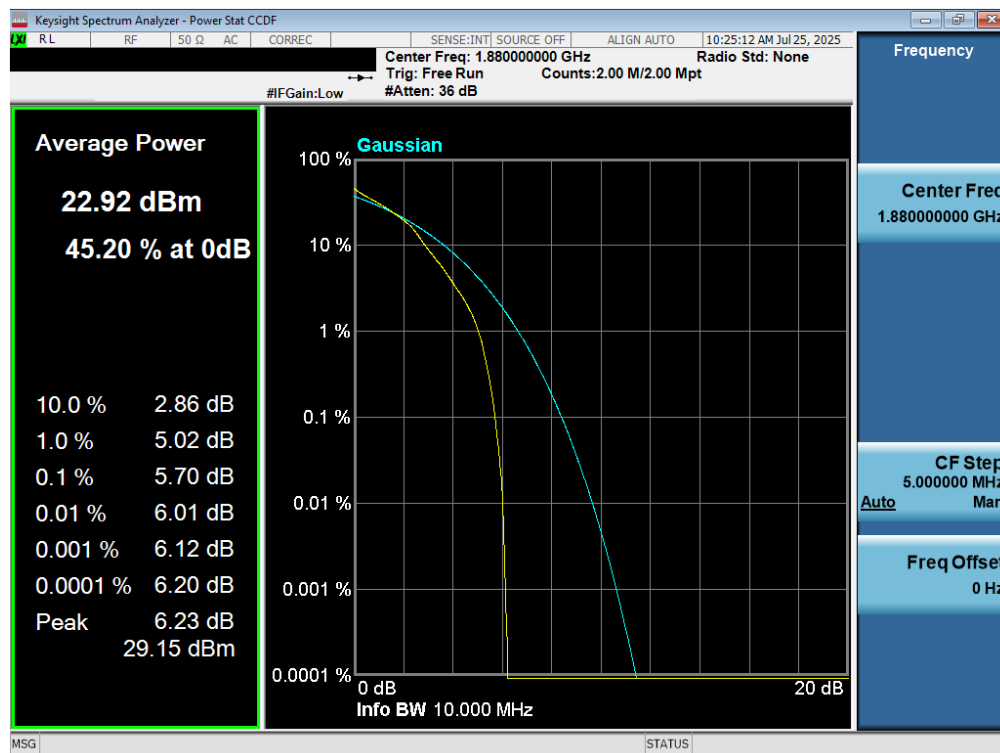
Plot 7-144. PAR Plot (LTE Band 2 - 5MHz 16-QAM - Full RB Configuration)

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

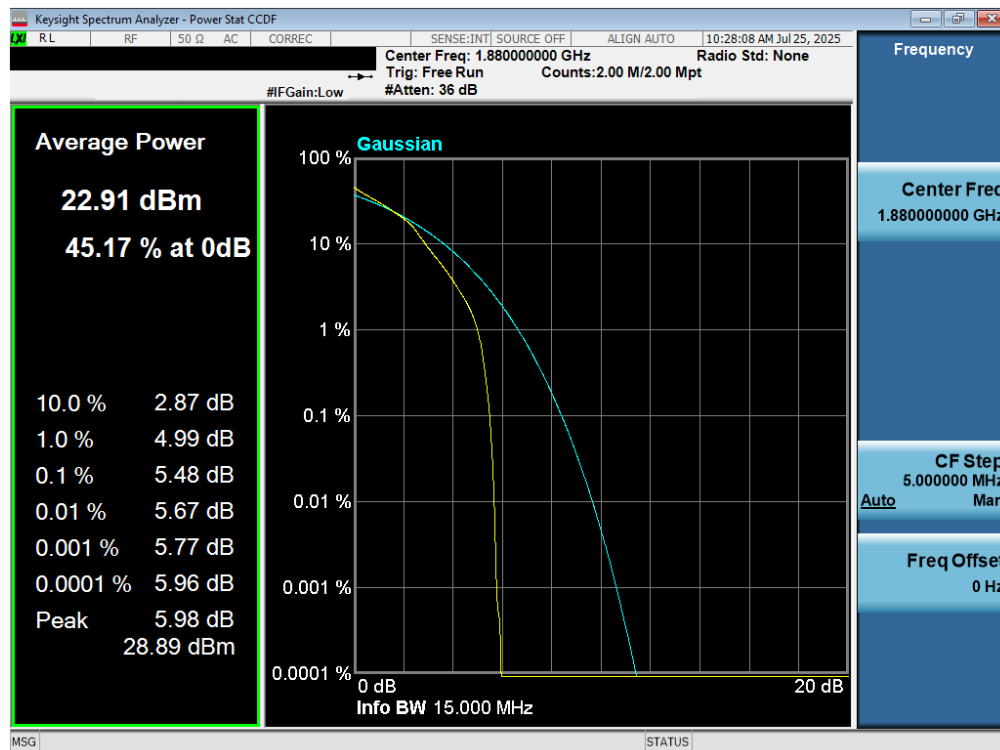
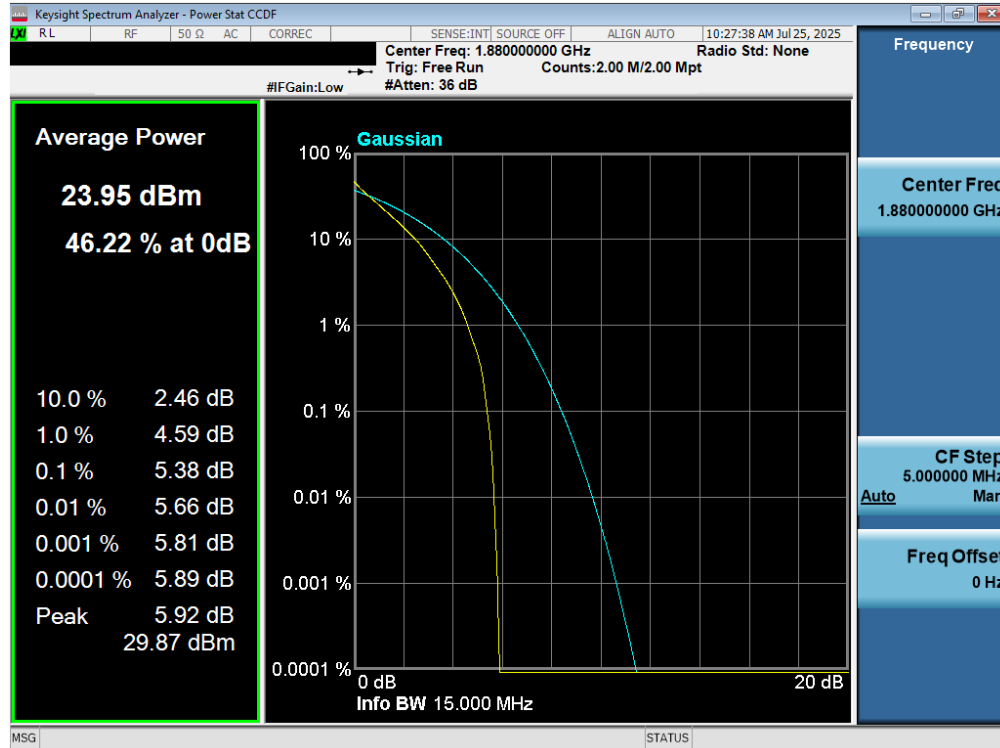



Plot 7-146. PAR Plot (LTE Band 2 - 10MHz 16-QAM - Full RB Configuration)

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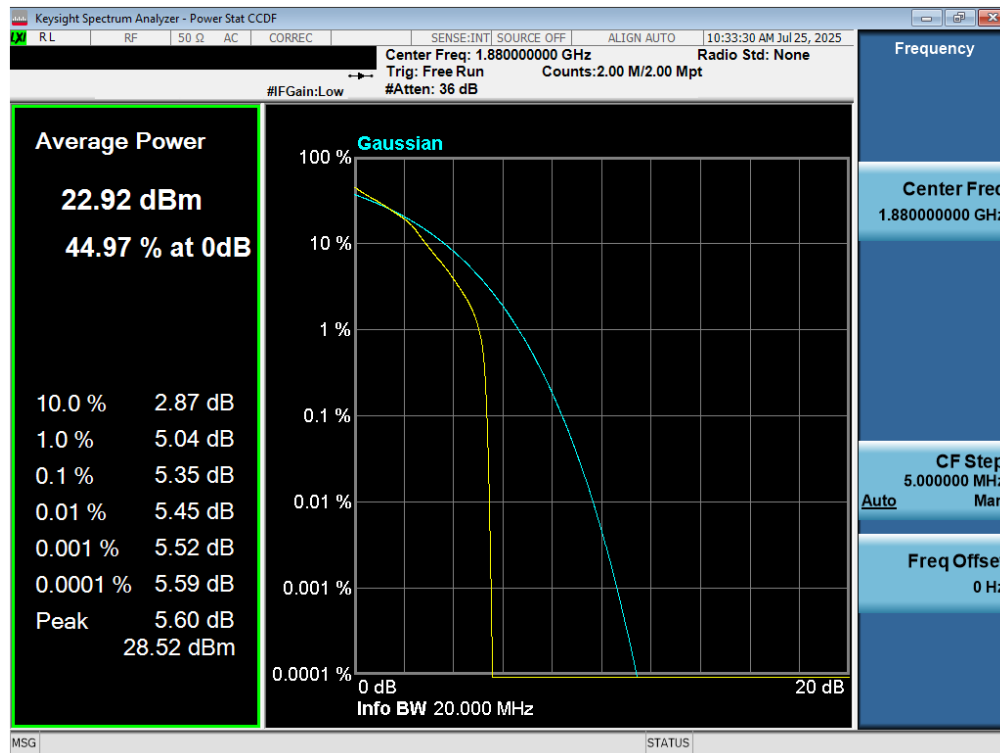
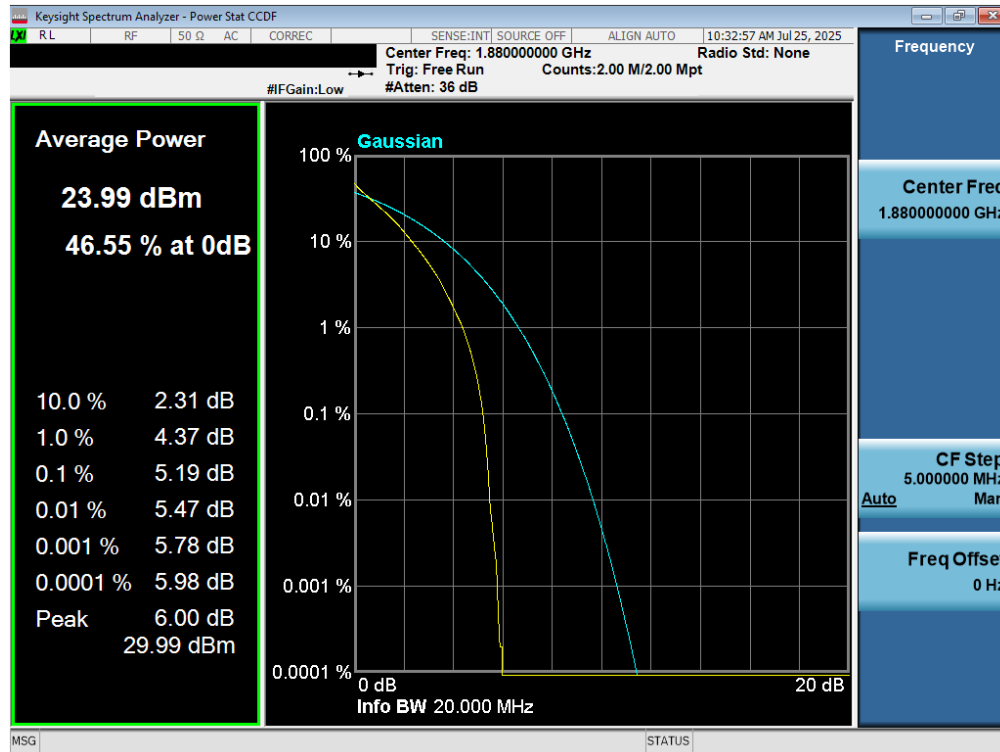
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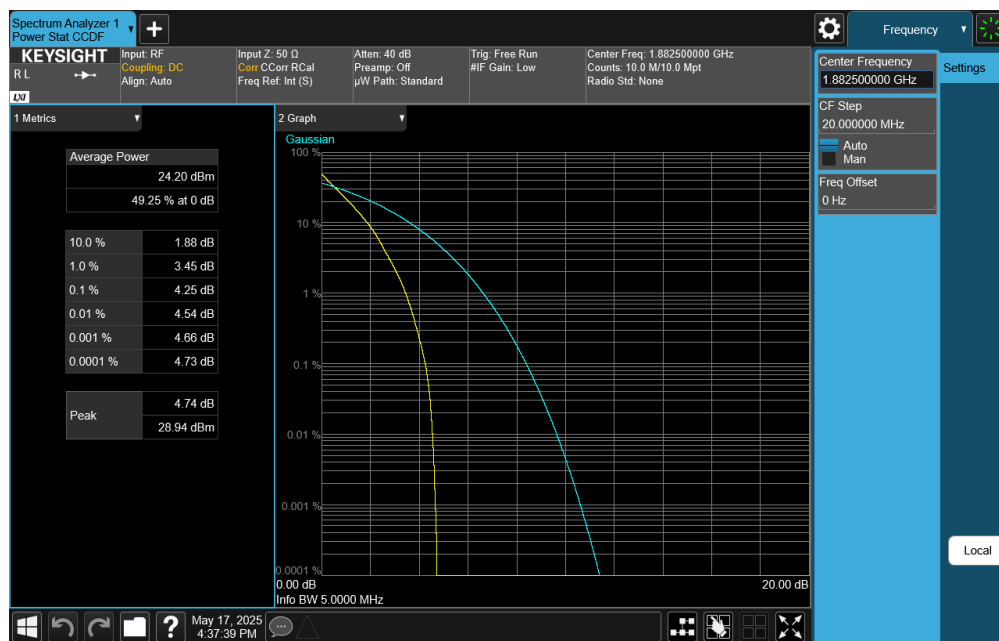


FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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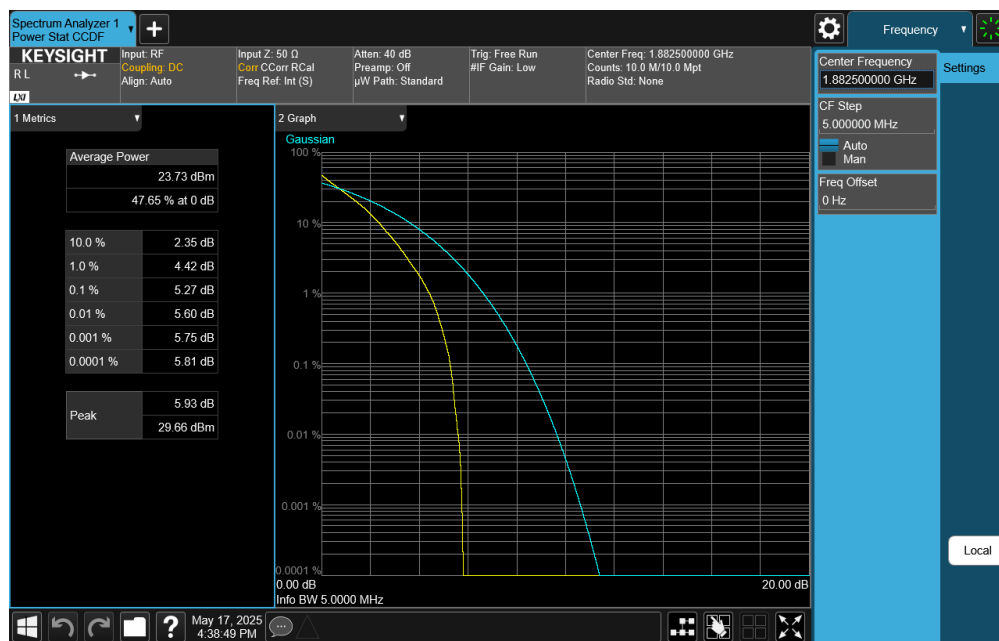
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NR Band n25



Plot 7-151. PAR Plot (NR Band n25 - 5.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

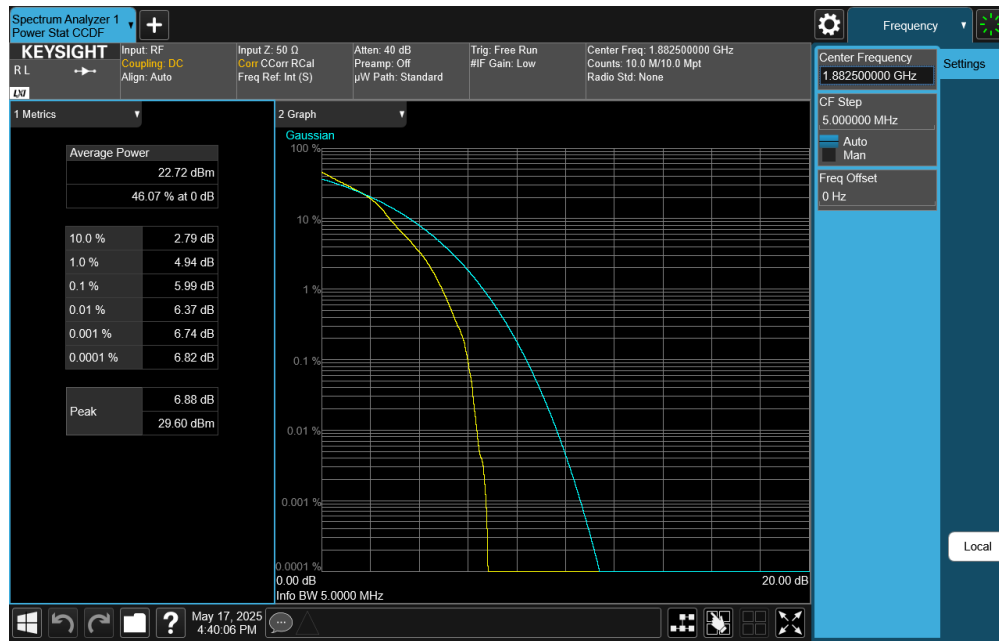


Plot 7-152. PAR Plot (NR Band n25 - 5.0MHz DFT-s-OFDM QPSK - Full RB)

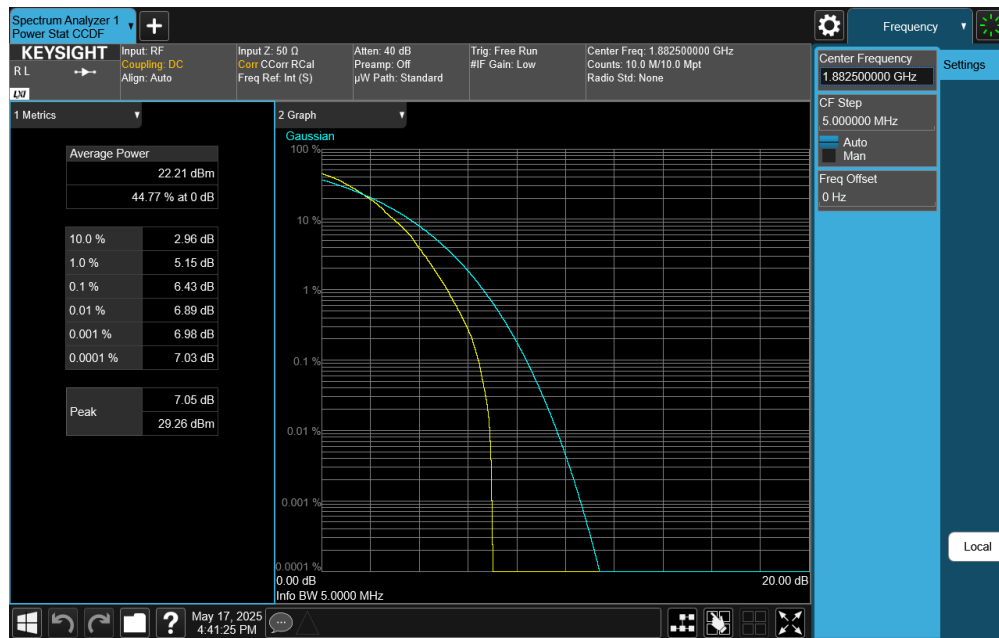
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-153. PAR Plot (NR Band n25 - 5.0MHz DFT-s-OFDM 16-QAM - Full RB)

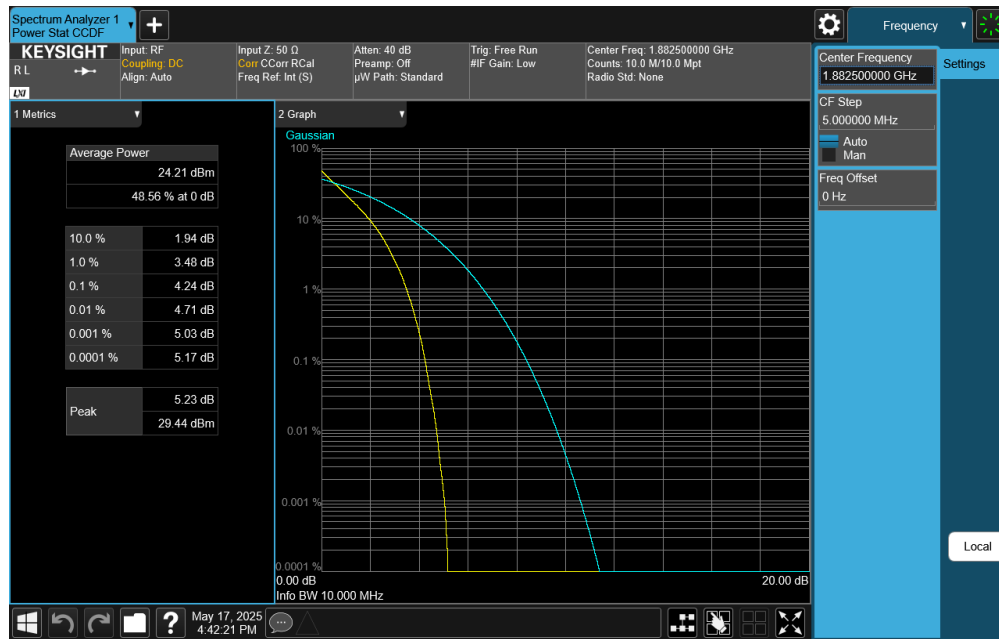


Plot 7-154. PAR Plot (NR Band n25 - 5.0MHz DFT-s-OFDM 64-QAM - Full RB)

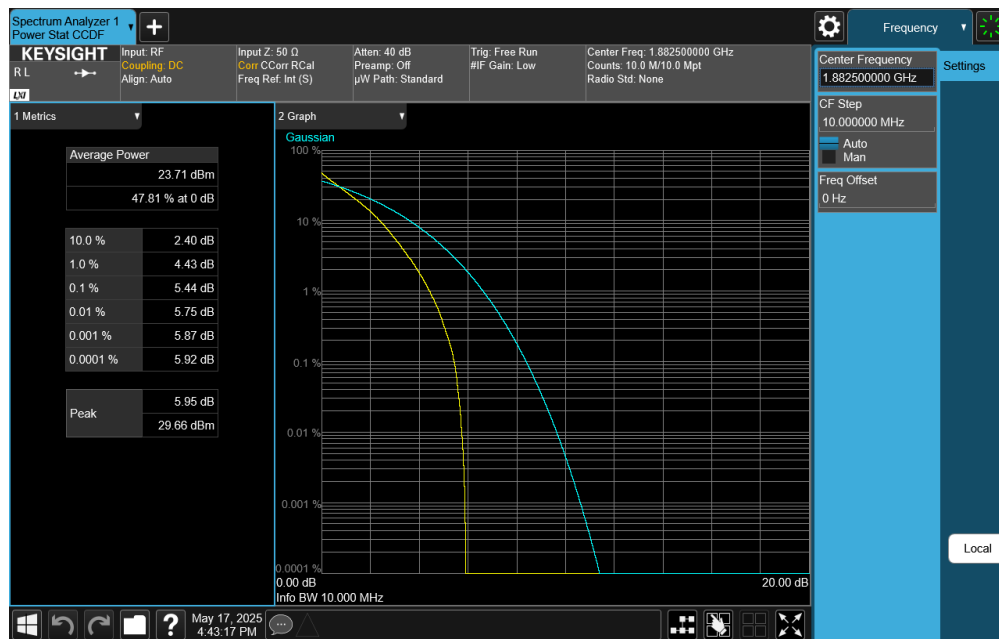
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-155. PAR Plot (NR Band n25 - 10.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

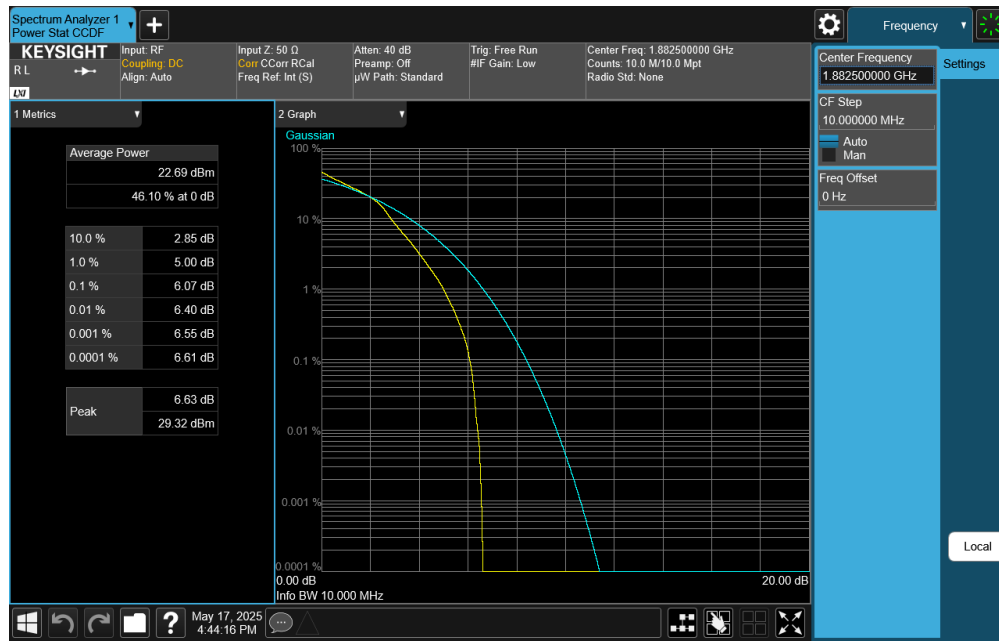


Plot 7-156. PAR Plot (NR Band n25 - 10.0MHz DFT-s-OFDM QPSK - Full RB)

