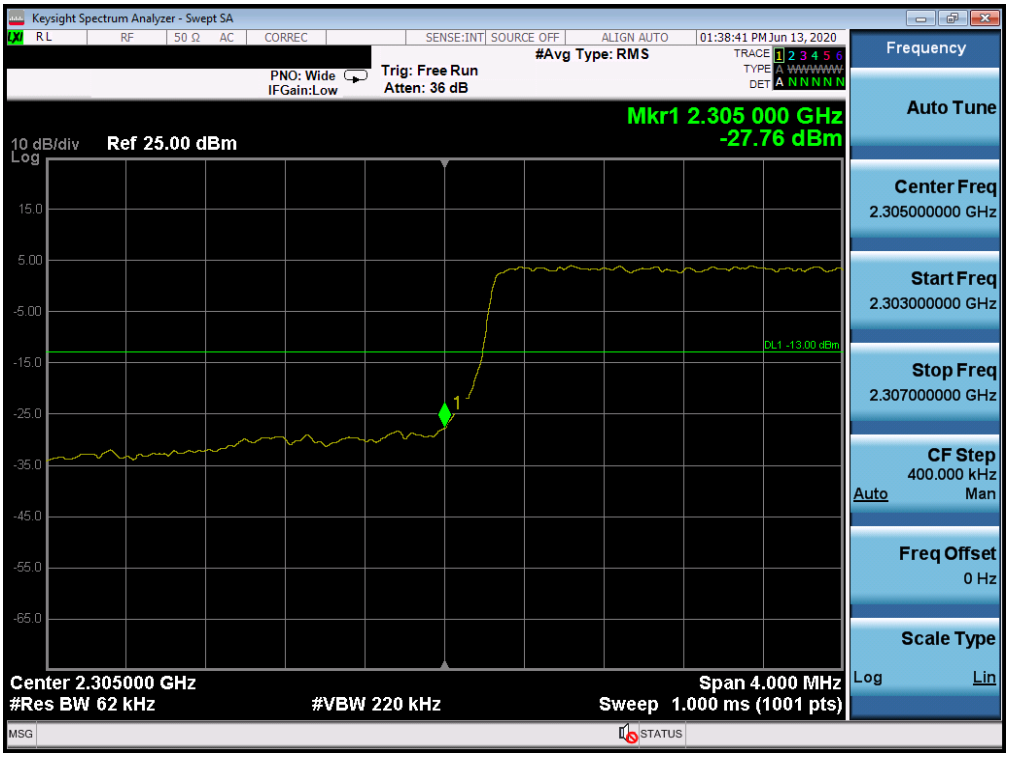
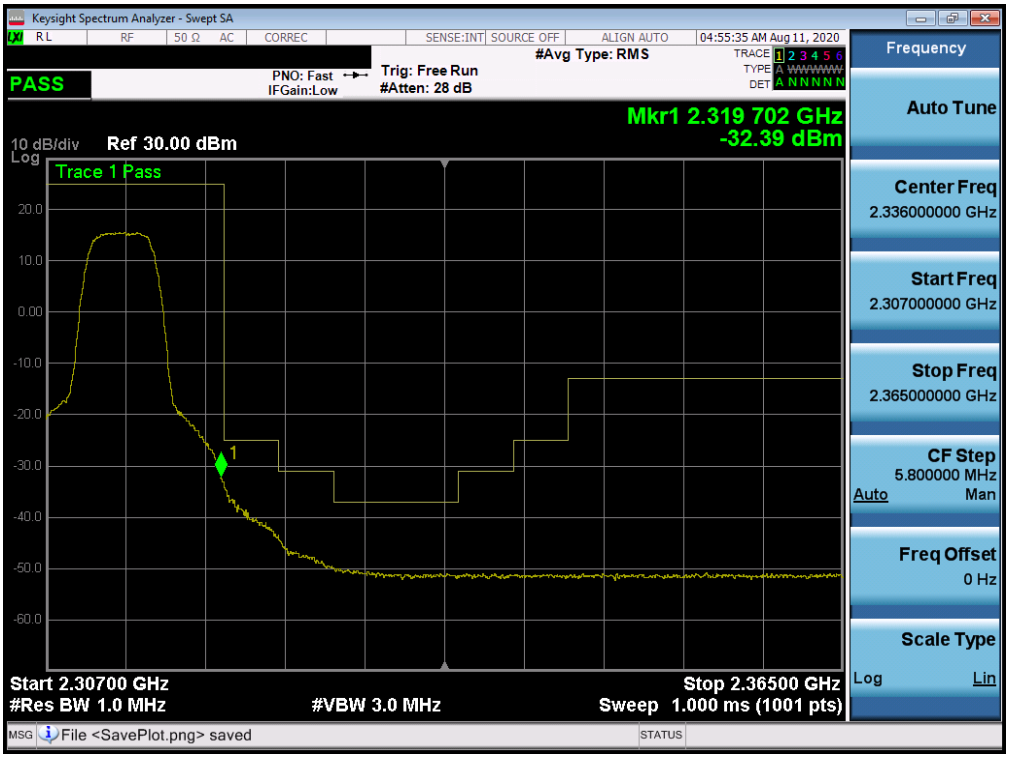
Band 30



Plot 7-330. Lower Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-331. Lower Extended Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-332. Upper Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

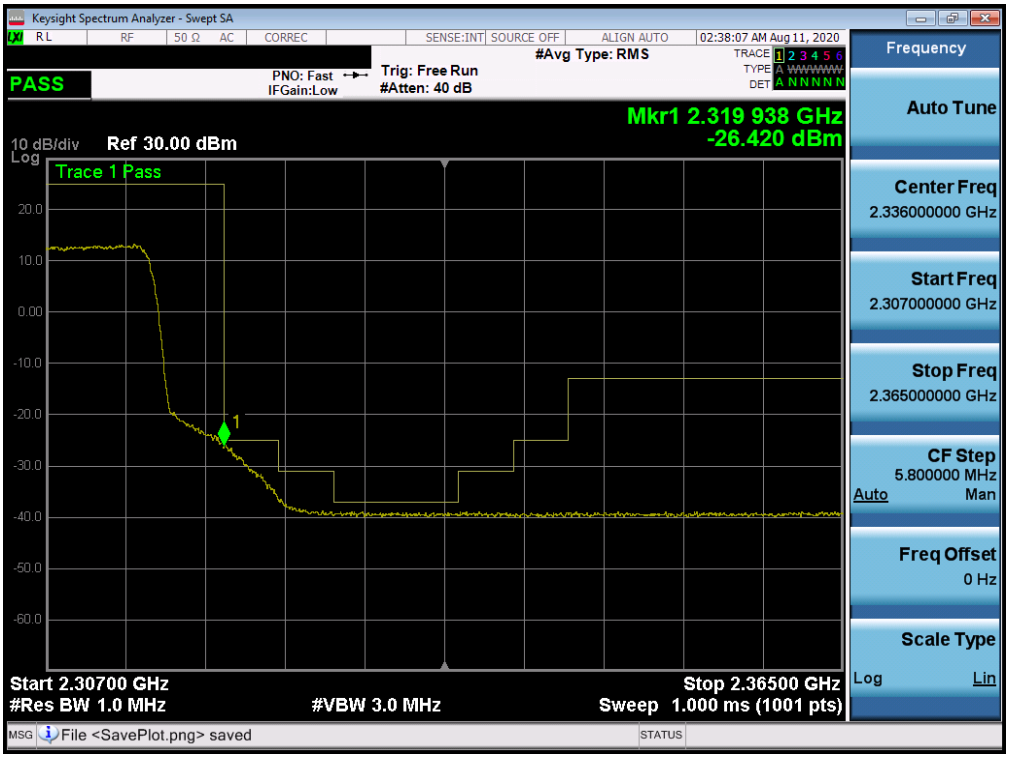


Plot 7-333. Upper Extended Band Edge Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-334. Lower Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)

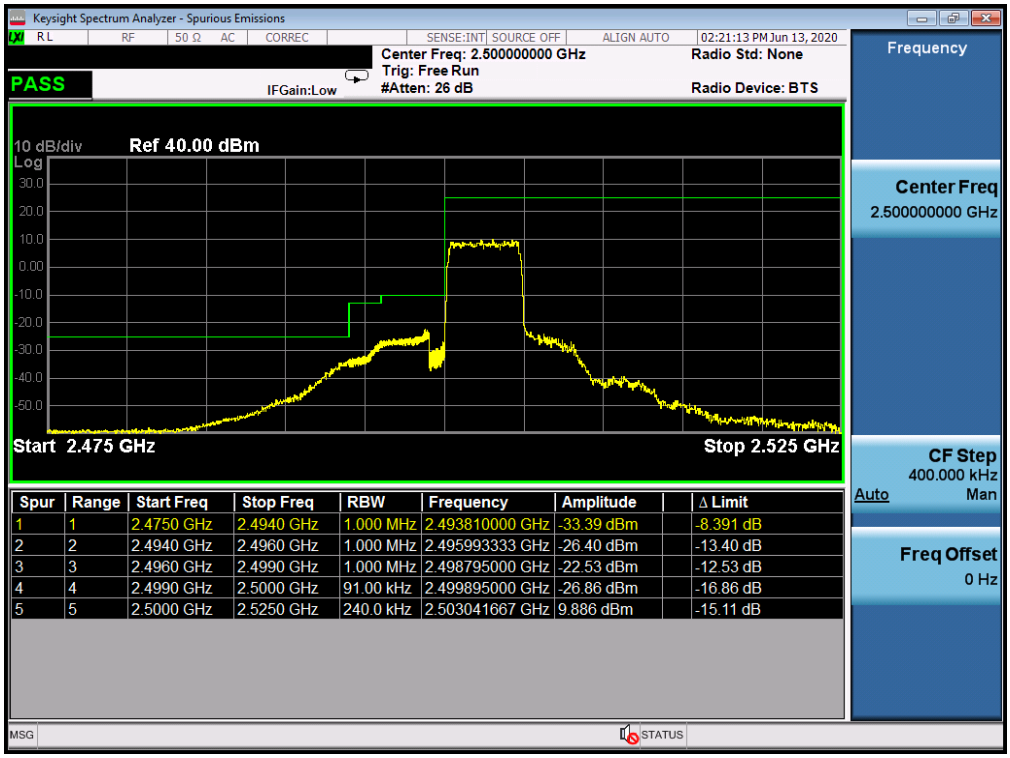
Plot 7-335. Lower Extended Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-336. Upper Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)



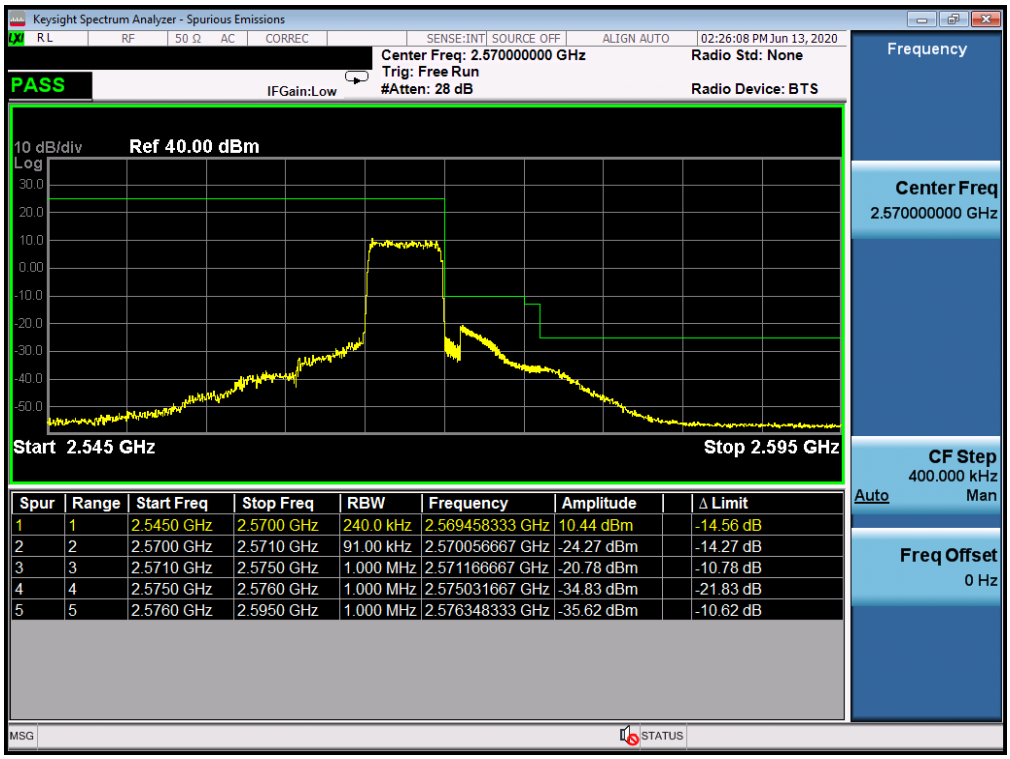
Plot 7-337. Upper Extended Band Edge Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)

