7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

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

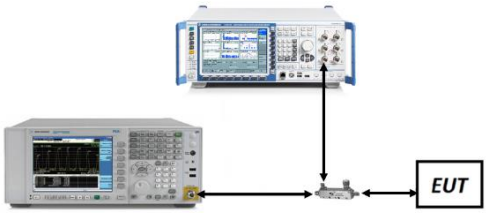
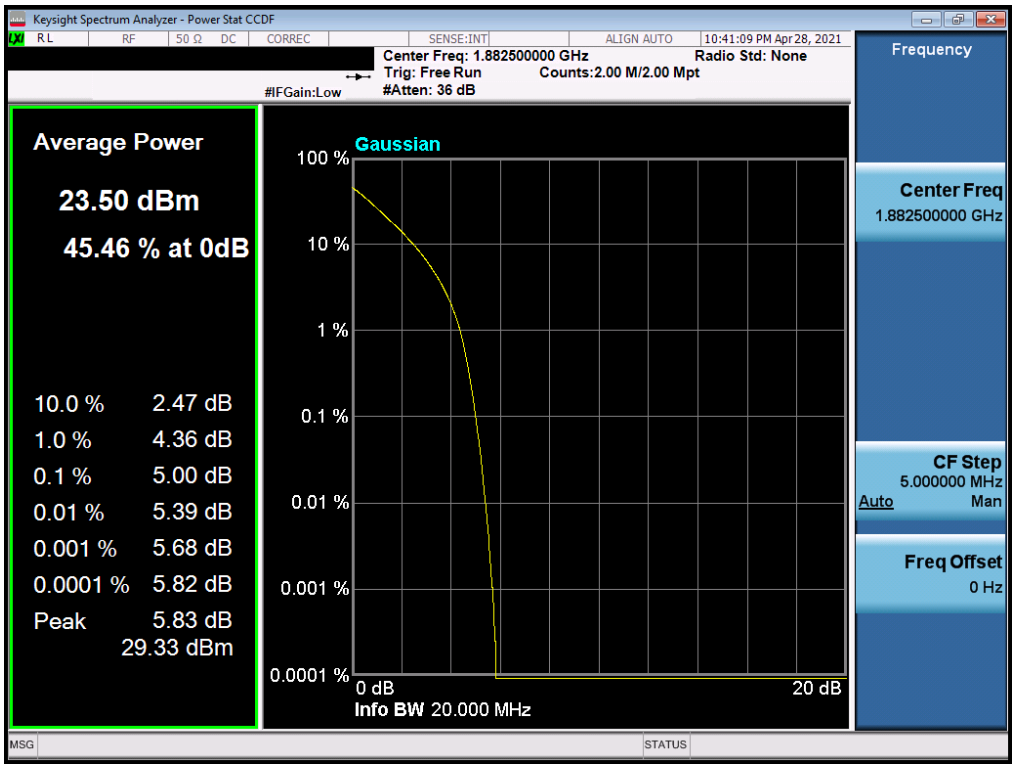


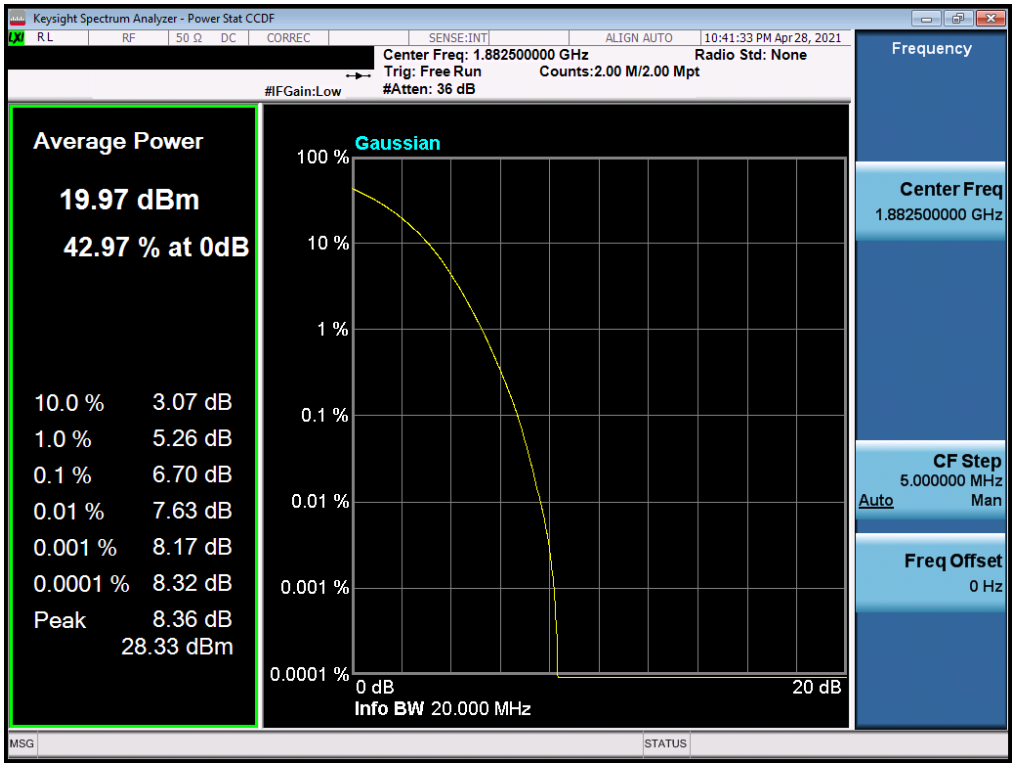
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

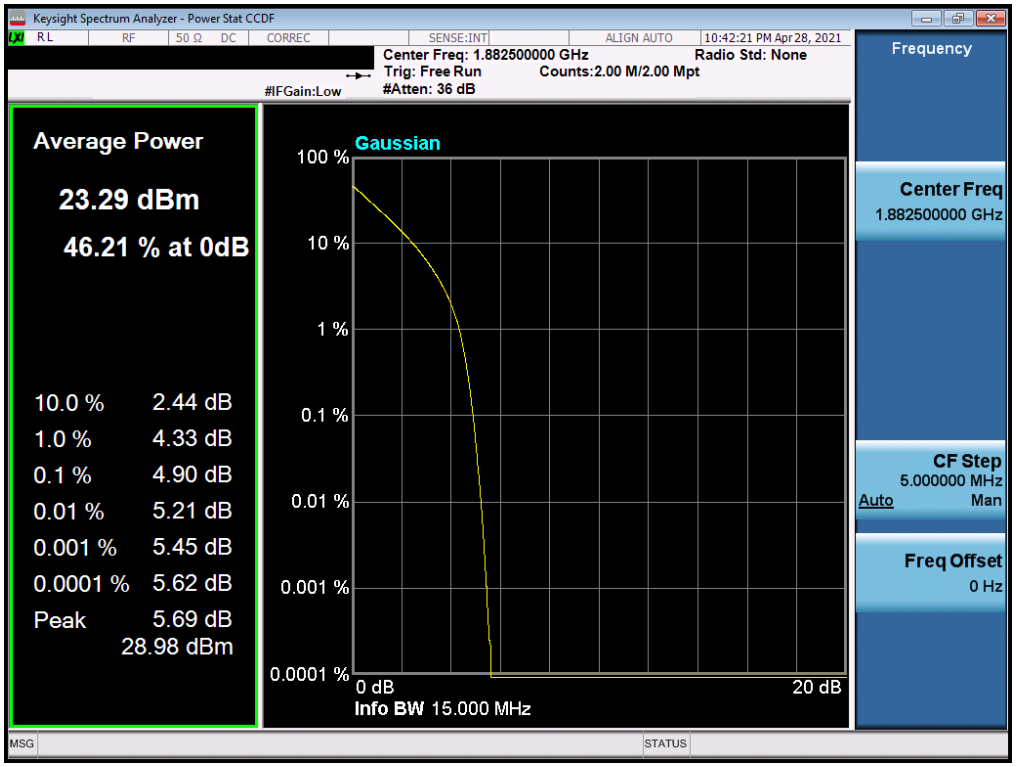
Among the PAR measurements for 16QAM, 64QAM, and 256QAM, it was determined that 256QAM exhibited the highest PAR.



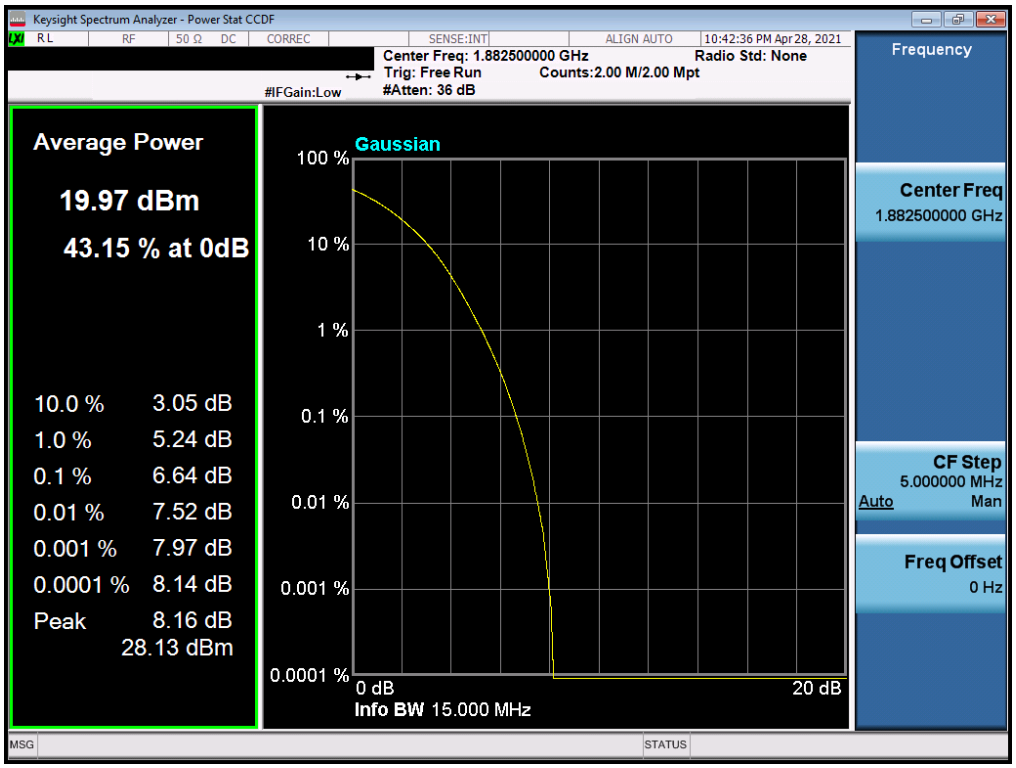
Plot 7-231. PAR Plot (LTE Band 25/2 - 20MHz QPSK - Full RB)



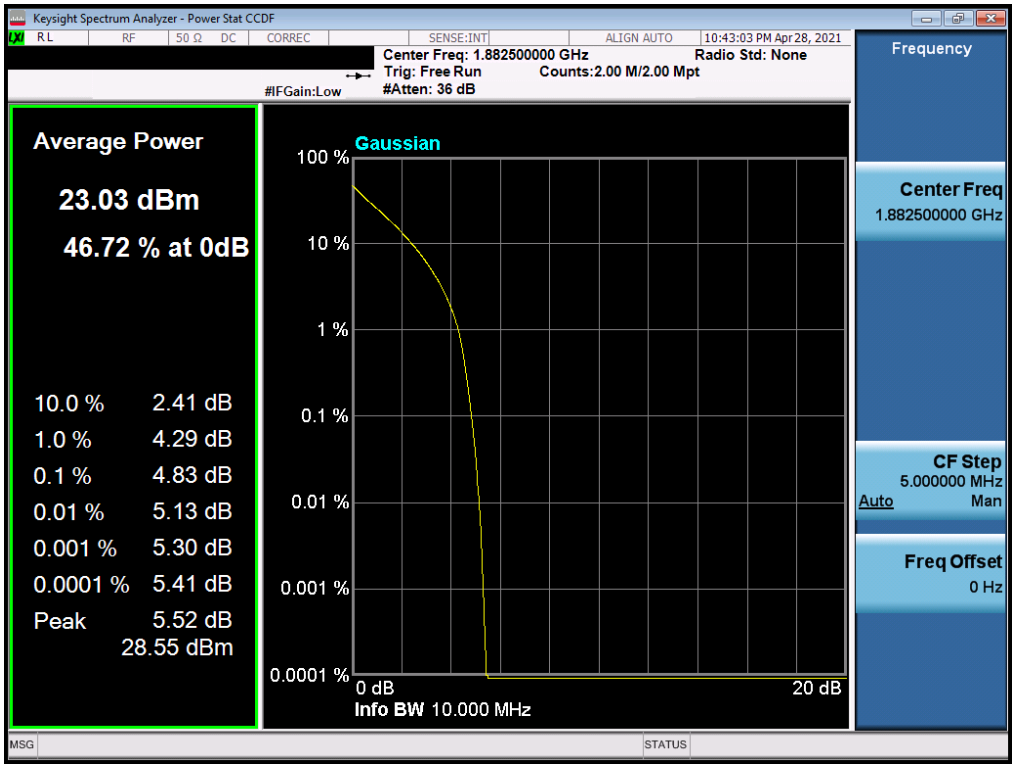
Plot 7-232. PAR Plot (LTE Band 25/2 - 20MHz 256-QAM - Full RB)



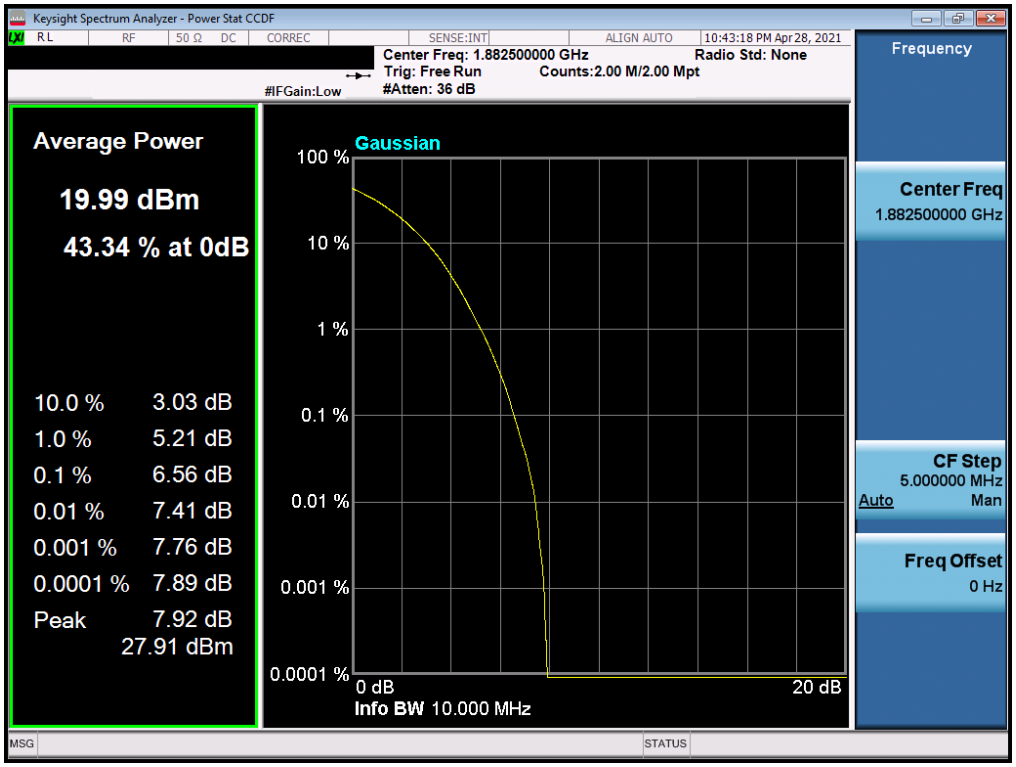
Plot 7-233. PAR Plot (LTE Band 25/2 - 15MHz QPSK - Full RB)



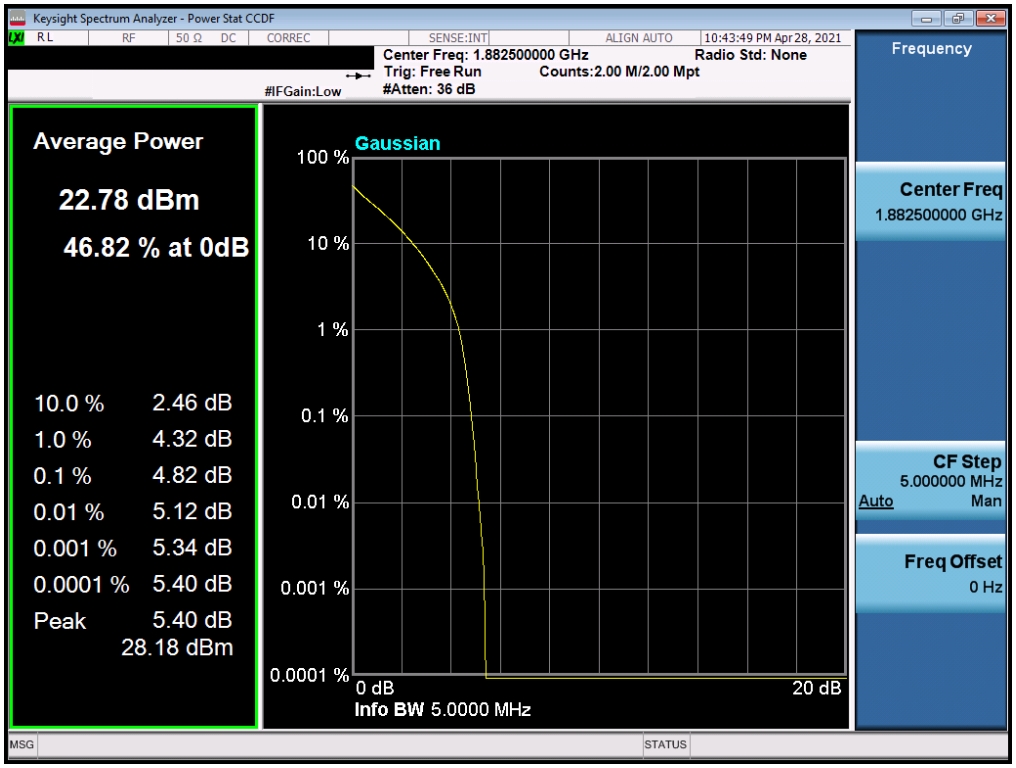
Plot 7-234. PAR Plot (LTE Band 25/2 - 15MHz 256-QAM - Full RB)



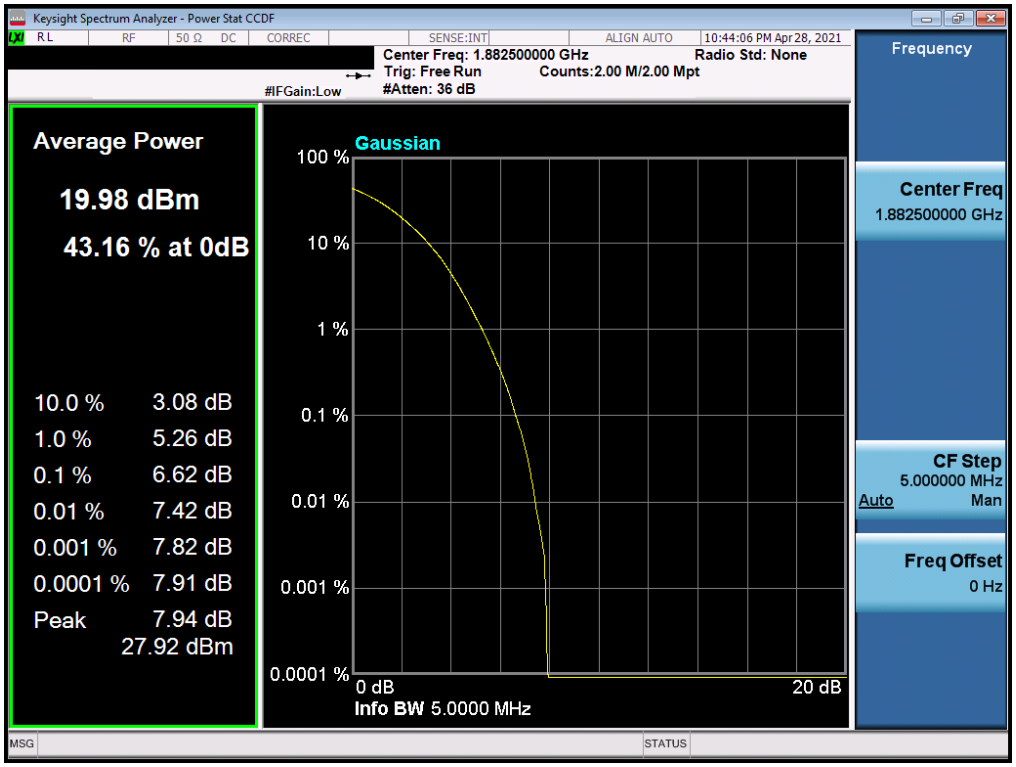
Plot 7-235. PAR Plot (LTE Band 25/2 - 10MHz QPSK - Full RB)



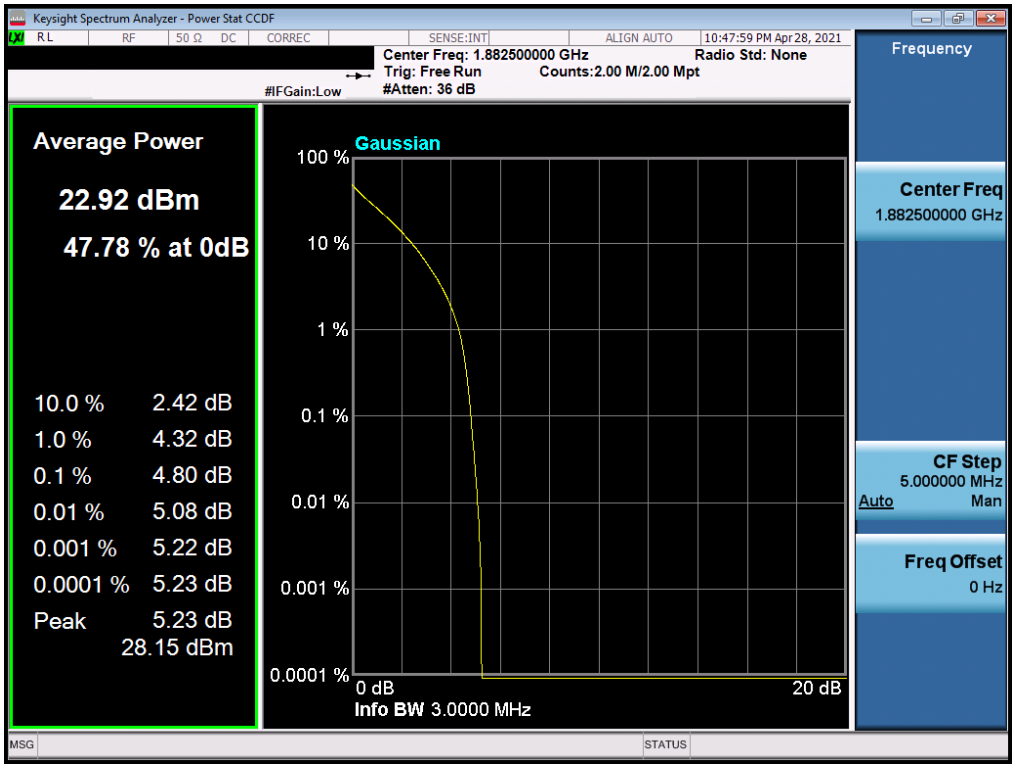
Plot 7-236. PAR Plot (LTE Band 25/2 - 10MHz 256-QAM - Full RB)



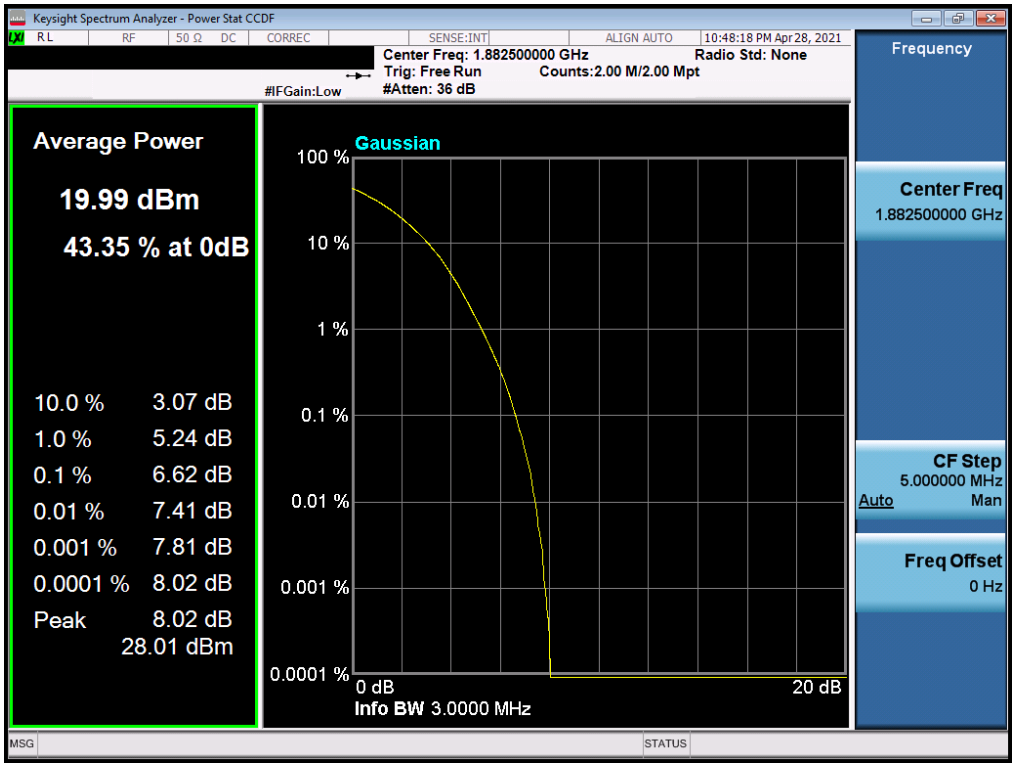
Plot 7-237. PAR Plot (LTE Band 25/2 - 5MHz QPSK - Full RB)



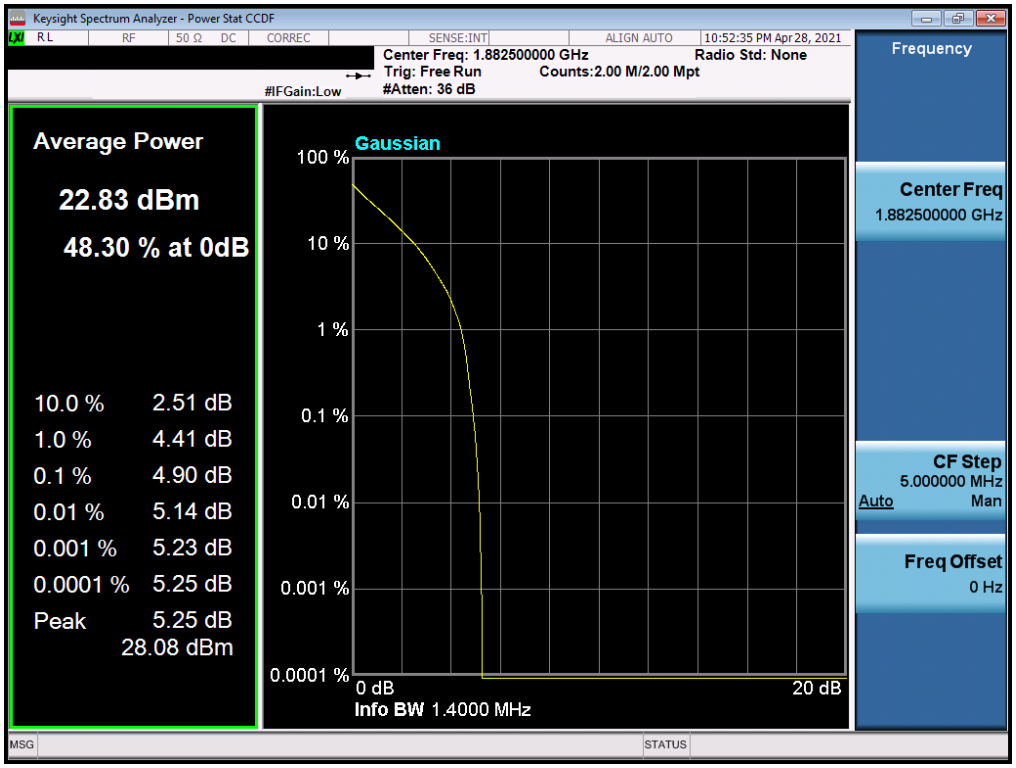
Plot 7-238. PAR Plot (LTE Band 25/2 - 5MHz 256-QAM - Full RB)