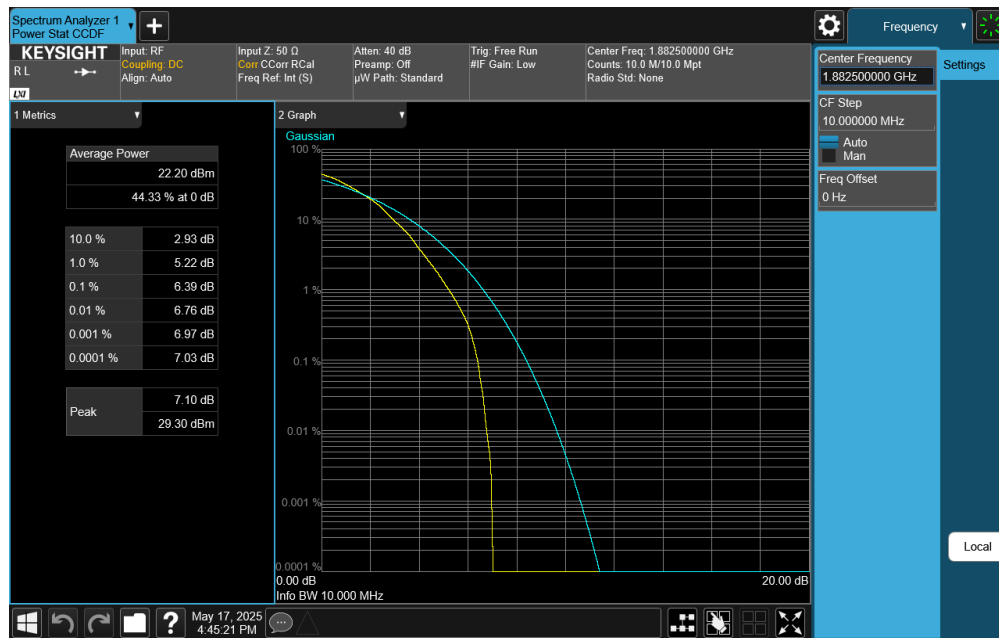
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-157. PAR Plot (NR Band n25 - 10.0MHz DFT-s-OFDM 16-QAM - Full RB)

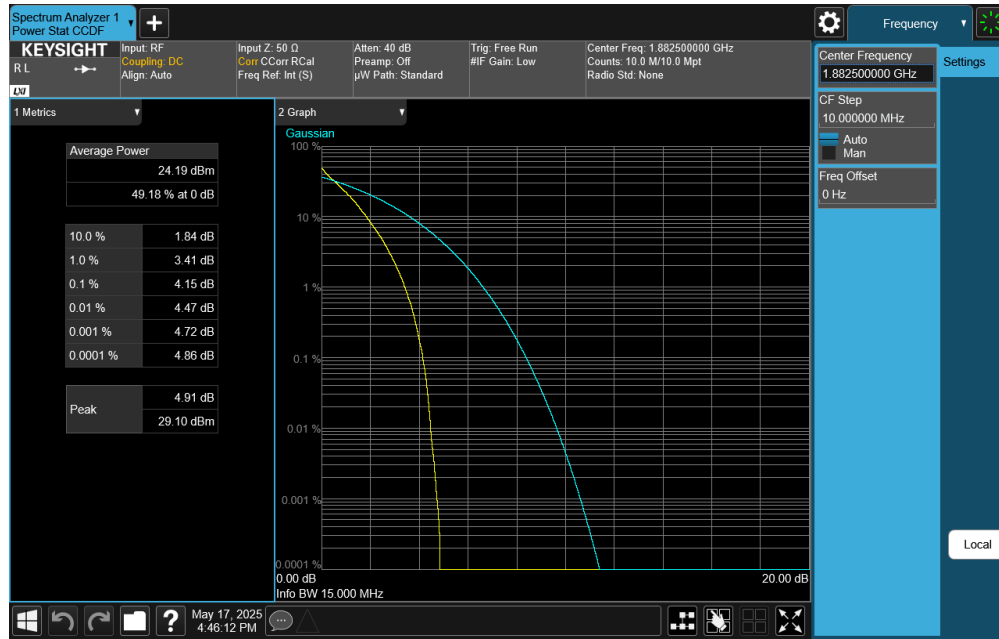


Plot 7-158. PAR Plot (NR Band n25 - 10.0MHz DFT-s-OFDM 64-QAM - Full RB)

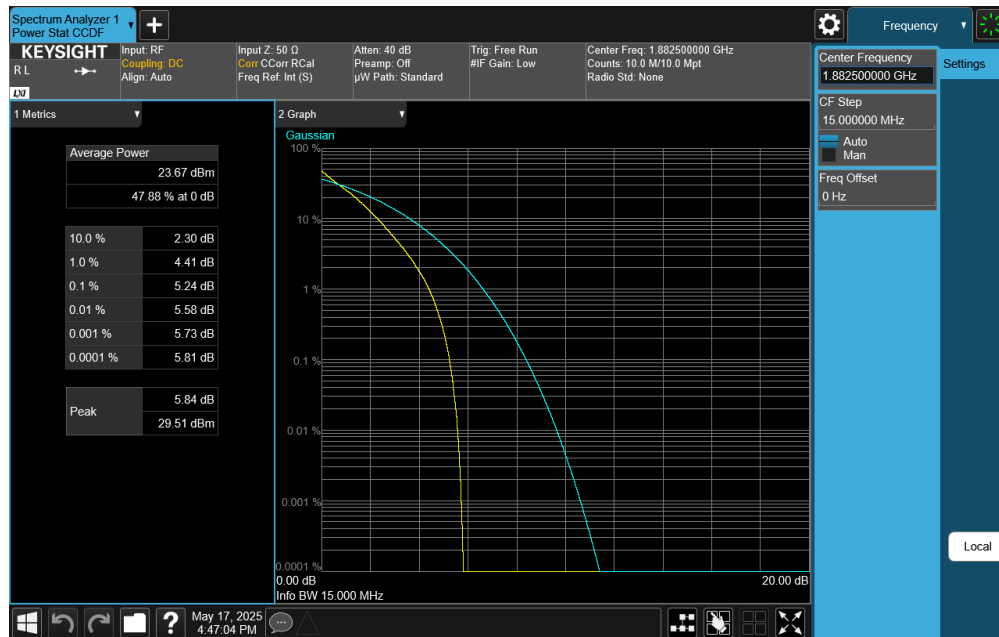
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-159. PAR Plot (NR Band n25 - 15.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

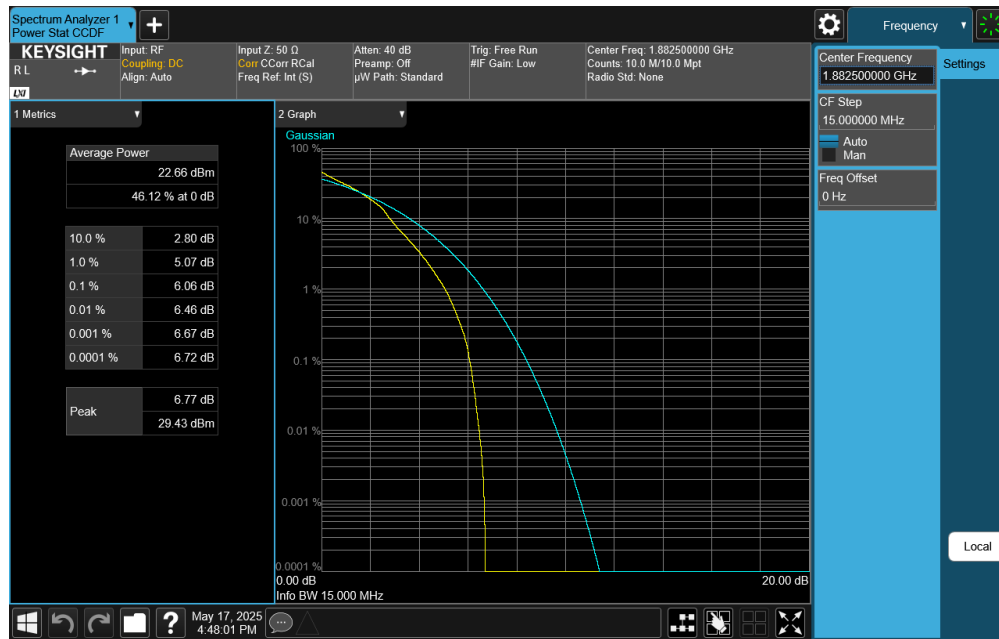


Plot 7-160. PAR Plot (NR Band n25 - 15.0MHz DFT-s-OFDM QPSK - Full RB)

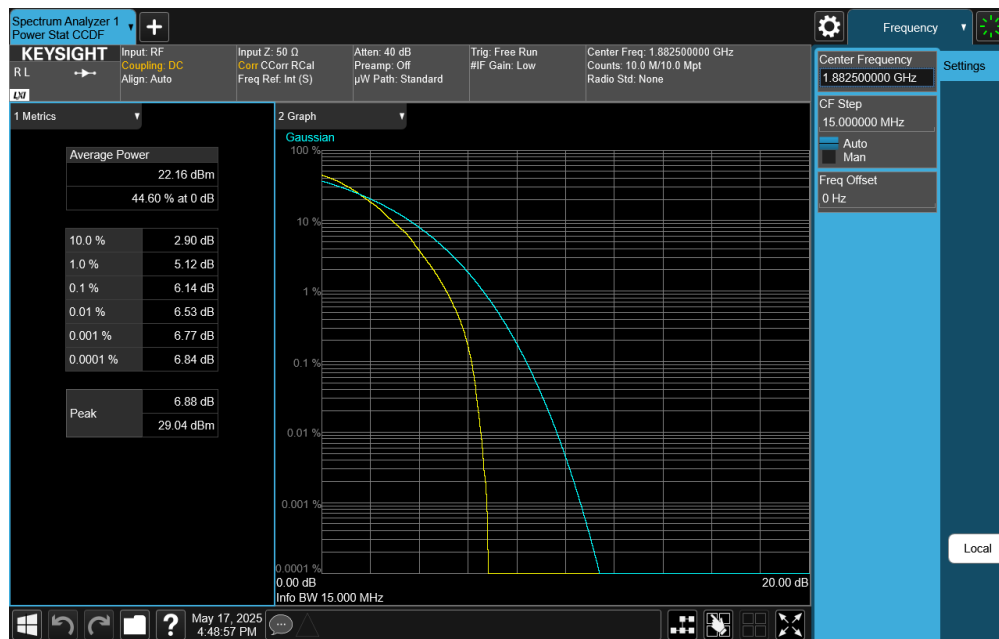
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-161. PAR Plot (NR Band n25 - 15.0MHz DFT-s-OFDM 16-QAM - Full RB)

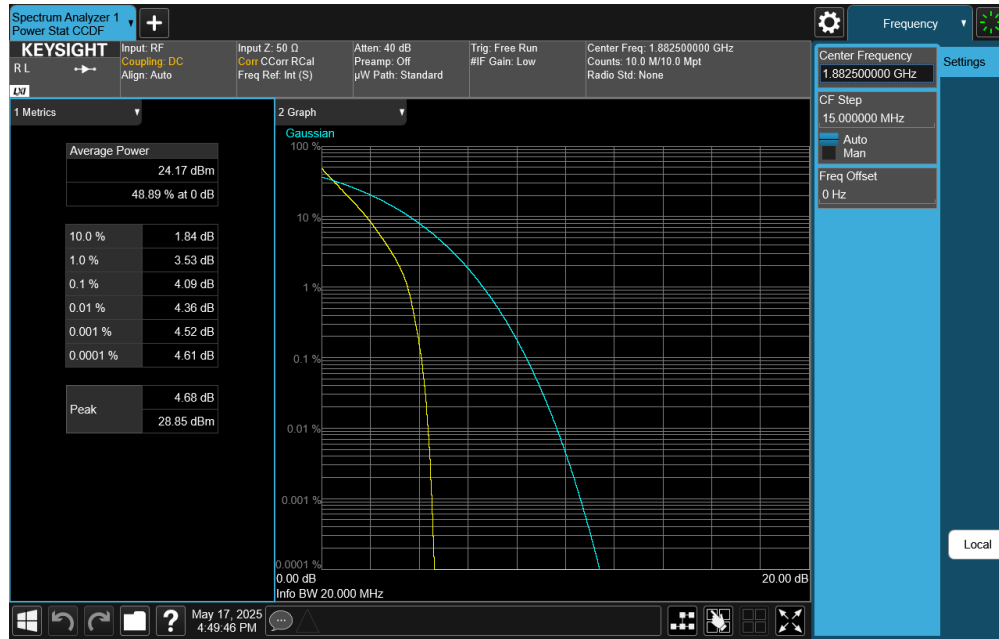


Plot 7-162. PAR Plot (NR Band n25 - 15.0MHz DFT-s-OFDM 64-QAM - Full RB)