Band 7



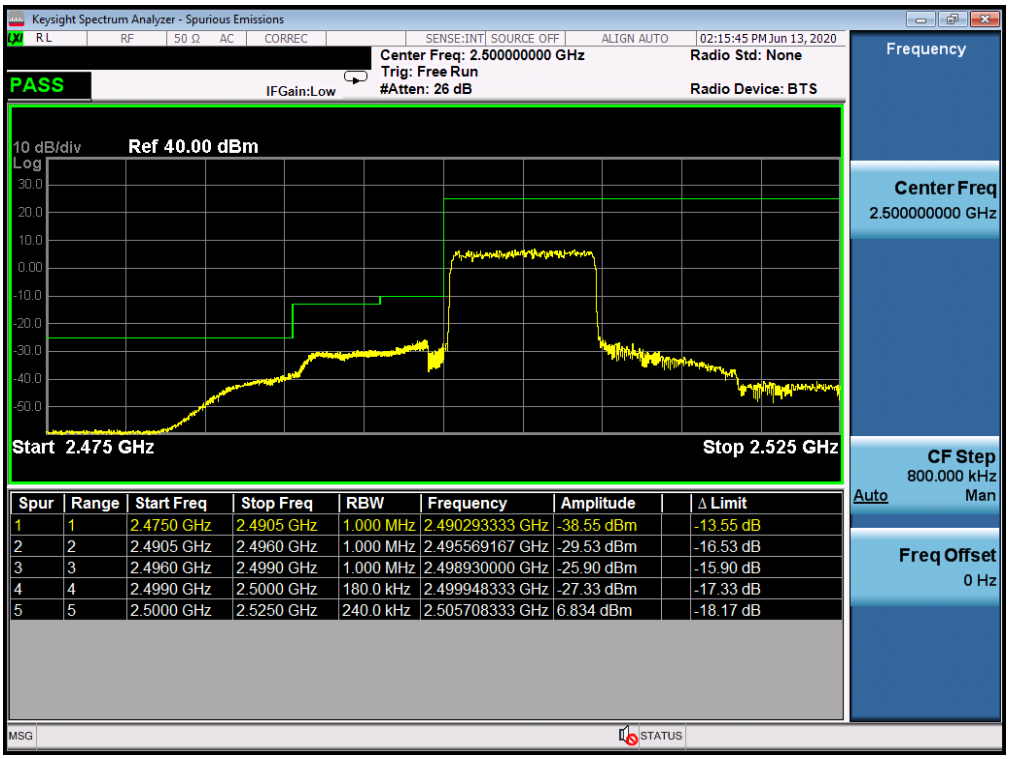
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4940 GHz	1.000 MHz	2.493810000 GHz	-33.39 dBm	-8.391 dB
2	2	2.4940 GHz	2.4960 GHz	1.000 MHz	2.495993333 GHz	-26.40 dBm	-13.40 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498795000 GHz	-22.53 dBm	-12.53 dB
4	4	2.4990 GHz	2.5000 GHz	91.00 kHz	2.499895000 GHz	-26.86 dBm	-16.86 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.503041667 GHz	9.886 dBm	-15.11 dB

Plot 7-338. Lower ACP Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



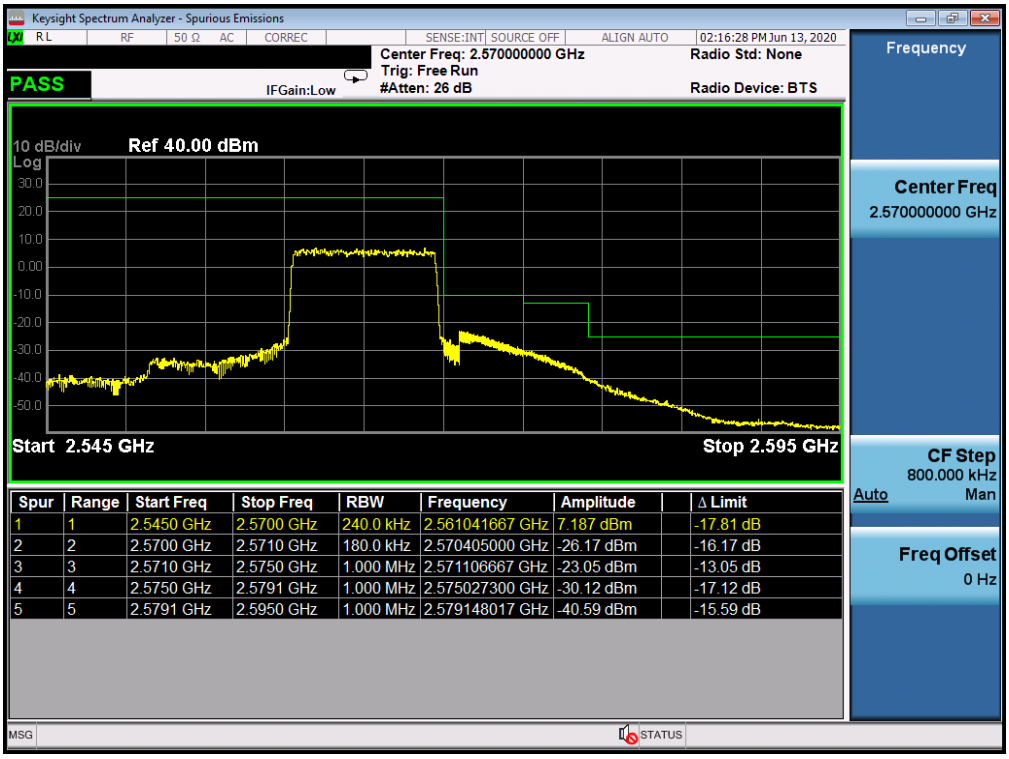
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.569458333 GHz	10.44 dBm	-14.56 dB
2	2	2.5700 GHz	2.5710 GHz	91.00 kHz	2.570056667 GHz	-24.27 dBm	-14.27 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571166667 GHz	-20.78 dBm	-10.78 dB
4	4	2.5750 GHz	2.5760 GHz	1.000 MHz	2.575031667 GHz	-34.83 dBm	-21.83 dB
5	5	2.5760 GHz	2.5950 GHz	1.000 MHz	2.576348333 GHz	-35.62 dBm	-10.62 dB

Plot 7-339. Upper ACP Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490293333 GHz	-38.55 dBm	-13.55 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495569167 GHz	-29.53 dBm	-16.53 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498930000 GHz	-25.90 dBm	-15.90 dB
4	4	2.4990 GHz	2.5000 GHz	180.0 kHz	2.499948333 GHz	-27.33 dBm	-17.33 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.505708333 GHz	6.834 dBm	-18.17 dB

Plot 7-340. Lower ACP Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)

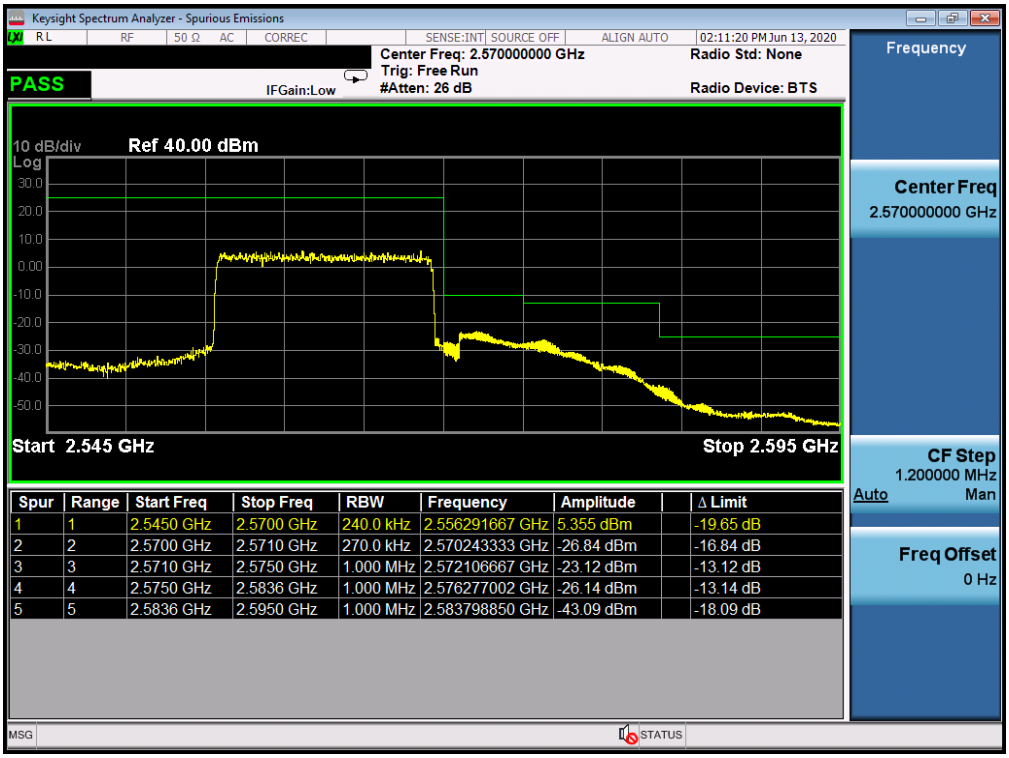


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.561041667 GHz	7.187 dBm	-17.81 dB
2	2	2.5700 GHz	2.5710 GHz	180.0 kHz	2.570405000 GHz	-26.17 dBm	-16.17 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571106667 GHz	-23.05 dBm	-13.05 dB
4	4	2.5750 GHz	2.5791 GHz	1.000 MHz	2.575027300 GHz	-30.12 dBm	-17.12 dB
5	5	2.5791 GHz	2.5950 GHz	1.000 MHz	2.579148017 GHz	-40.59 dBm	-15.59 dB

Plot 7-341. Upper ACP Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)

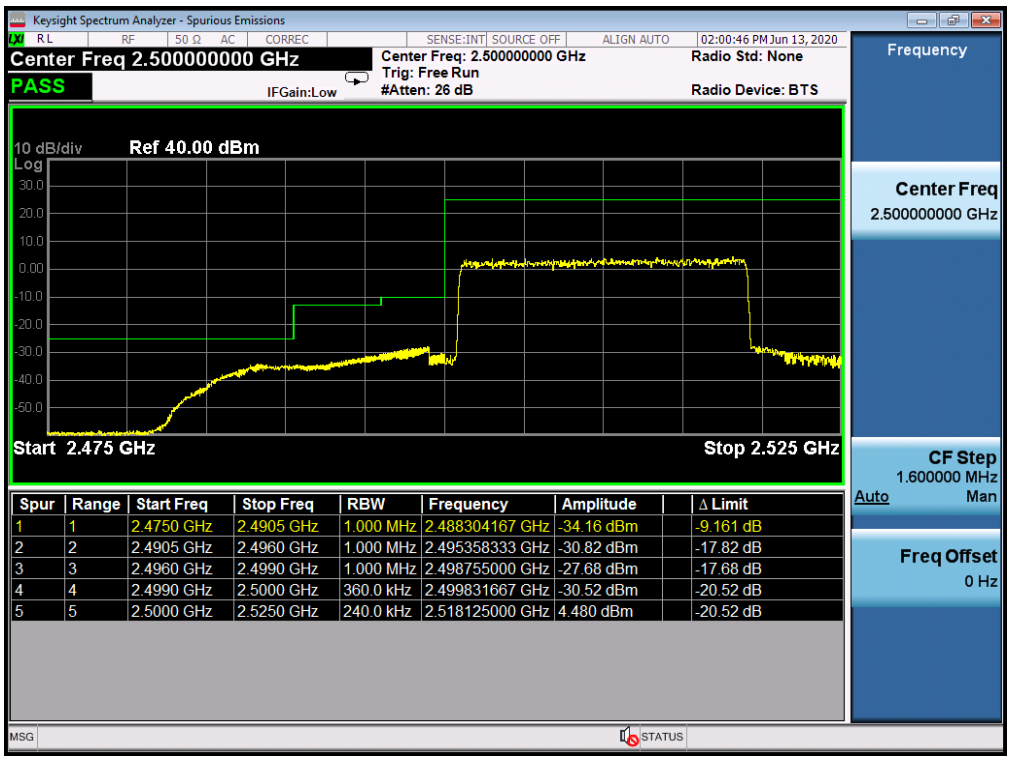
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.488820833 GHz	-34.69 dBm	-9.687 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.491664167 GHz	-34.60 dBm	-21.60 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498895000 GHz	-28.98 dBm	-18.98 dB
4	4	2.4990 GHz	2.5000 GHz	270.0 kHz	2.499991667 GHz	-30.96 dBm	-20.96 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.510000000 GHz	5.352 dBm	-19.65 dB