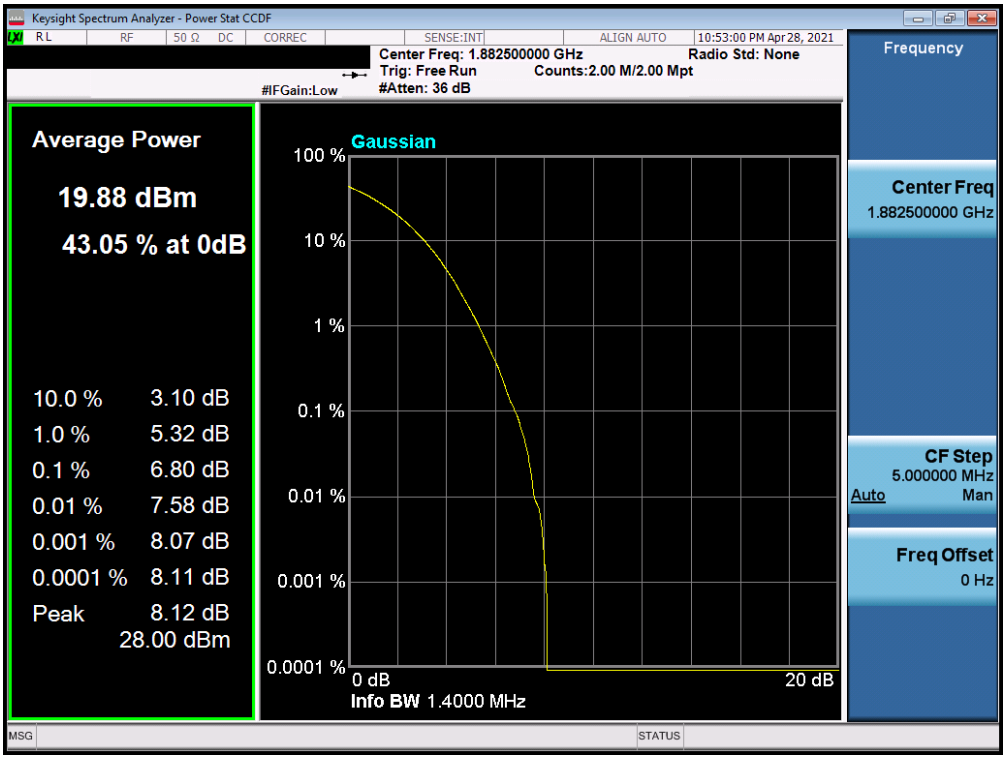
Plot 7-239. PAR Plot (LTE Band 25/2 - 3MHz QPSK - Full RB)



Plot 7-240. PAR Plot (LTE Band 25/2 - 3MHz 256-QAM - Full RB)

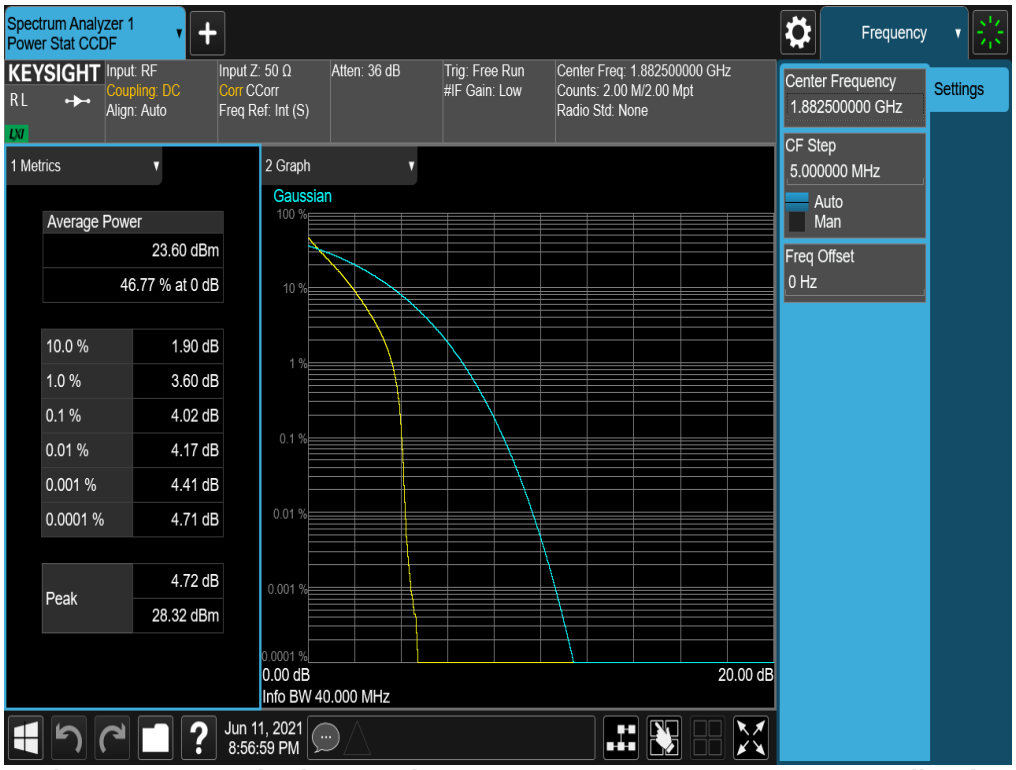


Plot 7-241. PAR Plot (LTE Band 25/2 - 1.4MHz QPSK - Full RB)



Plot 7-242. PAR Plot (LTE Band 25/2 - 1.4MHz 256-QAM - Full RB)

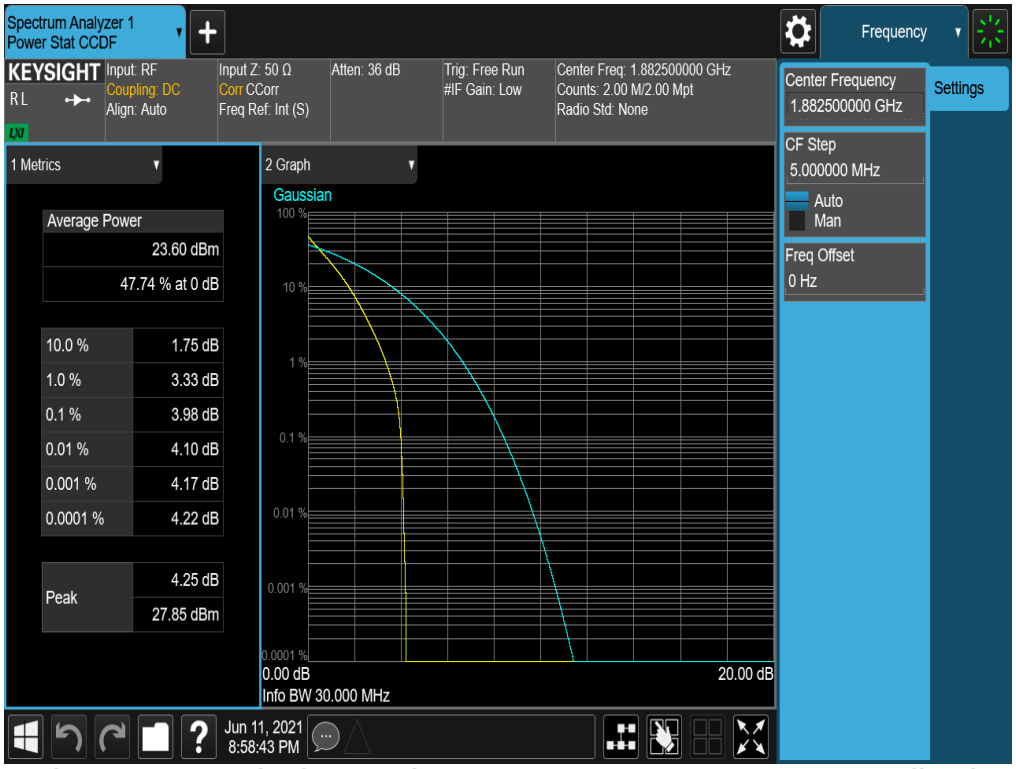
n25/2– Ant A



Plot 7-243. PAR Plot (NR Band n25 - 40.0MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-244. PAR Plot (NR Band n25 - 40.0MHz CP-OFDM QPSK - Full RB)

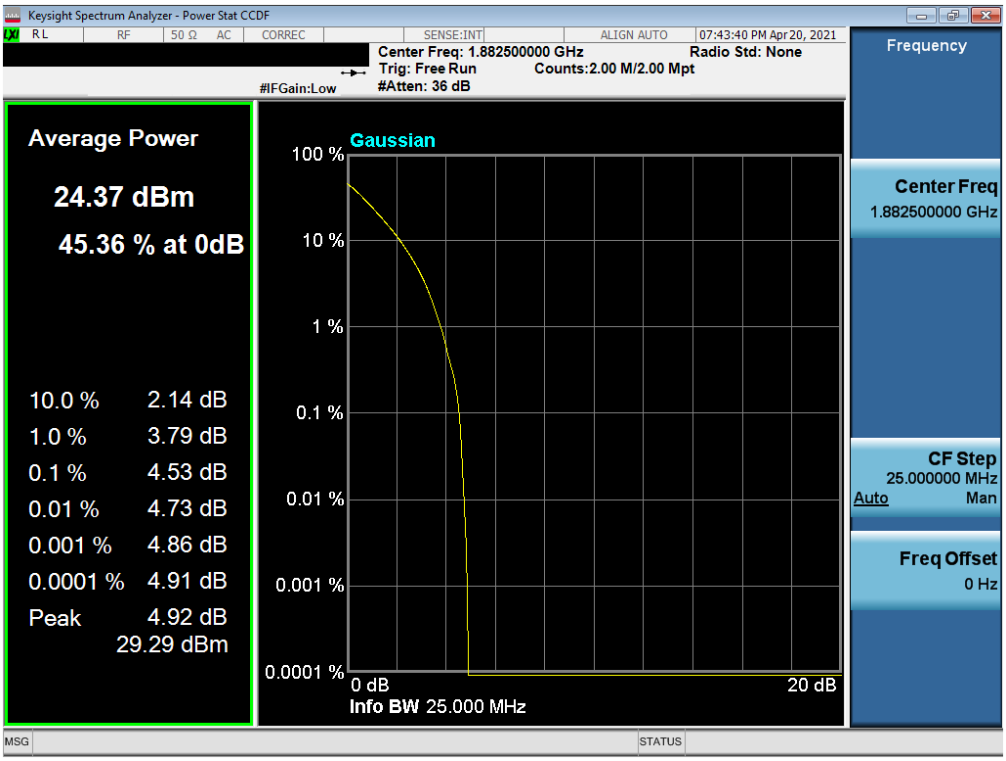
Plot 7-245. PAR Plot (NR Band n25 - 40.0MHz CP-OFDM 256-QAM - Full RB)



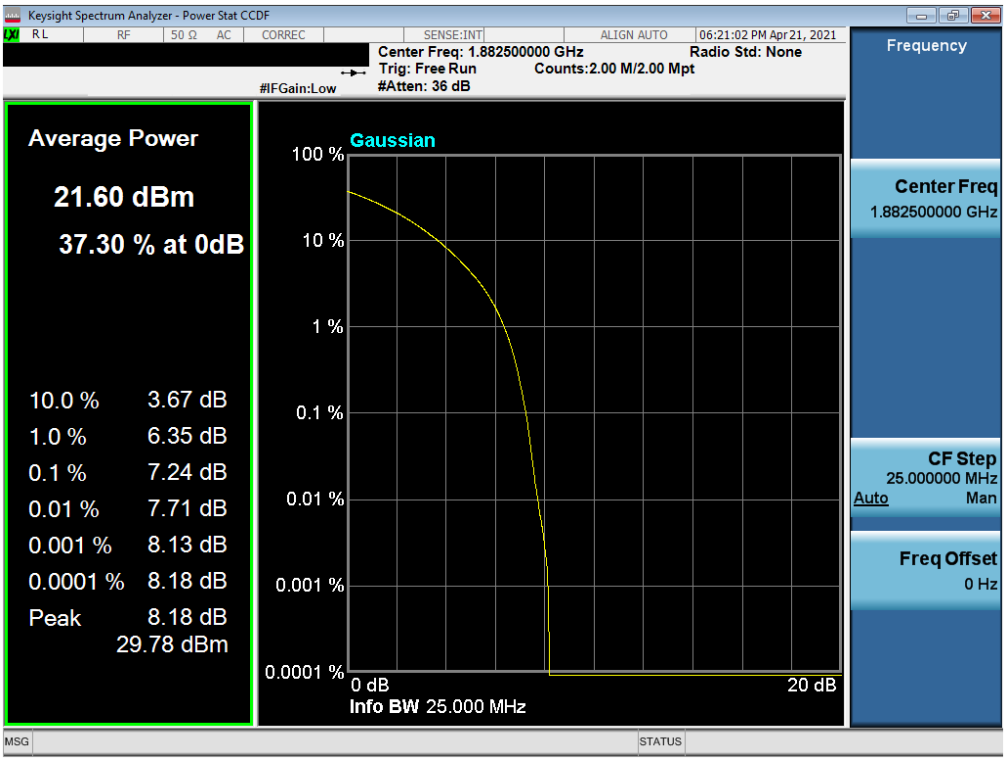
Plot 7-246. PAR Plot (NR Band n25 - 30.0MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-247. PAR Plot (NR Band n25 - 30.0MHz CP-OFDM QPSK - Full RB)

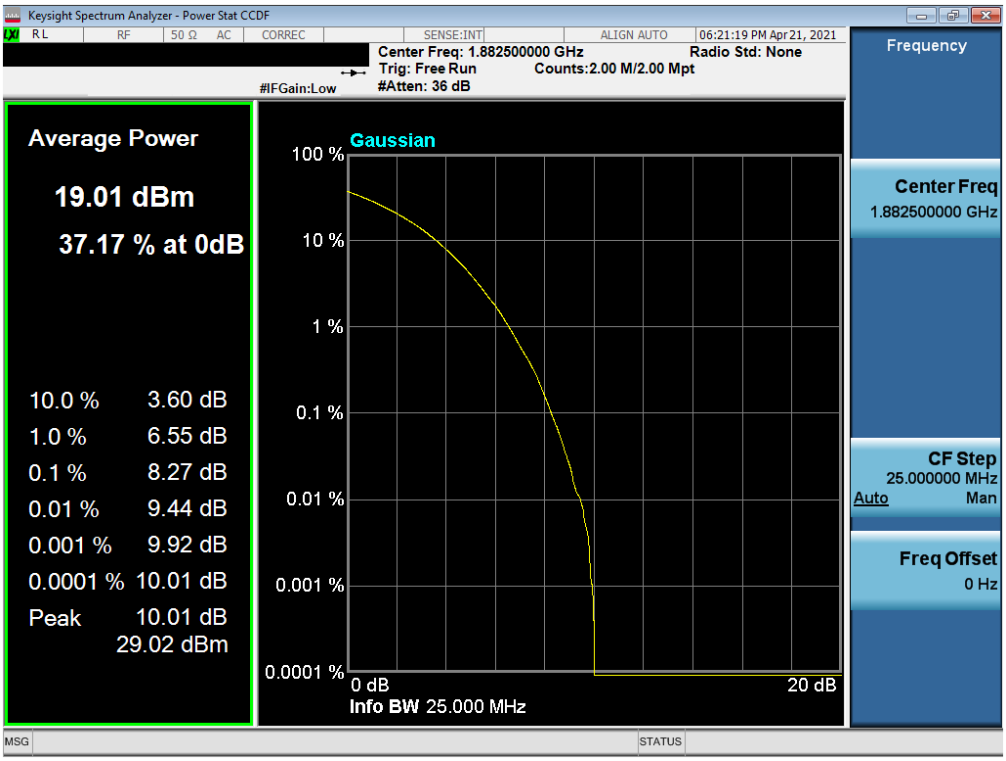
Plot 7-248. PAR Plot (NR Band n25 - 30.0MHz CP-OFDM 256-QAM - Full RB)



Plot 7-249. PAR Plot (NR Band n25 - 25.0MHz DFT-s-OFDM BPSK - Full RB)

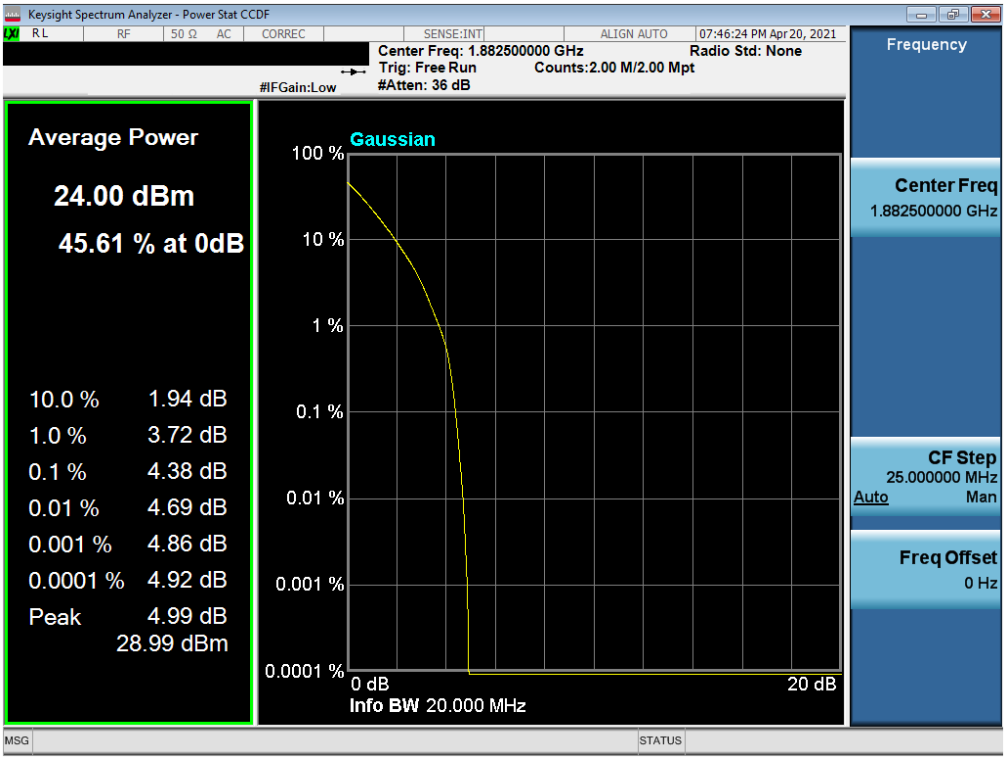


Plot 7-250. PAR Plot (NR Band n25 - 25.0MHz CP-OFDM QPSK - Full RB)

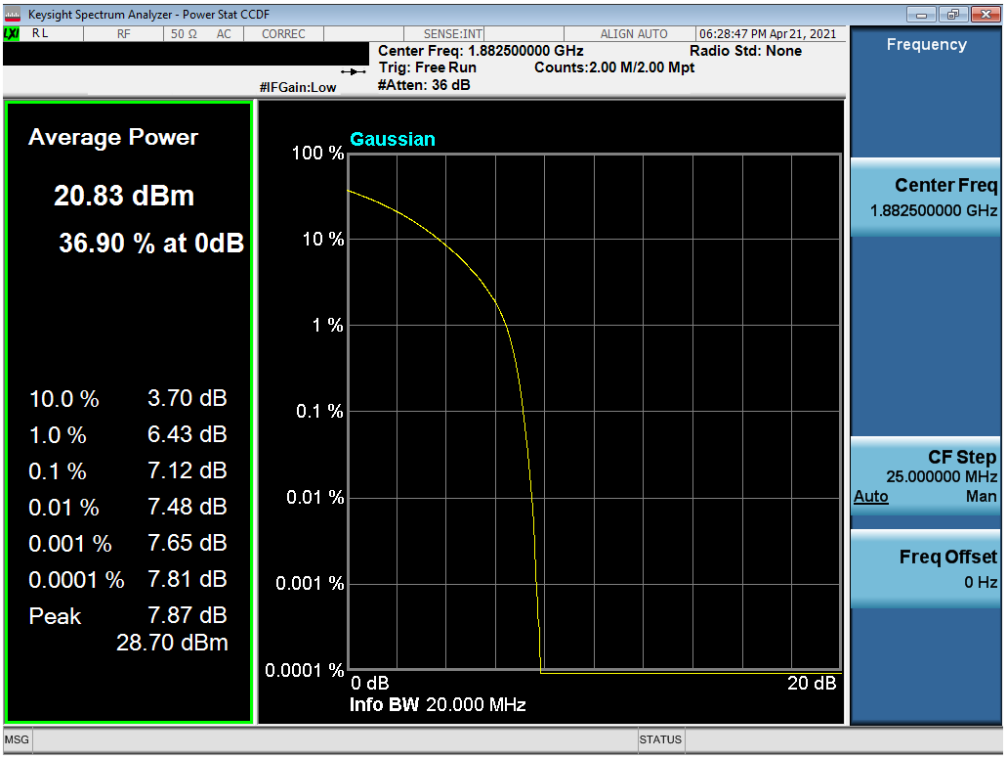


Plot 7-251. PAR Plot (NR Band n25 - 25.0MHz CP-OFDM 256-QAM - Full RB)

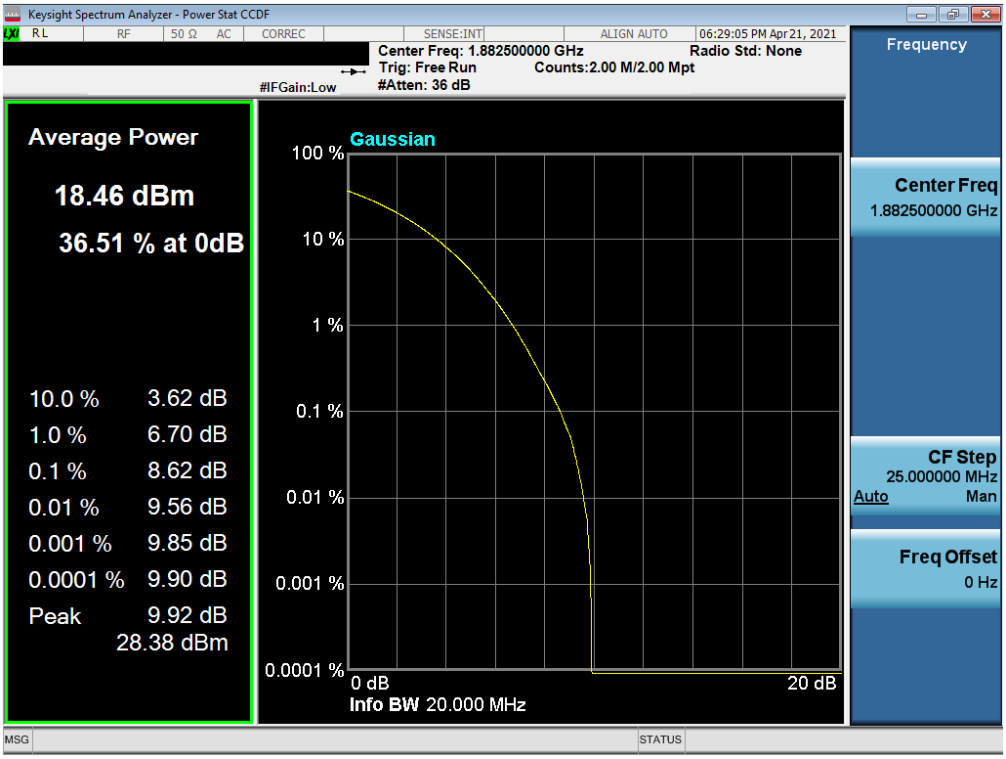
NR Band n25/2 – Ant A



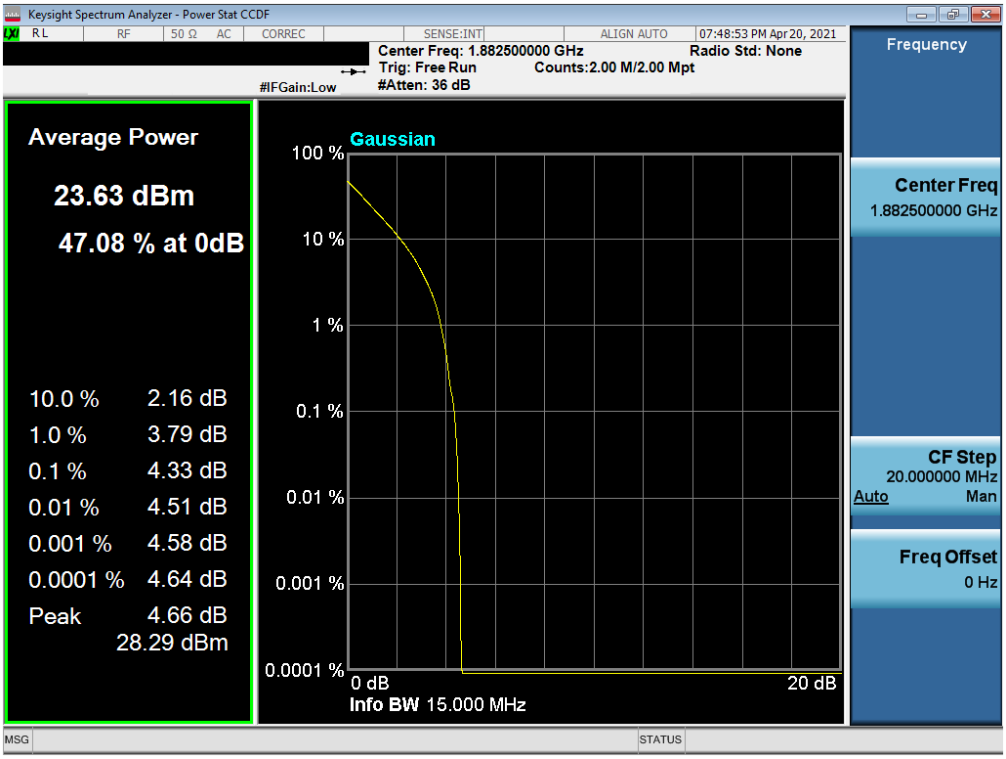
Plot 7-252. PAR Plot (NR Band n25/2 - 20.0MHz DFT-s-OFDM BPSK - Full RB)



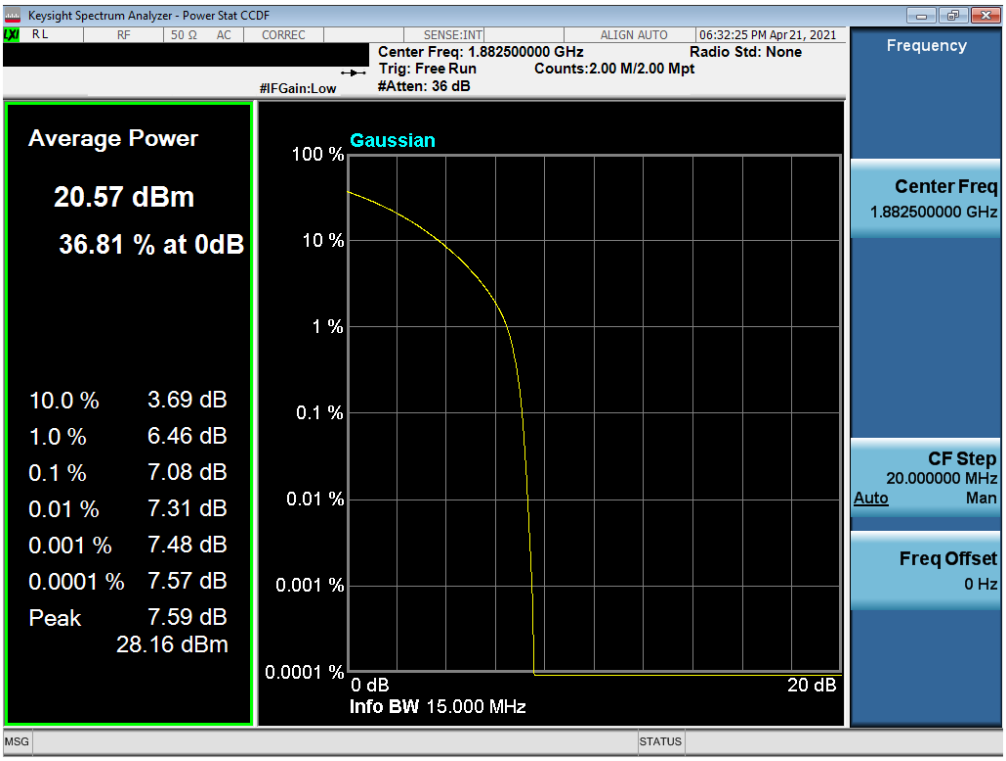
Plot 7-253. PAR Plot (NR Band n25/2 - 20.0MHz CP-OFDM QPSK - Full RB)



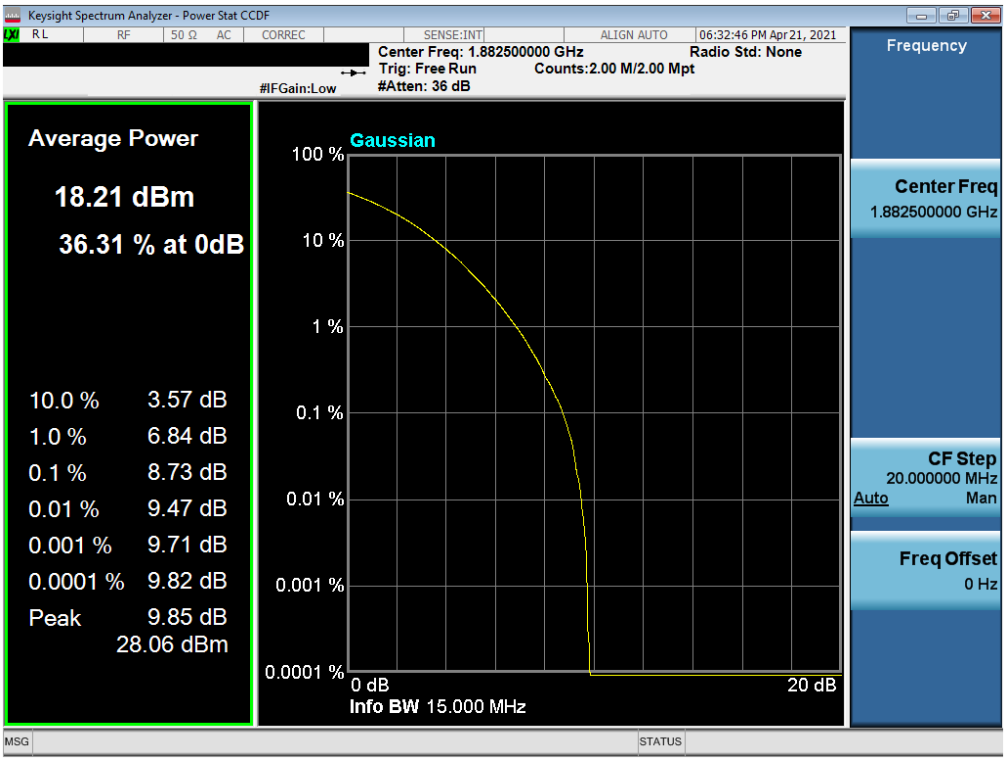
Plot 7-254. PAR Plot (NR Band n25/2 - 20.0MHz CP-OFDM 256-QAM - Full RB)