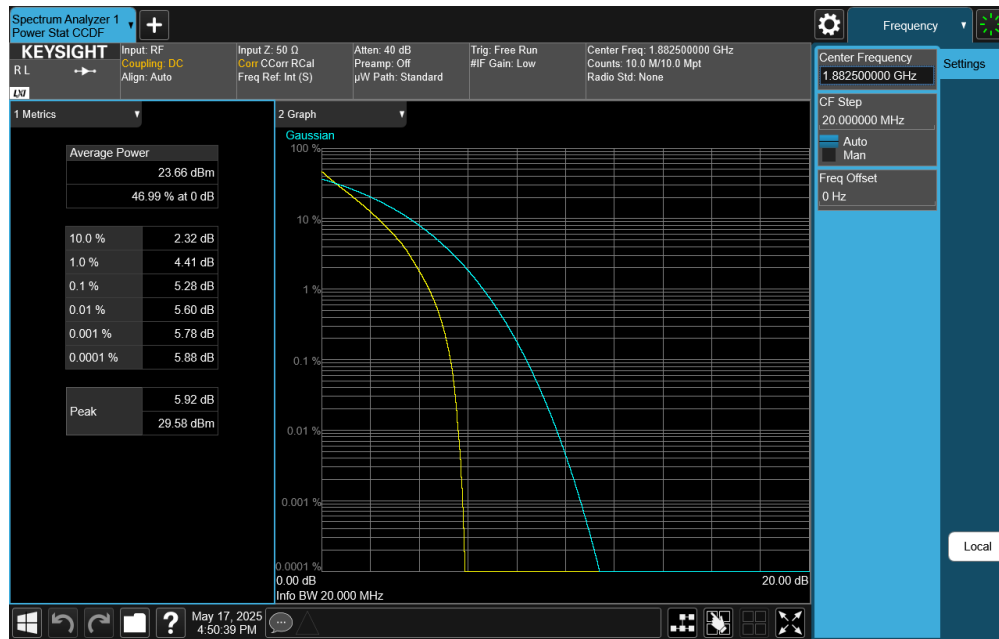
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-163. PAR Plot (NR Band n25 - 20.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

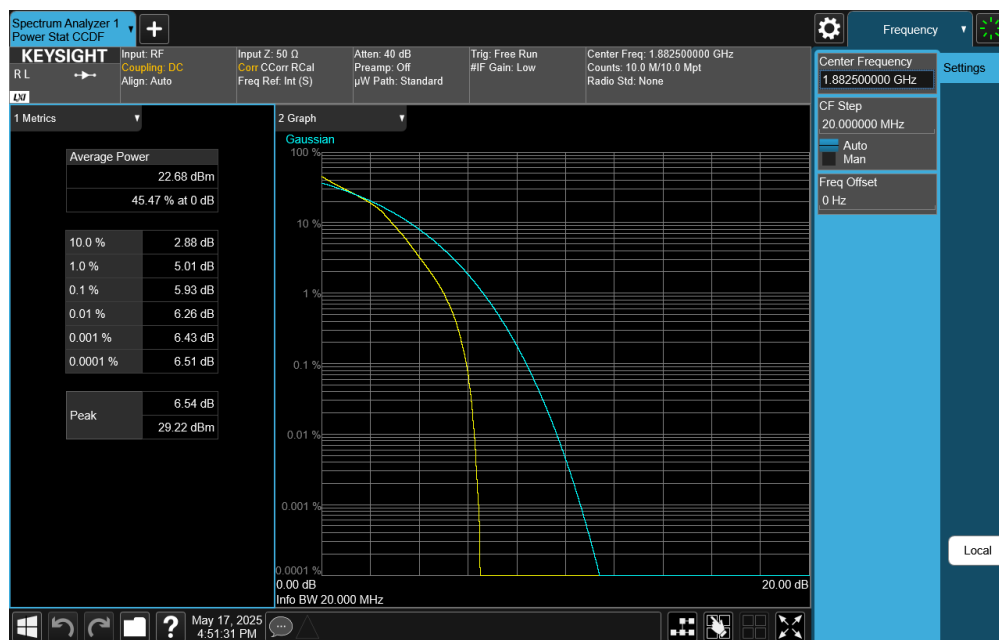


Plot 7-164. PAR Plot (NR Band n25 - 20.0MHz DFT-s-OFDM QPSK - Full RB)

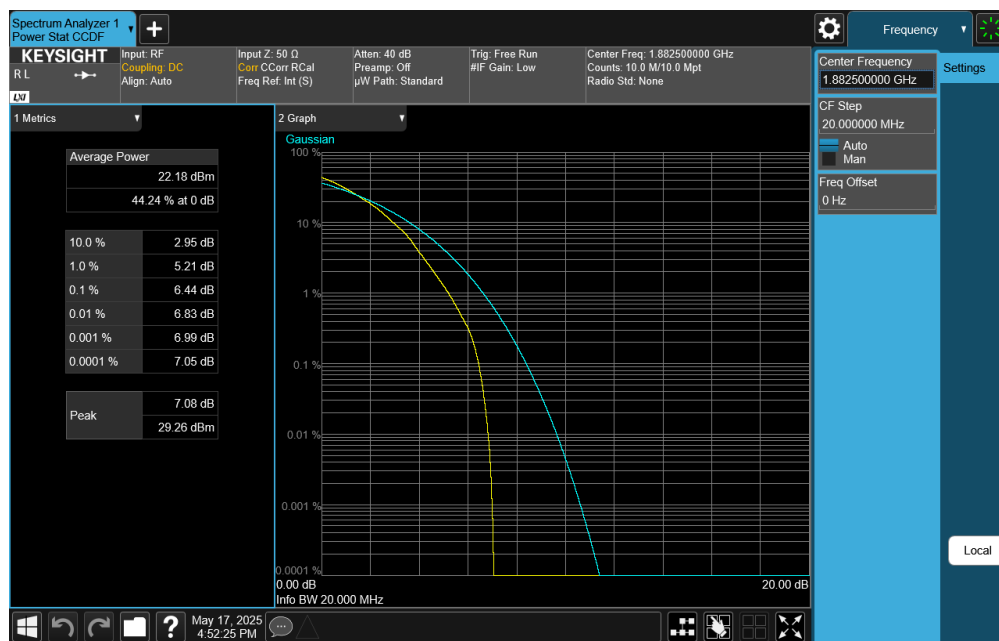
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-165. PAR Plot (NR Band n25 - 20.0MHz DFT-s-OFDM 16-QAM - Full RB)



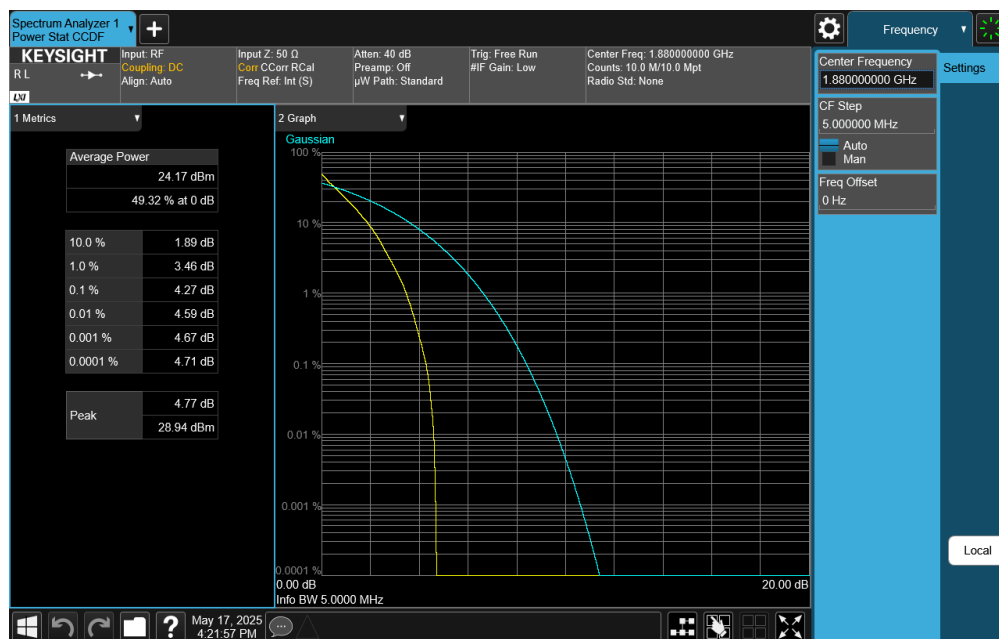
Plot 7-166. PAR Plot (NR Band n25 - 20.0MHz DFT-s-OFDM 64-QAM - Full RB)

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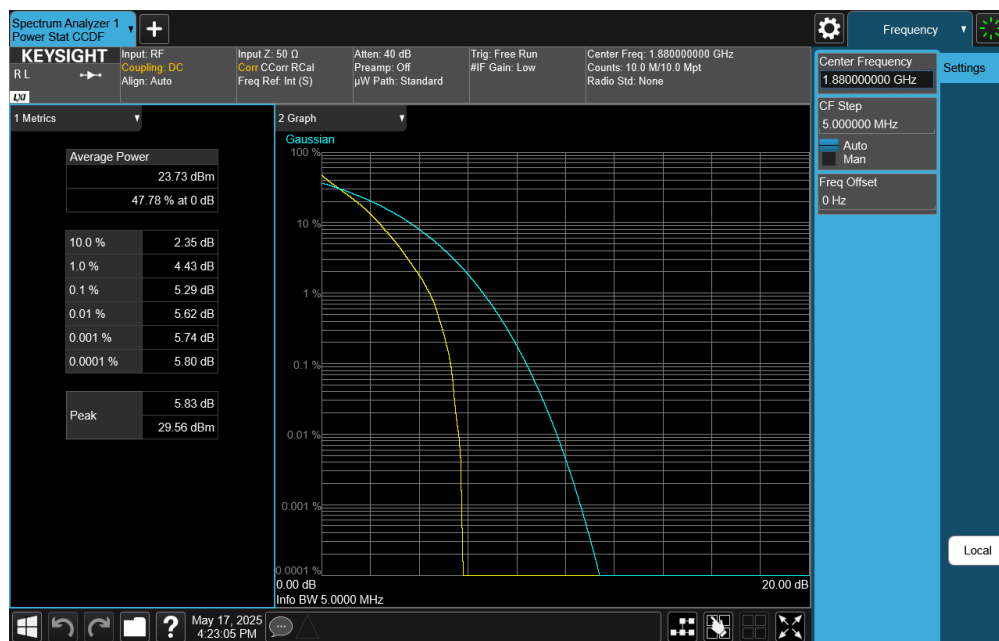
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NR Band n2



Plot 7-167. PAR Plot (NR Band n2 - 5.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

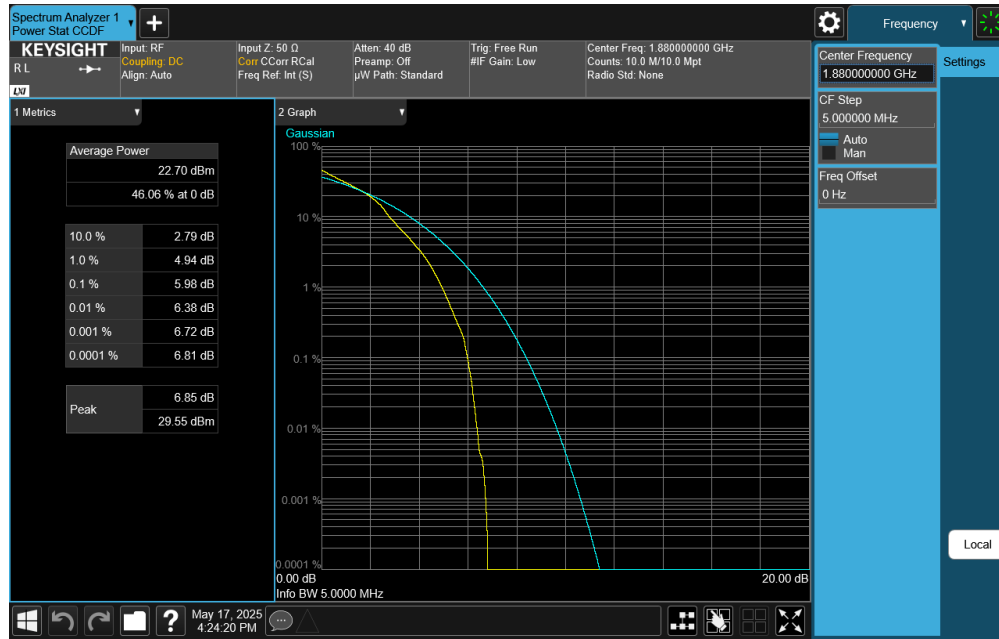


Plot 7-168. PAR Plot (NR Band n2 - 5.0MHz DFT-s-OFDM QPSK - Full RB)

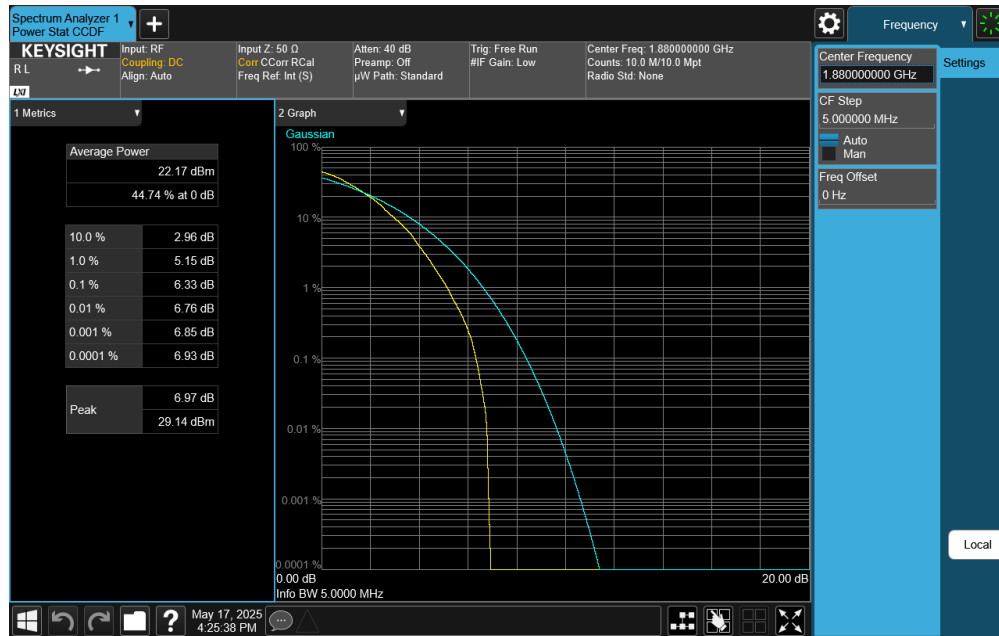
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-169. PAR Plot (NR Band n2 - 5.0MHz DFT-s-OFDM 16-QAM - Full RB)