Plot 7-342. Lower ACP Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

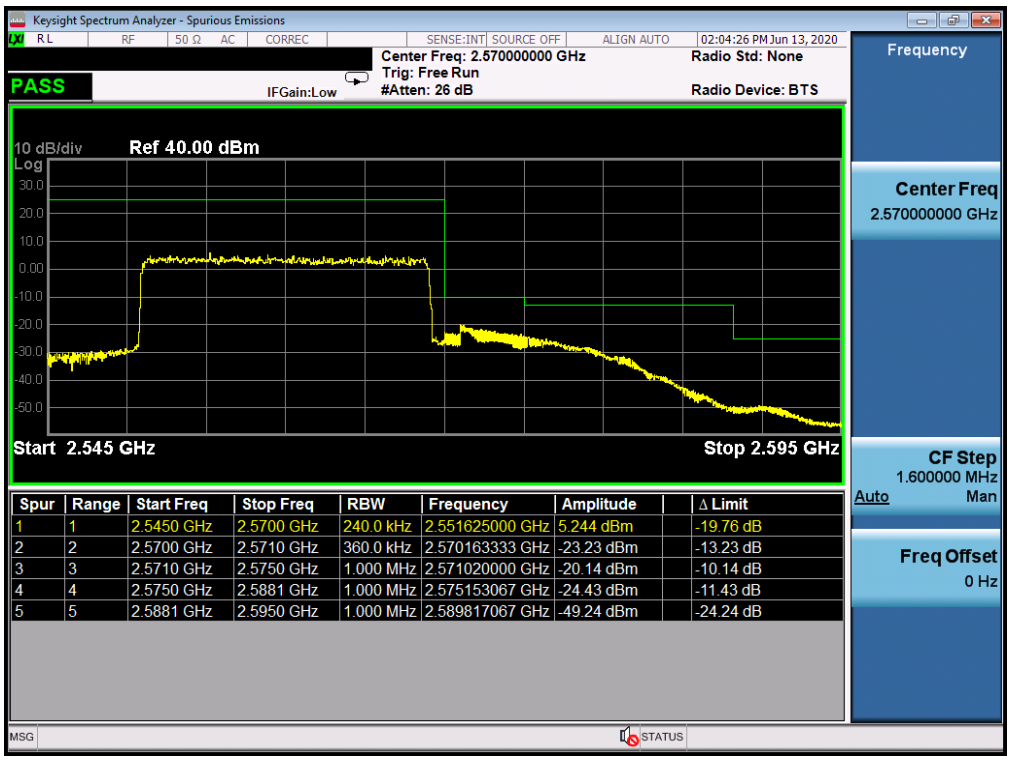


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.556291667 GHz	5.355 dBm	-19.65 dB
2	2	2.5700 GHz	2.5710 GHz	270.0 kHz	2.570243333 GHz	-26.84 dBm	-16.84 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.572106667 GHz	-23.12 dBm	-13.12 dB
4	4	2.5750 GHz	2.5836 GHz	1.000 MHz	2.576277002 GHz	-26.14 dBm	-13.14 dB
5	5	2.5836 GHz	2.5950 GHz	1.000 MHz	2.583798850 GHz	-43.09 dBm	-18.09 dB

Plot 7-343. Upper ACP Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

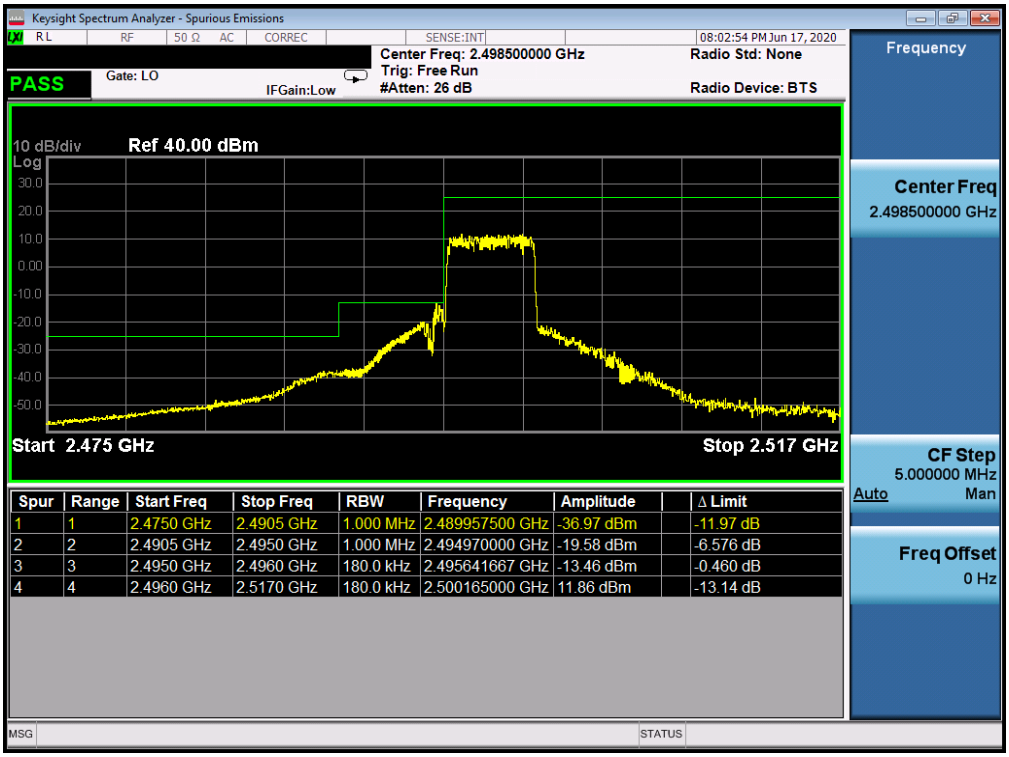


Plot 7-344. Lower ACP Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)



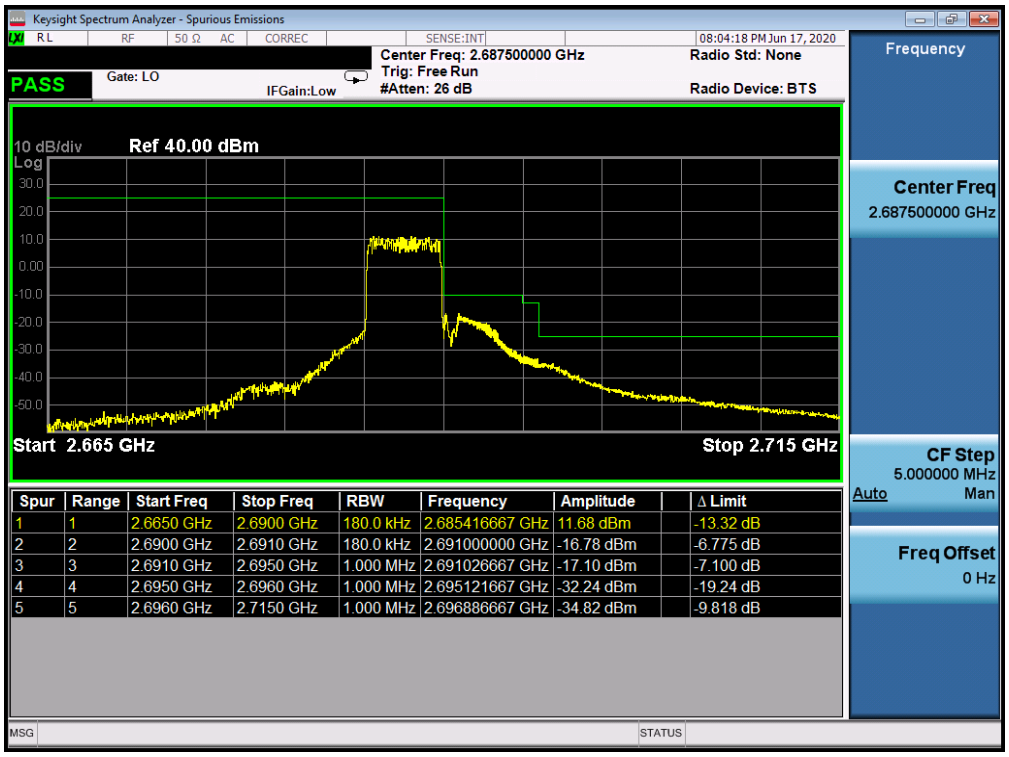
Plot 7-345. Upper ACP Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)

Band 41



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489957500 GHz	-36.97 dBm	-11.97 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494970000 GHz	-19.58 dBm	-6.576 dB
3	3	2.4950 GHz	2.4960 GHz	180.0 kHz	2.495641667 GHz	-13.46 dBm	-0.460 dB
4	4	2.4960 GHz	2.5170 GHz	180.0 kHz	2.500165000 GHz	11.86 dBm	-13.14 dB

Plot 7-346. Lower ACP Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	180.0 kHz	2.685416667 GHz	11.68 dBm	-13.32 dB
2	2	2.6900 GHz	2.6910 GHz	180.0 kHz	2.691000000 GHz	-16.78 dBm	-6.775 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691026667 GHz	-17.10 dBm	-7.100 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695121667 GHz	-32.24 dBm	-19.24 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696886667 GHz	-34.82 dBm	-9.818 dB

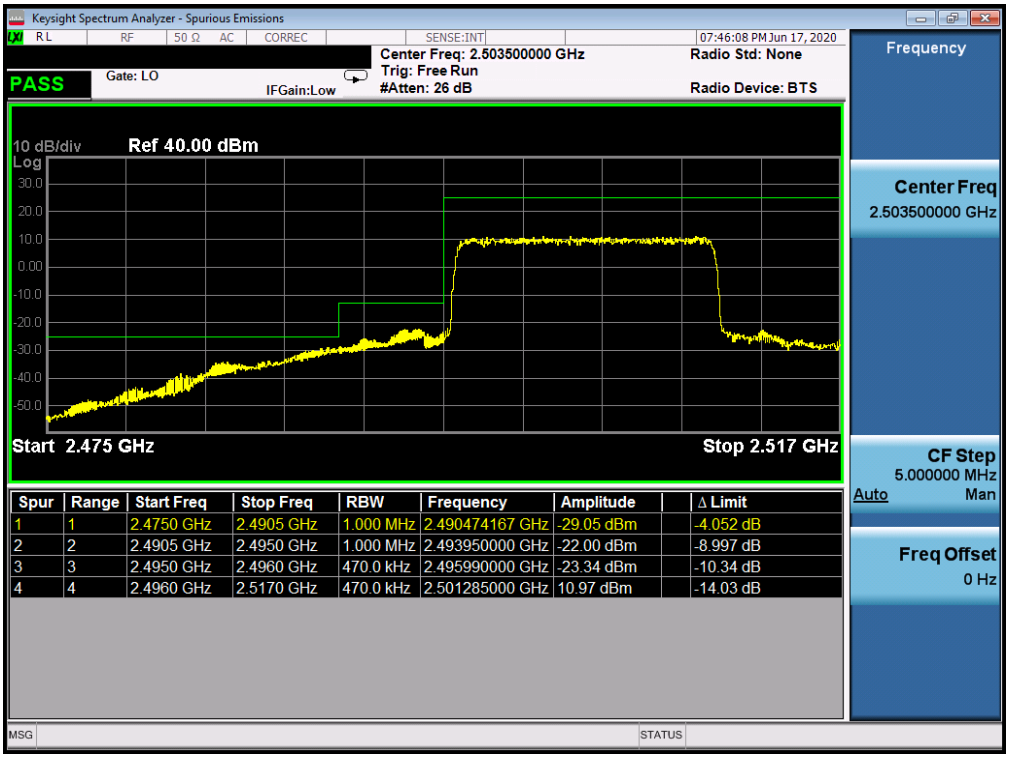
Plot 7-347. Upper ACP Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490474167 GHz	-29.96 dBm	-4.964 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494940000 GHz	-20.73 dBm	-7.732 dB
3	3	2.4950 GHz	2.4960 GHz	270.0 kHz	2.495963333 GHz	-22.67 dBm	-9.668 dB
4	4	2.4960 GHz	2.5170 GHz	270.0 kHz	2.501880000 GHz	10.71 dBm	-14.29 dB