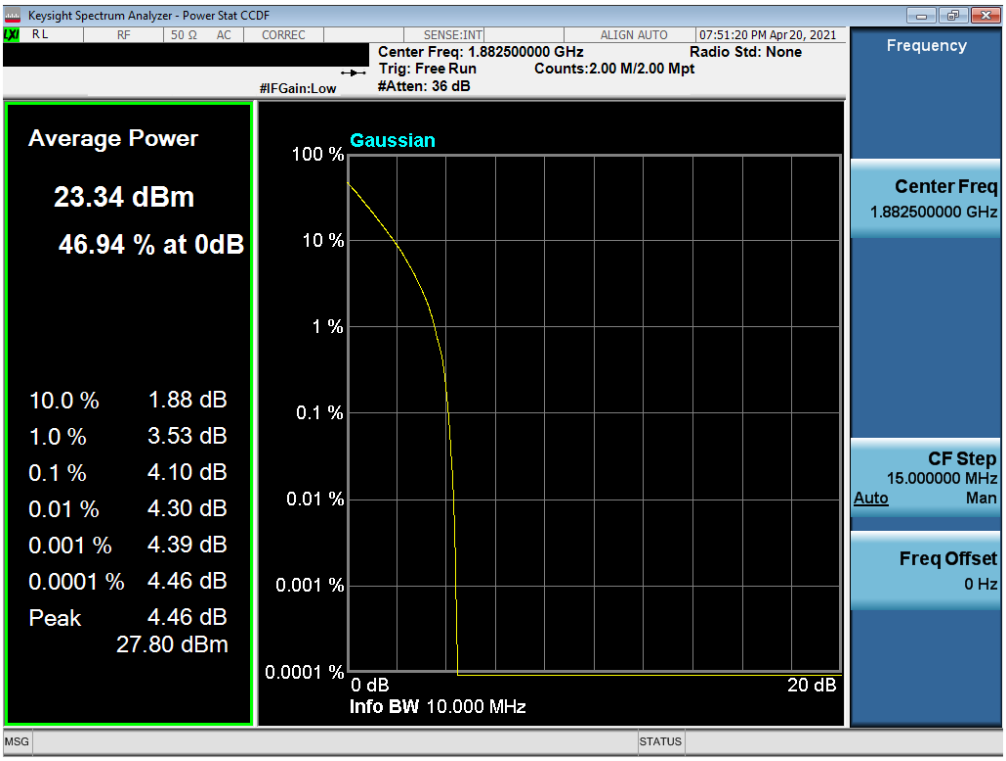
Plot 7-255. PAR Plot (NR Band n25/2 - 15.0MHz DFT-s-OFDM BPSK - Full RB)



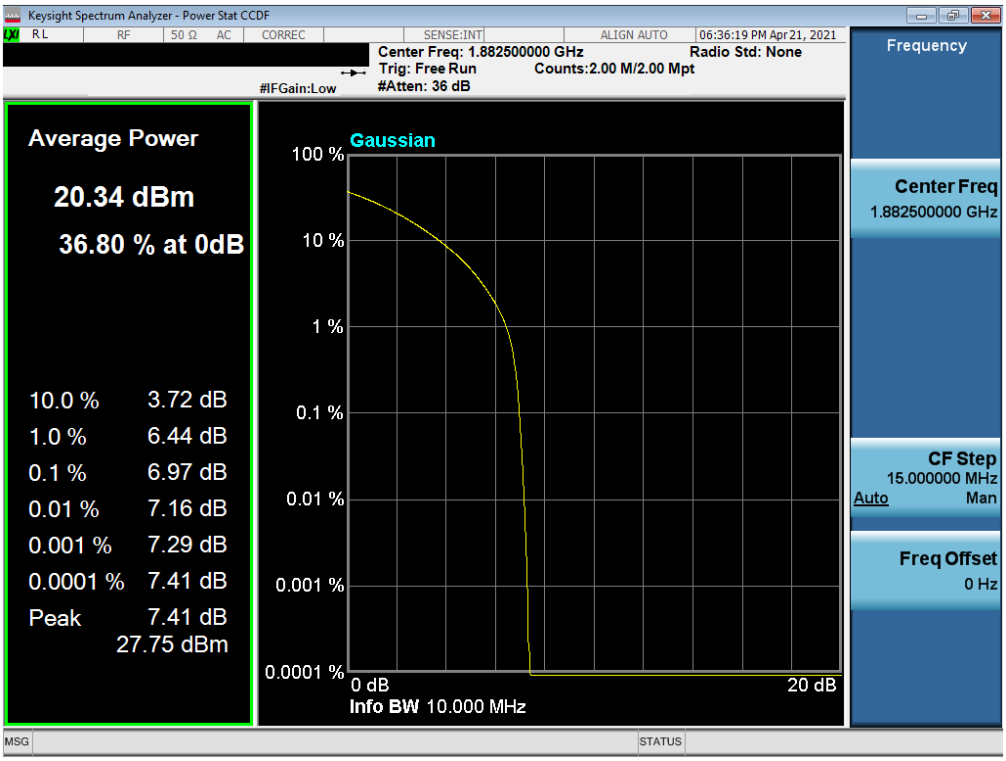
Plot 7-256. PAR Plot (NR Band n25/2 - 15.0MHz CP-OFDM QPSK - Full RB)



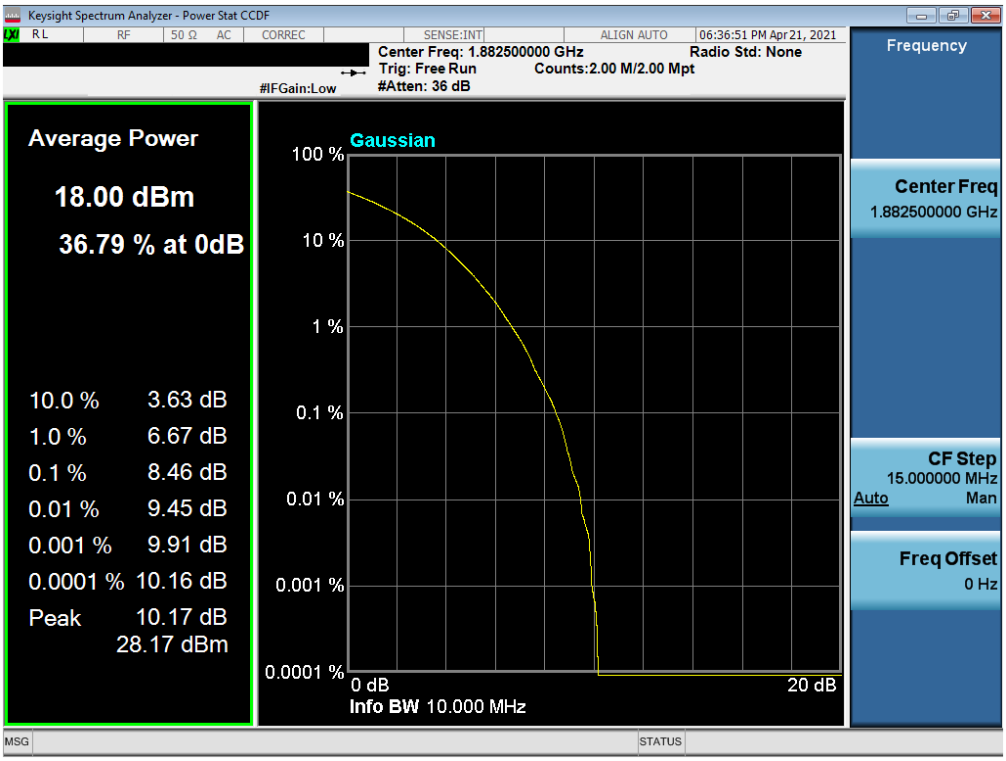
Plot 7-257. PAR Plot (NR Band n25/2 - 15.0MHz CP-OFDM 256-QAM - Full RB)



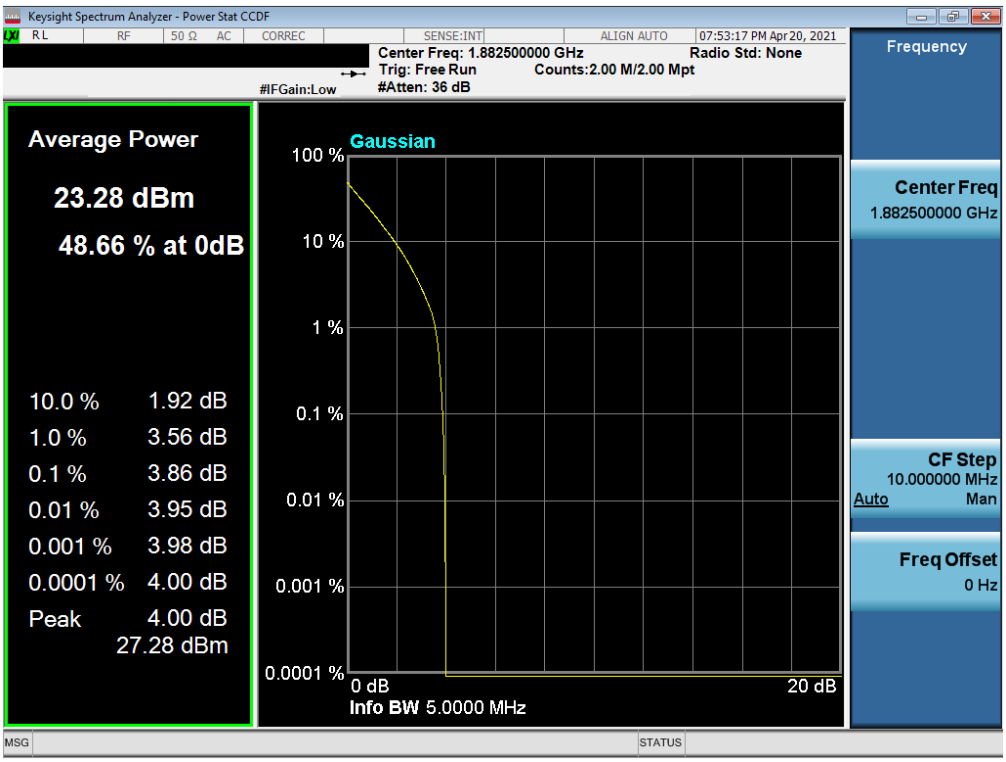
Plot 7-258. PAR Plot (NR Band n25/2 - 10.0MHz DFT-s-OFDM BPSK - Full RB)



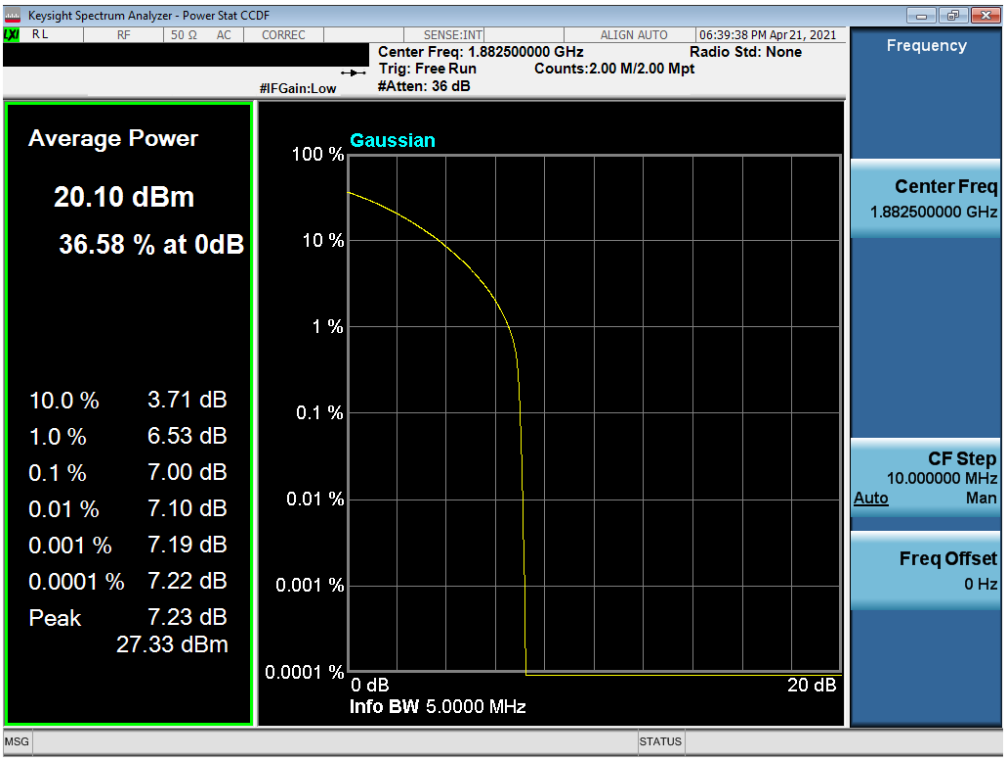
Plot 7-259. PAR Plot (NR Band n25/2 - 10.0MHz CP-OFDM QPSK - Full RB)



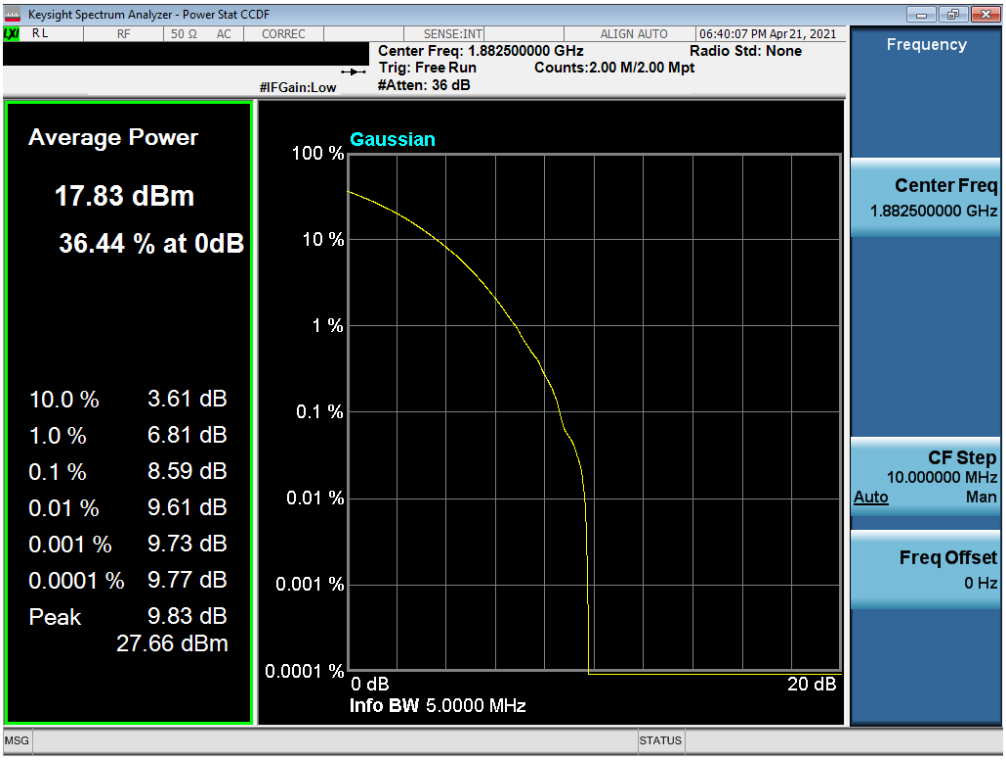
Plot 7-260. PAR Plot (NR Band n25/2 - 10.0MHz CP-OFDM 256-QAM - Full RB)



Plot 7-261. PAR Plot (NR Band n25/2 - 5.0MHz DFT-s-OFDM BPSK - Full RB)

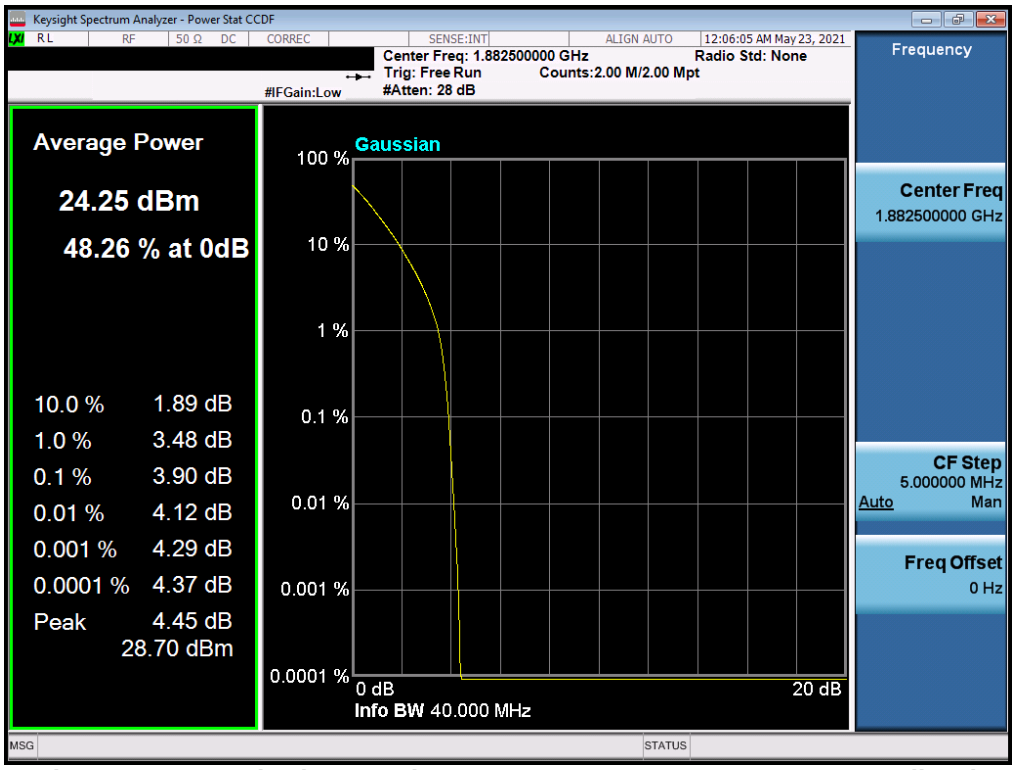


Plot 7-262. PAR Plot (NR Band n25/2 - 5.0MHz CP-OFDM QPSK - Full RB)

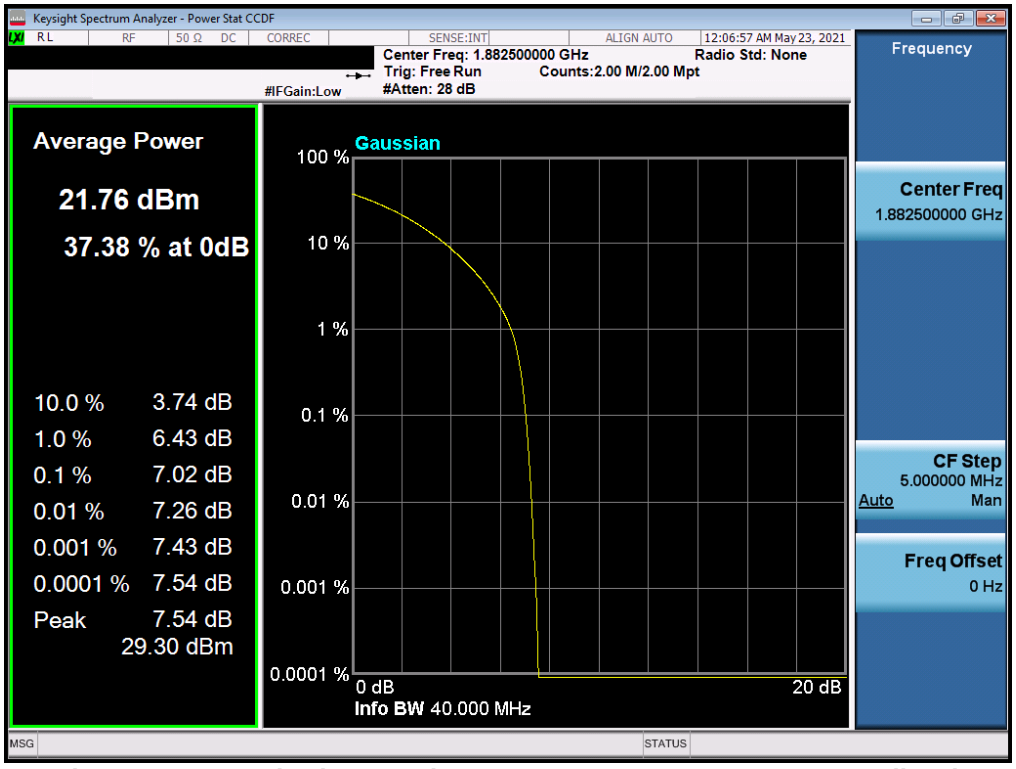


Plot 7-263. PAR Plot (NR Band n25/2 - 5.0MHz CP-OFDM 256-QAM - Full RB)

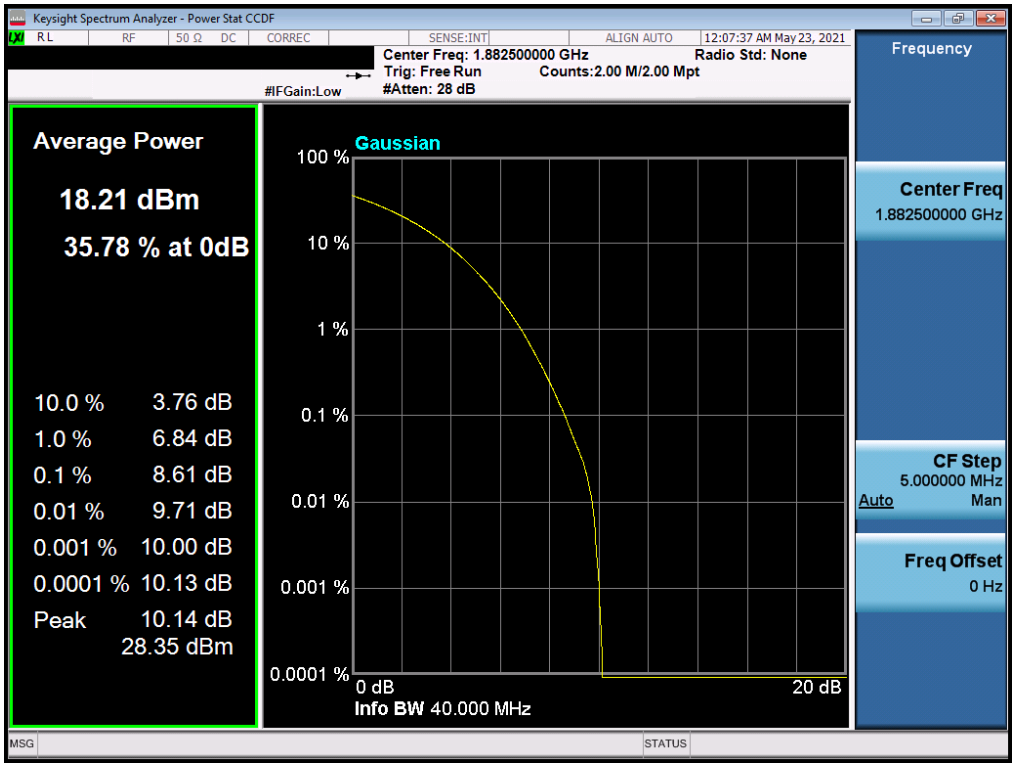
NR Band n25 – Ant I



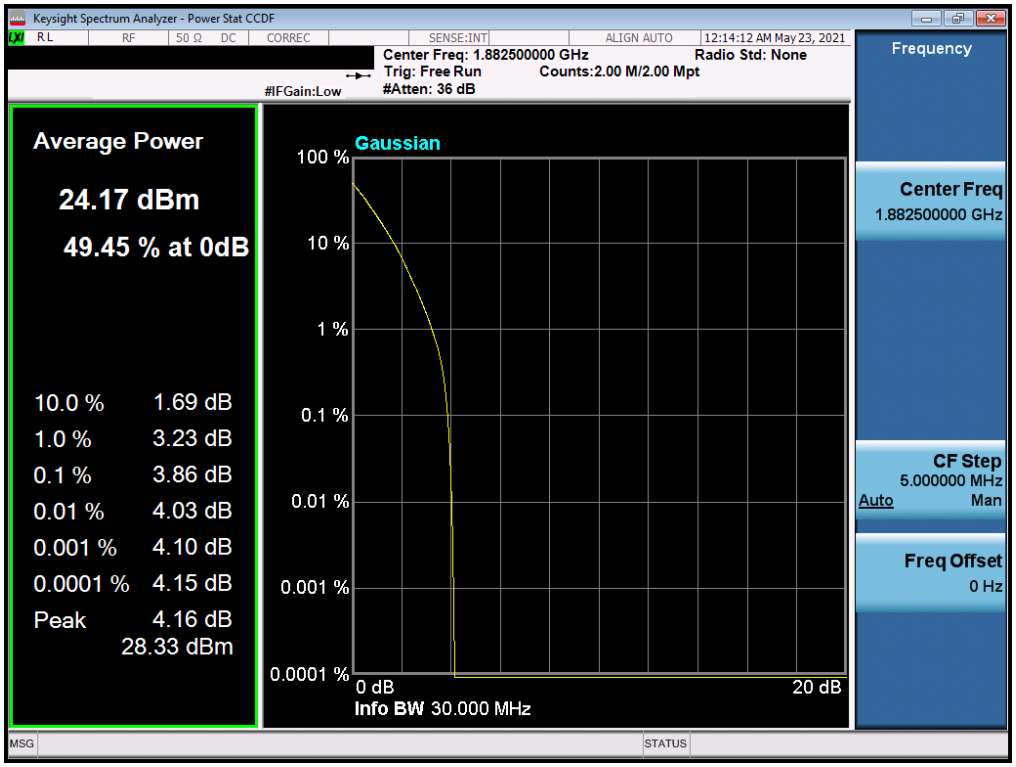
Plot 7-264. PAR Plot (NR Band n25 - 40.0MHz DFT-s-OFDM BPSK - Full RB)



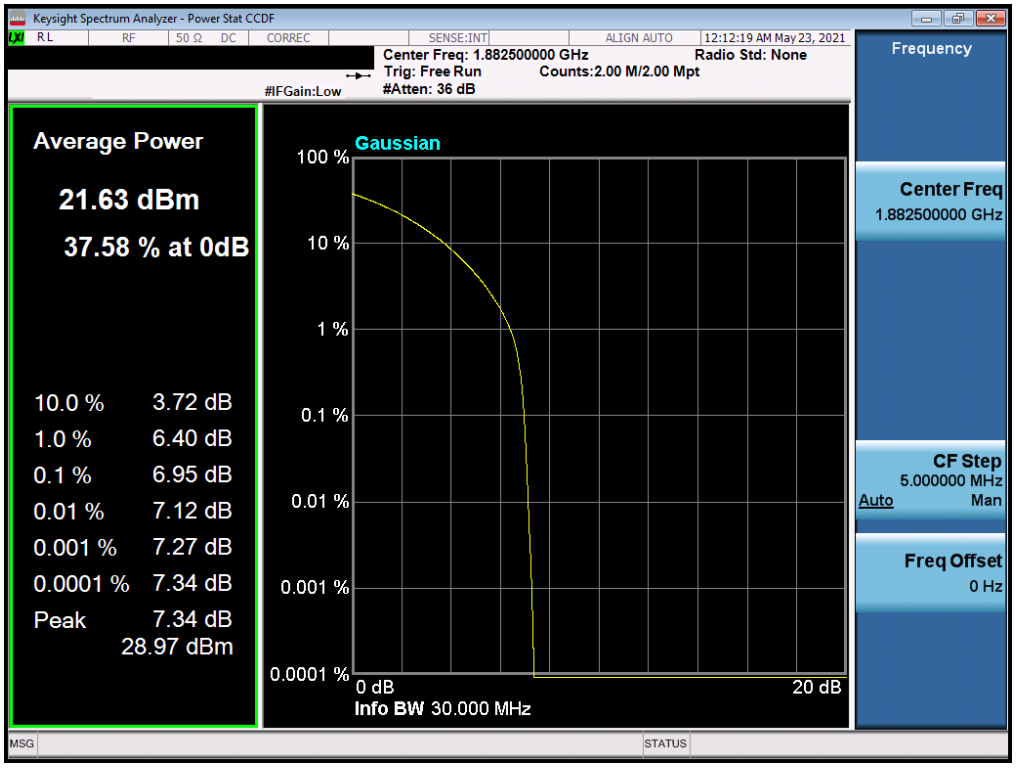
Plot 7-265. PAR Plot (NR Band n25 - 40.0MHz CP-OFDM QPSK - Full RB)