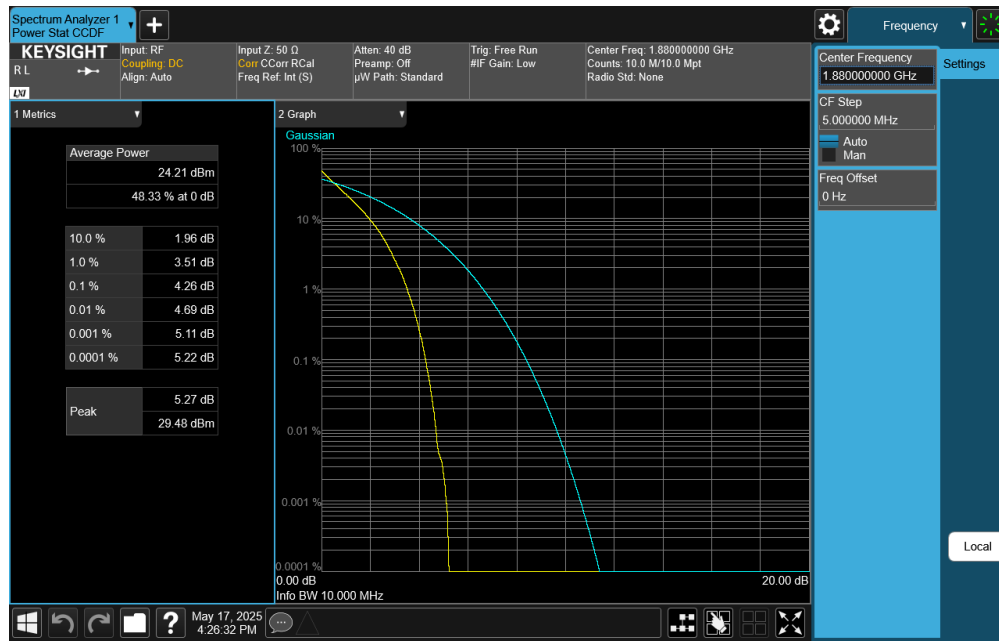


Plot 7-170. PAR Plot (NR Band n2 - 5.0MHz DFT-s-OFDM 64-QAM - Full RB)

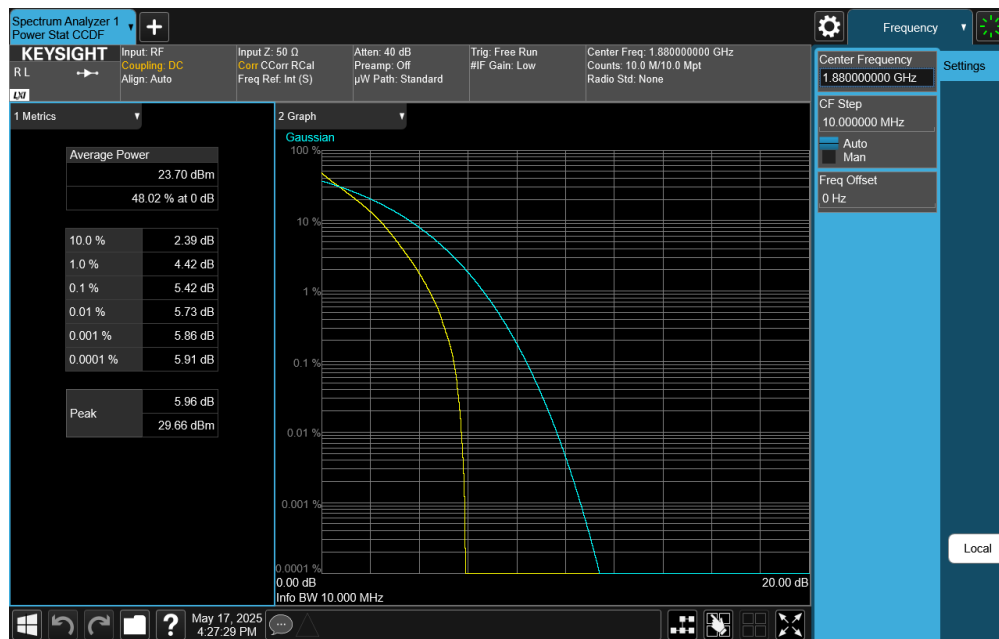
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-171. PAR Plot (NR Band n2 - 10.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

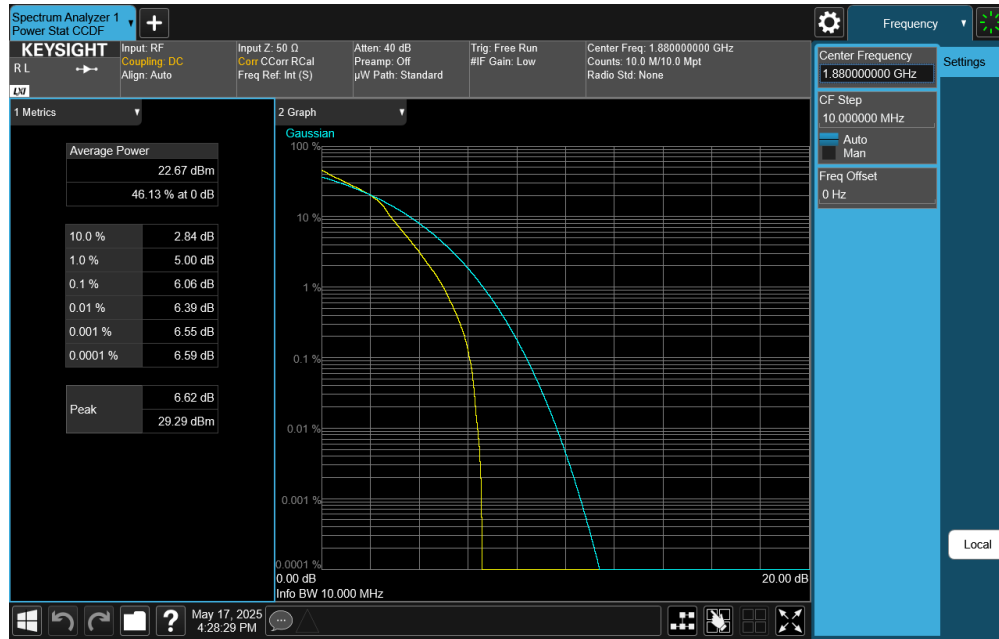


Plot 7-172. PAR Plot (NR Band n2 - 10.0MHz DFT-s-OFDM QPSK - Full RB)

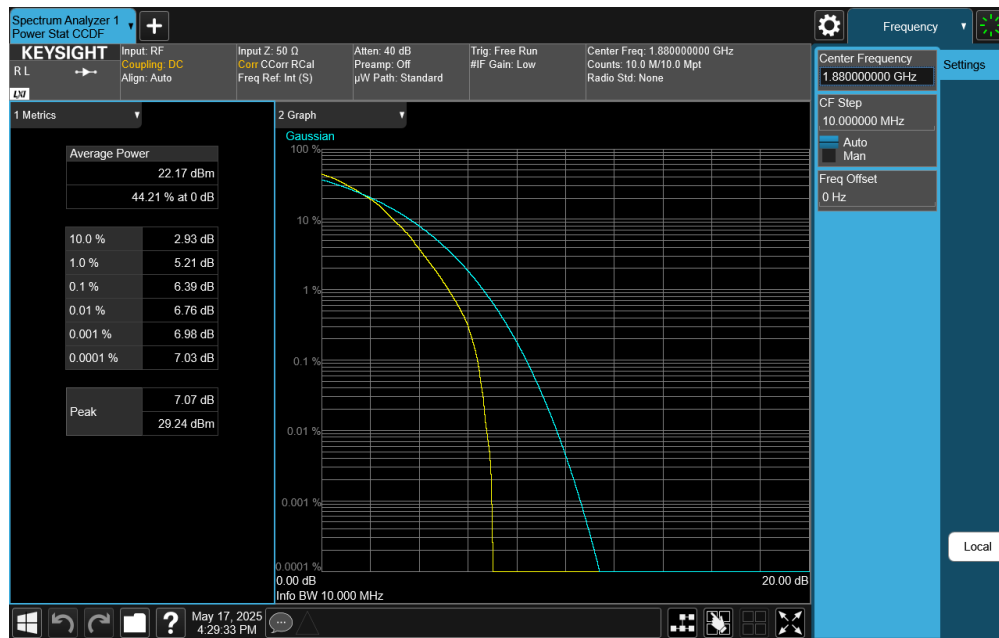
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-173. PAR Plot (NR Band n2 - 10.0MHz DFT-s-OFDM 16-QAM - Full RB)

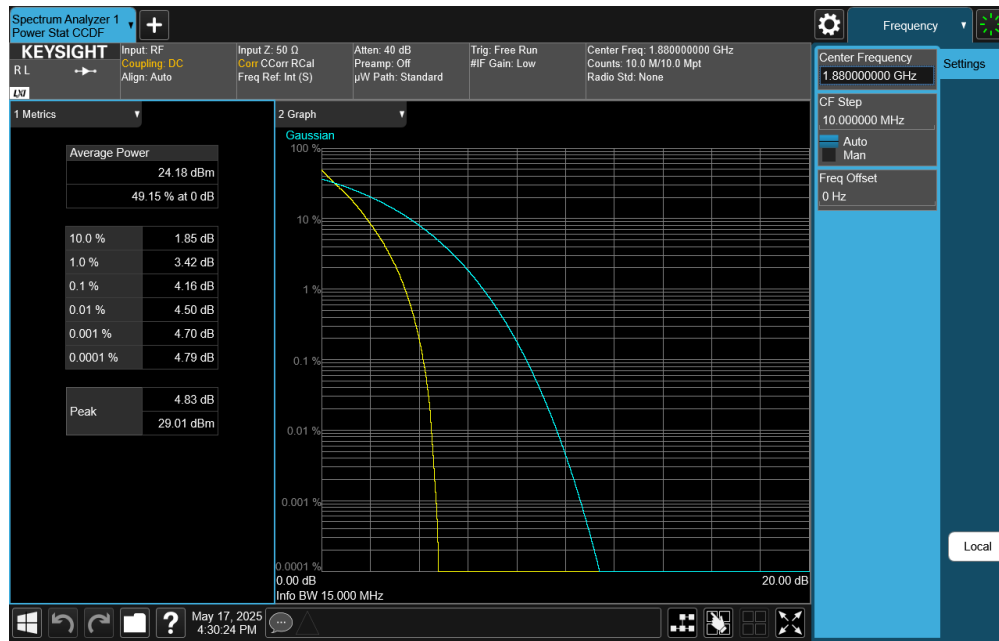


Plot 7-174. PAR Plot (NR Band n2 - 10.0MHz DFT-s-OFDM 64-QAM - Full RB)

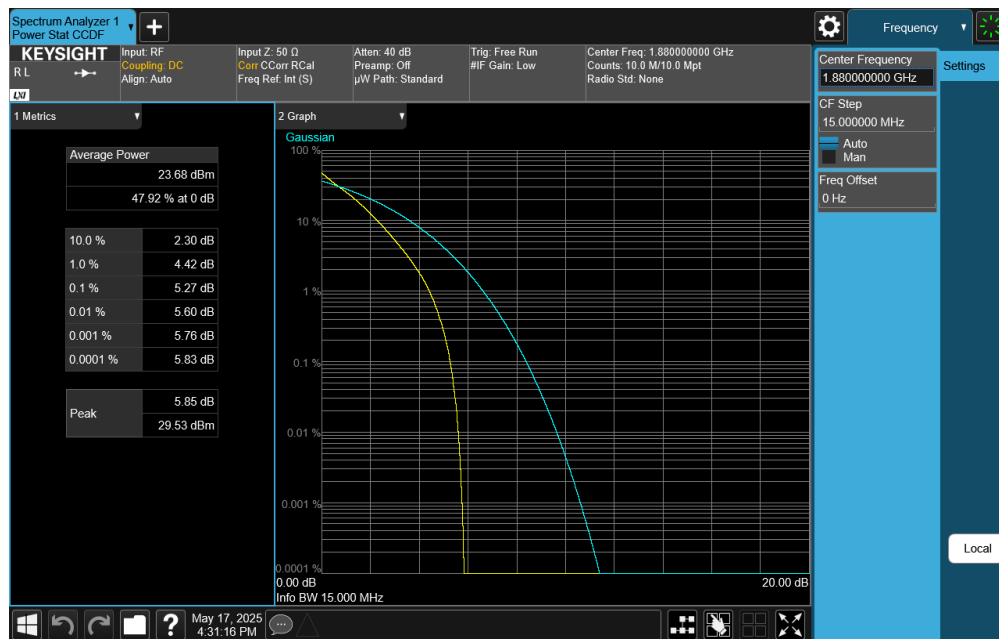
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-175. PAR Plot (NR Band n2 - 15.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