Plot 7-348. Lower ACP Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)

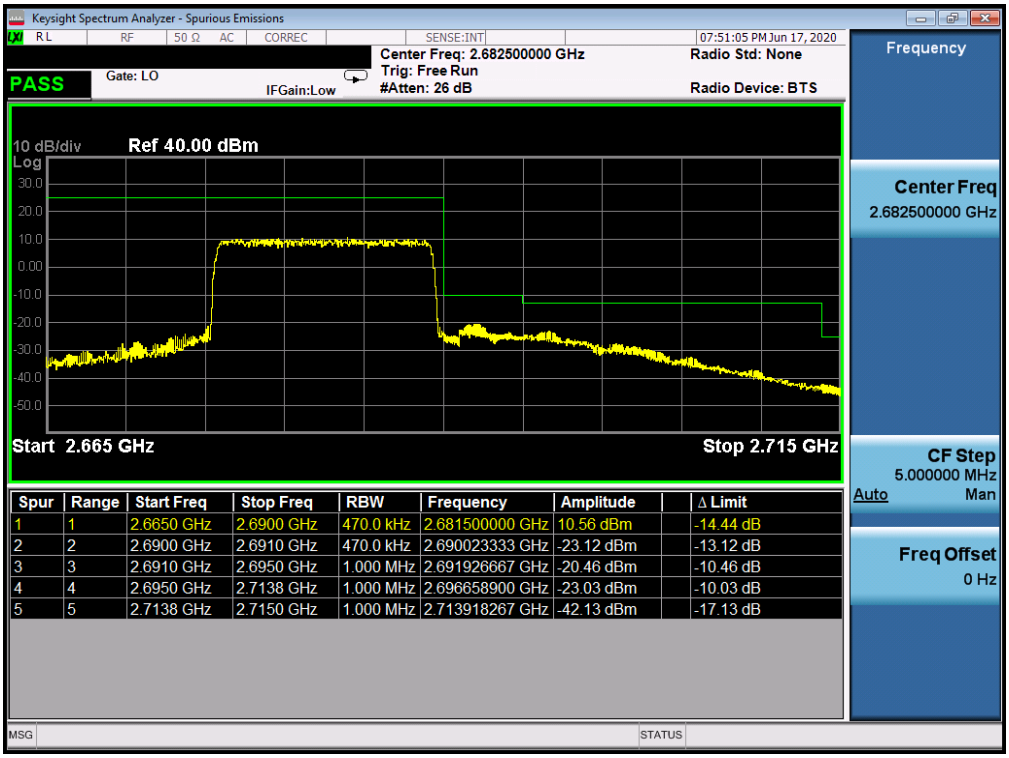
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	270.0 kHz	2.682208333 GHz	10.21 dBm	-14.79 dB
2	2	2.6900 GHz	2.6910 GHz	270.0 kHz	2.690201667 GHz	-23.50 dBm	-13.50 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691286667 GHz	-20.82 dBm	-10.82 dB
4	4	2.6950 GHz	2.7040 GHz	1.000 MHz	2.696024420 GHz	-25.31 dBm	-12.31 dB
5	5	2.7040 GHz	2.7150 GHz	1.000 MHz	2.704221683 GHz	-38.37 dBm	-13.37 dB

Plot 7-349. Upper ACP Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)



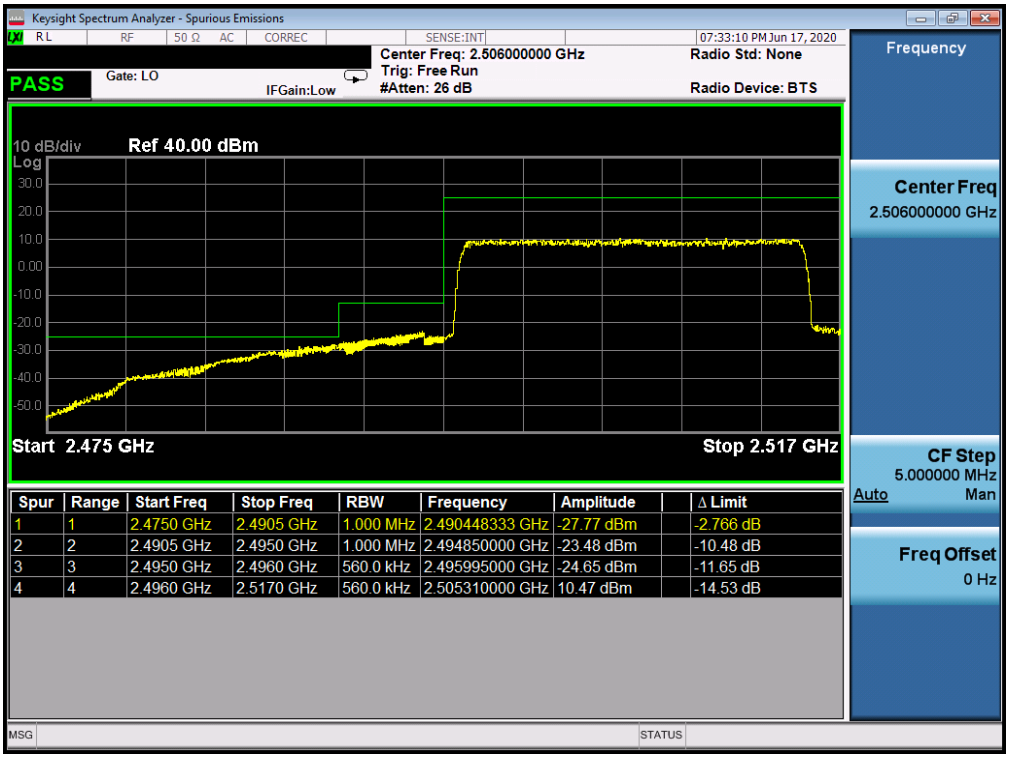
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490474167 GHz	-29.05 dBm	-4.052 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.493950000 GHz	-22.00 dBm	-8.997 dB
3	3	2.4950 GHz	2.4960 GHz	470.0 kHz	2.495990000 GHz	-23.34 dBm	-10.34 dB
4	4	2.4960 GHz	2.5170 GHz	470.0 kHz	2.501285000 GHz	10.97 dBm	-14.03 dB

Plot 7-350. Lower ACP Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)



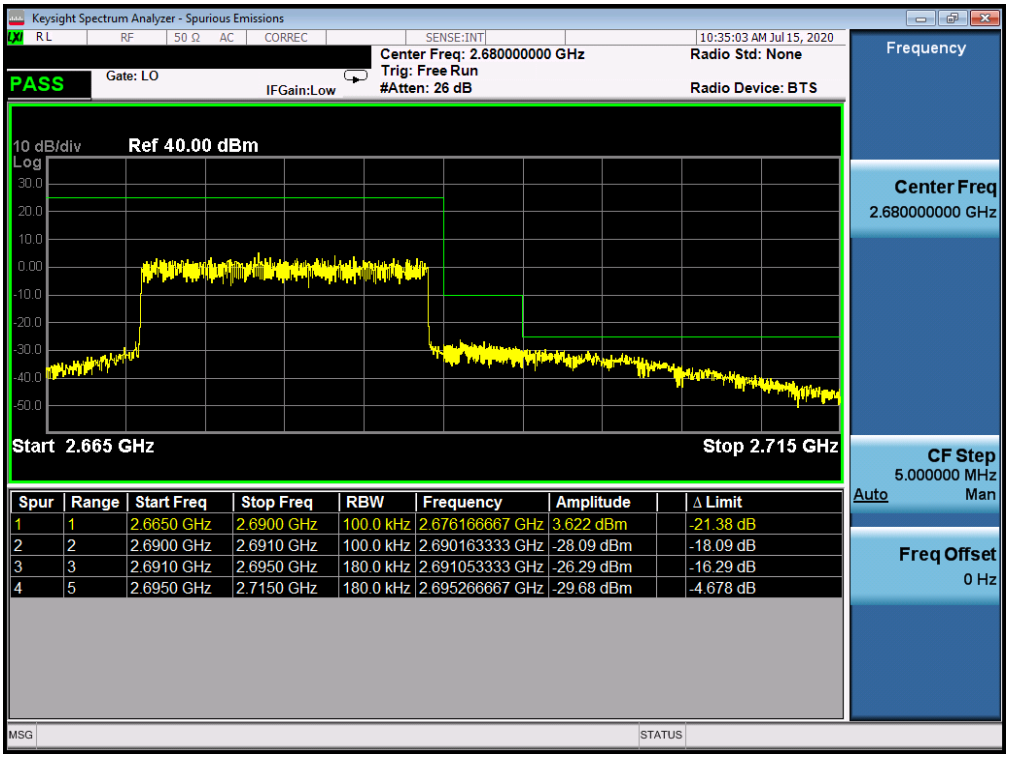
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	470.0 kHz	2.681500000 GHz	10.56 dBm	-14.44 dB
2	2	2.6900 GHz	2.6910 GHz	470.0 kHz	2.690023333 GHz	-23.12 dBm	-13.12 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691926667 GHz	-20.46 dBm	-10.46 dB
4	4	2.6950 GHz	2.7138 GHz	1.000 MHz	2.696658900 GHz	-23.03 dBm	-10.03 dB
5	5	2.7138 GHz	2.7150 GHz	1.000 MHz	2.713918267 GHz	-42.13 dBm	-17.13 dB

Plot 7-351. Upper ACP Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490448333 GHz	-27.77 dBm	-2.766 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494850000 GHz	-23.48 dBm	-10.48 dB
3	3	2.4950 GHz	2.4960 GHz	560.0 kHz	2.495995000 GHz	-24.65 dBm	-11.65 dB
4	4	2.4960 GHz	2.5170 GHz	560.0 kHz	2.505310000 GHz	10.47 dBm	-14.53 dB

Plot 7-352. Lower ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	100.0 kHz	2.676166667 GHz	3.622 dBm	-21.38 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690163333 GHz	-28.09 dBm	-18.09 dB
3	3	2.6910 GHz	2.6950 GHz	180.0 kHz	2.691053333 GHz	-26.29 dBm	-16.29 dB
4	5	2.6950 GHz	2.7150 GHz	180.0 kHz	2.695266667 GHz	-29.68 dBm	-4.678 dB

Plot 7-353. Upper ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

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

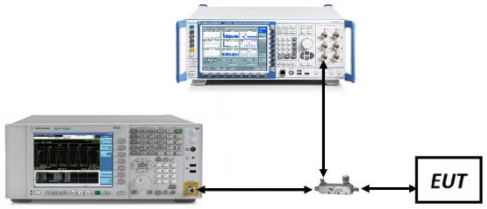


Figure 7-4. Test Instrument & Measurement Setup

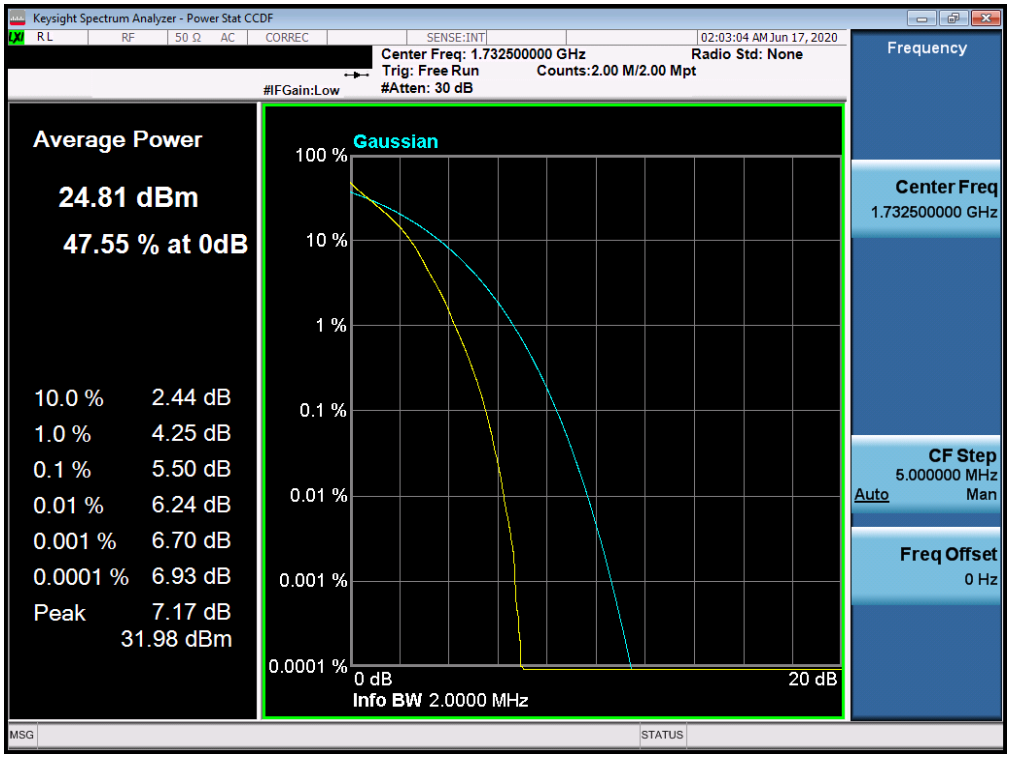
Test Notes

All ports were tested and only the worst case data were reported.