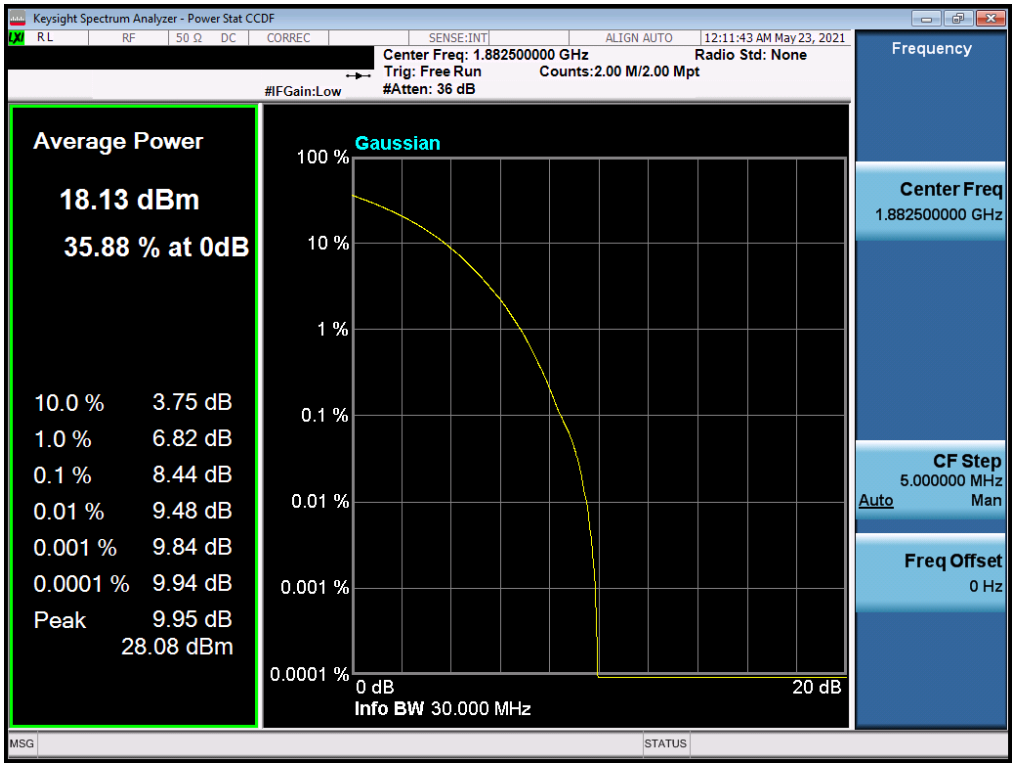
Plot 7-266. PAR Plot (NR Band n25 - 40.0MHz CP-OFDM 256-QAM - Full RB)



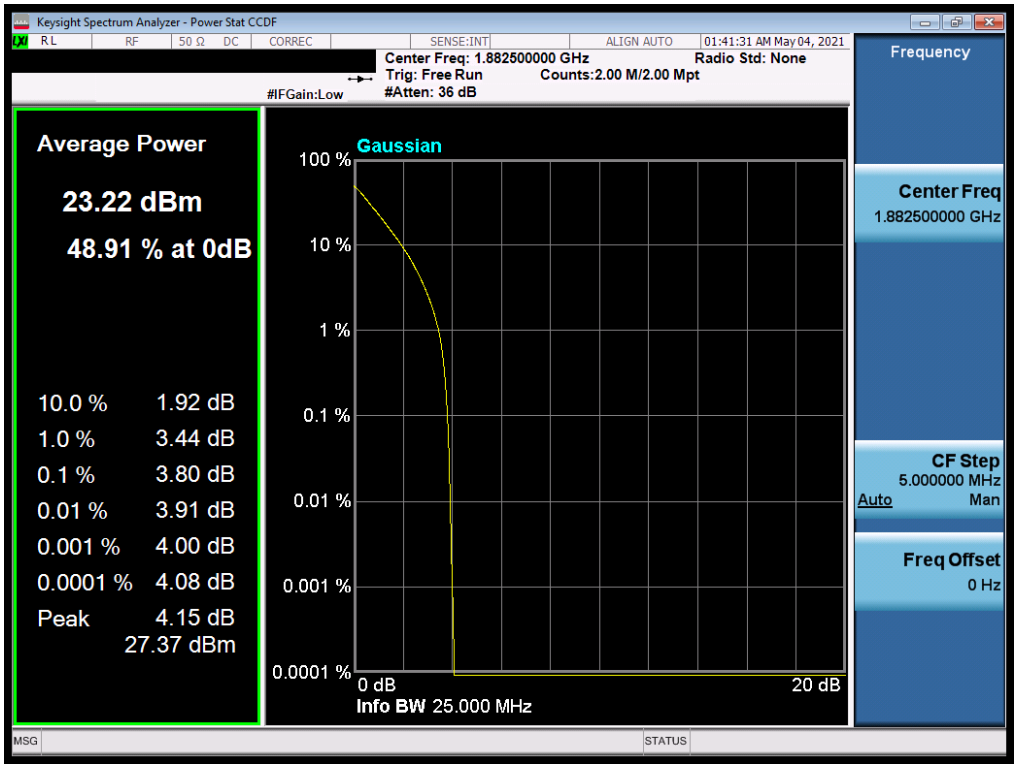
Plot 7-267. PAR Plot (NR Band n25 - 30.0MHz DFT-s-OFDM BPSK - Full RB)



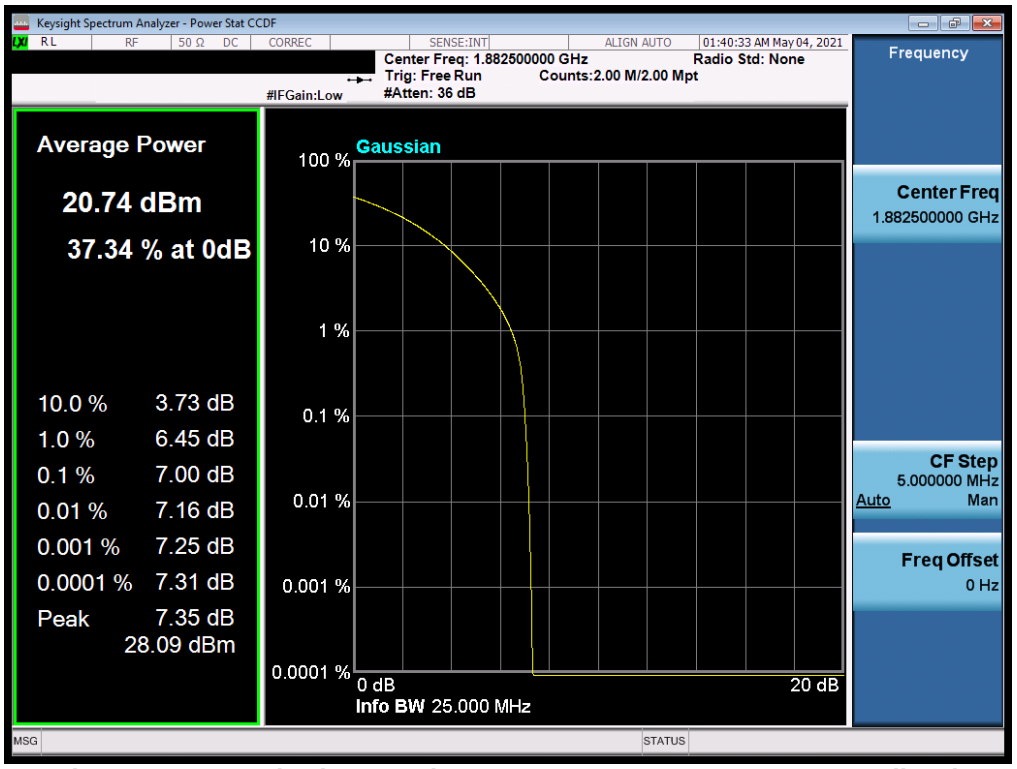
Plot 7-268. PAR Plot (NR Band n25 - 30.0MHz CP-OFDM QPSK - Full RB)



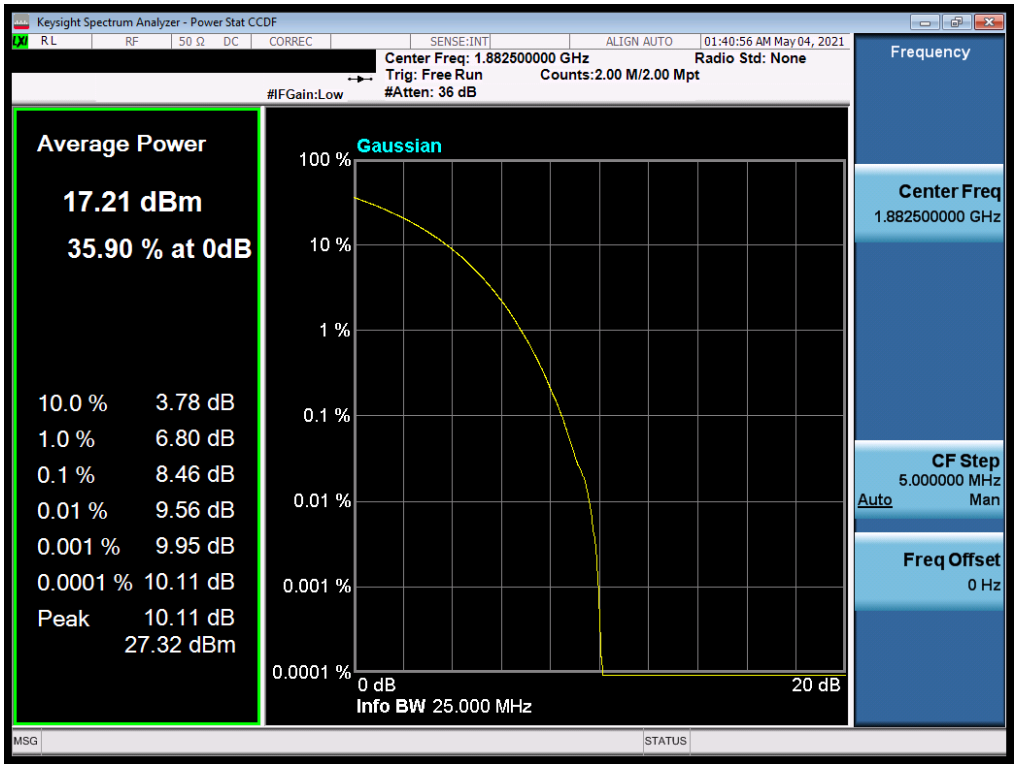
Plot 7-269. PAR Plot (NR Band n25 - 30.0MHz CP-OFDM 256-QAM - Full RB)



Plot 7-270. PAR Plot (NR Band n25 - 25.0MHz DFT-s-OFDM BPSK - Full RB)

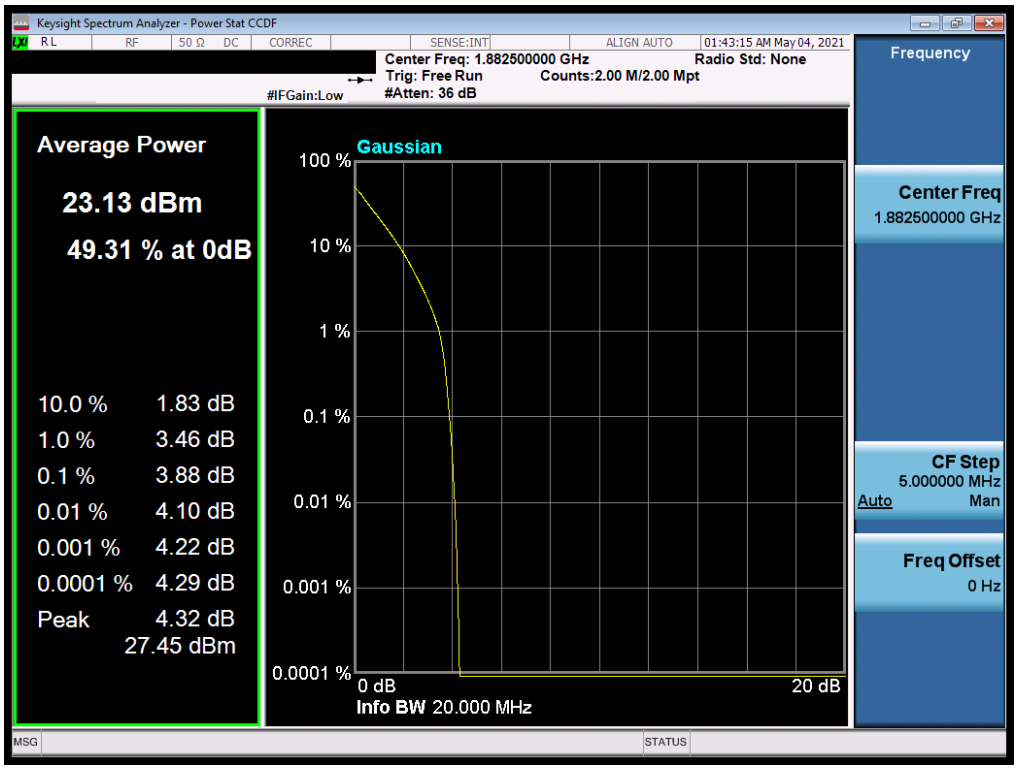


Plot 7-271. PAR Plot (NR Band n25 - 25.0MHz CP-OFDM QPSK - Full RB)

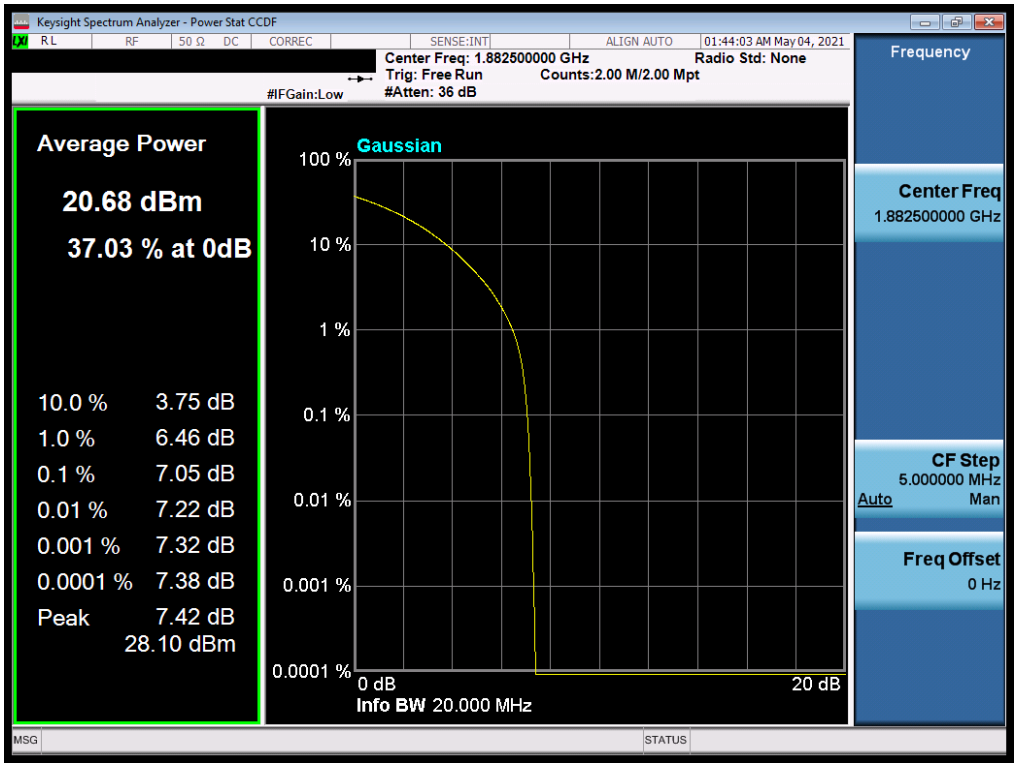


Plot 7-272. PAR Plot (NR Band n25 - 25.0MHz CP-OFDM 256-QAM - Full RB)

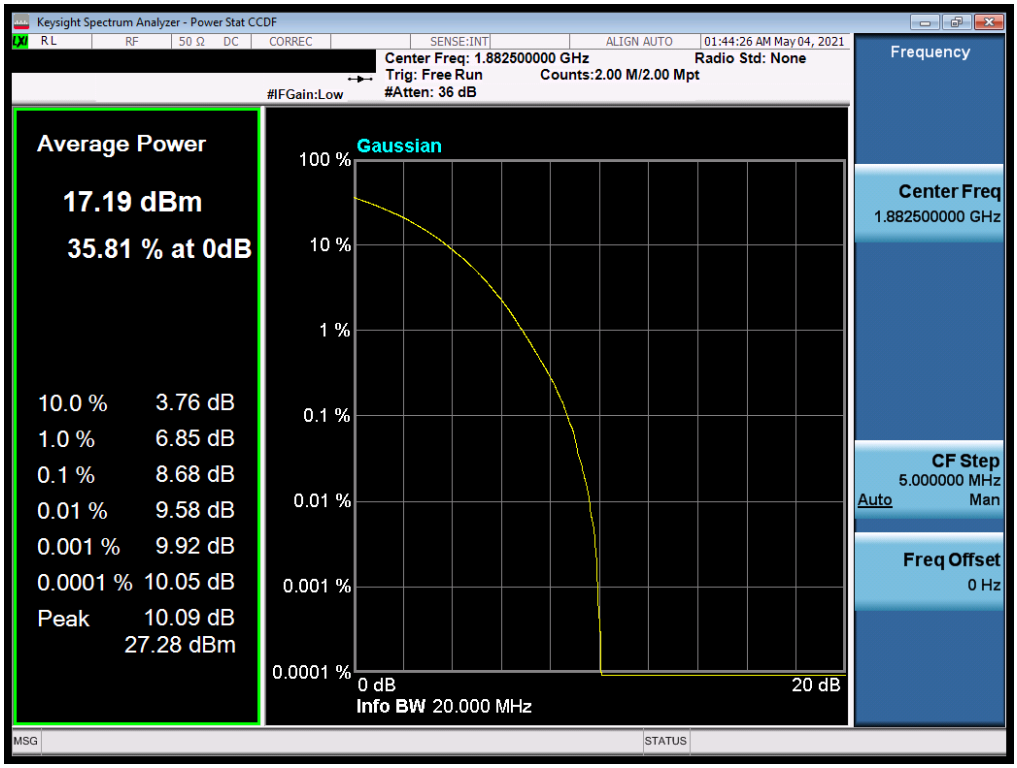
NR Band n25/2 – Ant I



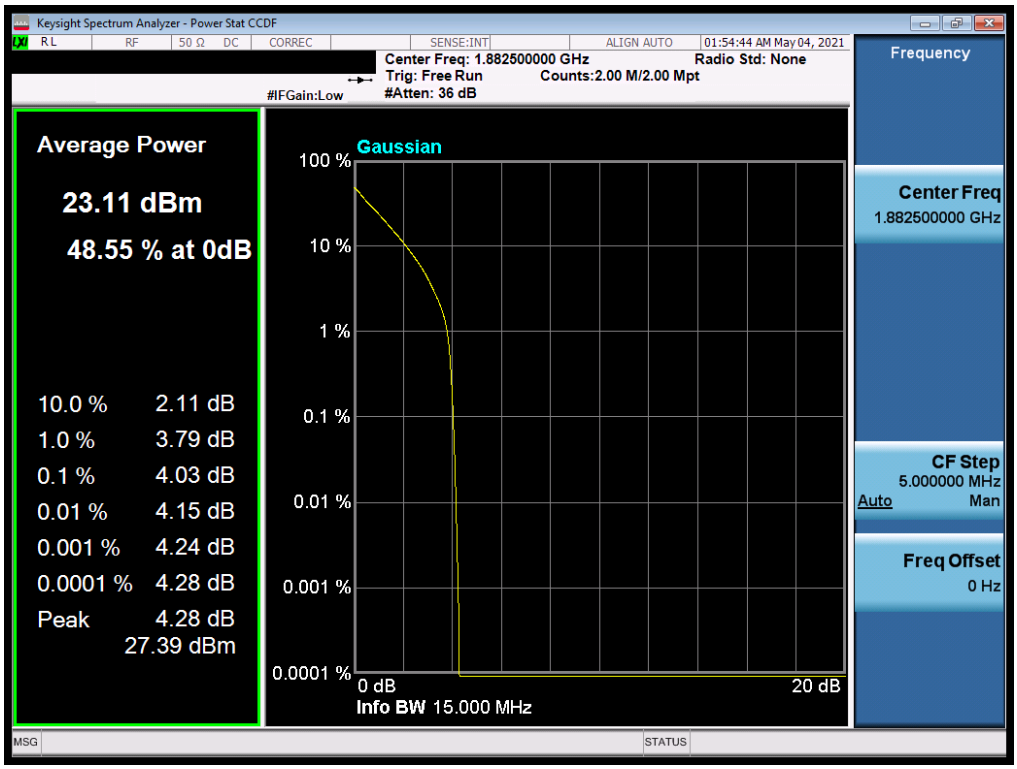
Plot 7-273. PAR Plot (NR Band n25/2 - 20.0MHz DFT-s-OFDM BPSK - Full RB)



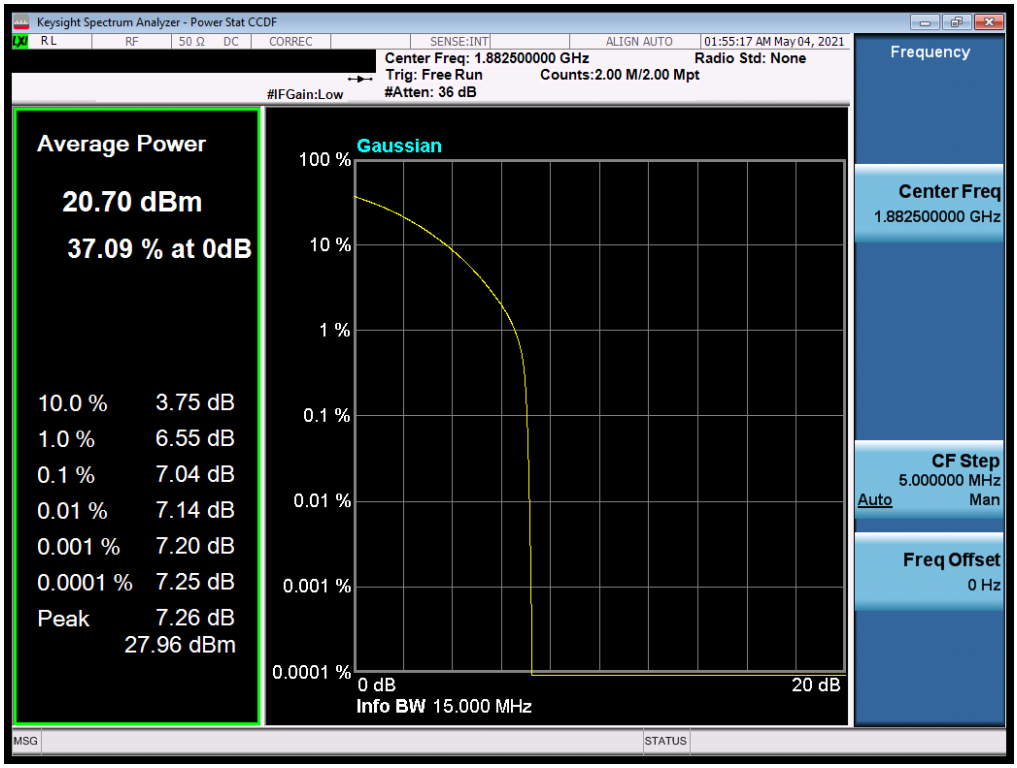
Plot 7-274. PAR Plot (NR Band n25/2 - 20.0MHz CP-OFDM QPSK - Full RB)



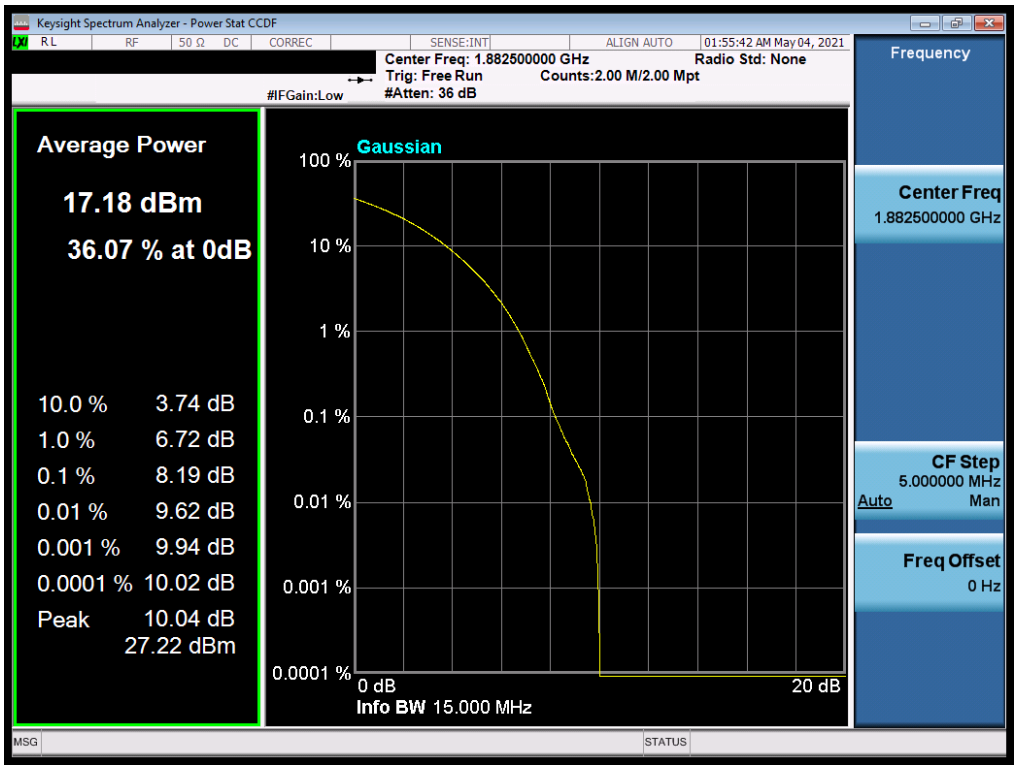
Plot 7-275. PAR Plot (NR Band n25/2 - 20.0MHz CP-OFDM 256-QAM - Full RB)



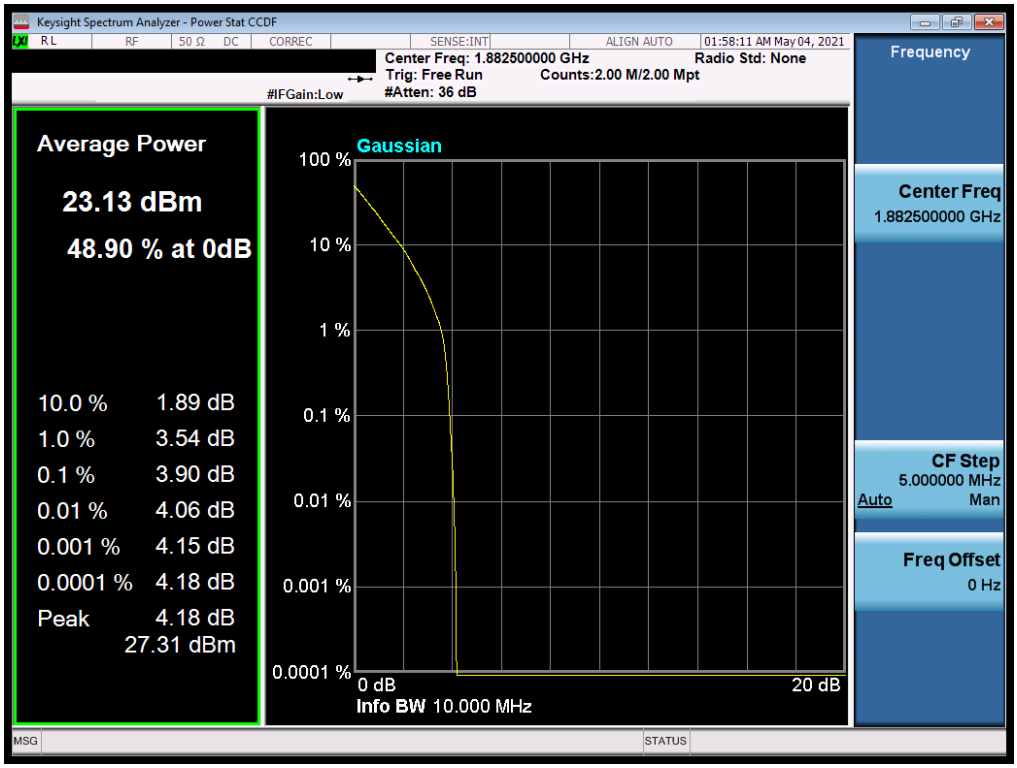
Plot 7-276. PAR Plot (NR Band n25/2 - 15.0MHz DFT-s-OFDM BPSK - Full RB)