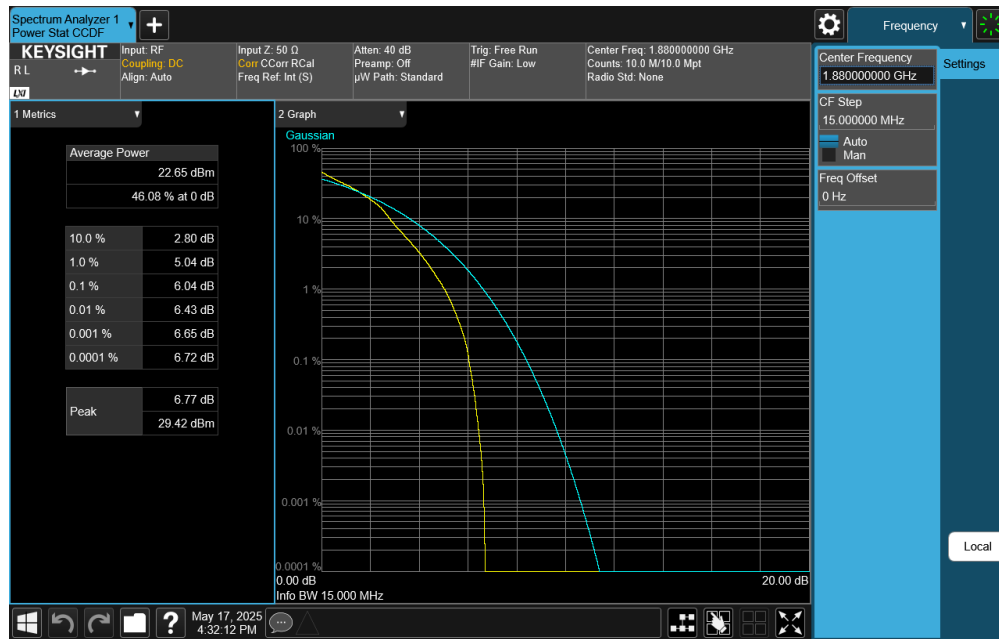


Plot 7-176. PAR Plot (NR Band n2 - 15.0MHz DFT-s-OFDM QPSK - Full RB)

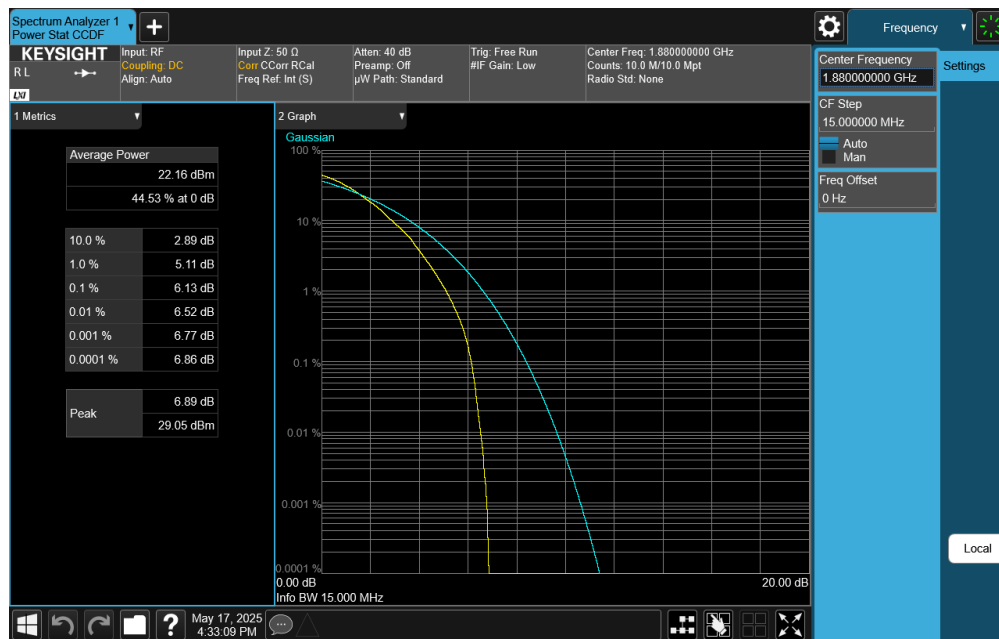
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-177. PAR Plot (NR Band n2 - 15.0MHz DFT-s-OFDM 16-QAM - Full RB)

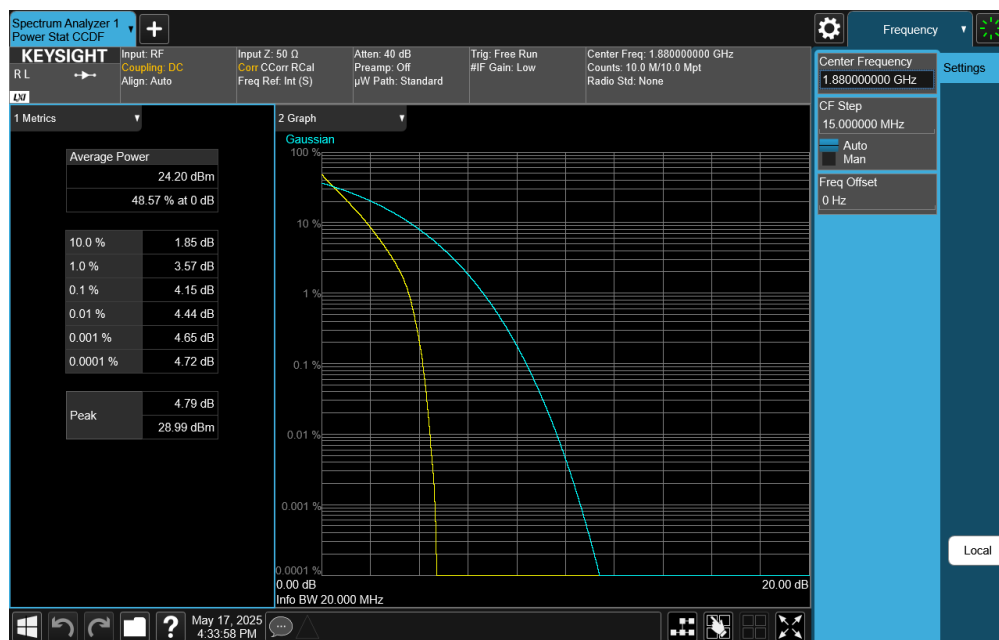


Plot 7-178. PAR Plot (NR Band n2 - 15.0MHz DFT-s-OFDM 64-QAM - Full RB)

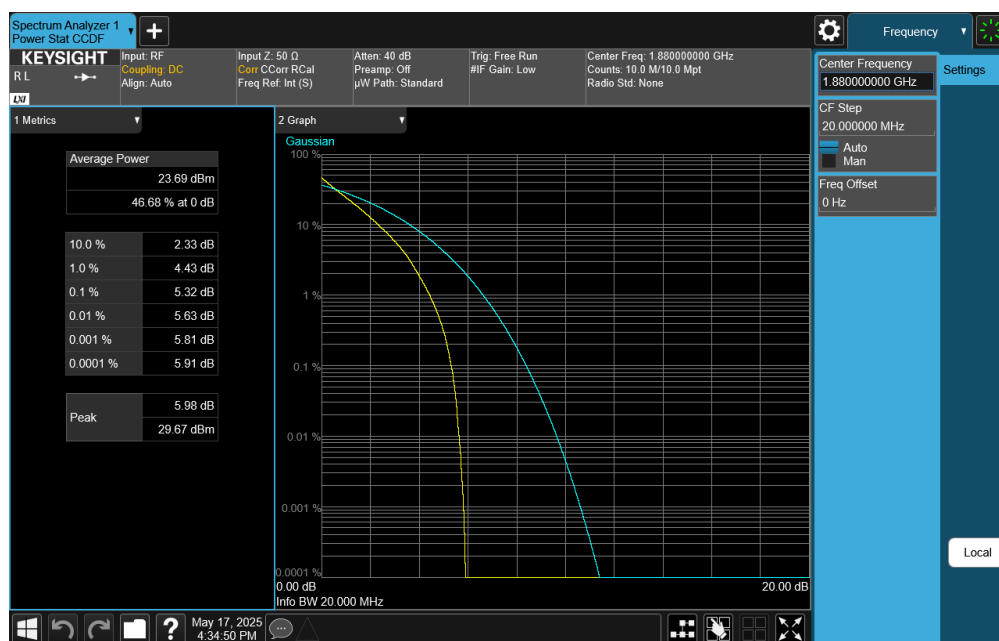
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-179. PAR Plot (NR Band n2 - 20.0MHz DFT-s-OFDM $\pi/2$ BPSK - Full RB)

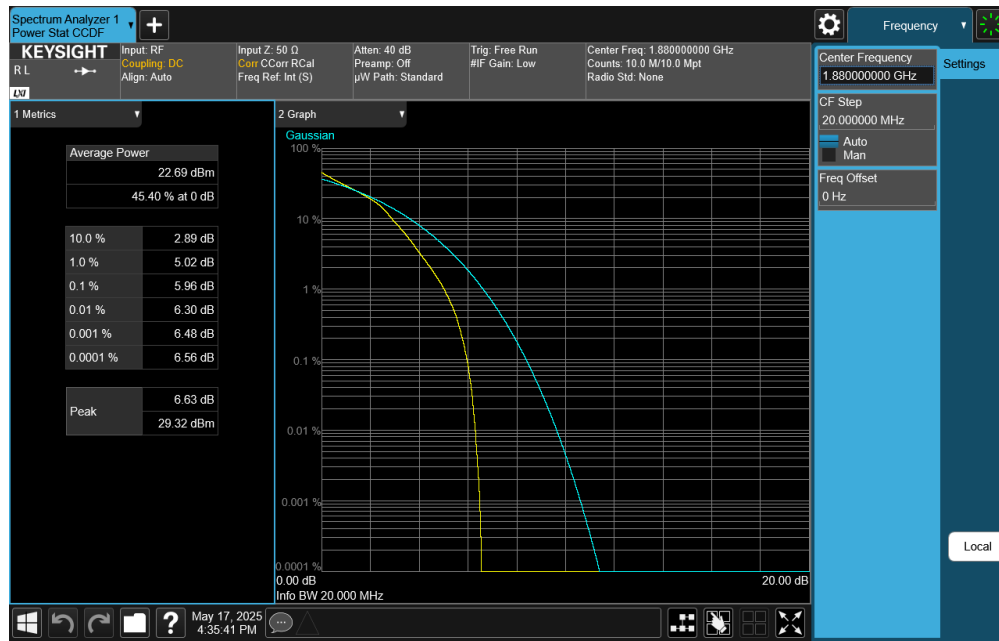


Plot 7-180. PAR Plot (NR Band n2 - 20.0MHz DFT-s-OFDM QPSK - Full RB)

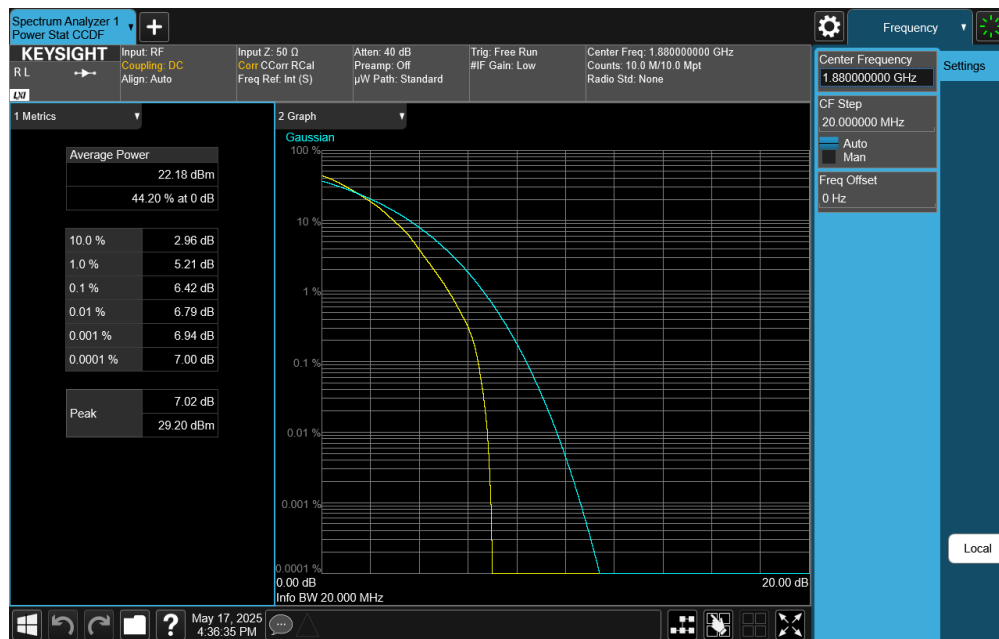
FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-181. PAR Plot (NR Band n2 - 20.0MHz DFT-s-OFDM 16-QAM - Full RB)



Plot 7-182. PAR Plot (NR Band n2 - 20.0MHz DFT-s-OFDM 64-QAM - Full RB)

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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:

$$\text{EIRP} = \text{PMeas} - \text{LC} + \text{GT}$$

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.