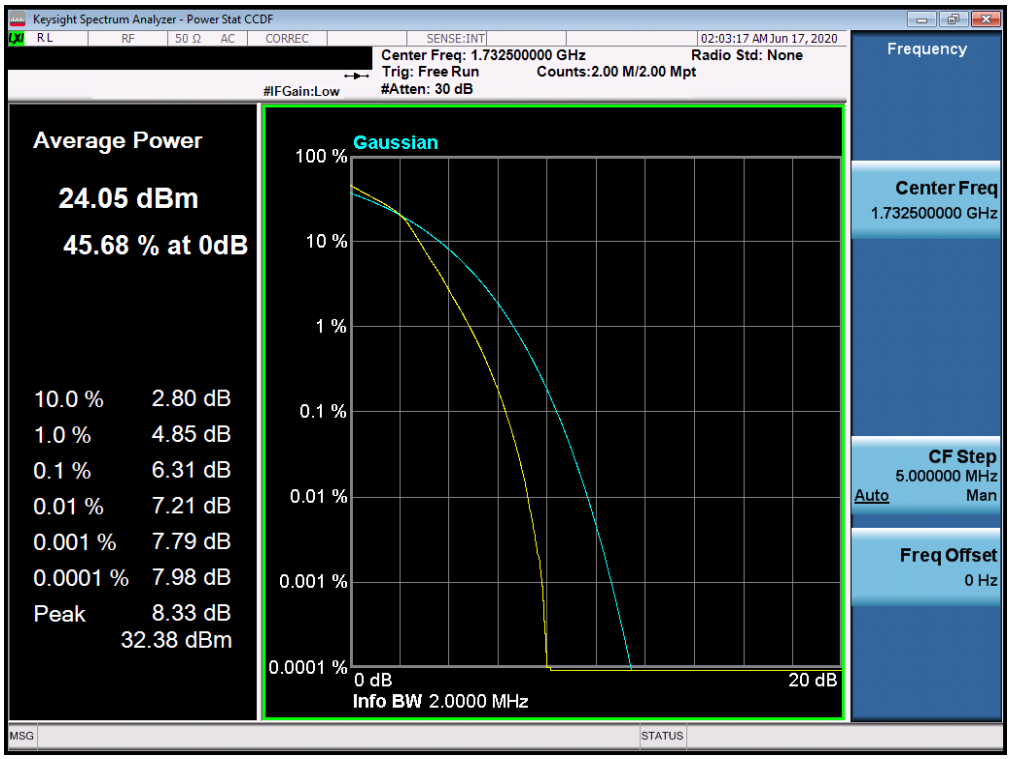
LTE	BW (MHz)	Modulation	Average Power [dBm]	PAR at 0.1% [dB]	Limit [dB]	Margin [dB]
Band 4	1.4	QPSK	24.81	5.5	13	-7.5
Band 4	1.4	16QAM	24.05	6.31	13	-6.69
Band 4	1.4	64QAM	23.01	6.30	13	-6.7
Band 4	3	QPSK	24.80	5.57	13	-7.43
Band 4	3	16QAM	24.04	6.31	13	-6.69
Band 4	3	64QAM	22.97	6.40	13	-6.6
Band 4	5	QPSK	24.83	5.60	13	-7.4
Band 4	5	16QAM	24.04	6.25	13	-6.75
Band 4	5	64QAM	23	6.35	13	-6.65
Band 4	10	QPSK	24.79	5.64	13	-7.36
Band 4	10	16QAM	24.01	6.27	13	-6.73
Band 4	10	64QAM	22.97	6.38	13	-6.62
Band 4	15	QPSK	24.83	5.97	13	-7.03
Band 4	15	16QAM	24.05	6.30	13	-6.7
Band 4	15	64QAM	22.99	6.40	13	-6.6
Band 4	20	QPSK	24.85	5.70	13	-7.3
Band 4	20	16QAM	24.02	6.32	13	-6.68
Band 4	20	64QAM	23.02	6.48	13	-6.52
Band 66	1.4	QPSK	24.67	6.04	13	-6.96
Band 66	1.4	16QAM	23.68	6.83	13	-6.17
Band 66	1.4	64QAM	22.63	6.79	13	-6.21
Band 66	3	QPSK	24.63	5.95	13	-7.05
Band 66	3	16QAM	23.65	6.70	13	-6.3
Band 66	3	64QAM	22.58	6.77	13	-6.23
Band 66	5	QPSK	24.62	5.96	13	-7.04
Band 66	5	16QAM	23.61	6.68	13	-6.32
Band 66	5	64QAM	22.55	6.75	13	-6.25
Band 66	10	QPSK	24.62	5.92	13	-7.08
Band 66	10	16QAM	23.58	6.61	13	-6.39
Band 66	10	64QAM	22.53	6.71	13	-6.29
Band 66	15	QPSK	24.64	6.29	13	-6.71
Band 66	15	16QAM	23.60	6.60	13	-6.4
Band 66	15	64QAM	22.55	6.68	13	-6.32
Band 66	20	QPSK	24.91	5.77	13	-7.23
Band 66	20	16QAM	23.62	6.53	13	-6.47
Band 66	20	64QAM	22.57	6.62	13	-6.38
Band 2	1.4	QPSK	24.64	5.76	13	-7.24
Band 2	1.4	16QAM	23.67	6.57	13	-6.43
Band 2	1.4	64QAM	22.65	6.49	13	-6.51
Band 2	3	QPSK	24.62	5.70	13	-7.3
Band 2	3	16QAM	23.64	6.48	13	-6.52
Band 2	3	64QAM	22.61	6.60	13	-6.4
Band 2	5	QPSK	24.63	5.72	13	-7.28
Band 2	5	16QAM	23.63	6.43	13	-6.57
Band 2	5	64QAM	22.62	6.60	13	-6.4
Band 2	10	QPSK	24.68	5.80	13	-7.2
Band 2	10	16QAM	23.68	6.50	13	-6.5
Band 2	10	64QAM	22.65	6.68	13	-6.32
Band 2	15	QPSK	24.70	6.13	13	-6.87
Band 2	15	16QAM	23.72	6.54	13	-6.46
Band 2	15	64QAM	22.71	6.69	13	-6.31
Band 2	20	QPSK	24.82	5.74	13	-7.26
Band 2	20	16QAM	23.79	6.48	13	-6.52
Band 2	20	64QAM	22.79	6.67	13	-6.33
Band 25	1.4	QPSK	24.82	5.70	13	-7.3
Band 25	1.4	16QAM	23.89	6.52	13	-6.48
Band 25	1.4	64QAM	22.86	6.56	13	-6.44
Band 25	3	QPSK	24.84	5.62	13	-7.38
Band 25	3	16QAM	23.85	6.47	13	-6.53
Band 25	3	64QAM	22.81	6.64	13	-6.36
Band 25	5	QPSK	24.81	5.71	13	-7.29
Band 25	5	16QAM	23.84	6.39	13	-6.61
Band 25	5	64QAM	22.82	6.60	13	-6.4
Band 25	10	QPSK	24.86	5.75	13	-7.25
Band 25	10	16QAM	23.87	6.46	13	-6.54
Band 25	10	64QAM	22.85	6.65	13	-6.35
Band 25	15	QPSK	24.88	6.04	13	-6.96
Band 25	15	16QAM	23.91	6.50	13	-6.5
Band 25	15	64QAM	22.89	6.70	13	-6.3
Band 25	20	QPSK	24.96	5.71	13	-7.29
Band 25	20	16QAM	23.96	6.46	13	-6.54
Band 25	20	64QAM	22.95	6.64	13	-6.36

Table 7-6. PAR Table

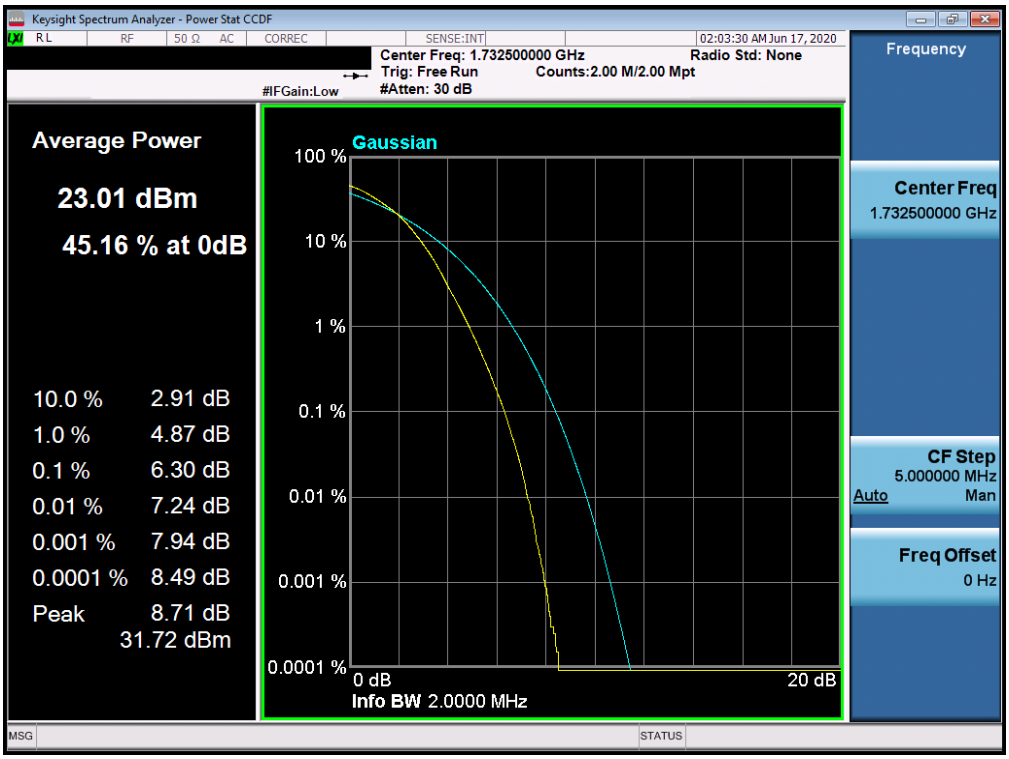
Band 4



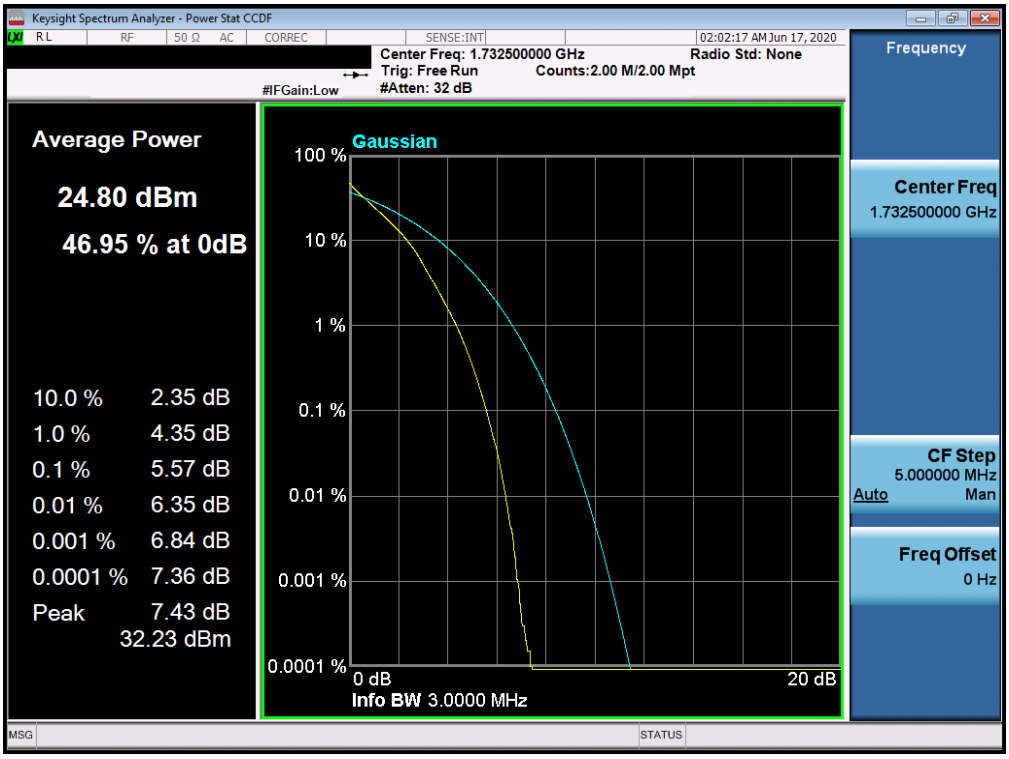
Plot 7-346. PAR Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