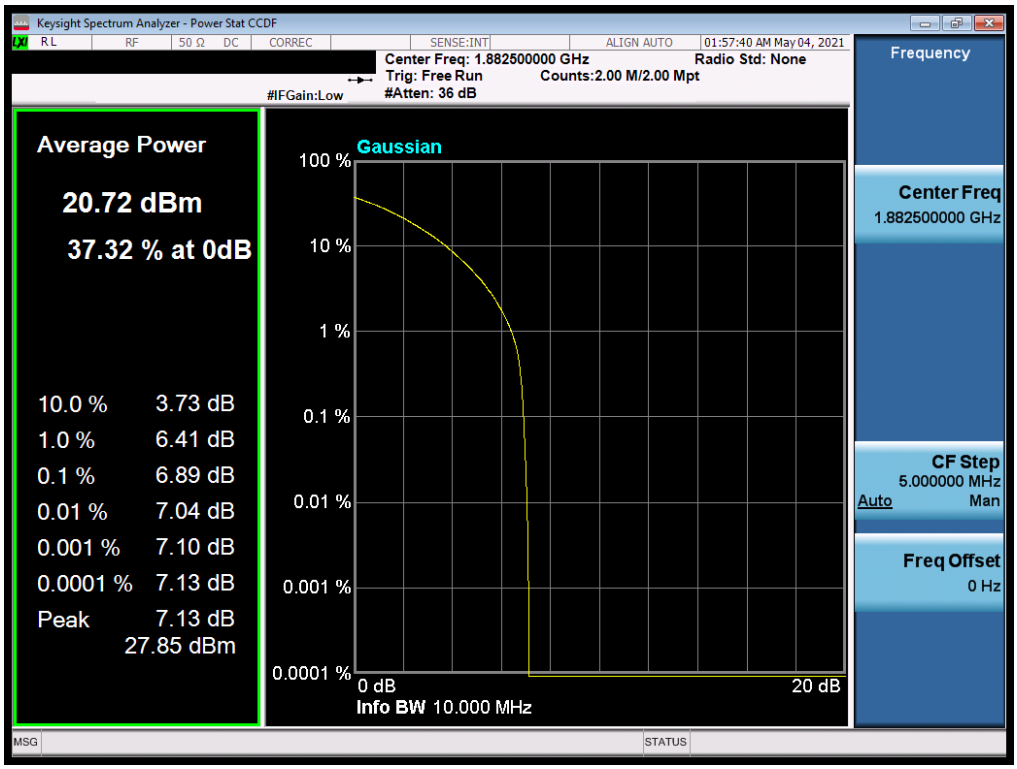
Plot 7-277. PAR Plot (NR Band n25/2 - 15.0MHz CP-OFDM QPSK - Full RB)



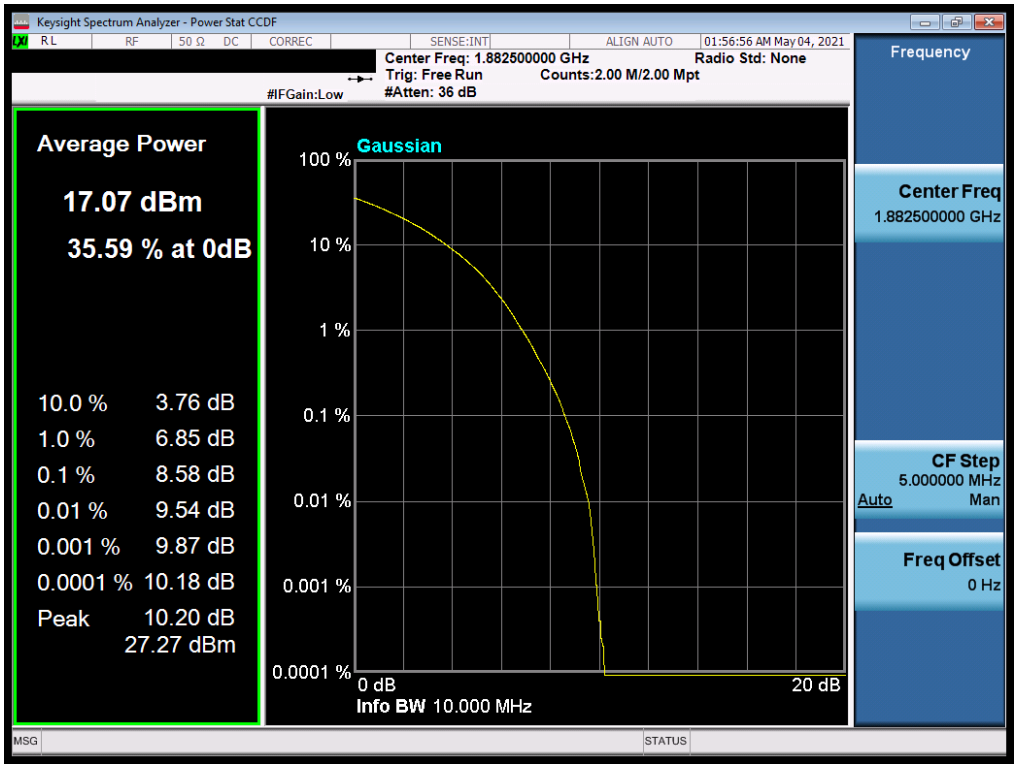
Plot 7-278. PAR Plot (NR Band n25/2 - 15.0MHz CP-OFDM 256-QAM - Full RB)



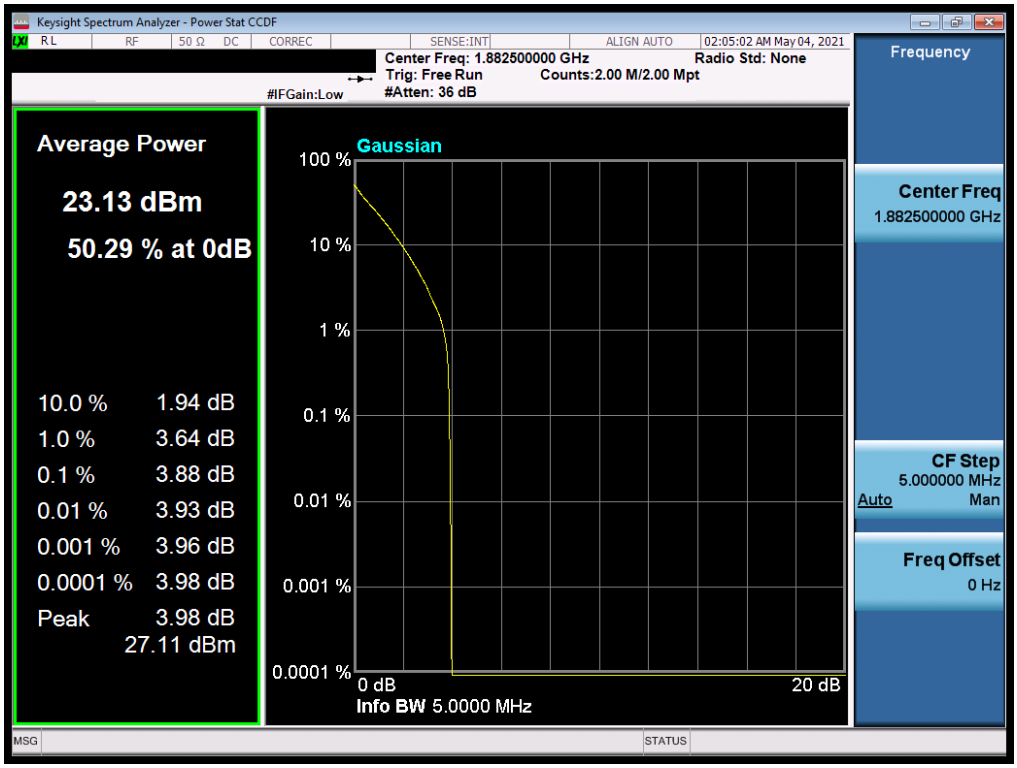
Plot 7-279. PAR Plot (NR Band n25/2 - 10.0MHz DFT-s-OFDM BPSK - Full RB)



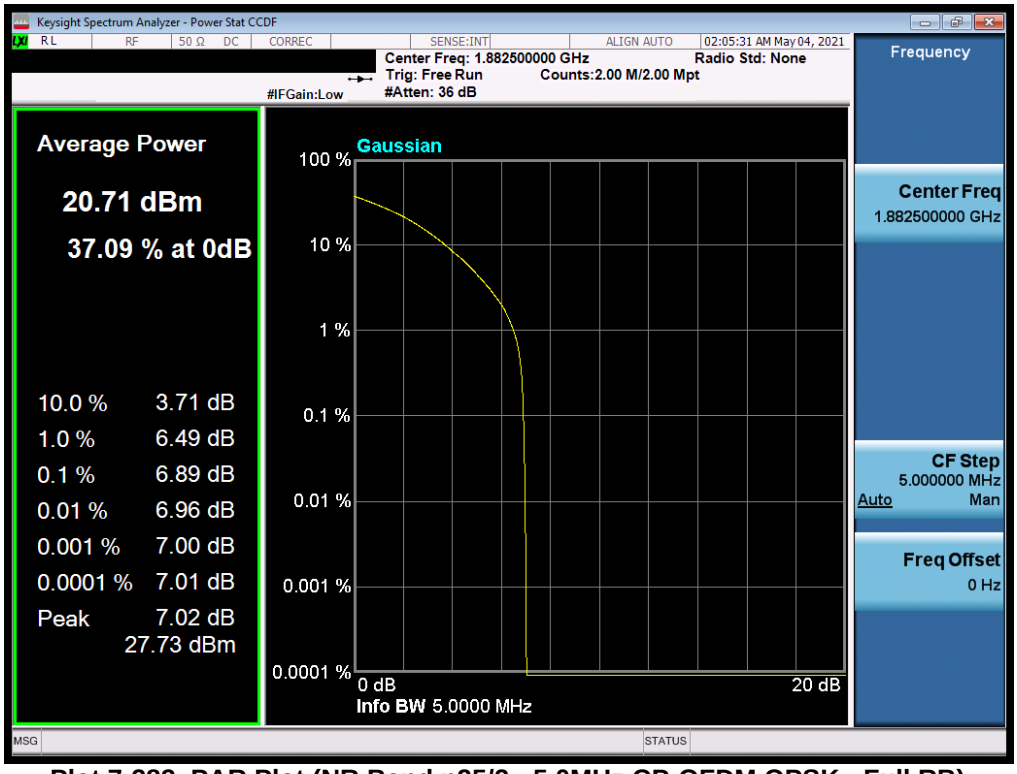
Plot 7-280. PAR Plot (NR Band n25/2 - 10.0MHz CP-OFDM QPSK - Full RB)



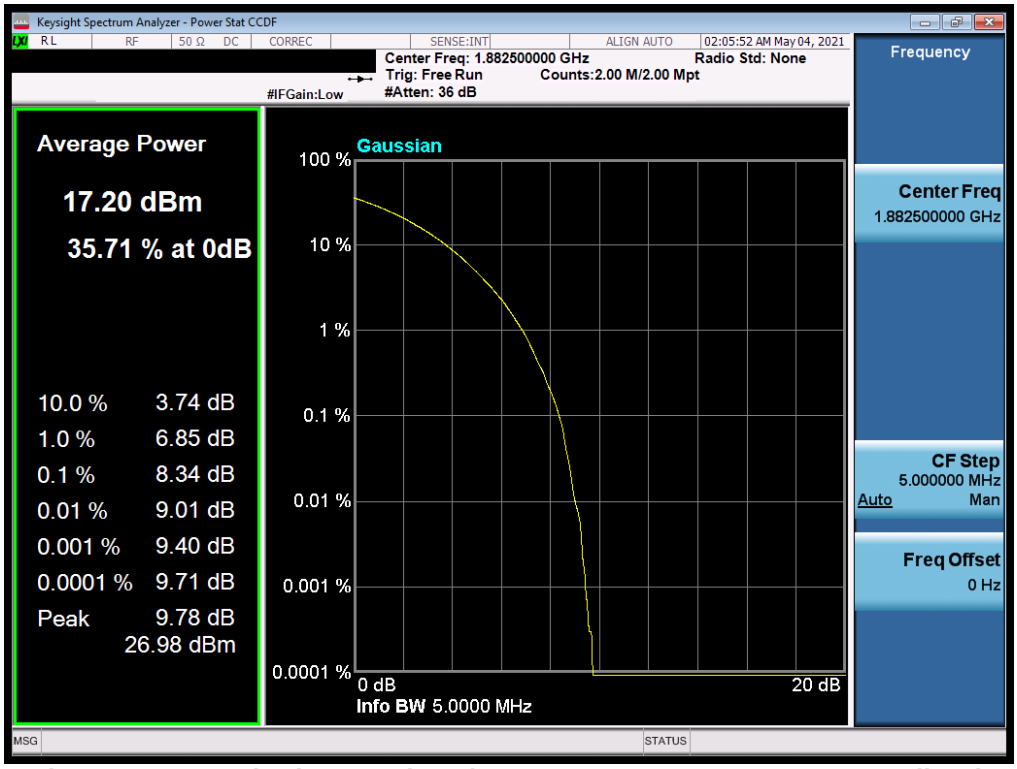
Plot 7-281. PAR Plot (NR Band n25/2 - 10.0MHz CP-OFDM 256-QAM - Full RB)



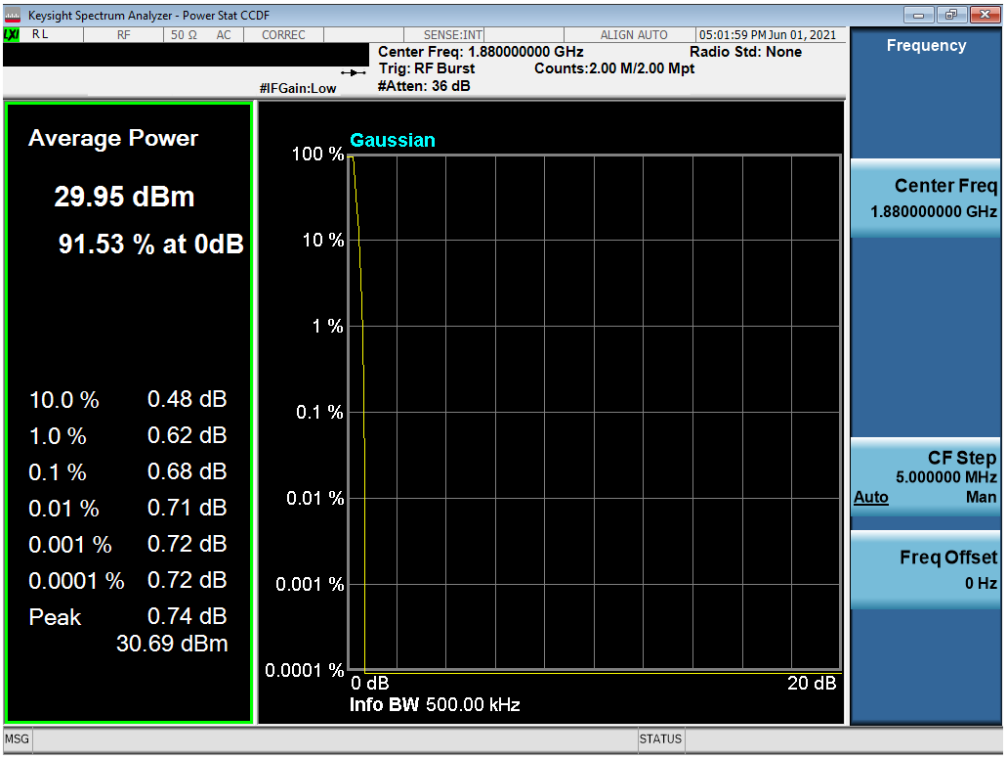
Plot 7-282. PAR Plot (NR Band n25/2 - 5.0MHz DFT-s-OFDM BPSK - Full RB)



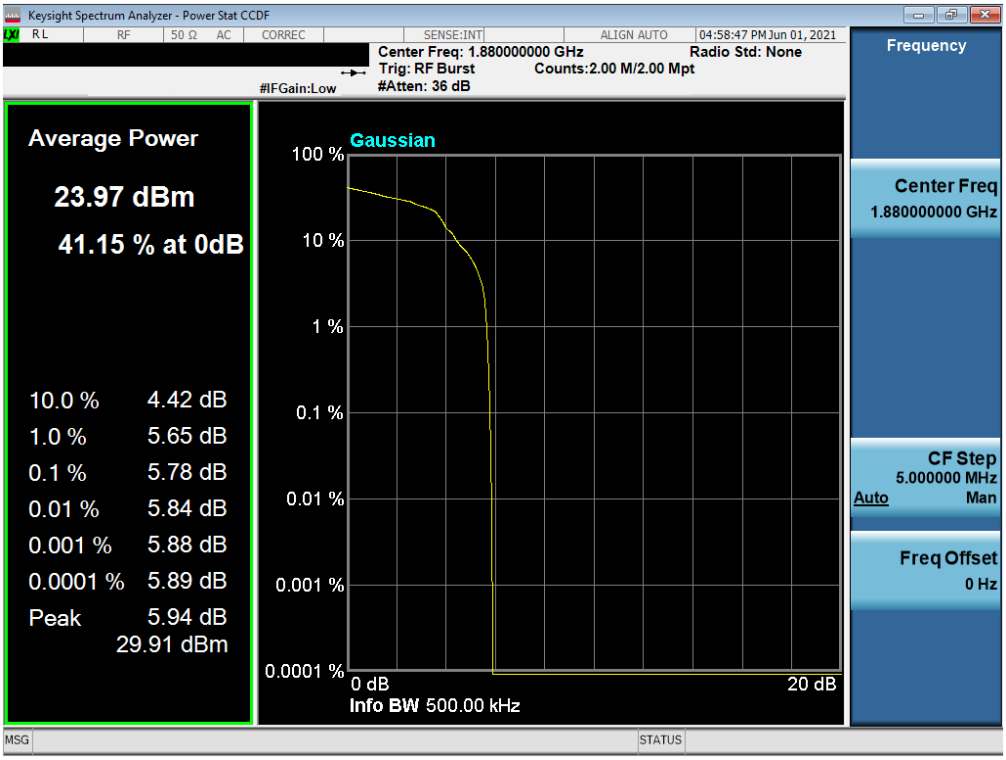
Plot 7-283. PAR Plot (NR Band n25/2 - 5.0MHz CP-OFDM QPSK - Full RB)



Plot 7-284. PAR Plot (NR Band n25/2 - 5.0MHz CP-OFDM 256-QAM - Full RB)

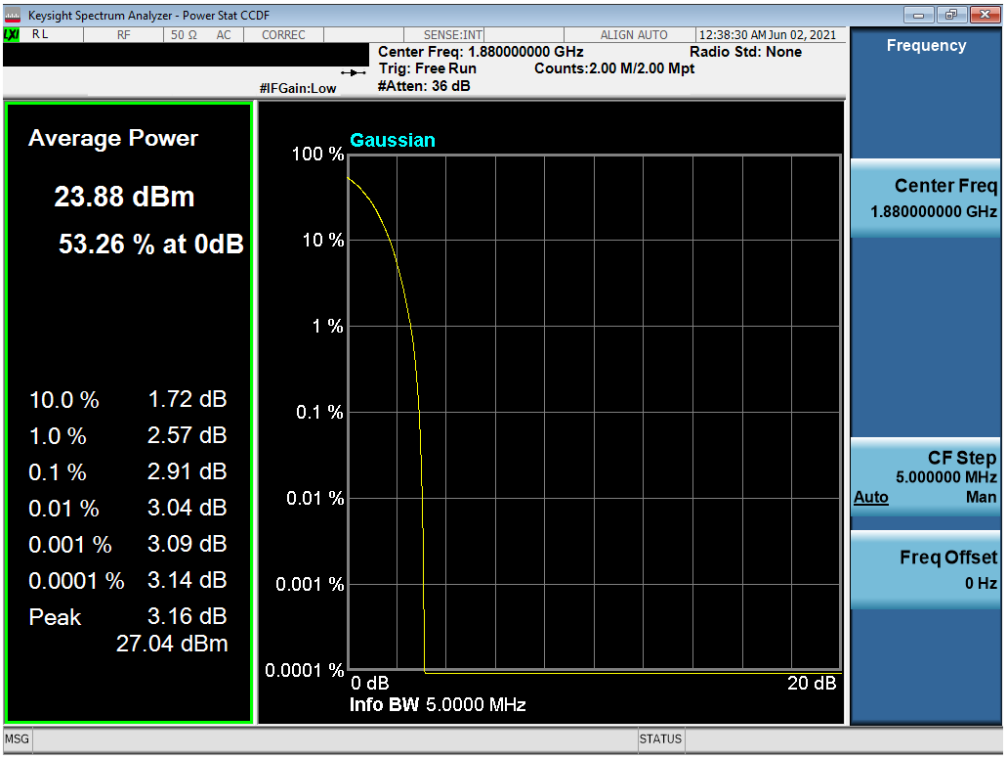


Plot 7-285. PAR Plot (GPRS, Ch. 661)

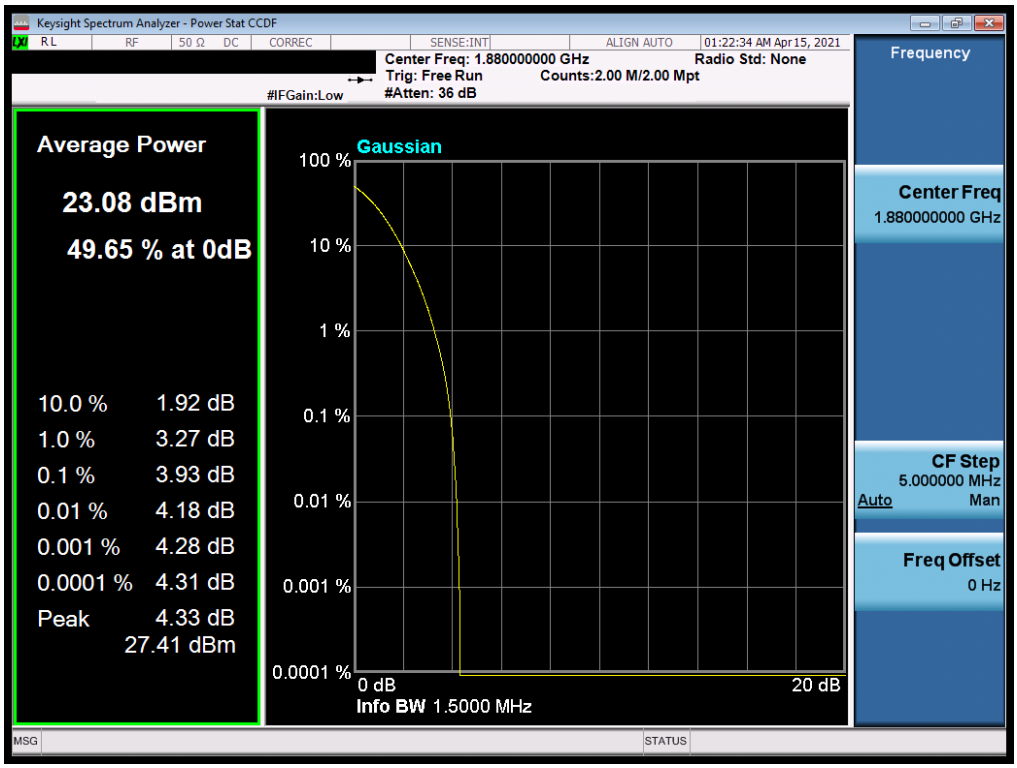


Plot 7-286. PAR Plot (EDGE, Ch. 661)

WCDMA PCS



Plot 7-287. PAR Plot (WCDMA, Ch. 9400)



Plot 7-288. PAR Plot (CDMA, Ch. 600)

7.6 Radiated Power (ERP/EIRP)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

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

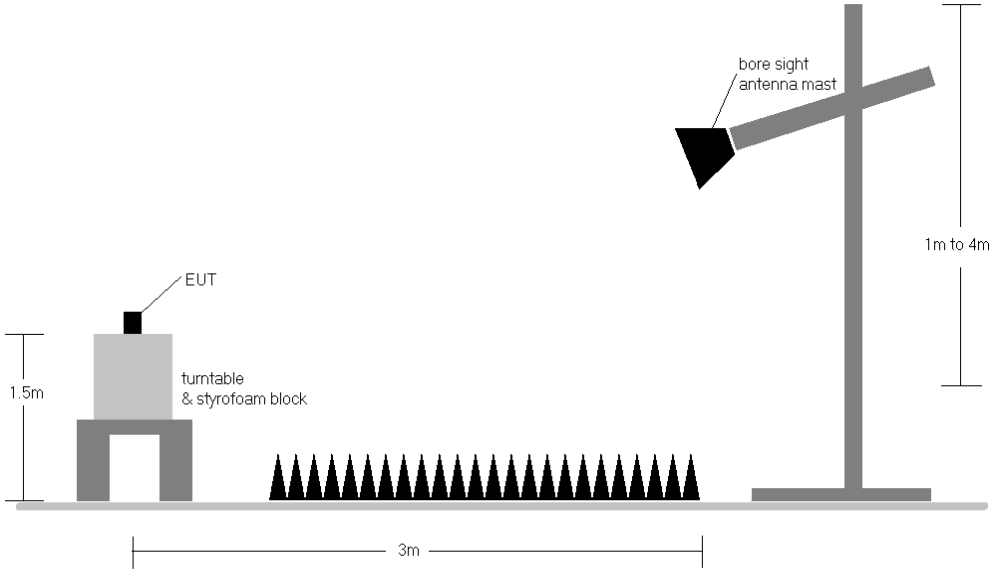


Figure 7-5. Radiated Test Setup >1GHz

Test Notes

1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.

2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to “1”.

3) This device employs CDMA technology and was tested under all RC and SO combinations and the worst case is reported with CDMA RC3/SO55 with "All Up" power control bits.

4) 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.

5) This unit was tested with its standard battery.