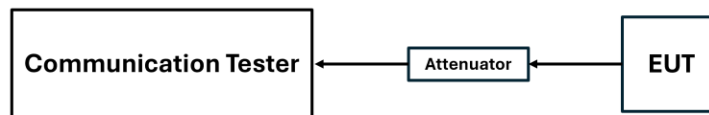


Figure 7-9. LTE Test Instrument & Measurement Setup

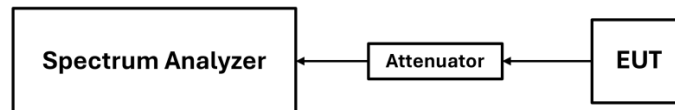




Figure 7-10. FR1 Test Instrument & Measurement Setup

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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.

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7.6.1 Antenna FCM – EIRP

LTE Band 25

Bandwidth	Mod.	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	-12.70	1 / 0	25.05	12.35	17.179	33.01	-20.66
		1882.5	-12.70	1 / 5	25.13	12.43	17.498	33.01	-20.58
		1914.3	-12.70	1 / 5	24.92	12.22	16.672	33.01	-20.79
	16-QAM	1850.7	-12.70	1 / 0	24.57	11.87	15.382	33.01	-21.14
3 MHz	QPSK	1851.5	-12.70	1 / 0	25.05	12.35	17.179	33.01	-20.66
		1882.5	-12.70	1 / 0	24.99	12.29	16.943	33.01	-20.72
		1913.5	-12.70	1 / 14	24.94	12.24	16.749	33.01	-20.77
	16-QAM	1882.5	-12.70	1 / 0	24.42	11.72	14.859	33.01	-21.29
5 MHz	QPSK	1852.5	-12.70	1 / 0	25.08	12.38	17.298	33.01	-20.63
		1882.5	-12.70	1 / 0	25.05	12.35	17.179	33.01	-20.66
		1912.5	-12.70	1 / 24	24.83	12.13	16.331	33.01	-20.88
	16-QAM	1882.5	-12.70	1 / 12	24.63	11.93	15.596	33.01	-21.08
10 MHz	QPSK	1855.0	-12.70	1 / 0	25.04	12.34	17.140	33.01	-20.67
		1882.5	-12.70	1 / 49	24.98	12.28	16.904	33.01	-20.73
		1910.0	-12.70	1 / 49	24.95	12.25	16.788	33.01	-20.76
	16-QAM	1882.5	-12.70	1 / 49	24.37	11.67	14.689	33.01	-21.34
15 MHz	QPSK	1857.5	-12.70	1 / 74	25.20	12.50	17.783	33.01	-20.51
		1882.5	-12.70	1 / 37	25.06	12.36	17.219	33.01	-20.65
		1907.5	-12.70	1 / 37	25.01	12.31	17.022	33.01	-20.70
	16-QAM	1882.5	-12.70	1 / 37	24.44	11.74	14.928	33.01	-21.27
20 MHz	QPSK	1860.0	-12.70	1 / 99	25.20	12.50	17.783	33.01	-20.51
		1882.5	-12.70	1 / 50	24.94	12.24	16.749	33.01	-20.77
		1905.0	-12.70	1 / 50	25.20	12.50	17.783	33.01	-20.51
	16-QAM	1905.0	-12.70	1 / 50	24.73	12.03	15.959	33.01	-20.98

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


FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 2

Bandwidth	Mod.	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	-12.70	1 / 5	25.08	12.38	17.298	33.01	-20.63
		1880.0	-12.70	1 / 0	25.20	12.50	17.783	33.01	-20.51
		1909.3	-12.70	1 / 0	24.89	12.19	16.558	33.01	-20.82
	16-QAM	1850.7	-12.70	1 / 5	24.52	11.82	15.205	33.01	-21.19
3 MHz	QPSK	1851.5	-12.70	1 / 14	25.12	12.42	17.458	33.01	-20.59
		1880.0	-12.70	1 / 0	25.04	12.34	17.140	33.01	-20.67
		1908.5	-12.70	1 / 0	24.89	12.19	16.558	33.01	-20.82
	16-QAM	1880.0	-12.70	1 / 0	24.46	11.76	14.997	33.01	-21.25
5 MHz	QPSK	1852.5	-12.70	1 / 24	25.16	12.46	17.620	33.01	-20.55
		1880.0	-12.70	1 / 0	25.10	12.40	17.378	33.01	-20.61
		1907.5	-12.70	1 / 0	24.93	12.23	16.711	33.01	-20.78
	16-QAM	1880.0	-12.70	1 / 0	24.60	11.90	15.488	33.01	-21.11
10 MHz	QPSK	1855.0	-12.70	1 / 25	25.02	12.32	17.061	33.01	-20.69
		1880.0	-12.70	1 / 0	25.06	12.36	17.219	33.01	-20.65
		1905.0	-12.70	1 / 0	25.01	12.31	17.022	33.01	-20.70
	16-QAM	1880.0	-12.70	1 / 0	24.43	11.73	14.894	33.01	-21.28
15 MHz	QPSK	1857.5	-12.70	1 / 37	25.20	12.50	17.783	33.01	-20.51
		1880.0	-12.70	1 / 74	25.09	12.39	17.338	33.01	-20.62
		1902.5	-12.70	1 / 37	25.03	12.33	17.100	33.01	-20.68
	16-QAM	1880.0	-12.70	1 / 37	24.40	11.70	14.791	33.01	-21.31
20 MHz	QPSK	1860.0	-12.70	1 / 50	25.20	12.50	17.783	33.01	-20.51
		1880.0	-12.70	1 / 50	24.91	12.21	16.634	33.01	-20.80
		1900.0	-12.70	1 / 50	25.13	12.43	17.498	33.01	-20.58
	16-QAM	1900.0	-12.70	1 / 50	24.70	12.00	15.849	33.01	-21.01

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

FCC ID: BCG-A3328	 PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n25

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
5 MHz	$\pi/2$ BPSK	1852.5	-12.70	1 / 0	25.20	12.50	17.783	33.01	-20.51
		1882.5	-12.70	1 / 23	25.04	12.34	17.140	33.01	-20.67
		1912.5	-12.70	1 / 12	25.18	12.48	17.701	33.01	-20.53
	QPSK	1852.5	-12.70	1 / 23	24.88	12.18	16.520	33.01	-20.83
		1882.5	-12.70	1 / 0	25.18	12.48	17.701	33.01	-20.53
		1912.5	-12.70	1 / 12	25.15	12.45	17.579	33.01	-20.56
	16-QAM	1852.5	-12.70	1 / 0	24.18	11.48	14.060	33.01	-21.53
	64-QAM	1882.5	-12.70	1 / 23	23.15	10.45	11.092	33.01	-22.56
10 MHz	$\pi/2$ BPSK	1855.0	-12.70	1 / 48	24.95	12.25	16.788	33.01	-20.76
		1882.5	-12.70	1 / 25	25.20	12.50	17.783	33.01	-20.51
		1910.0	-12.70	1 / 0	25.08	12.38	17.298	33.01	-20.63
	QPSK	1855.0	-12.70	1 / 0	25.04	12.34	17.140	33.01	-20.67
		1882.5	-12.70	1 / 0	25.13	12.43	17.498	33.01	-20.58
		1910.0	-12.70	1 / 25	25.12	12.42	17.458	33.01	-20.59
	16-QAM	1910.0	-12.70	1 / 0	24.21	11.51	14.158	33.01	-21.50
	64-QAM	1882.5	-12.70	1 / 48	23.13	10.43	11.041	33.01	-22.58
15 MHz	$\pi/2$ BPSK	1857.5	-12.70	1 / 73	25.18	12.48	17.701	33.01	-20.53
		1882.5	-12.70	1 / 0	25.20	12.50	17.783	33.01	-20.51
		1907.5	-12.70	1 / 0	25.17	12.47	17.660	33.01	-20.54
	QPSK	1857.5	-12.70	1 / 0	25.03	12.33	17.100	33.01	-20.68
		1882.5	-12.70	1 / 73	24.93	12.23	16.711	33.01	-20.78
		1907.5	-12.70	1 / 37	24.99	12.29	16.943	33.01	-20.72
	16-QAM	1907.5	-12.70	1 / 37	24.22	11.52	14.191	33.01	-21.49
	64-QAM	1882.5	-12.70	1 / 37	23.20	10.50	11.220	33.01	-22.51
20 MHz	$\pi/2$ BPSK	1860.0	-12.70	1 / 50	24.92	12.22	16.672	33.01	-20.79
		1882.5	-12.70	1 / 50	25.20	12.50	17.783	33.01	-20.51
		1905.0	-12.70	1 / 0	25.09	12.39	17.338	33.01	-20.62
	QPSK	1860.0	-12.70	1 / 98	25.15	12.45	17.579	33.01	-20.56
		1882.5	-12.70	1 / 98	25.17	12.47	17.660	33.01	-20.54
		1905.0	-12.70	1 / 98	25.15	12.45	17.579	33.01	-20.56
	16-QAM	1905.0	-12.70	1 / 98	24.09	11.39	13.772	33.01	-21.62
	64-QAM	1905.0	-12.70	1 / 0	23.13	10.43	11.041	33.01	-22.58

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


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NR Band n2

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
5 MHz	$\pi/2$ BPSK	1852.5	-12.70	1 / 12	25.14	12.44	17.539	33.01	-20.57
		1880.0	-12.70	1 / 23	24.87	12.17	16.482	33.01	-20.84
		1907.5	-12.70	1 / 0	25.20	12.50	17.783	33.01	-20.51
	QPSK	1852.5	-12.70	1 / 12	24.96	12.26	16.827	33.01	-20.75
		1880.0	-12.70	1 / 0	25.09	12.39	17.338	33.01	-20.62
		1907.5	-12.70	1 / 0	25.17	12.47	17.660	33.01	-20.54
	16-QAM	1907.5	-12.70	1 / 0	24.13	11.43	13.900	33.01	-21.58
	64-QAM	1880.0	-12.70	1 / 0	23.19	10.49	11.194	33.01	-22.52
10 MHz	$\pi/2$ BPSK	1855.0	-12.70	1 / 0	25.17	12.47	17.660	33.01	-20.54
		1880.0	-12.70	1 / 25	25.19	12.49	17.742	33.01	-20.52
		1905.0	-12.70	1 / 0	25.20	12.50	17.783	33.01	-20.51
	QPSK	1855.0	-12.70	1 / 0	25.19	12.49	17.742	33.01	-20.52
		1880.0	-12.70	1 / 0	25.15	12.45	17.579	33.01	-20.56
		1905.0	-12.70	1 / 48	25.19	12.49	17.742	33.01	-20.52
	16-QAM	1855.0	-12.70	1 / 48	24.13	11.43	13.900	33.01	-21.58
	64-QAM	1880.0	-12.70	1 / 25	23.15	10.45	11.092	33.01	-22.56
15 MHz	$\pi/2$ BPSK	1857.5	-12.70	1 / 73	25.05	12.35	17.179	33.01	-20.66
		1880.0	-12.70	1 / 0	25.01	12.31	17.022	33.01	-20.70
		1902.5	-12.70	1 / 37	25.15	12.45	17.579	33.01	-20.56
	QPSK	1857.5	-12.70	1 / 73	25.20	12.50	17.783	33.01	-20.51
		1880.0	-12.70	1 / 0	25.19	12.49	17.742	33.01	-20.52
		1902.5	-12.70	1 / 0	25.15	12.45	17.579	33.01	-20.56
	16-QAM	1857.5	-12.70	1 / 73	24.13	11.43	13.900	33.01	-21.58
	64-QAM	1880.0	-12.70	1 / 37	23.15	10.45	11.092	33.01	-22.56
20 MHz	$\pi/2$ BPSK	1860.0	-12.70	1 / 50	25.20	12.50	17.783	33.01	-20.51
		1880.0	-12.70	1 / 98	25.05	12.35	17.179	33.01	-20.66
		1900.0	-12.70	1 / 50	24.96	12.26	16.827	33.01	-20.75
	QPSK	1860.0	-12.70	1 / 98	24.96	12.26	16.827	33.01	-20.75
		1880.0	-12.70	1 / 0	24.95	12.25	16.788	33.01	-20.76
		1900.0	-12.70	1 / 98	25.16	12.46	17.620	33.01	-20.55
	16-QAM	1900.0	-12.70	1 / 98	24.17	11.47	14.028	33.01	-21.54
	64-QAM	1860.0	-12.70	1 / 0	23.15	10.45	11.092	33.01	-22.56

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

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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 $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