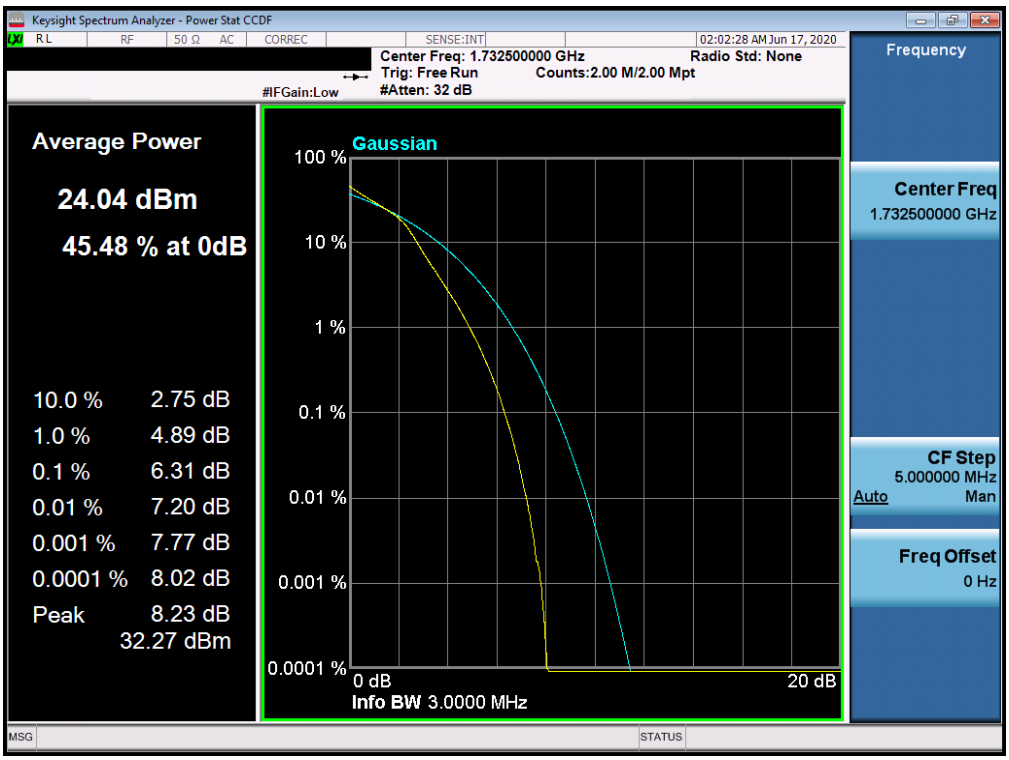
Plot 7-347. PAR Plot (Band 4 - 1.4MHz 16-QAM - Full RB Configuration)



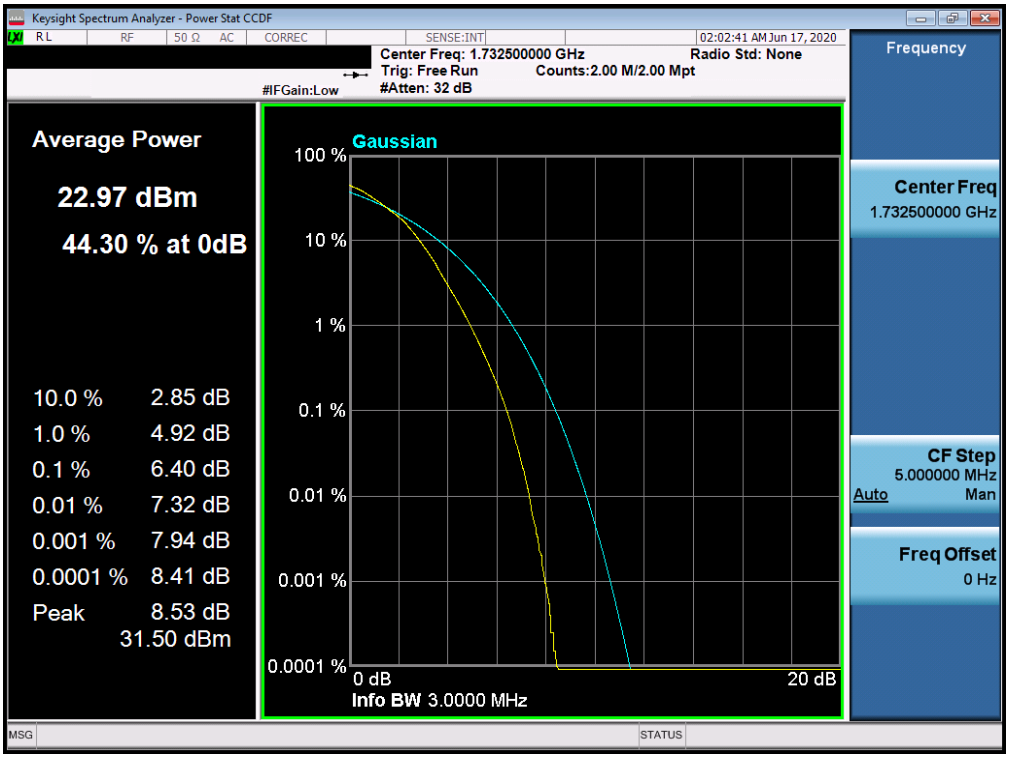
Plot 7-348. PAR Plot (Band 4 - 1.4MHz 64-QAM - Full RB Configuration)



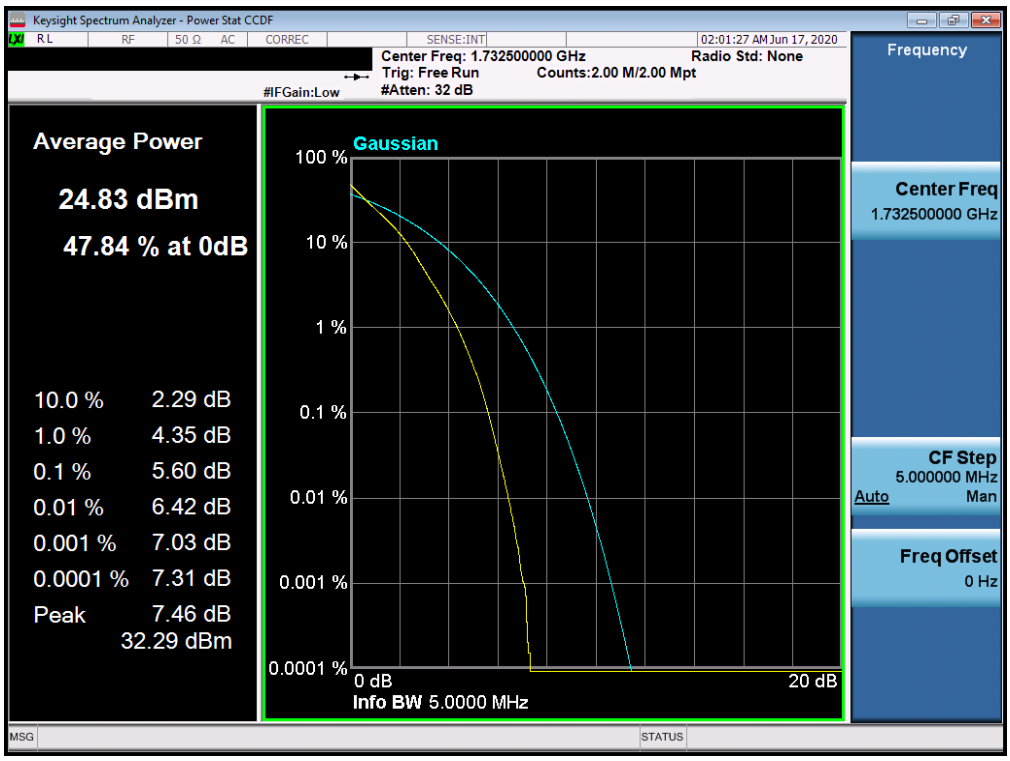
Plot 7-349. PAR Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



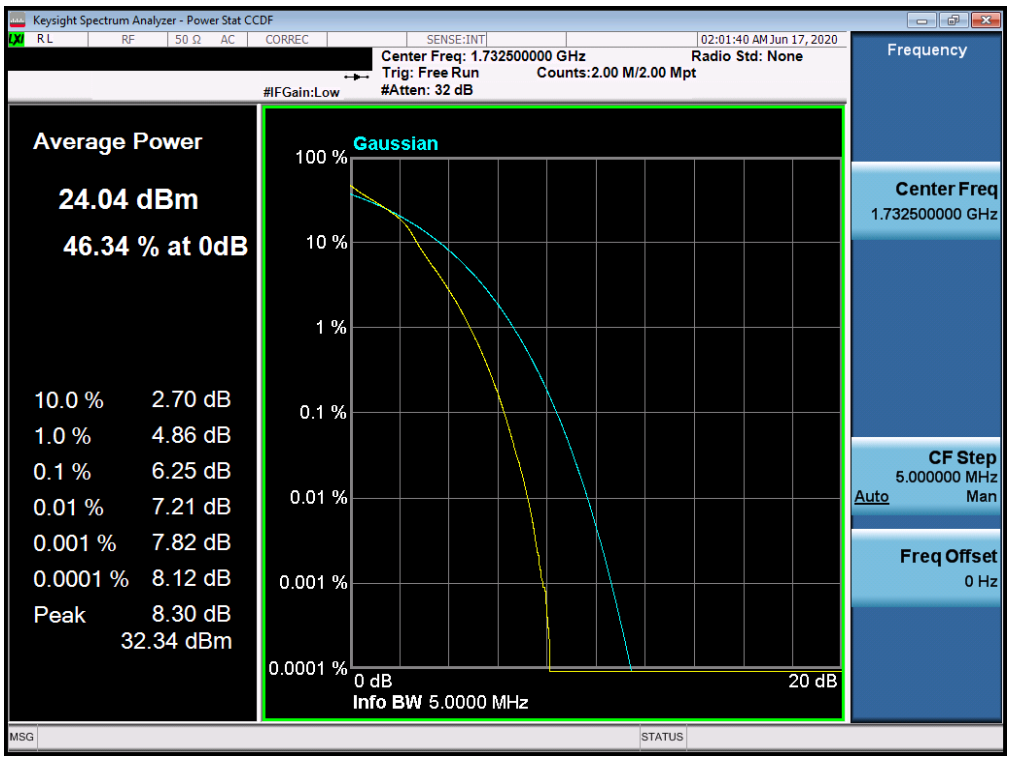
Plot 7-350. PAR Plot (Band 4 - 3.0MHz 16-QAM - Full RB Configuration)