6) 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.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	QPSK	1860.0	H	151	218	9.64	1 / 99	14.49	**24.13**	0.259	33.01	-8.88
		1882.5	H	104	223	9.96	1 / 0	13.77	23.73	0.236	33.01	-9.28
		1905.0	H	142	188	10.24	1 / 0	12.78	23.02	0.201	33.01	-9.99
	16-QAM	1860.0	H	151	218	9.64	1 / 99	13.92	23.56	0.227	33.01	-9.45
15 MHz	QPSK	1857.5	H	151	218	9.61	1 / 74	14.53	**24.14**	0.260	33.01	-8.87
		1882.5	H	104	223	9.96	1 / 0	13.74	23.70	0.235	33.01	-9.31
		1907.5	H	142	188	10.26	1 / 0	12.72	22.98	0.199	33.01	-10.03
	16-QAM	1857.5	H	151	218	9.61	1 / 74	14.06	23.67	0.233	33.01	-9.34
10 MHz	QPSK	1855.0	H	151	218	9.57	1 / 0	14.28	**23.85**	0.243	33.01	-9.16
		1882.5	H	104	223	9.96	1 / 0	13.56	23.52	0.225	33.01	-9.49
		1910.0	H	142	188	10.28	1 / 0	12.28	22.56	0.180	33.01	-10.45
	16-QAM	1855.0	H	151	218	9.57	1 / 0	13.57	23.14	0.206	33.01	-9.87
5 MHz	QPSK	1852.5	H	151	218	9.54	1 / 0	14.28	**23.82**	0.241	33.01	-9.19
		1882.5	H	104	223	9.96	1 / 0	13.17	23.13	0.206	33.01	-9.88
		1912.5	H	142	188	10.30	1 / 12	12.38	22.68	0.185	33.01	-10.33
	16-QAM	1852.5	H	151	218	9.54	1 / 0	13.61	23.15	0.206	33.01	-9.86
3 MHz	QPSK	1851.5	H	151	218	9.52	1 / 0	14.42	**23.94**	0.248	33.01	-9.07
		1882.5	H	104	223	9.96	1 / 0	13.10	23.06	0.202	33.01	-9.95
		1913.5	H	142	188	10.31	1 / 0	12.52	22.83	0.192	33.01	-10.18
	16-QAM	1851.5	H	151	218	9.52	1 / 0	13.74	23.27	0.212	33.01	-9.74
1.4 MHz	QPSK	1850.7	H	151	218	9.51	1 / 0	14.35	**23.86**	0.243	33.01	-9.15
		1882.5	H	104	223	9.96	1 / 0	12.82	22.78	0.190	33.01	-10.23
		1914.3	H	142	188	10.32	1 / 0	12.56	22.87	0.194	33.01	-10.14
	16-QAM	1850.7	H	151	218	9.51	1 / 0	13.79	23.30	0.214	33.01	-9.71
20 MHz	Opposite Pol.	1860.0	V	285	96	9.98	1 / 5	10.55	20.53	0.113	33.01	-12.48
	QPSK (Closed)	1860.0	H	115	6	9.64	1/3	14.27	23.91	0.246	33.01	-9.10
	WCP	1860.0	H	195	203	9.64	1 / 0	13.65	23.29	0.214	33.01	-9.72

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

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
40 MHz	π/2 BPSK	1870.0	V	147	272	10.06	1 / 161	13.90	23.96	0.249	33.01	-9.05
		1882.5	V	147	281	10.15	1 / 108	14.11	24.26	0.267	33.01	-8.75
		1895.0	V	149	282	10.25	1 / 54	14.24	**24.49**	0.281	33.01	-8.52
	QPSK	1882.5	V	147	281	10.15	1 / 161	13.88	24.03	0.253	33.01	-8.98
	16-QAM	1882.5	V	147	281	10.15	1 / 161	13.20	23.35	0.216	33.01	-9.66
30 MHz	π/2 BPSK	1865.0	V	147	272	10.02	1 / 40	13.63	23.64	0.231	33.01	-9.37
		1882.5	V	147	281	10.15	1 / 40	13.85	24.00	0.251	33.01	-9.01
		1900.0	V	149	282	10.29	1 / 119	13.72	**24.00**	0.251	33.01	-9.01
	QPSK	1882.5	V	147	281	10.15	1 / 40	13.77	23.92	0.247	33.01	-9.09
	16-QAM	1882.5	V	147	281	10.15	1 / 40	13.15	23.31	0.214	33.01	-9.70
25 MHz	π/2 BPSK	1862.5	V	147	272	10.00	1 / 99	13.15	23.15	0.206	33.01	-9.86
		1882.5	V	147	281	10.15	1 / 33	13.55	23.70	0.234	33.01	-9.31
		1902.5	V	149	282	10.30	1 / 99	13.50	23.80	0.240	33.01	-9.21
	QPSK	1882.5	V	147	281	10.15	1 / 33	13.81	**23.96**	0.249	33.01	-9.05
	16-QAM	1882.5	V	147	281	10.15	1 / 33	12.72	22.87	0.194	33.01	-10.14
40 MHz	QPSK (CP-OFDM)	1895.0	V	149	282	10.25	1 / 54	11.83	22.08	0.161	33.01	-10.93
	BPSK (Opposite Pol.)	1895.0	H	148	205	10.14	1 / 161	12.71	22.85	0.193	33.01	-10.17
	BPSK (CLOSED)	1895.0	V	132	175	10.25	1 / 161	14.00	24.25	0.266	33.01	-8.76
	BPSK (WCP)	1895.0	H	145	178	10.14	1 / 161	12.24	22.38	0.173	33.01	-10.64

Table 7-3. EIRP Data (NR Band n25 – Ant A)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	1860.0	V	147	272	9.98	1 / 79	13.18	23.16	0.207	33.01	-9.85
		1882.5	V	147	281	10.15	1 / 26	13.57	23.72	0.236	33.01	-9.29
		1905.0	V	149	282	10.31	1 / 26	13.36	23.67	0.233	33.01	-9.34
	QPSK	1882.5	V	147	281	10.15	1 / 26	13.85	**24.01**	0.252	33.01	-9.00
	16-QAM	1882.5	V	147	281	10.15	1 / 26	12.43	22.59	0.181	33.01	-10.42
15 MHz	π/2 BPSK	1857.5	V	147	272	9.96	1 / 20	13.46	23.42	0.220	33.01	-9.59
		1882.5	V	147	281	10.15	1 / 20	13.74	23.89	0.245	33.01	-9.12
		1907.5	V	149	282	10.33	1 / 39	13.30	23.63	0.230	33.01	-9.38
	QPSK	1882.5	V	147	281	10.15	1 / 20	13.75	**23.90**	0.246	33.01	-9.11
	16-QAM	1882.5	V	147	281	10.15	1 / 20	12.65	22.80	0.191	33.01	-10.21
10 MHz	π/2 BPSK	1855.0	V	147	272	9.94	1 / 13	13.32	23.26	0.212	33.01	-9.75
		1882.5	V	147	281	10.15	1 / 13	13.49	23.64	0.231	33.01	-9.37
		1910.0	V	149	282	10.34	1 / 26	13.34	23.68	0.233	33.01	-9.33
	QPSK	1882.5	V	147	281	10.15	1 / 13	13.63	**23.78**	0.239	33.01	-9.23
	16-QAM	1882.5	V	147	281	10.15	1 / 13	12.51	22.66	0.185	33.01	-10.35
5 MHz	π/2 BPSK	1852.5	V	147	272	9.92	1 / 18	13.25	23.17	0.207	33.01	-9.84
		1882.5	V	147	281	10.15	1 / 6	13.53	**23.69**	0.234	33.01	-9.32
		1912.5	V	149	282	10.36	1 / 18	13.33	23.68	0.233	33.01	-9.33
	QPSK	1882.5	V	147	281	10.15	1 / 6	13.47	23.63	0.231	33.01	-9.38
	16-QAM	1882.5	V	147	281	10.15	1 / 6	12.33	22.48	0.177	33.01	-10.53

Table 7-4. EIRP Data (NR Band n25/2 – Ant A)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
40 MHz	π/2 BPSK	1870.0	H	155	216	9.79	1 / 161	14.07	23.86	0.243	33.01	-9.15
		1882.5	H	155	215	9.96	1 / 108	14.09	24.05	0.254	33.01	-8.96
		1895.0	H	153	217	10.14	1 / 54	14.18	24.32	0.270	33.01	-8.70
	QPSK	1895.0	H	153	217	10.14	1 / 54	14.22	**24.36**	0.273	33.01	-8.66
	16-QAM	1882.5	H	155	215	9.96	1 / 108	13.07	23.03	0.201	33.01	-9.98
30 MHz	π/2 BPSK	1865.0	H	155	216	9.72	1 / 119	14.03	23.75	0.237	33.01	-9.26
		1882.5	H	155	215	9.96	1 / 40	14.19	24.15	0.260	33.01	-8.86
		1900.0	H	153	217	10.20	1 / 119	13.97	24.17	0.261	33.01	-8.84
	QPSK	1900.0	H	153	217	10.20	1 / 119	14.01	**24.21**	0.264	33.01	-8.80
	16-QAM	1900.0	H	153	217	10.20	1 / 119	12.93	23.14	0.206	33.01	-9.87
25 MHz	π/2 BPSK	1862.5	H	155	216	9.68	1 / 99	14.13	23.81	0.240	33.01	-9.20
		1882.5	H	155	215	9.96	1 / 33	14.18	24.15	0.260	33.01	-8.86
		1902.5	H	153	217	10.22	1 / 33	13.93	**24.16**	0.260	33.01	-8.85
	QPSK	1902.5	H	153	217	10.22	1 / 33	13.86	24.09	0.256	33.01	-8.92
	16-QAM	1902.5	H	153	217	10.22	1 / 33	12.67	22.89	0.194	33.01	-10.12
40 MHz	QPSK (CP-OFDM)	1895.0	H	153	217	10.14	1 / 54	12.65	22.79	0.190	33.01	-10.23
	QPSK (Closed)	1895.0	H	150	283	10.14	1 / 54	11.20	21.34	0.136	33.01	-11.68
	QPSK (Opposite Pol.)	1895.0	V	100	266	10.25	1 / 54	12.91	23.16	0.207	33.01	-9.85
	QPSK (WCP)	1895.0	V	133	178	10.25	1 / 108	12.44	22.69	0.186	33.01	-10.32

Table 7-5. EIRP Data (NR Band n25 – Ant I)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	1860.0	H	155	216	9.64	1 / 26	14.13	23.77	0.238	33.01	-9.24
		1882.5	H	155	215	9.96	1 / 26	14.18	24.14	0.260	33.01	-8.87
		1905.0	H	153	217	10.24	1 / 79	13.94	**24.18**	0.262	33.01	-8.83
	QPSK	1905.0	H	153	217	10.24	1 / 79	13.87	24.11	0.258	33.01	-8.90
	16-QAM	1905.0	H	153	217	10.24	1 / 79	12.77	23.02	0.200	33.01	-9.99
15 MHz	π/2 BPSK	1857.5	H	155	216	9.61	1 / 20	14.08	23.69	0.234	33.01	-9.32
		1882.5	H	155	215	9.96	1 / 20	14.09	24.05	0.254	33.01	-8.96
		1907.5	H	153	217	10.26	1 / 39	13.79	24.06	0.255	33.01	-8.95
	QPSK	1882.5	H	155	215	9.96	1 / 20	14.18	**24.14**	0.260	33.01	-8.87
	16-QAM	1907.5	H	153	217	10.26	1 / 39	12.54	22.80	0.190	33.01	-10.21
10 MHz	π/2 BPSK	1855.0	H	155	216	9.57	1 / 26	14.09	23.66	0.232	33.01	-9.35
		1882.5	H	155	215	9.96	1 / 38	13.99	23.96	0.249	33.01	-9.06
		1910.0	H	153	217	10.28	1 / 38	13.70	23.99	0.250	33.01	-9.03
	QPSK	1882.5	H	155	215	9.96	1 / 38	14.13	**24.09**	0.256	33.01	-8.92
	16-QAM	1910.0	H	153	217	10.28	1 / 38	12.67	22.96	0.197	33.01	-10.05
5 MHz	π/2 BPSK	1852.5	H	155	216	9.54	1 / 12	14.13	23.67	0.233	33.01	-9.34
		1882.5	H	155	215	9.96	1 / 12	13.96	23.92	0.247	33.01	-9.09
		1912.5	H	153	217	10.30	1 / 18	13.95	**24.25**	0.266	33.01	-8.76
	QPSK	1912.5	H	153	217	10.30	1 / 18	13.81	24.12	0.258	33.01	-8.90
	16-QAM	1912.5	H	153	217	10.30	1 / 18	12.64	22.94	0.197	33.01	-10.07

Table 7-6. EIRP Data (NR Band n25/2 – Ant I)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	V	137	329	20.07	9.90	**29.97**	**0.994**	33.01	-3.04
1880.00	GPRS1900	V	148	279	19.53	10.13	29.66	0.925	33.01	-3.35
1909.80	GPRS1900	V	153	337	19.14	10.34	29.48	0.887	33.01	-3.53
1850.20	GPRS1900	H	149	241	17.98	9.51	27.49	0.561	33.01	-5.52
1850.20	EDGE1900	V	137	329	14.86	9.90	**24.76**	0.299	33.01	-8.25
1850.20	GPRS1900 (WCP)	V	130	131	15.39	9.90	25.29	0.338	33.01	-7.72
1850.20	GPRS1900 (Closed)	V	109	181	18.32	9.90	28.22	0.664	33.01	-4.79

Table 7-7. EIRP Data (GPRS PCS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	H	155	222	13.73	9.92	**23.65**	**0.232**	33.01	-9.36
1880.00	WCDMA1900	H	149	213	13.21	10.13	23.34	0.216	33.01	-9.67
1907.60	WCDMA1900	H	135	223	11.90	10.33	22.23	0.167	33.01	-10.78
1852.40	WCDMA1900	V	115	327	13.32	9.92	23.24	0.211	33.01	-9.77
1852.40	WCDMA1900 (Closed)	H	208	193	12.61	9.54	22.15	0.164	33.01	-10.86
1852.40	WCDMA1900 (WCP)	H	149	222	13.05	9.92	22.97	0.198	33.01	-10.04

Table 7-8. EIRP Data (WCDMA PCS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1851.25	CDMA1900	V	155	306	13.58	9.91	23.49	0.223	33.01	-9.52
1880.00	CDMA1900	V	142	291	13.65	10.13	**23.78**	**0.239**	33.01	-9.23
1908.75	CDMA1900	V	154	326	12.70	10.33	23.03	0.201	33.01	-9.98
1880.00	CDMA1900	H	101	175	13.37	10.13	23.50	0.224	33.01	-9.51
1880.00	CDMA1900 (Closed)	V	136	174	12.91	10.13	23.04	0.202	33.01	-9.97
1880.00	CDMA1900 (WCP)	V	166	310	9.15	10.13	19.28	0.085	33.01	-13.73

Table 7-9. EIRP Data (CDMA PCS)

7.7 Radiated Spurious Emissions Measurements

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 RMS 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.

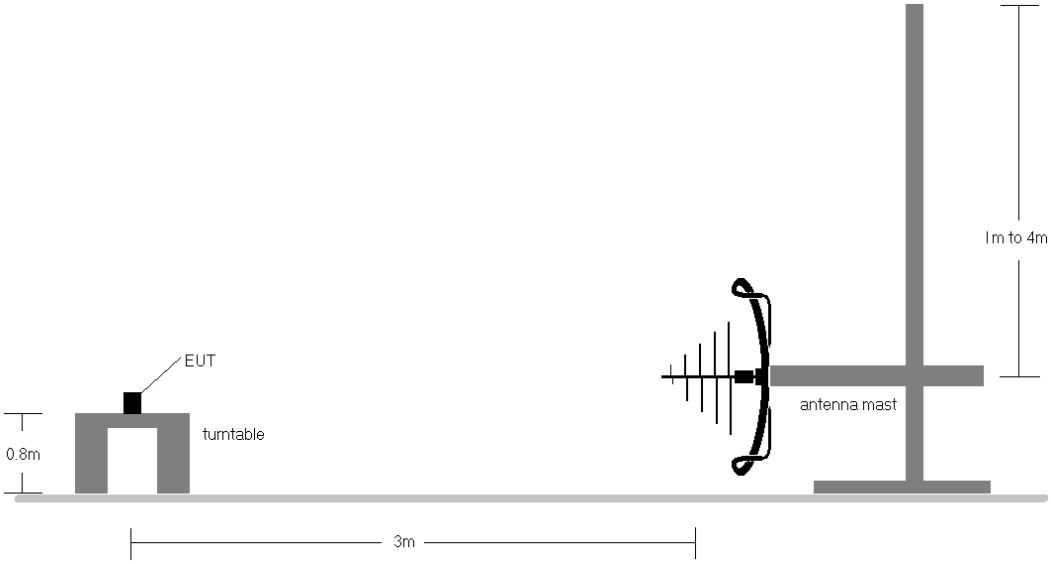


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

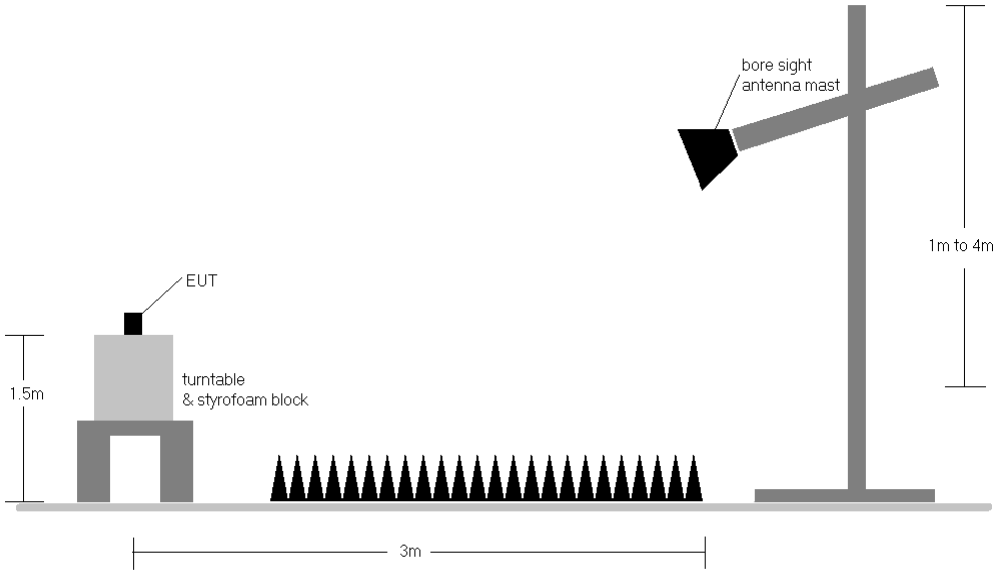


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 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) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.

3) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to “1”.

4) For CDMA, this device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.

5) 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.

6) This unit was tested with its standard battery.

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

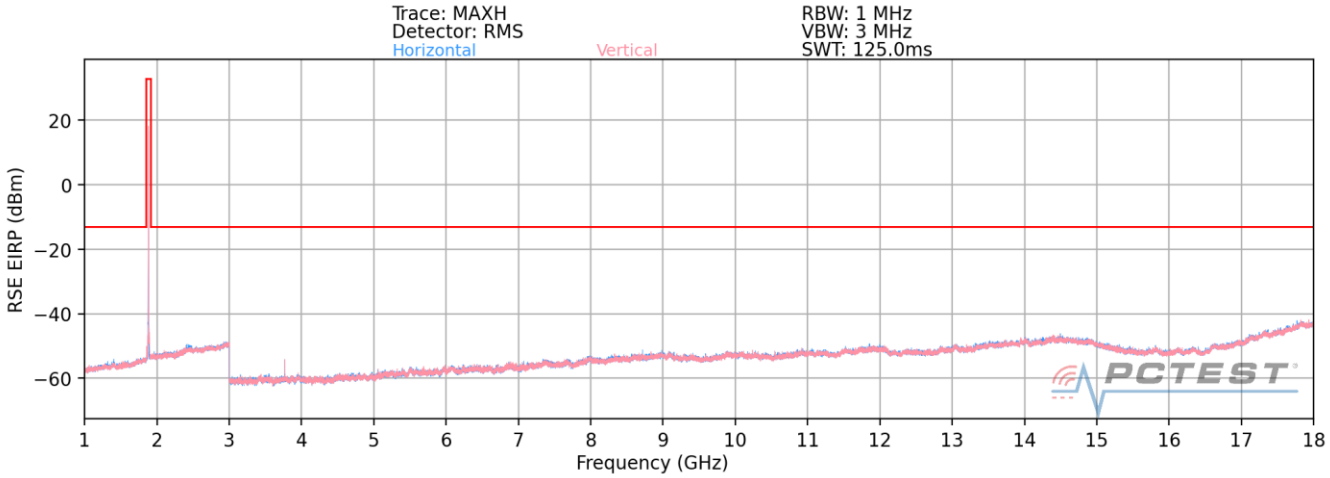
8) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

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

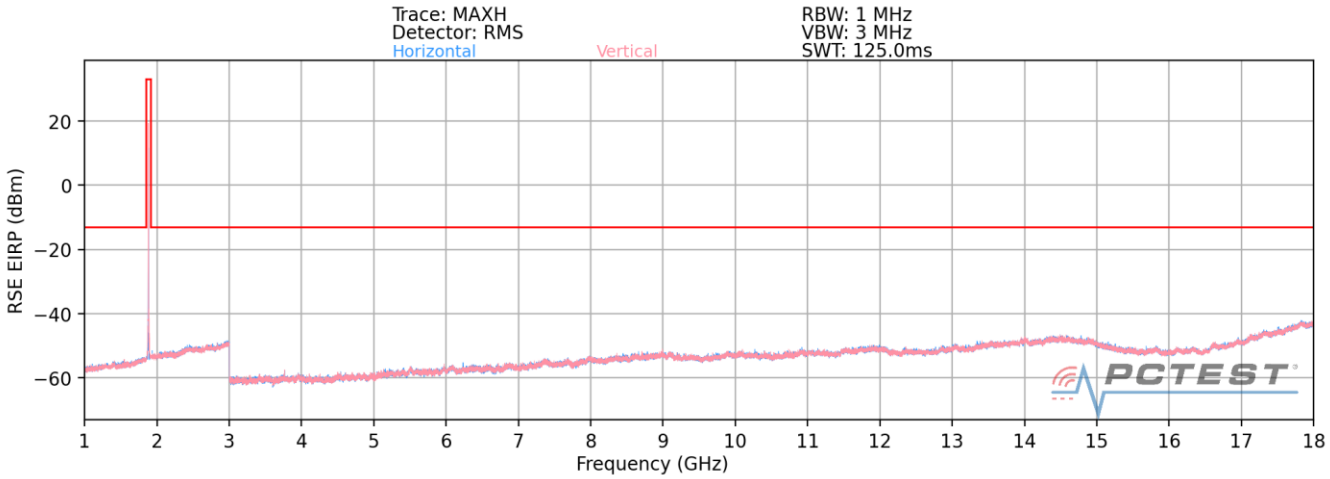
10) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

11) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device, is subject to the rules under which the NR carrier operates. Spurious emission caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

LTE Band 25/2



Plot 7-289. Radiated Spurious Plot (LTE Band 25/2) – Open



Plot 7-290. Radiated Spurious Plot (LTE Band 25/2) – Closed

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	308	318	-69.10	2.44	40.34	-54.91	-13.00	-41.91
5580.0	H	309	66	-76.87	5.41	35.54	-59.72	-13.00	-46.72
7440.0	H	-	-	-78.71	8.71	37.00	-58.25	-13.00	-45.25
9300.0	H	-	-	-79.34	10.96	38.62	-56.64	-13.00	-43.64

Table 7-10. Radiated Spurious Data (LTE Band 25/2 – Low Channel - Open)

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	113	348	-66.38	2.88	43.50	-51.76	-13.00	-38.76
5647.5	H	-	-	-78.39	5.56	34.17	-61.09	-13.00	-48.09
7530.0	H	-	-	-79.18	8.99	36.81	-58.45	-13.00	-45.45
9412.5	H	-	-	-79.83	11.54	38.71	-56.55	-13.00	-43.55

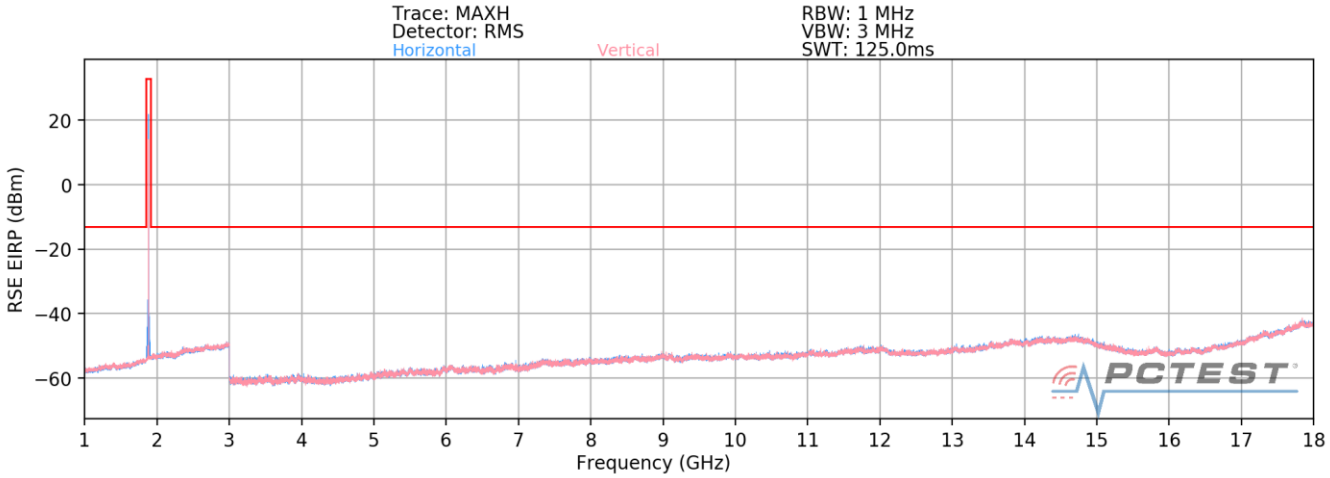
Table 7-11. Radiated Spurious Data (LTE Band 25/2 – Mid Channel - Open)

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

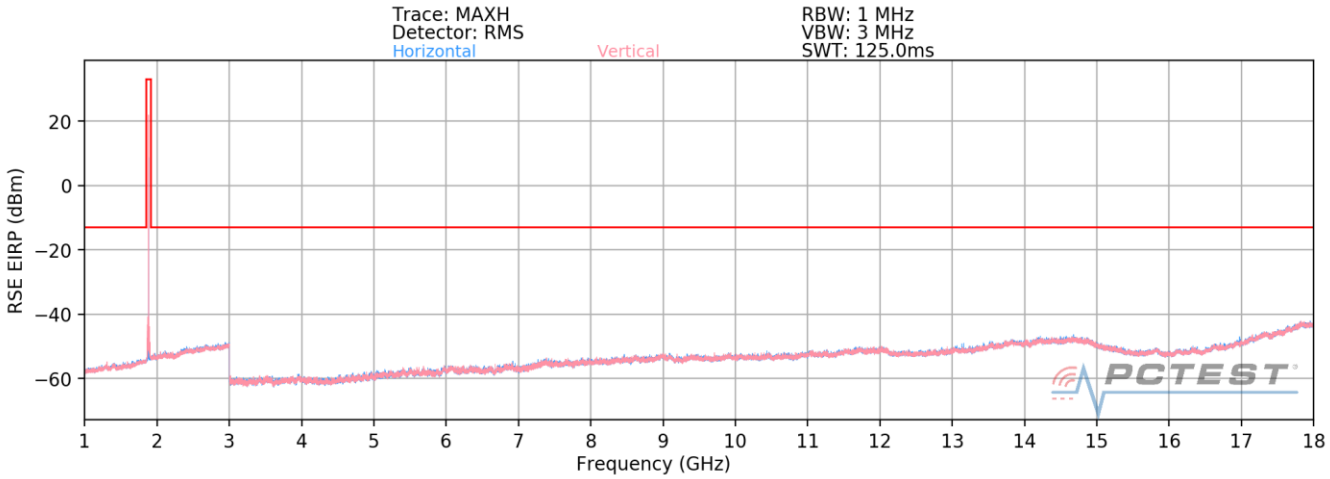
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3810.00	H	111	349	-67.37	2.30	41.93	-53.33	-13.00	-40.33
5715.00	H	-	-	-78.34	5.47	34.13	-61.12	-13.00	-48.12
7620.00	H	-	-	-78.90	8.88	36.98	-58.28	-13.00	-45.28
9525.00	H	-	-	-79.82	11.06	38.24	-57.01	-13.00	-44.01

Table 7-12. Radiated Spurious Data (LTE Band 25/2 – High Channel - Open)

NR Band n25/2 – Ant A



Plot 7-291. Radiated Spurious Plot (NR Band n25/2 - Open)



Plot 7-292. Radiated Spurious Plot (NR Band n25/2 - Closed)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	1 / 53
Mode:	SA
Anchor Band:	-

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	V	230	179	-77.82	2.44	31.62	-63.63	-13.00	-50.63
5580.0	V	196	216	-77.17	5.41	35.24	-60.02	-13.00	-47.02
7440.0	V	-	-	-80.24	8.71	35.47	-59.78	-13.00	-46.78
9300.0	V	-	-	-81.21	10.96	36.75	-58.51	-13.00	-45.51

Table 7-13. Radiated Spurious Data (NR Band n25/2 – Low Channel - Closed)

Bandwidth (MHz):	20
Frequency (MHz):	1882.5
RB / Offset:	1 / 5
Mode:	SA
Anchor Band:	-

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	V	322	198	-76.82	2.88	33.06	-62.20	-13.00	-49.20
5647.5	V	-	-	-79.26	5.56	33.30	-61.96	-13.00	-48.96
7530.0	V	-	-	-80.45	8.99	35.54	-59.72	-13.00	-46.72

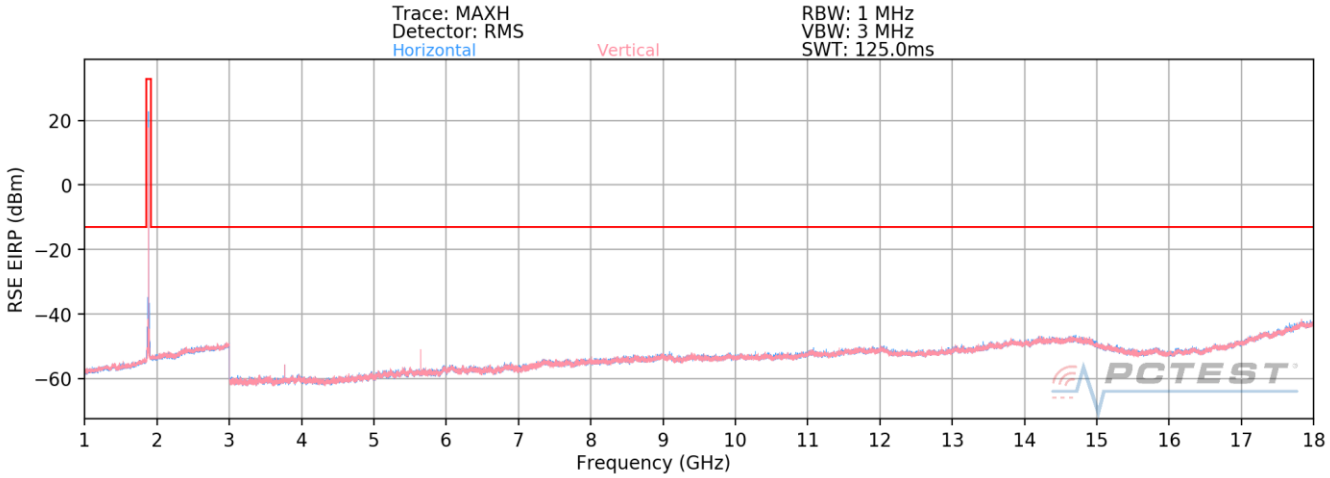
Table 7-14. Radiated Spurious Data (NR Band n25/2 – Mid Channel - Closed)

Bandwidth (MHz):	20
Frequency (MHz):	1905.0
RB / Offset:	1 / 53
Mode:	SA
Anchor Band:	-

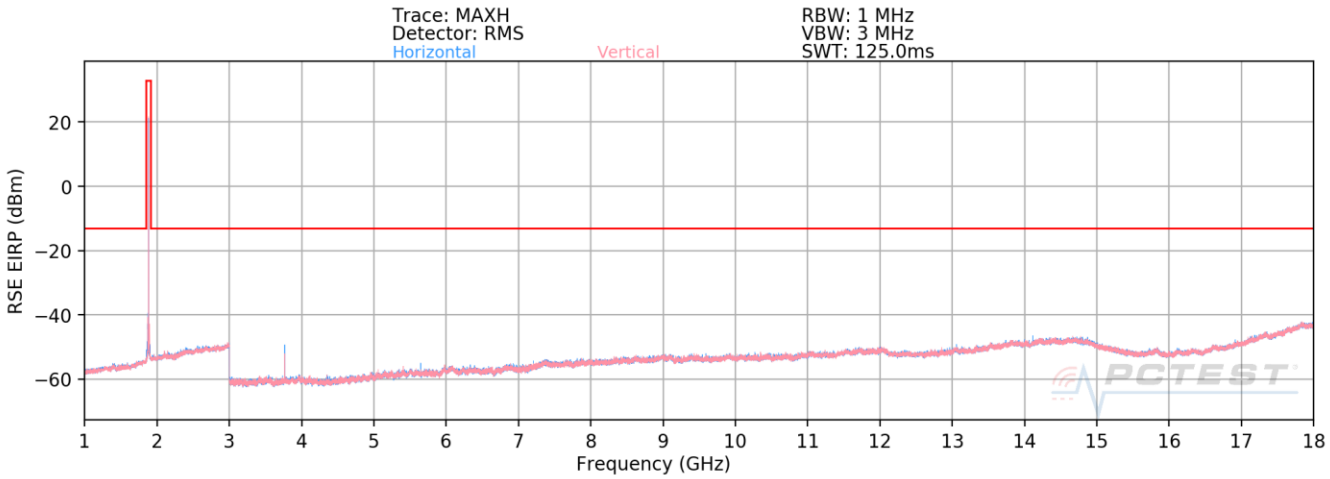
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3810.0	V	116	160	-77.42	2.30	31.88	-63.38	-13.00	-50.38
5715.0	V	-	-	-79.26	5.47	33.21	-62.04	-13.00	-49.04
7620.0	V	-	-	-80.49	8.88	35.39	-59.87	-13.00	-46.87