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

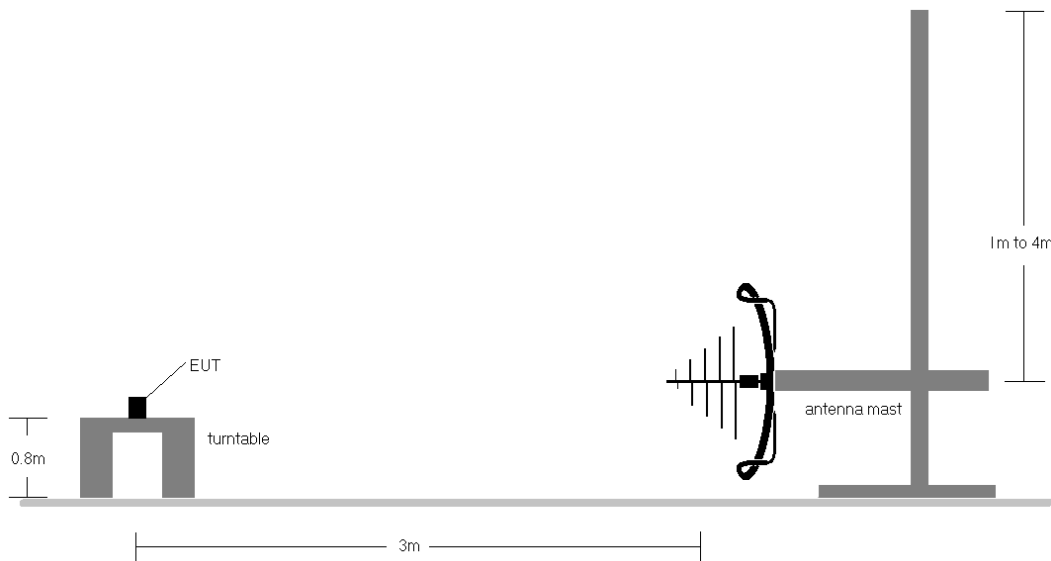


Figure 7-11. Test Instrument & Measurement Setup < 1GHz

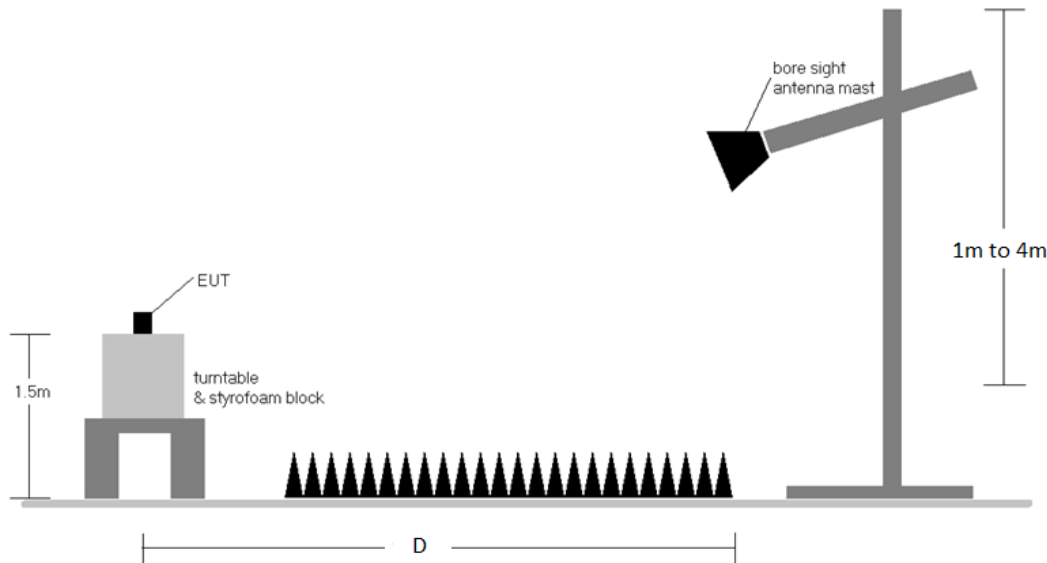




Figure 7-12. Test Instrument & Measurement Setup >1 GHz

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Test Notes

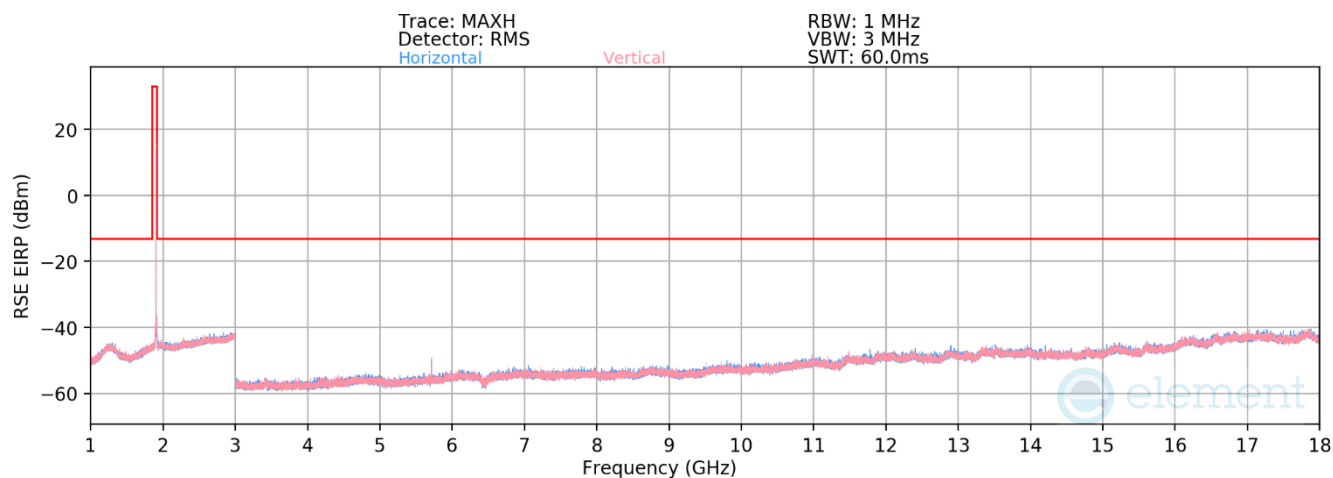
1. Field strengths are calculated using the Measurement quantity conversions in KDB 971168 D01 v03r01 Section 5.8.4.
 - a. $E(\text{dB}\mu\text{V/m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - b. $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V/m}) + 20\log D - 104.8$; 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. No significant emissions were found for below 1GHz and Above 18GHz measurement.
7. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
8. 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.
9. 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.

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7.7.1 Antenna FCM – Radiated Spurious Emission Measurement

LTE Band 25/2



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

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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	168	240	-77.75	3.40	32.65	-62.61	-13.00	-49.61
5580.0	H	312	312	-70.95	6.74	42.78	-52.48	-13.00	-39.48
7440.0	H	-	-	-80.24	8.66	35.42	-59.84	-13.00	-46.84
9300.0	H	-	-	-80.57	9.74	36.17	-59.09	-13.00	-46.09
11160.0	V	-	-	-82.03	13.73	38.70	-56.55	-13.00	-43.55

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	114	94	-77.44	3.24	32.80	-62.46	-13.00	-49.46
5647.5	H	110	132	-69.98	6.91	43.94	-51.32	-13.00	-38.32
7530.0	H	-	-	-79.73	8.48	35.75	-59.51	-13.00	-46.51
9412.5	H	-	-	-80.27	9.69	36.42	-58.84	-13.00	-45.84
11295.0	H	-	-	-81.86	13.50	38.64	-56.62	-13.00	-43.62

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	-	-	-77.73	2.99	32.25	-63.01	-13.00	-50.01
5715.00	H	305	131	-67.33	7.39	47.07	-48.19	-13.00	-35.19
7620.00	V	-	-	-80.59	8.88	35.29	-59.97	-13.00	-46.97
9525.00	H	-	-	-80.18	10.06	36.88	-58.38	-13.00	-45.38
11430.00	H	-	-	-83.38	15.79	39.42	-55.84	-13.00	-42.84

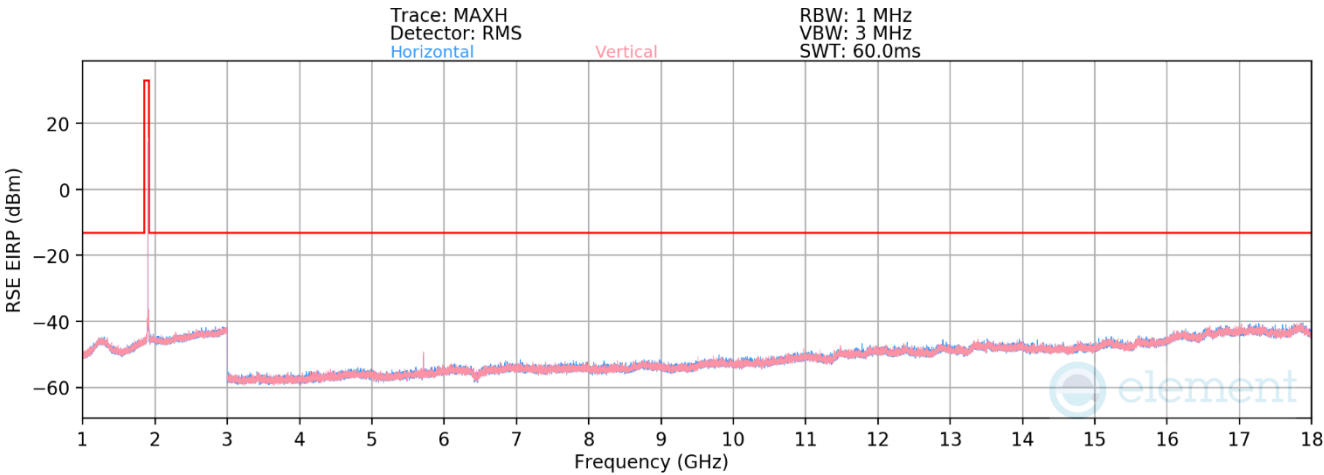
Table 7-8. Antenna FCM Radiated Spurious Data (LTE Band 25/2 – High Channel)

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NR Band n25/n2



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

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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	-	-	-78.11	3.35	32.24	-63.02	-13.00	-50.02
5580.0	H	-	-	-79.33	6.74	34.41	-60.85	-13.00	-47.85
7440.0	H	-	-	-79.86	8.48	35.62	-59.63	-13.00	-46.63

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	-	-	-77.87	3.24	32.37	-62.88	-13.00	-49.88
5647.5	H	299	124	-74.30	6.91	39.61	-55.65	-13.00	-42.65
7530.0	H	-	-	-79.90	8.48	35.58	-59.68	-13.00	-46.68
9412.5	H	-	-	-80.27	9.63	36.37	-58.89	-13.00	-45.89
11295.0	H	-	-	-81.92	13.50	38.58	-56.68	-13.00	-43.68

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	-	-	-77.39	2.99	32.61	-62.65	-13.00	-49.65
5715.0	H	109	109	-74.24	7.39	40.15	-55.10	-13.00	-42.10
7620.0	H	-	-	-80.37	8.88	35.51	-59.75	-13.00	-46.75
9525.0	H	-	-	-80.11	10.13	37.02	-58.24	-13.00	-45.24
11430.0	H	-	-	-81.58	14.40	39.82	-55.44	-13.00	-42.44

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

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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.

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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.

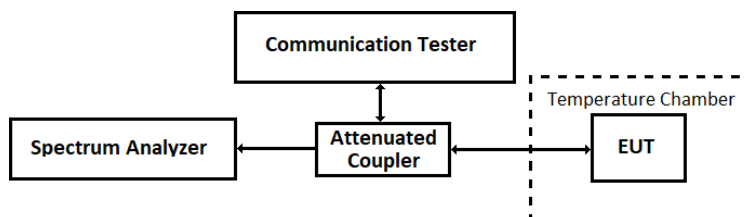


Figure 7-13. LTE Test Instrument & Measurement Setup

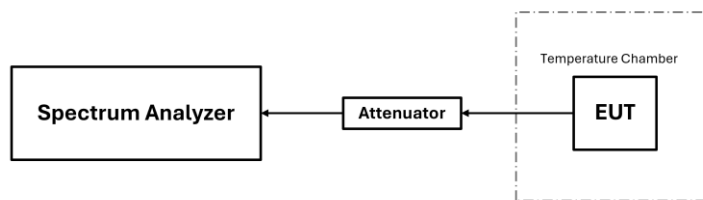



Figure 7-14. FR1 Test Instrument & Measurement Setup

Test Notes

N/A

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Frequency Stability / Temperature Variation

LTE B25/2				
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	1.85033970	-0.00033970
		- 20	1.85045390	-0.00045390
		- 10	1.85078060	-0.00078060
		0	1.85021980	-0.00021980
		+ 10	1.85037460	-0.00037460
		+ 20 (Ref)	1.85050890	-0.00050890
		+ 30	1.85047220	-0.00047220
		+ 40	1.85046140	-0.00046140
		+ 50	1.85072880	-0.00072880
Battery Endpoint	3.40	+ 20	1.85096670	-0.00096670

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

LTE B25/2				
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	1.91406030	-0.00093970
		- 20	1.91406460	-0.00093540
		- 10	1.91420890	-0.00079110
		0	1.91407820	-0.00092180
		+ 10	1.91422340	-0.00077660
		+ 20 (Ref)	1.91444590	-0.00055410
		+ 30	1.91439160	-0.00060840
		+ 40	1.91437130	-0.00062870
		+ 50	1.91448980	-0.00051020
Battery Endpoint	3.40	+ 20	1.91442010	-0.00057990

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

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Frequency Stability / Temperature Variation

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	1.85091790	-0.00091790
		- 20	1.85041910	-0.00041910
		- 10	1.85049830	-0.00049830
		0	1.85056510	-0.00056510
		+ 10	1.85080670	-0.00080670
		+ 20 (Ref)	1.85099630	-0.00099630
		+ 30	1.85098810	-0.00098810
		+ 40	1.85067770	-0.00067770
		+ 50	1.85045640	-0.00045640
Battery Endpoint	3.40	+ 20	1.85081310	-0.00081310

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	1.91445380	-0.00054620
		- 20	1.91469700	-0.00030300
		- 10	1.91470770	-0.00029230
		0	1.91434580	-0.00065420
		+ 10	1.91421900	-0.00078100
		+ 20 (Ref)	1.91439080	-0.00060920
		+ 30	1.91483770	-0.00016230
		+ 40	1.91485740	-0.00014260
		+ 50	1.91460080	-0.00039920
Battery Endpoint	3.40	+ 20	1.91474160	-0.00025840


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

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Apple **Watch** **FCC ID: BCG-A3328** complies with all the requirements of Part 24 of the FCC rules.

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