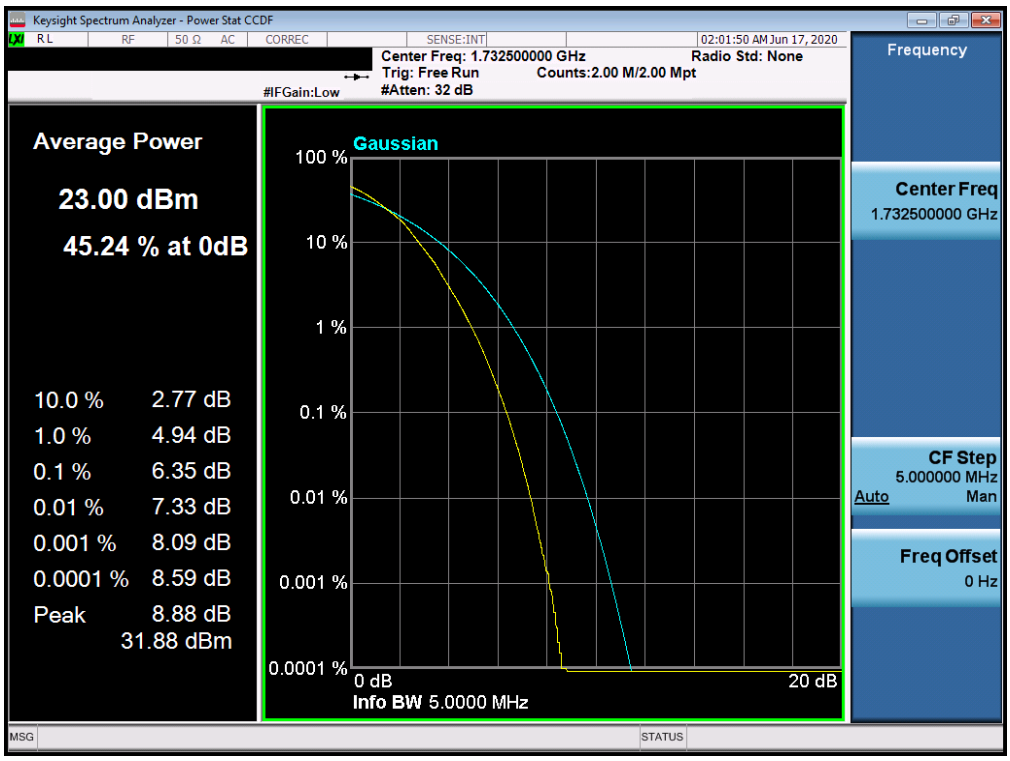
Plot 7-351. PAR Plot (Band 4 - 3.0MHz 64-QAM - Full RB Configuration)



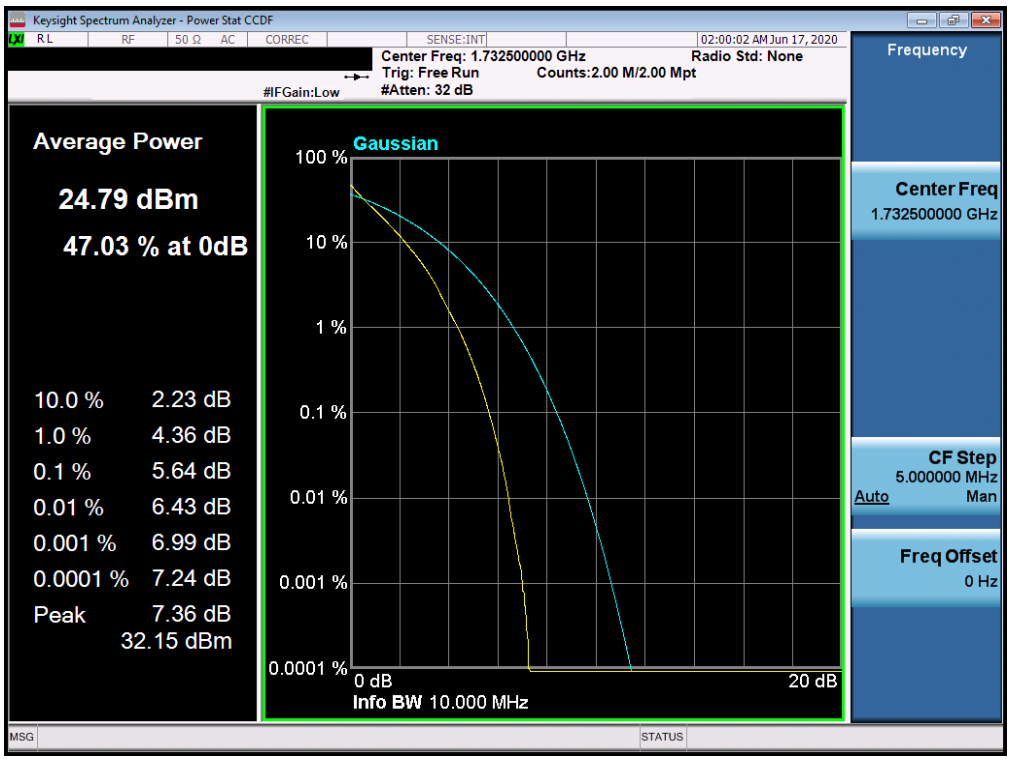
Plot 7-352. PAR Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



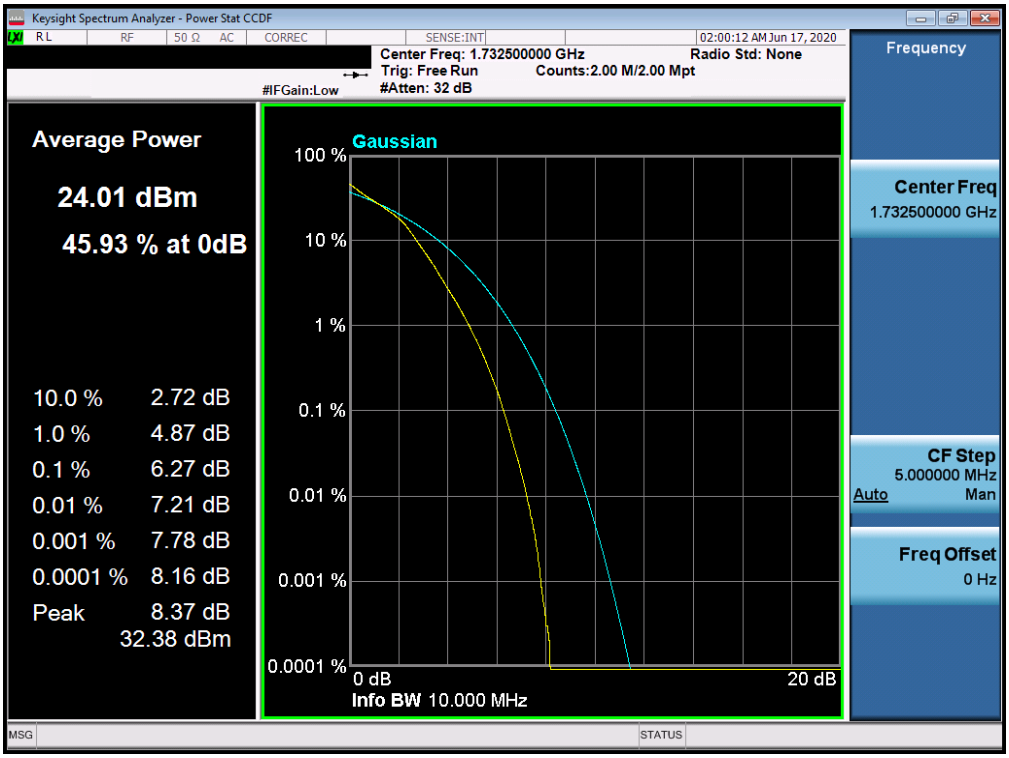
Plot 7-353. PAR Plot (Band 4 - 5.0MHz 16-QAM - Full RB Configuration)



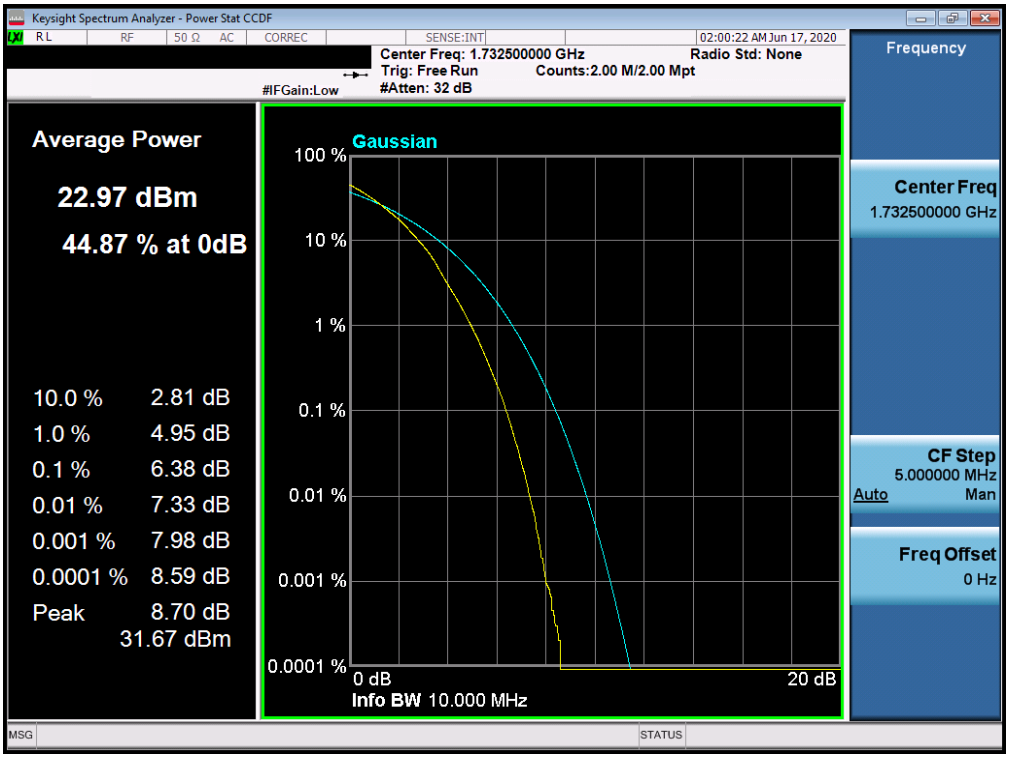
Plot 7-354. PAR Plot (Band 4 - 5.0MHz 64-QAM - Full RB Configuration)



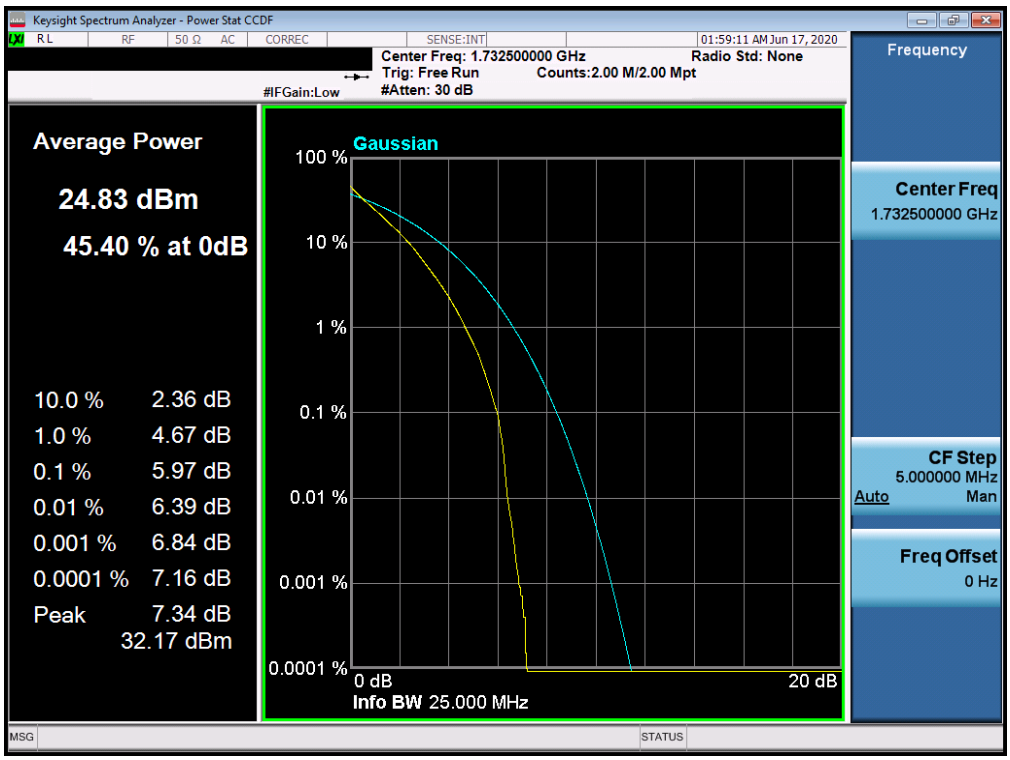
Plot 7-355. PAR Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