Table 7-15. Radiated Spurious Data (NR Band n25/2 – High Channel -Closed)

NR Band n25/2 – Ant I



Plot 7-293. Radiated Spurious Plot (NR Band n25/2 - Open)



Plot 7-294. Radiated Spurious Plot (NR Band n25/2 - Closed)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	1 / 53
Mode:	SA
Anchor Band:	-

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	280	214	-61.69	2.44	47.75	-47.50	-13.00	-34.50
5580.0	H	268	175	-72.91	5.41	39.50	-55.76	-13.00	-42.76
7440.0	H	-	-	-80.13	8.71	35.58	-59.67	-13.00	-46.67
9300.0	H	-	-	-81.14	10.96	36.82	-58.44	-13.00	-45.44

Table 7-16. Radiated Spurious Data (NR Band n25/2 – Low Channel - Closed)

Bandwidth (MHz):	20
Frequency (MHz):	1882.5
RB / Offset:	1 / 53
Mode:	SA
Anchor Band:	-

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	312	215	-63.70	2.88	46.18	-49.08	-13.00	-36.08
5647.5	H	175	170	-75.55	5.56	37.01	-58.25	-13.00	-45.25
7530.0	H	-	-	-80.44	8.99	35.55	-59.71	-13.00	-46.71
9412.5	H	-	-	-81.64	11.54	36.90	-58.36	-13.00	-45.36

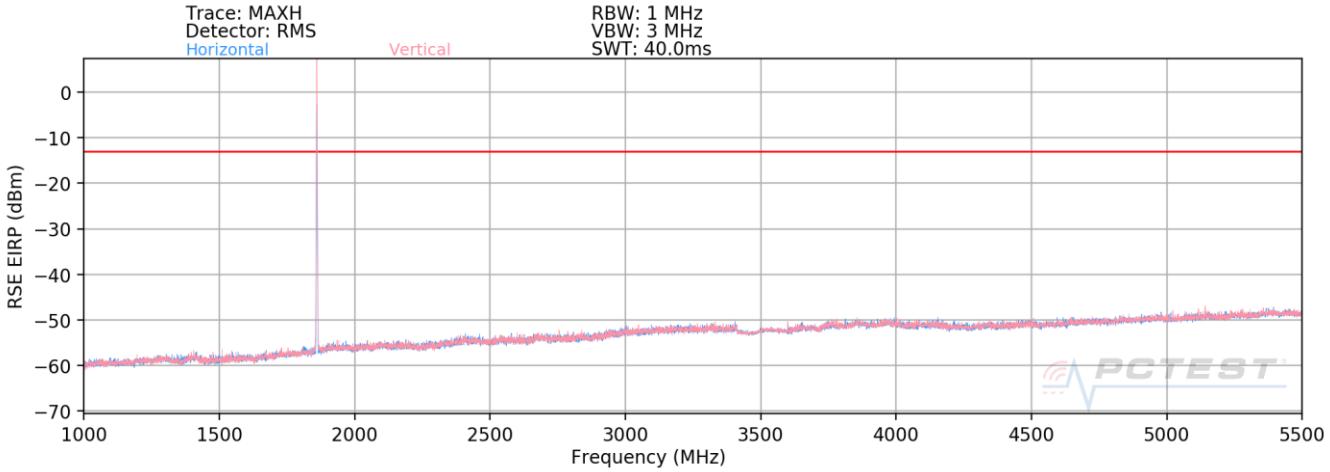
Table 7-17. Radiated Spurious Data (NR Band n25/2 – Mid Channel - Closed)

Bandwidth (MHz):	20
Frequency (MHz):	1905.0
RB / Offset:	1 / 53
Mode:	SA
Anchor Band:	-

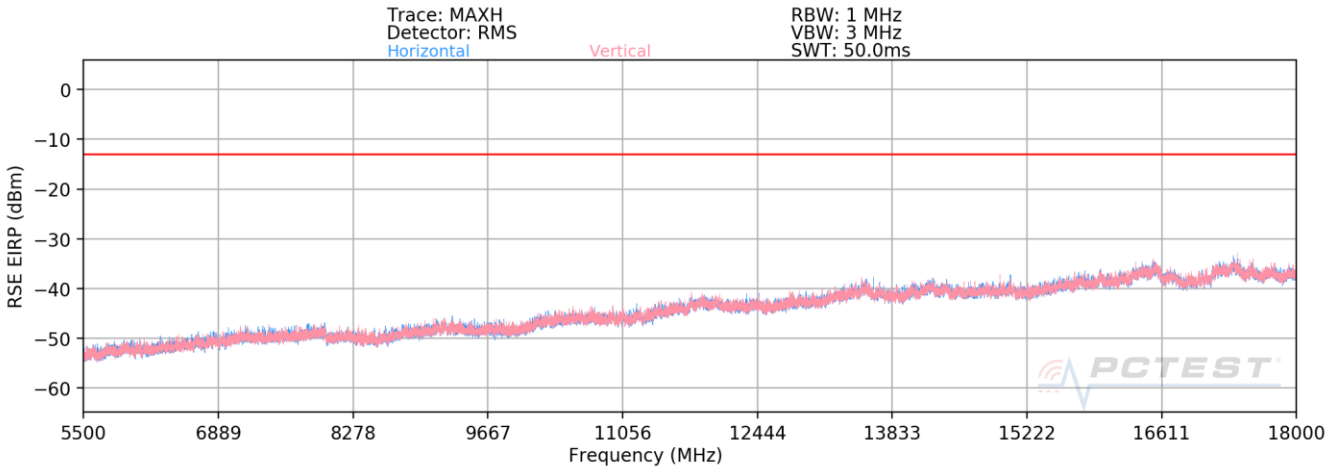
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3810.0	H	277	206	-65.76	2.30	43.54	-51.72	-13.00	-38.72
5715.0	H	186	183	-75.15	5.47	37.32	-57.93	-13.00	-44.93
7620.0	H	-	-	-80.44	8.88	35.44	-59.82	-13.00	-46.82
9525.0	H	-	-	-81.23	11.06	36.83	-58.42	-13.00	-45.42

Table 7-18. Radiated Spurious Data (NR Band n25/2 – High Channel - Closed)

EN-DC n2 (Ant I) – Band 14



Plot 7-295. Radiated Spurious Plot (EN-DC n2 - B14 1 - 5.5GHz – Open)



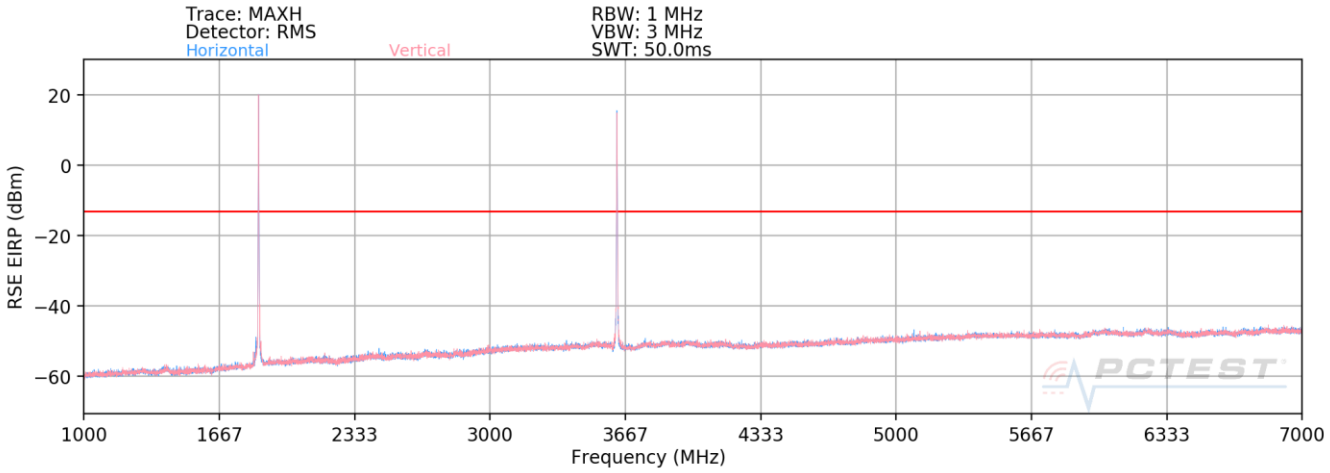
Plot 7-296. Radiated Spurious Plot (EN-DC n2 - B14 5.5 - 18GHz – OPEN)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	2/52
Mode:	EN-DC
Anchor Band:	LTE Band 14

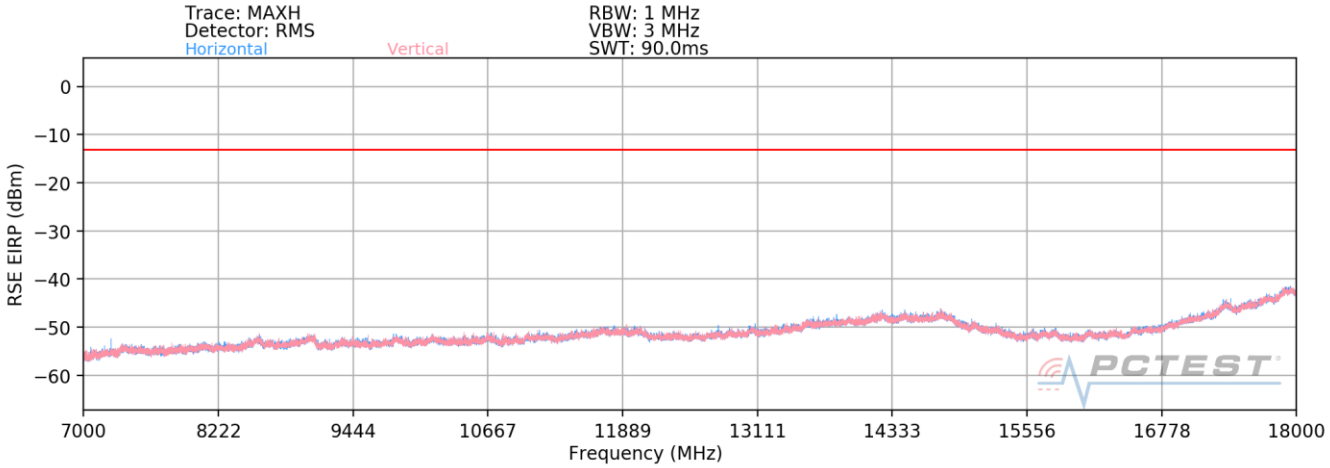
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1341.0	V	-	-	-69.85	-0.42	36.73	-58.53	-13.00	-45.53
2408.0	V	100	310	-70.90	5.30	41.40	-53.86	-13.00	-40.86
2927.0	V	-	-	-71.75	6.80	42.05	-53.21	-13.00	-40.21
3475.0	V	-	-	-71.86	6.90	42.04	-53.22	-13.00	-40.22
3994.0	V	-	-	-72.63	7.81	42.18	-53.08	-13.00	-40.08

Table 7-30. Radiated Spurious Data (EN-DC n2 - B14 – OPEN)

EN-DC n2 (Ant I) – Band 48



Plot 7-297. Radiated Spurious Plot (EN-DC n2 - B48 1-6GHz – Open)



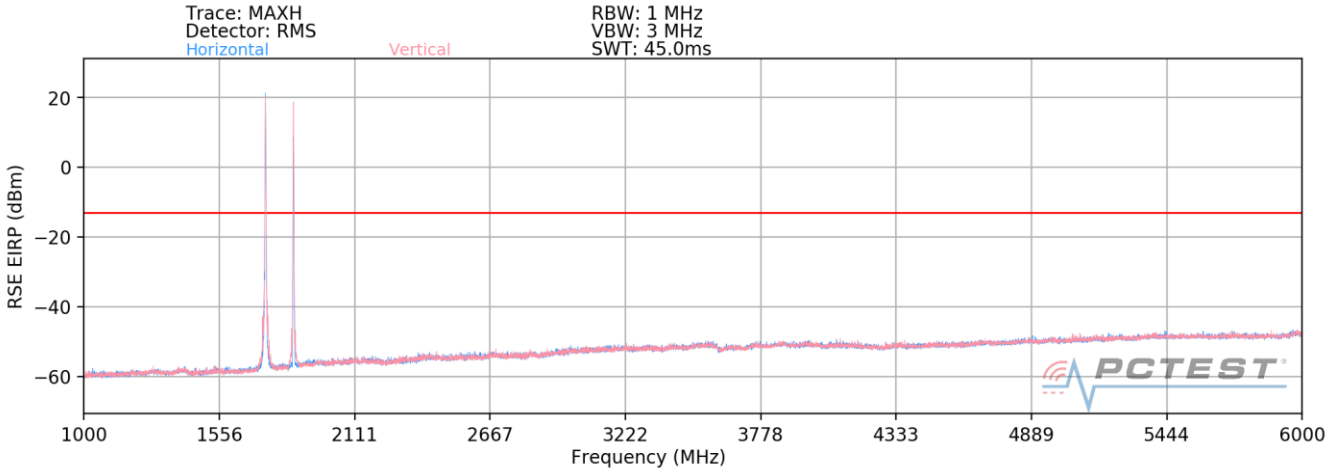
Plot 7-298. Radiated Spurious Plot (EN-DC n2 - B48 6-18GHz– Open)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	2/52
Mode:	EN-DC
Anchor Band:	LTE Band 48

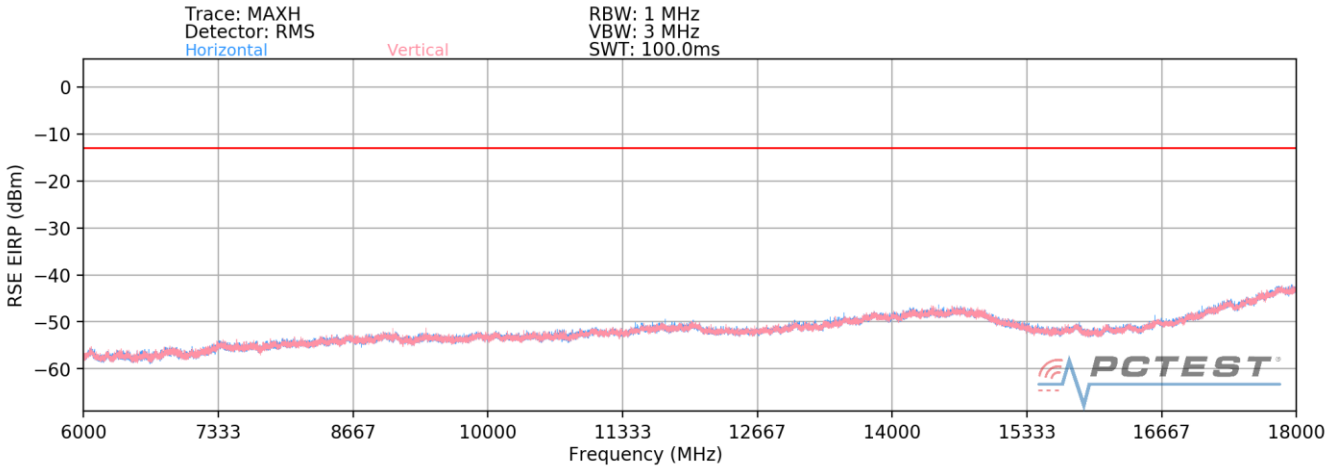
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1670.0	V	-	-	-76.17	1.05	31.88	-63.37	-13.00	-50.37
5390.0	V	-	-	-78.57	10.72	39.15	-56.11	-13.00	-43.11
7155.0	V	-	-	-79.58	17.20	44.62	-50.64	-13.00	-37.64

Table 7-30. Radiated Spurious Data (EN-DC n2 – B48 – Open)

EN-DC n2/25 (Ant I) – Band 66



Plot 7-299. Radiated Spurious Plot (EN-DC n2/25 – B66 1- 6GHz – Open)



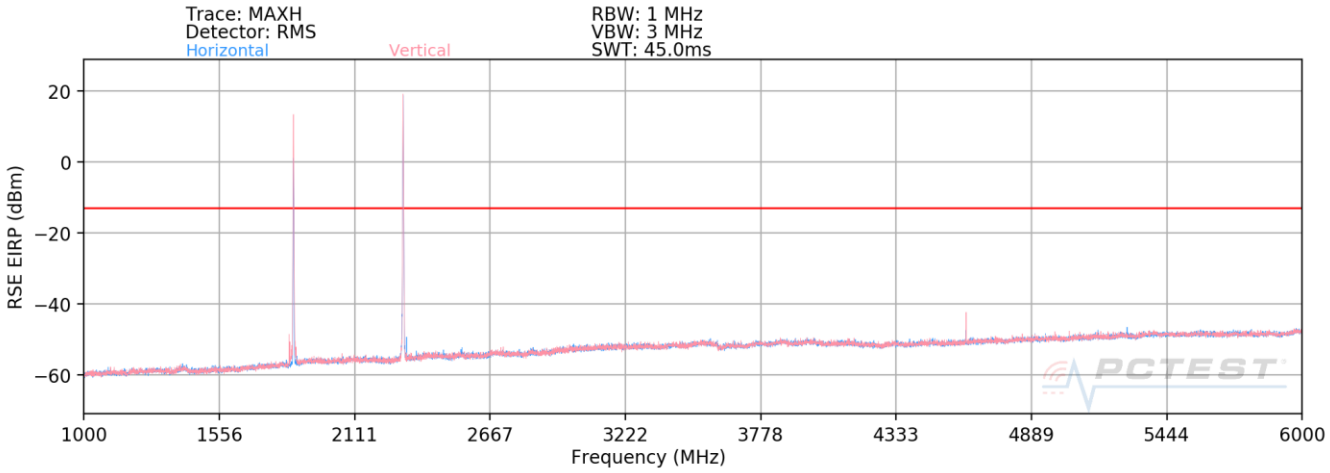
Plot 7-300. Radiated Spurious Plot (EN-DC n2/25 – B66 6 - 18GHz – Open)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	2/52
Mode:	EN-DC
Anchor Band:	LTE Band 66

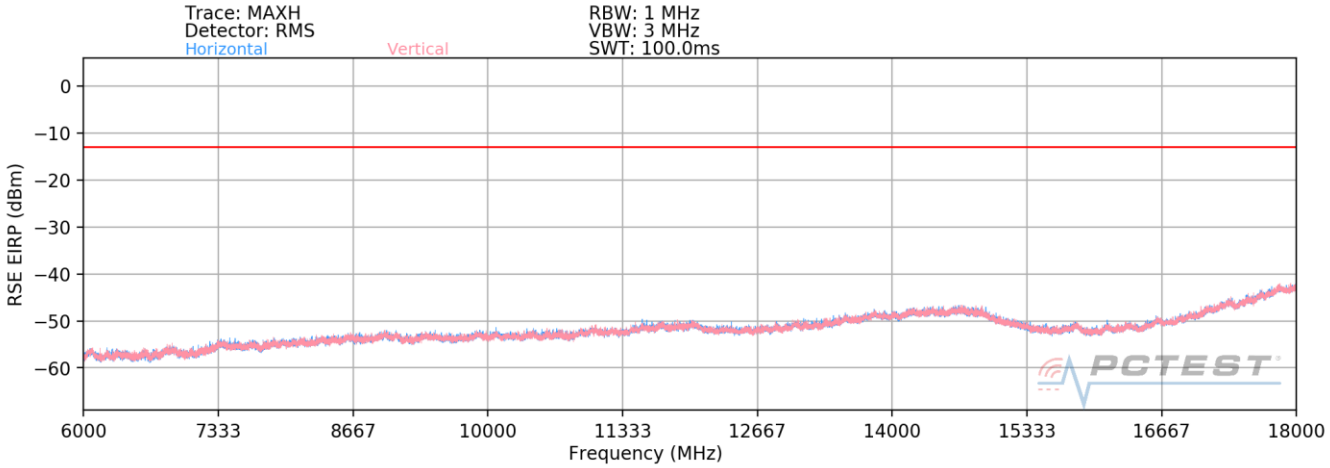
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1515.0	V	-	-	-71.57	-5.56	29.87	-65.38	-13.00	-52.38
1630.0	V	-	-	-73.38	-6.16	27.46	-67.80	-13.00	-54.80
1975.0	V	-	-	-71.55	-3.36	32.09	-63.16	-13.00	-50.16
2090.0	V	-	-	-71.28	-2.92	32.80	-62.46	-13.00	-49.46
2205.0	V	-	-	-71.37	-2.60	33.03	-62.23	-13.00	-49.23

Table 7-30. Radiated Spurious Data (NR Band n2 (ANT I) – Mid Channel) EN-DC – B66 Anchor

EN-DC n2 (Ant I) – Band 30



Plot 7-301. Radiated Spurious Plot (EN-DC n2 – B30 1-6GHz – Open)



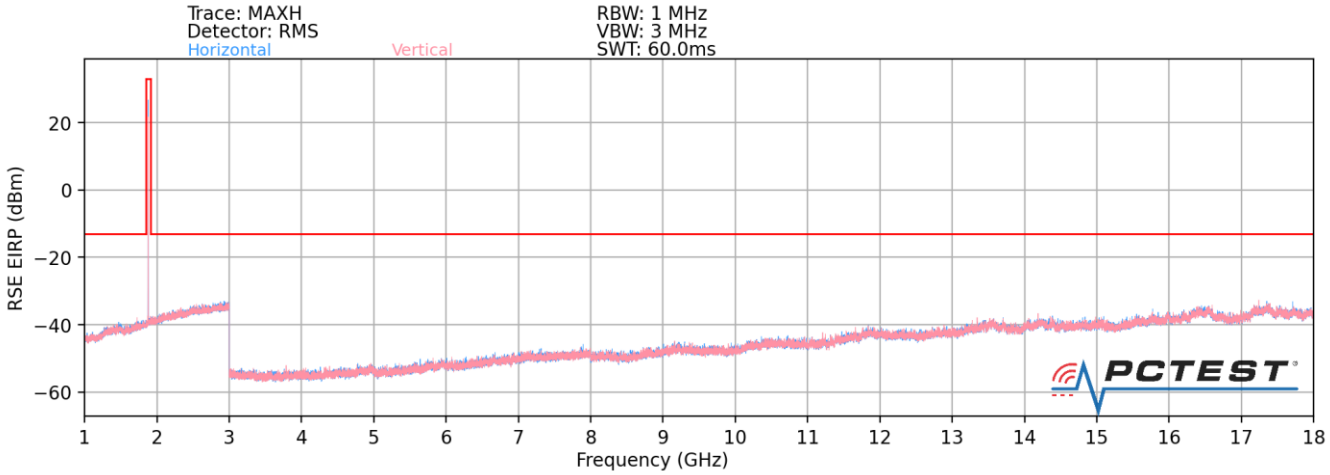
Plot 7-302. Radiated Spurious Plot (EN-DC n2 - B30 6-18GHz – Open)

Bandwidth (MHz):	20
Frequency (MHz):	1860.0
RB / Offset:	2 / 52
Mode:	EN-DC
Anchor Band:	LTE Band 30

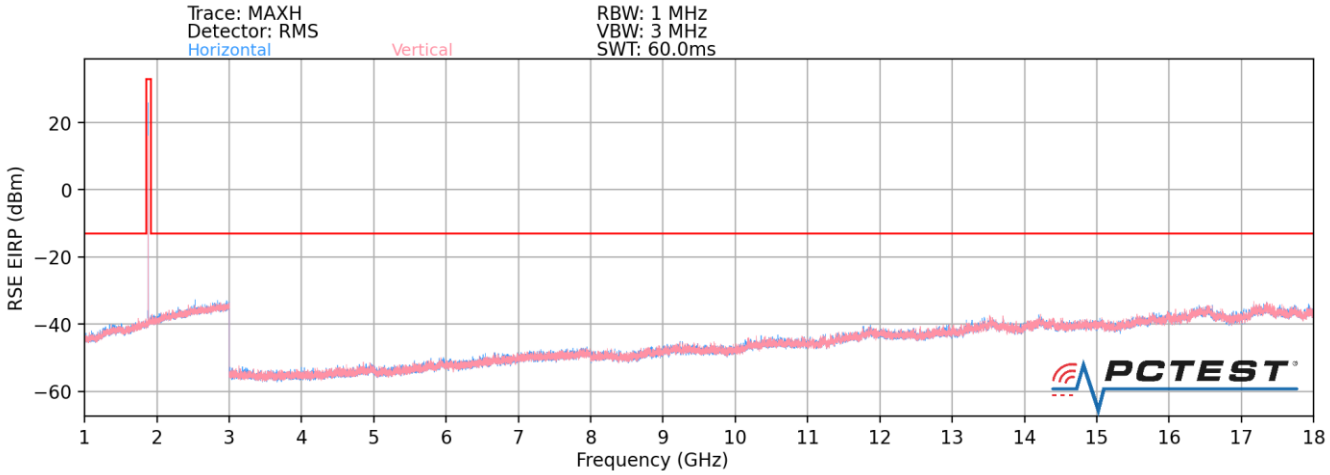
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1410.0	V	-	-	-71.55	-5.26	30.19	-65.06	-13.00	-52.06
2760.0	V	-	-	-72.02	-1.76	33.22	-62.04	-13.00	-49.04
3210.0	V	-	-	-71.96	0.50	35.54	-59.71	-13.00	-46.71
3660.0	V	-	-	-76.34	1.89	32.55	-62.71	-13.00	-49.71
4110.0	V	-	-	-76.18	2.25	33.07	-62.19	-13.00	-49.19
4560.0	V	-	-	-77.05	2.36	32.31	-62.95	-13.00	-49.95
4620.0	V	183	21	-58.74	2.89	51.15	-44.10	-13.00	-31.10

Table 7-30. Radiated Spurious Data (EN-DC n2 – B30 – Open)

GSM/GPRS PCS



Plot 7-303. Radiated Spurious Plot (GPRS PCS – Open)



Plot 7-304. Radiated Spurious Plot (GPRS PCS – Closed)

Mode:	GPRS 1 Tx Slot
Channel:	512
Frequency (MHz):	1850.2

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]
3700.4	H	-	-	-70.57	7.90	44.33	-50.93	-13.00	-37.93
5550.6	H	100	6	-67.88	11.88	51.00	-44.26	-13.00	-31.26
7400.8	H	-	-	-71.33	15.87	51.54	-43.72	-13.00	-30.72
9251.0	H	-	-	-71.43	18.18	53.75	-41.51	-13.00	-28.51

Table 7-19. Radiated Spurious Data (GPRS PCS – Low Channel – Open)

Mode:	GPRS 1 Tx Slot
Channel:	661
Frequency (MHz):	1880

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]
3760.0	H	-	-	-69.29	8.23	45.94	-49.32	-13.00	-36.32
5640.0	H	130	345	-67.99	11.46	50.47	-44.79	-13.00	-31.79
7520.0	H	-	-	-69.97	16.01	53.04	-42.22	-13.00	-29.22
9400.0	H	-	-	-72.24	18.93	53.69	-41.57	-13.00	-28.57

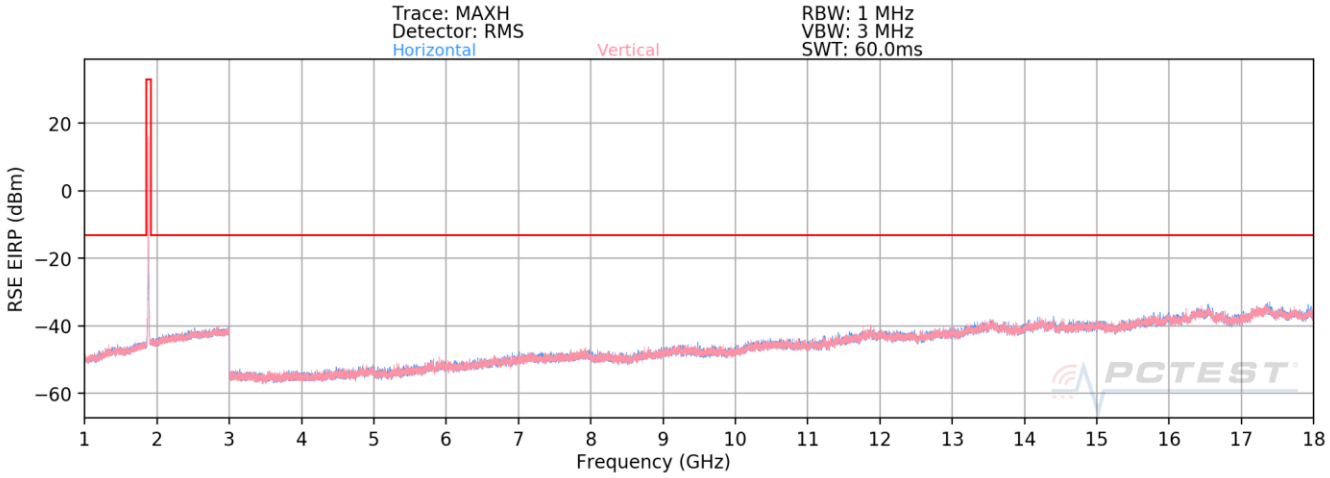
Table 7-20. Radiated Spurious Data (GPRS PCS – Mid Channel – Open)

Mode:	GPRS 1 Tx Slot
Channel:	810
Frequency (MHz):	1909.8

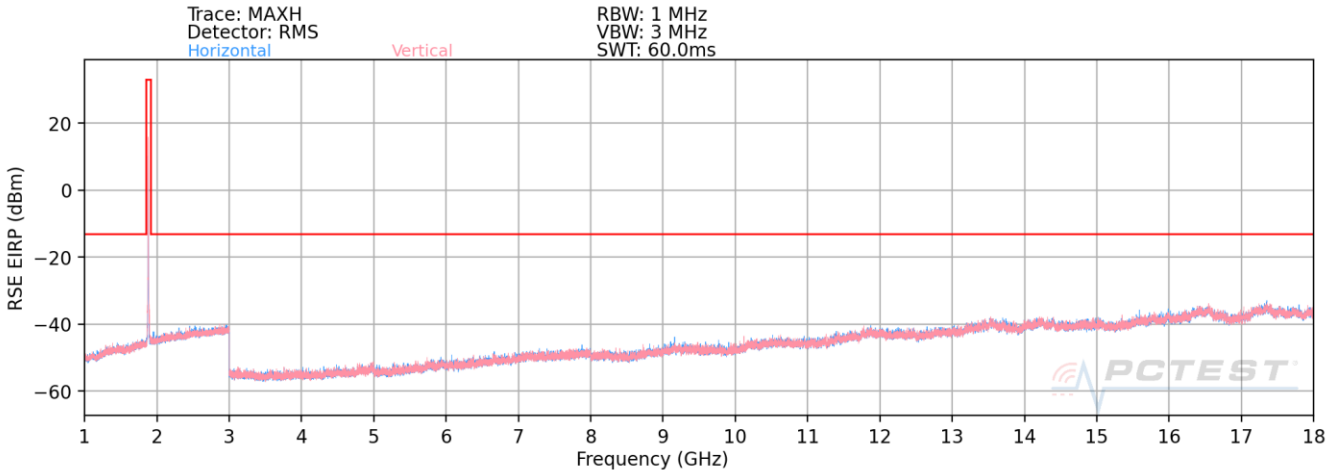
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3819.6	H	201	23	-68.93	8.59	46.66	-48.60	-13.00	-35.60
5729.4	H	141	358	-70.28	12.11	48.83	-46.42	-13.00	-33.42
7639.2	H	-	-	-71.45	16.66	52.21	-43.05	-13.00	-30.05
9549.0	H	-	-	-72.56	18.70	53.14	-42.12	-13.00	-29.12

Table 7-21. Radiated Spurious Data (GPRS PCS – High Channel – Open)

WCDMA PCS



Plot 7-305. Radiated Spurious Plot (WCDMA PCS – Open)



Plot 7-306. Radiated Spurious Plot (WCDMA PCS – Closed)

Mode:	WCDMA RMC
Channel:	9262
Frequency (MHz):	1852.4

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]
3704.8	H	100	4	-70.60	7.90	44.30	-50.96	-13.00	-37.96
5557.2	H	-	-	-71.55	12.04	47.49	-47.77	-13.00	-34.77
7409.6	H	-	-	-70.72	15.93	52.21	-43.05	-13.00	-30.05

Table 7-22. Radiated Spurious Data (WCDMA PCS – Low Channel – Open)

Mode:	WCDMA RMC
Channel:	9400
Frequency (MHz):	1880

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]
3760.0	H	133	362	-70.86	8.23	44.37	-50.89	-13.00	-37.89
5640.0	H	-	-	-71.01	11.46	47.45	-47.81	-13.00	-34.81
7520.0	H	-	-	-70.89	16.01	52.12	-43.14	-13.00	-30.14

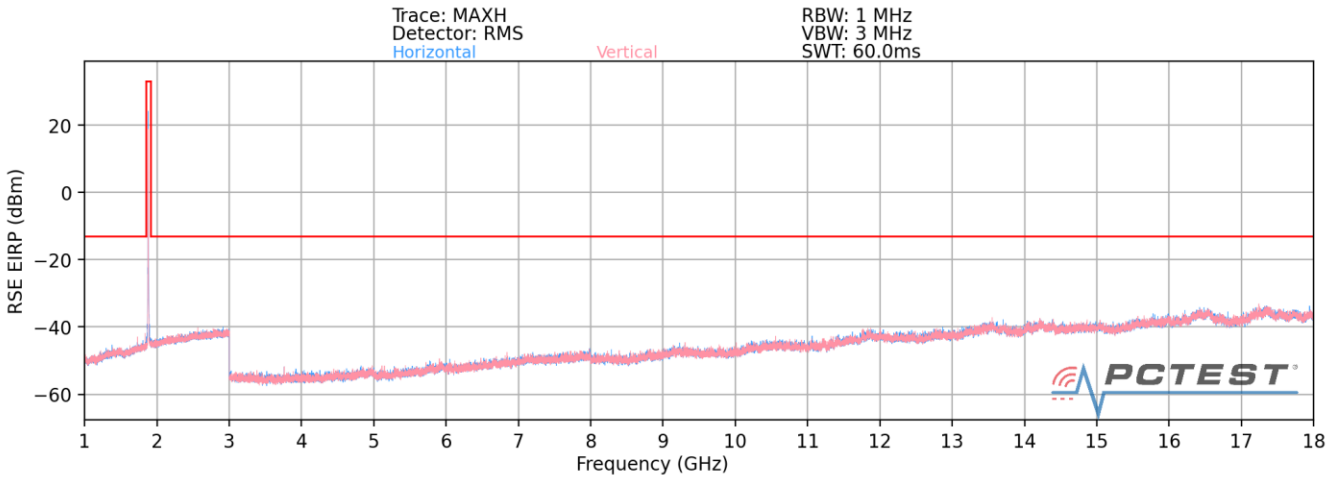
Table 7-23. Radiated Spurious Data (WCDMA PCS – Mid Channel – Open)

Mode:	WCDMA RMC
Channel:	9538
Frequency (MHz):	1907.6

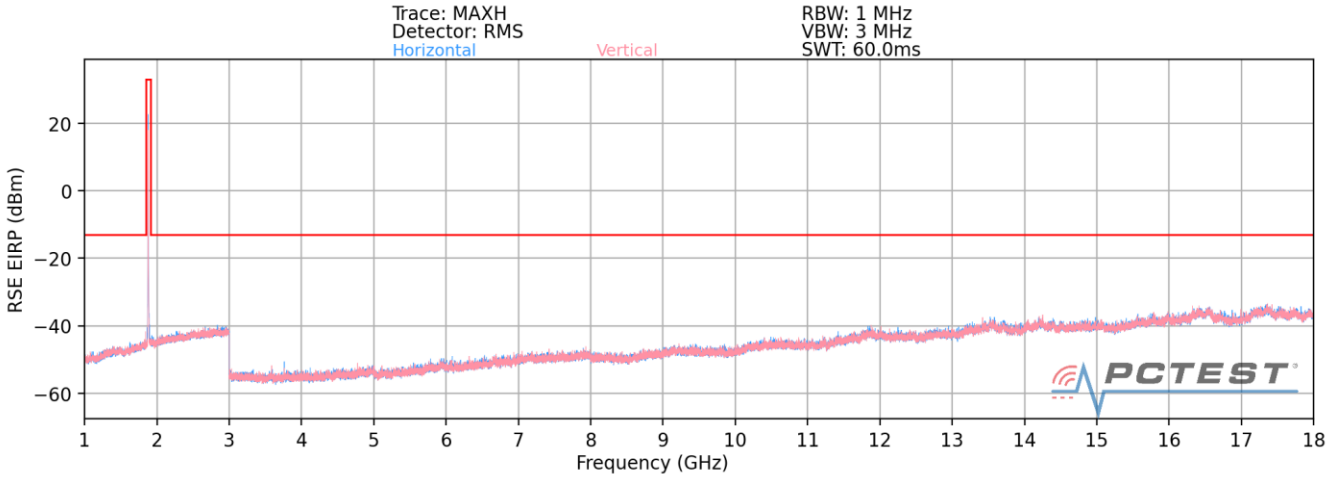
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3815.2	H	107	357	-69.31	8.65	46.34	-48.92	-13.00	-35.92
5722.8	H	-	-	-70.28	12.06	48.78	-46.48	-13.00	-33.48
7630.4	H	-	-	-71.13	16.62	52.49	-42.76	-13.00	-29.76

Table 7-24. Radiated Spurious Data (WCDMA PCS – High Channel – Open)

CDMA PCS



Plot 7-307. Radiated Spurious Plot (CDMA PCS – Open)



Plot 7-308. Radiated Spurious Plot (CDMA PCS – Closed)

Mode:	CDMA
Channel:	25
Frequency (MHz):	1851.25

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]
3702.50	H	153	149	-74.51	7.90	40.39	-54.87	-13.00	-41.87
5553.75	H	-	-	-81.77	11.95	37.18	-58.07	-13.00	-45.07
7405.00	H	-	-	-82.64	15.90	40.26	-55.00	-13.00	-42.00
9256.25	H	-	-	-82.97	18.29	42.32	-52.94	-13.00	-39.94

Table 7-25. Radiated Spurious Data (CDMA PCS – Low Channel – Closed)

Mode:	CDMA
Channel:	600
Frequency (MHz):	1880

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]
3760.00	H	132	144	-75.19	8.23	40.04	-55.22	-13.00	-42.22
5640.00	H	-	-	-81.79	11.46	36.67	-58.59	-13.00	-45.59
7520.00	H	-	-	-82.77	16.01	40.24	-55.02	-13.00	-42.02
9400.00	H	-	-	-83.74	18.93	42.19	-53.07	-13.00	-40.07

Table 7-26. Radiated Spurious Data (CDMA PCS – Mid Channel – Closed)

Mode:	CDMA
Channel:	1175
Frequency (MHz):	1908.75

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]
3817.50	H	198	154	-77.24	8.62	38.38	-56.88	-13.00	-43.88
5726.25	H	-	-	-81.70	12.06	37.36	-57.90	-13.00	-44.90
7635.00	H	-	-	-82.01	16.64	41.63	-53.63	-13.00	-40.63
9543.75	H	-	-	-82.83	18.63	42.80	-52.46	-13.00	-39.46

Table 7-27. Radiated Spurious Data (CDMA PCS – High Channel – Closed)

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/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/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.

Test Notes

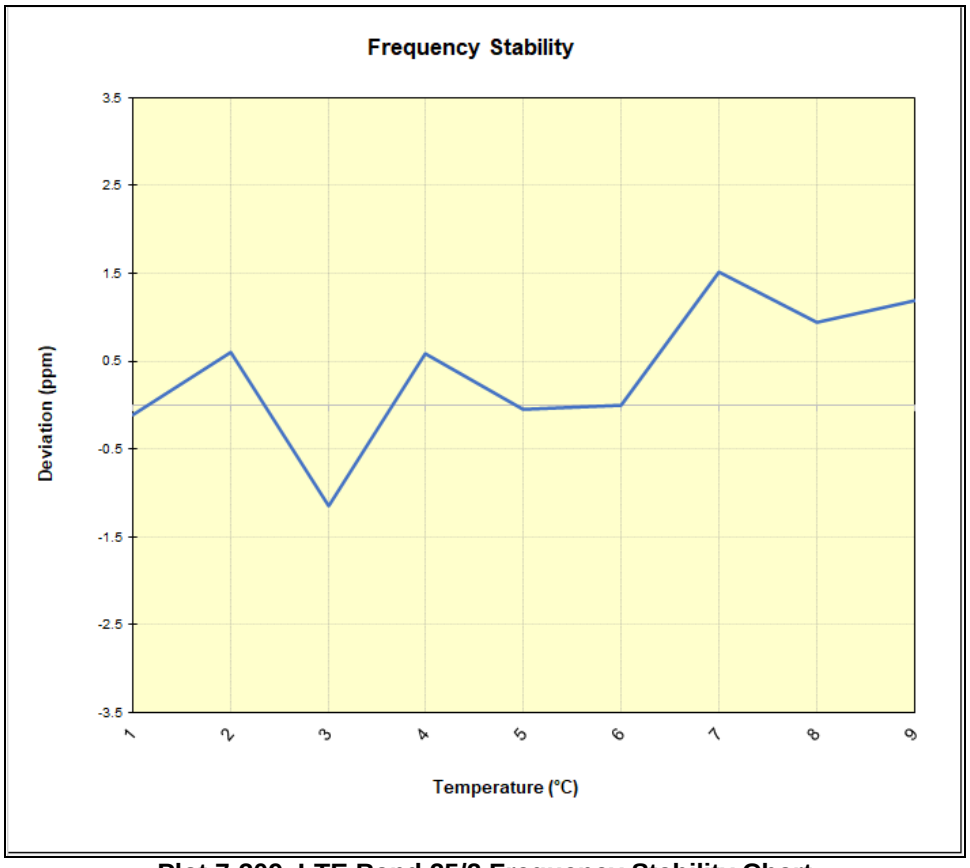
None

LTE Band 25/2

Operating Frequency (Hz):	1,882,500,000
Ref. Voltage (VDC):	4.43

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.43	- 30	1,882,503,558	-207	-0.0000110
		- 20	1,882,504,892	1,127	0.0000599
		- 10	1,882,501,620	-2,146	-0.0001140
		0	1,882,504,877	1,112	0.0000590
		+ 10	1,882,503,673	-92	-0.0000049
		+ 20 (Ref)	1,882,503,765	0	0.0000000
		+ 30	1,882,506,613	2,848	0.0001513
		+ 40	1,882,505,544	1,779	0.0000945
		+ 50	1,882,506,002	2,237	0.0001188
Battery Endpoint	3.36	+ 20	1,882,506,552	2,787	0.0001480

Table 7-28. LTE Band 25/2 Frequency Stability Data



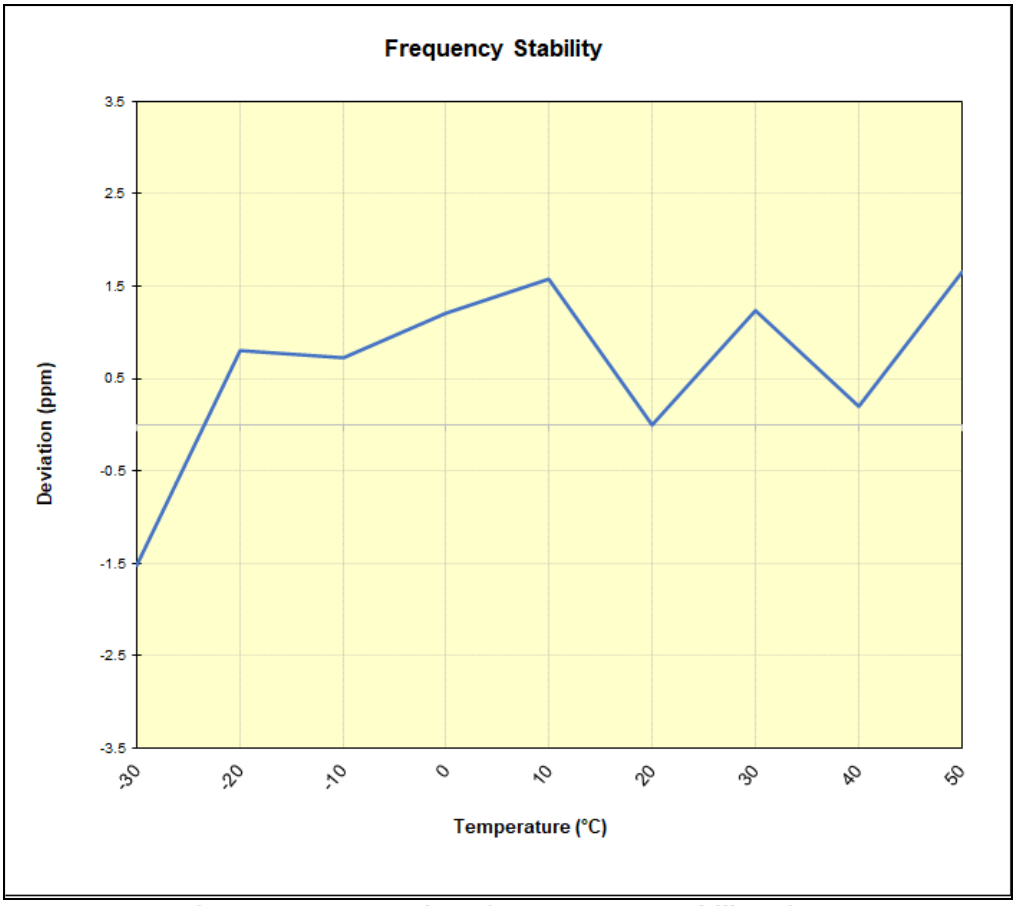
Plot 7-309. LTE Band 25/2 Frequency Stability Chart

NR Band n25/2 ANT A

Operating Frequency (Hz):	1,882,500,000
Ref. Voltage (VDC):	4.43

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.43	- 30	1,882,563,425	-2,865	-0.0001522
		- 20	1,882,567,806	1,515	0.0000805
		- 10	1,882,567,645	1,355	0.0000720
		0	1,882,568,560	2,270	0.0001206
		+ 10	1,882,569,264	2,974	0.0001580
		+ 20 (Ref)	1,882,566,290	0	0.0000000
		+ 30	1,882,568,619	2,329	0.0001237
		+ 40	1,882,566,655	365	0.0000194
		+ 50	1,882,569,397	3,107	0.0001650
Battery Endpoint	3.36	+ 20	1,882,565,843	-447	-0.0000237

Table 7-29. NR Band n25/2 Frequency Stability Data



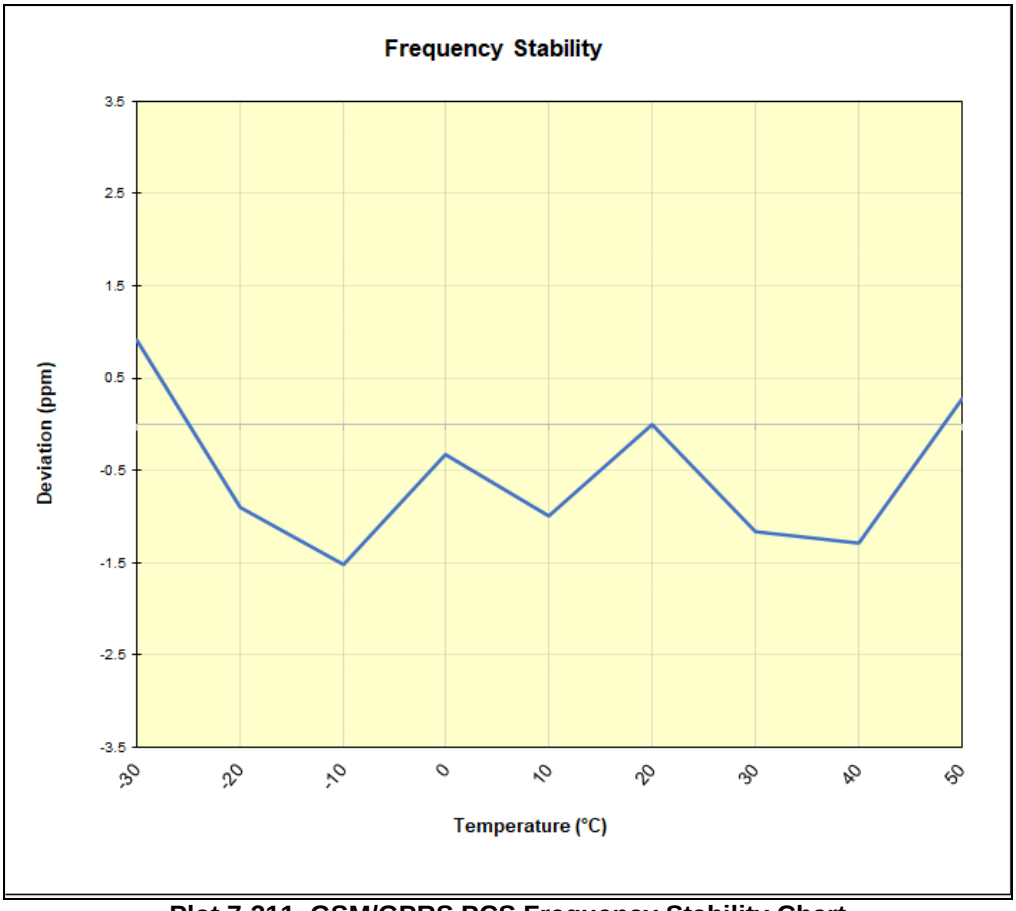
Plot 7-310. NR Band n25/2 Frequency Stability Chart

GSM/GPRS PCS

Operating Frequency (Hz):	1,880,000,000
Ref. Voltage (VDC):	4.43

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.43	- 30	1,880,005,138	1,727	0.0000919
		- 20	1,880,001,729	-1,682	-0.0000895
		- 10	1,880,000,551	-2,860	-0.0001521
		0	1,880,002,794	-617	-0.0000328
		+ 10	1,880,001,561	-1,850	-0.0000984
		+ 20 (Ref)	1,880,003,411	0	0.0000000
		+ 30	1,880,001,229	-2,182	-0.0001161
		+ 40	1,880,001,006	-2,406	-0.0001280
		+ 50	1,880,003,949	538	0.0000286
Battery Endpoint	3.36	+ 20	1,880,004,515	1,103	0.0000587

Table 7-30. GSM/GPRS PCS Frequency Stability Data



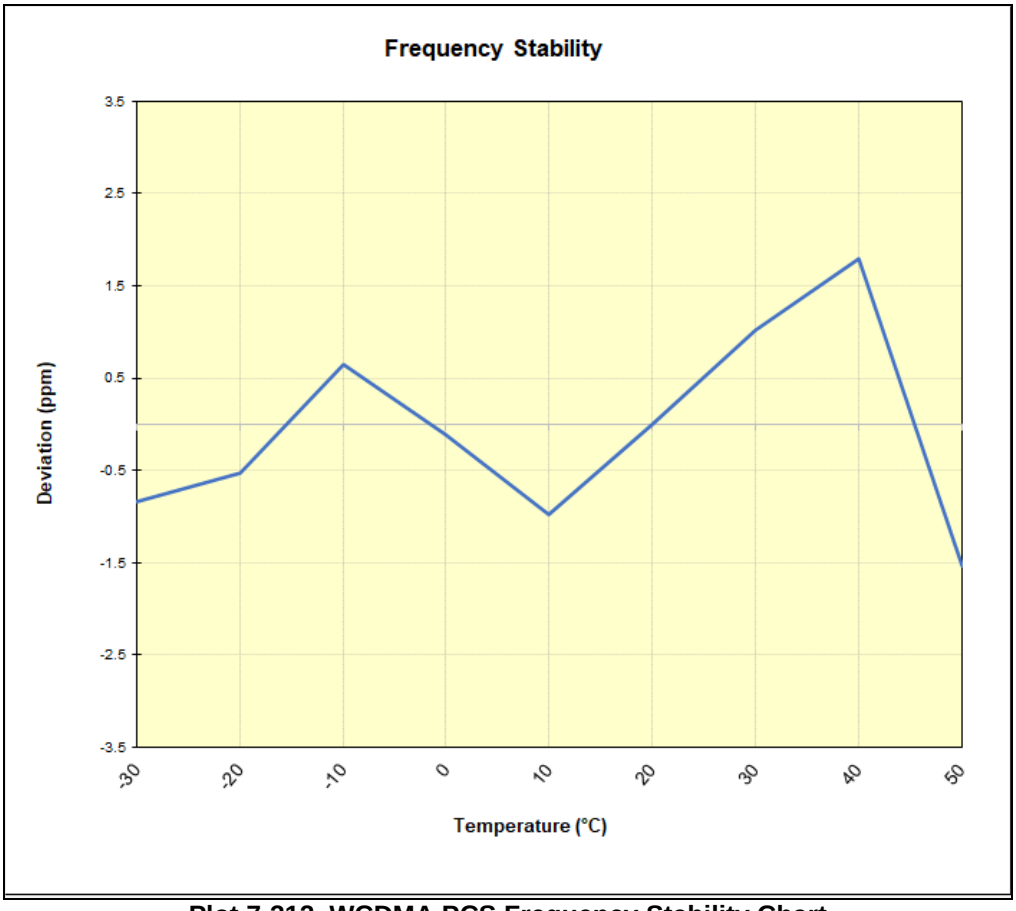
Plot 7-311. GSM/GPRS PCS Frequency Stability Chart

WCDMA PCS

Operating Frequency (Hz):	1,880,000,000
Ref. Voltage (VDC):	4.43

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.43	- 30	1,879,997,488	-1,574	-0.0000837
		- 20	1,879,998,070	-991	-0.0000527
		- 10	1,880,000,298	1,237	0.0000658
		0	1,879,998,872	-189	-0.0000101
		+ 10	1,879,997,221	-1,841	-0.0000979
		+ 20 (Ref)	1,879,999,062	0	0.0000000
		+ 30	1,880,000,987	1,925	0.0001024
		+ 40	1,880,002,445	3,384	0.0001800
		+ 50	1,879,996,176	-2,886	-0.0001535
Battery Endpoint	3.36	+ 20	1,879,998,958	-104	-0.0000055

Table 7-31. WCDMA PCS Frequency Stability Data



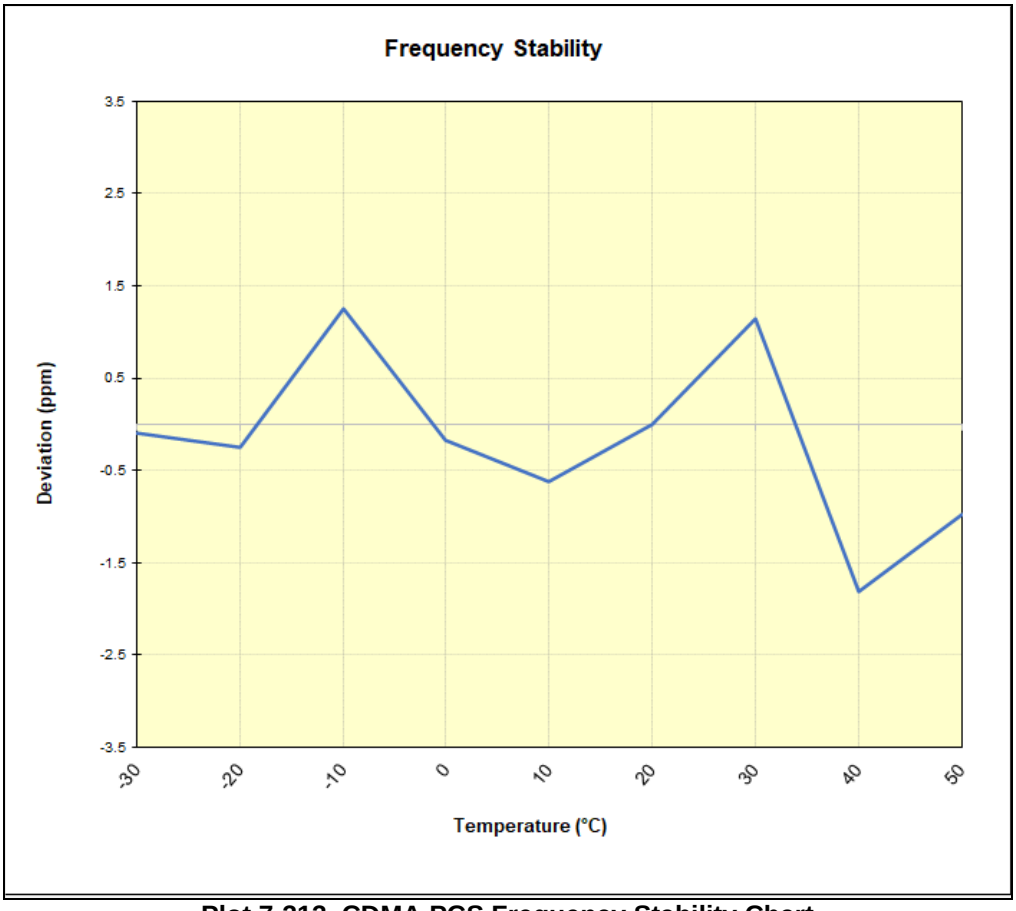
Plot 7-312. WCDMA PCS Frequency Stability Chart

CDMA PCS

Operating Frequency (Hz):	1,880,000,000
Ref. Voltage (VDC):	4.43

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.43	- 30	1,880,011,792	-177	-0.0000094
		- 20	1,880,011,497	-472	-0.0000251
		- 10	1,880,014,333	2,364	0.0001257
		0	1,880,011,652	-317	-0.0000169
		+ 10	1,880,010,819	-1,150	-0.0000612
		+ 20 (Ref)	1,880,011,969	0	0.0000000
		+ 30	1,880,014,123	2,154	0.0001146
		+ 40	1,880,008,550	-3,419	-0.0001819
		+ 50	1,880,010,134	-1,835	-0.0000976
Battery Endpoint	3.36	+ 20	1,880,011,652	-317	-0.0000169

Table 7-32. CDMA PCS Frequency Stability Data



Plot 7-313. CDMA PCS Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Samsung **Portable Handset FCC ID: A3LSMF711U** complies with all the requirements of Part 24 of the FCC rules.