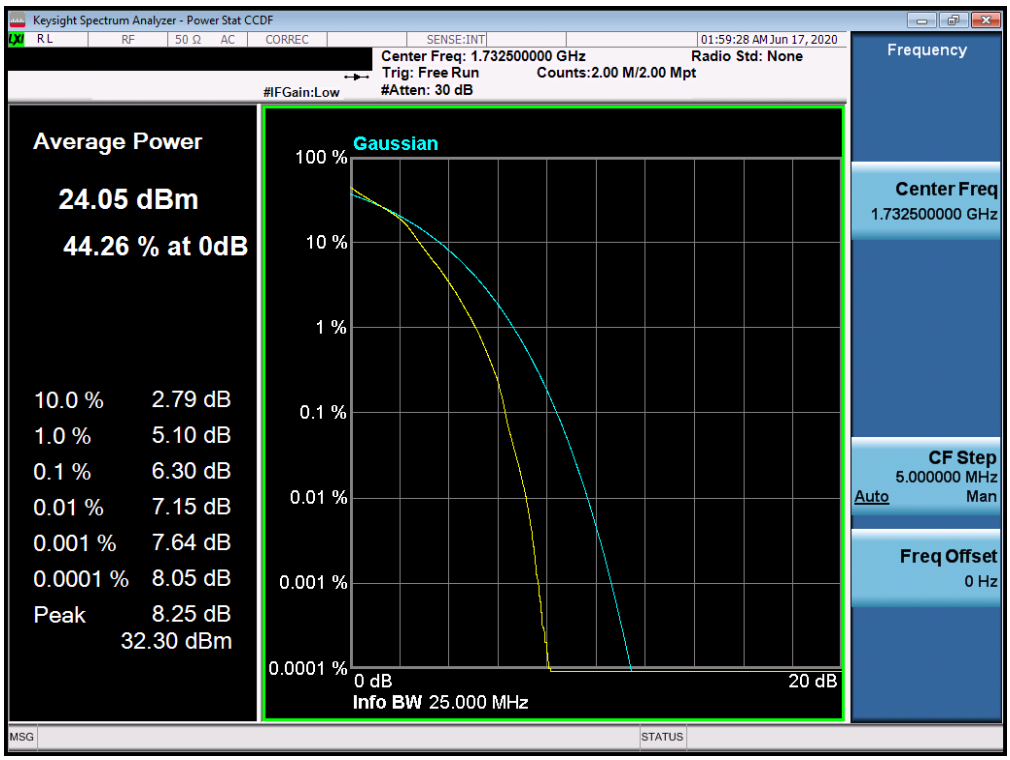
Plot 7-356. PAR Plot (Band 4 - 10.0MHz 16-QAM - Full RB Configuration)



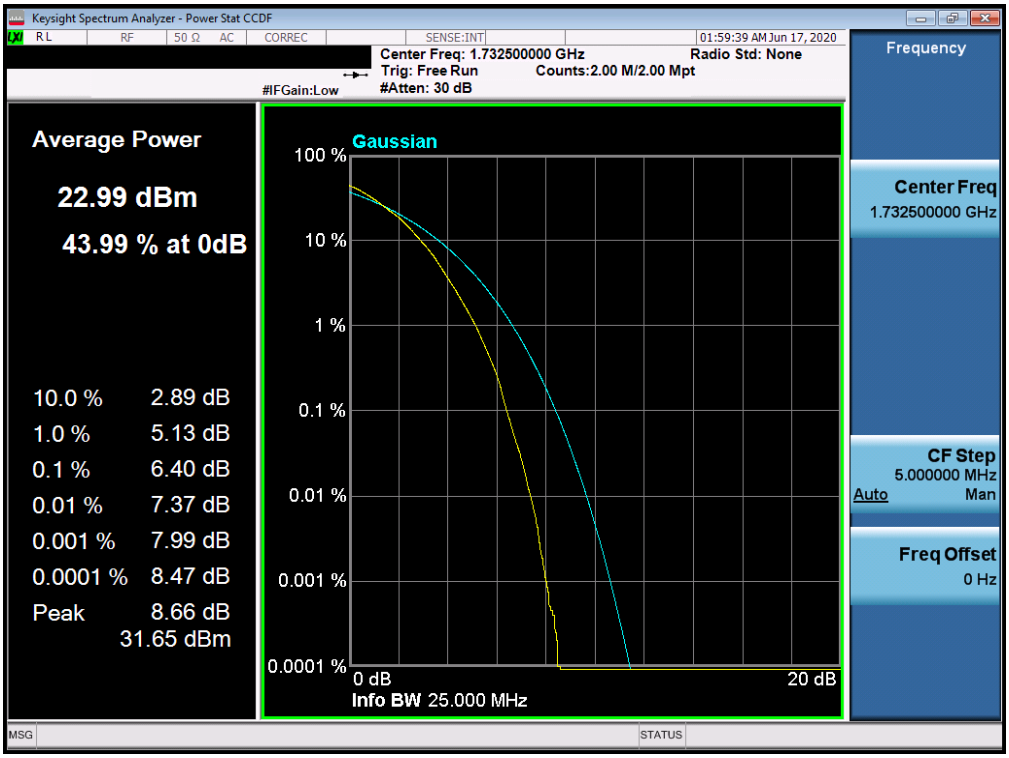
Plot 7-357. PAR Plot (Band 4 - 10.0MHz 64-QAM - Full RB Configuration)



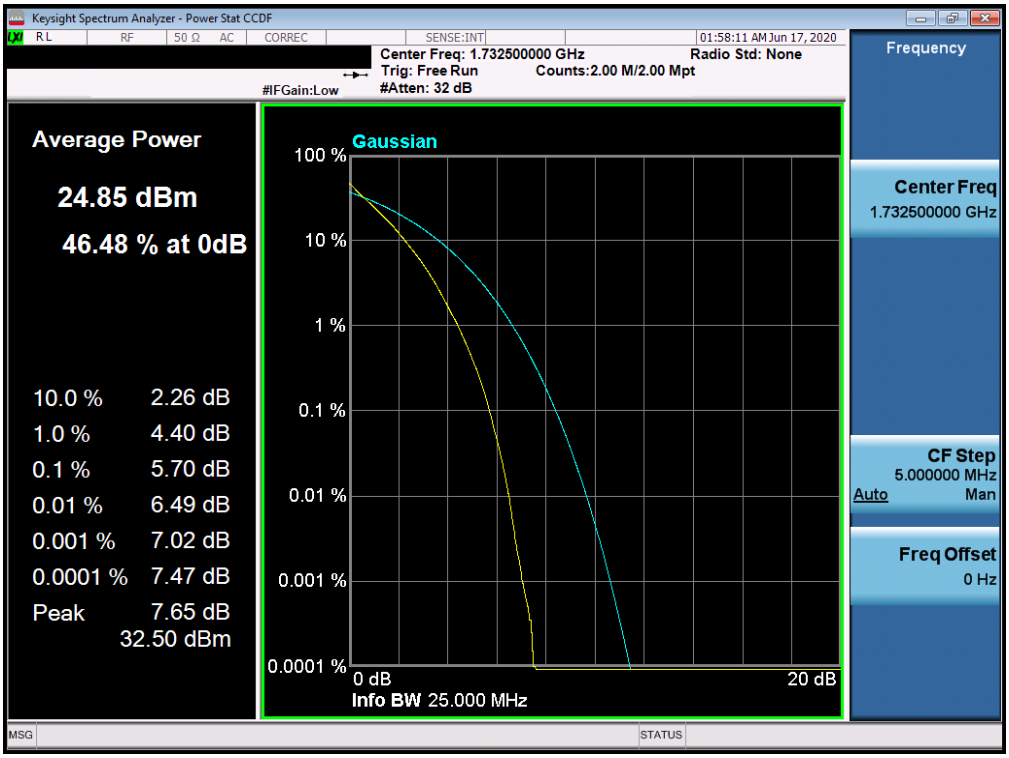
Plot 7-358. PAR Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



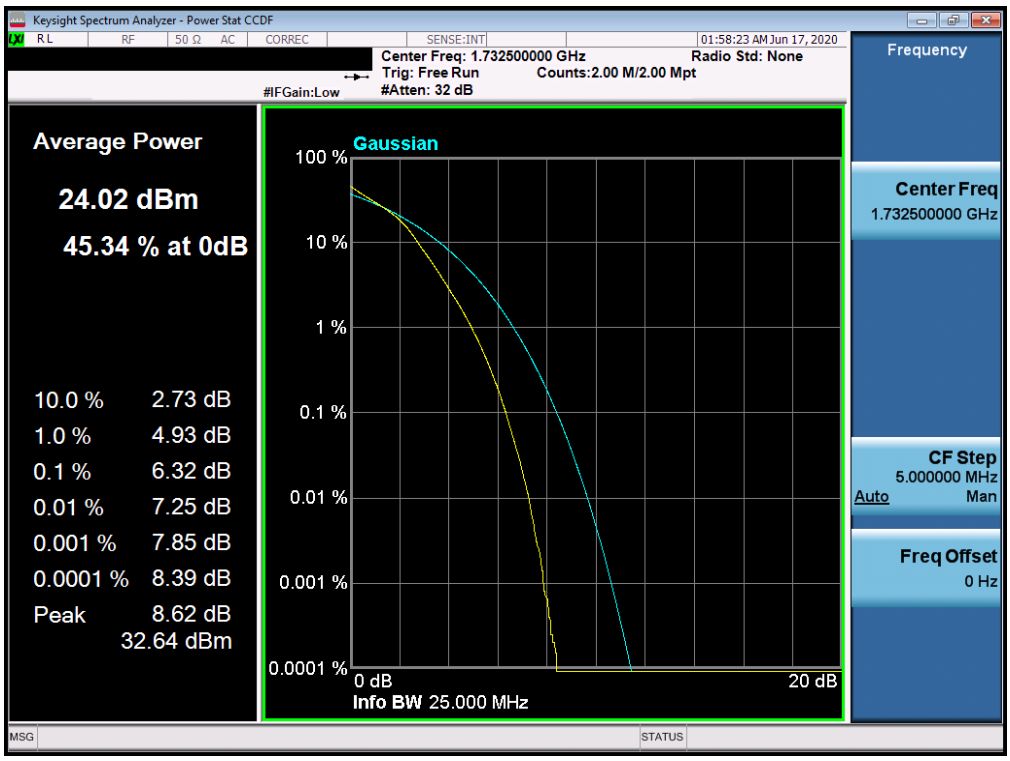
Plot 7-359. PAR Plot (Band 4 - 15.0MHz 16-QAM - Full RB Configuration)



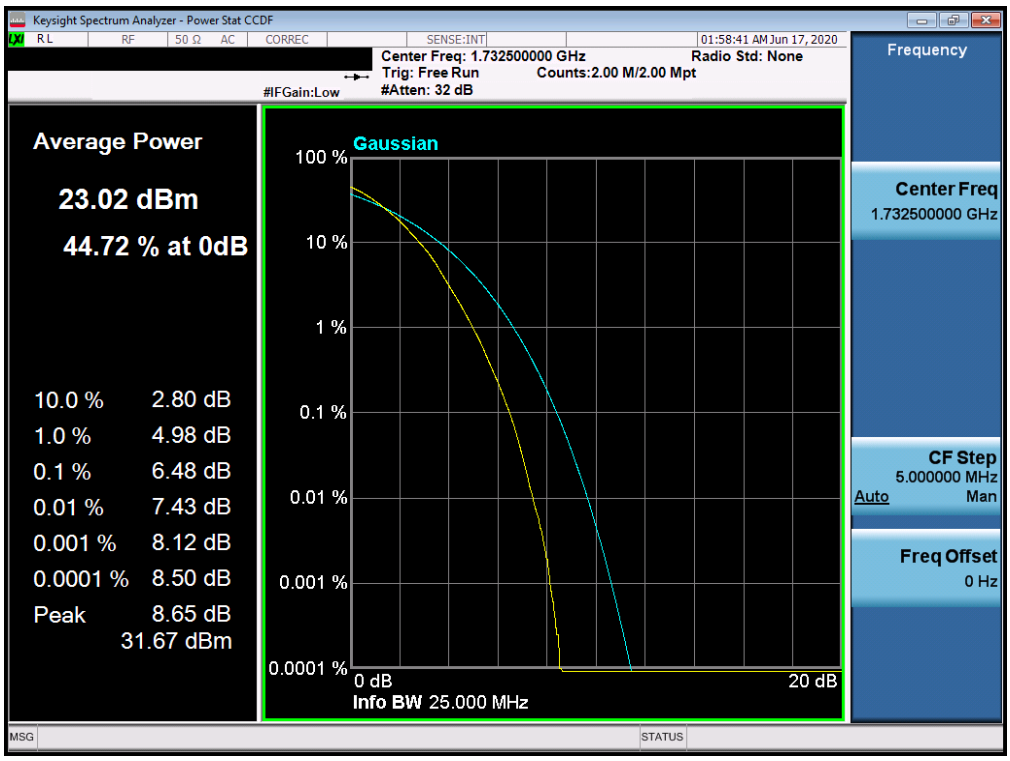
Plot 7-360. PAR Plot (Band 4 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-361. PAR Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

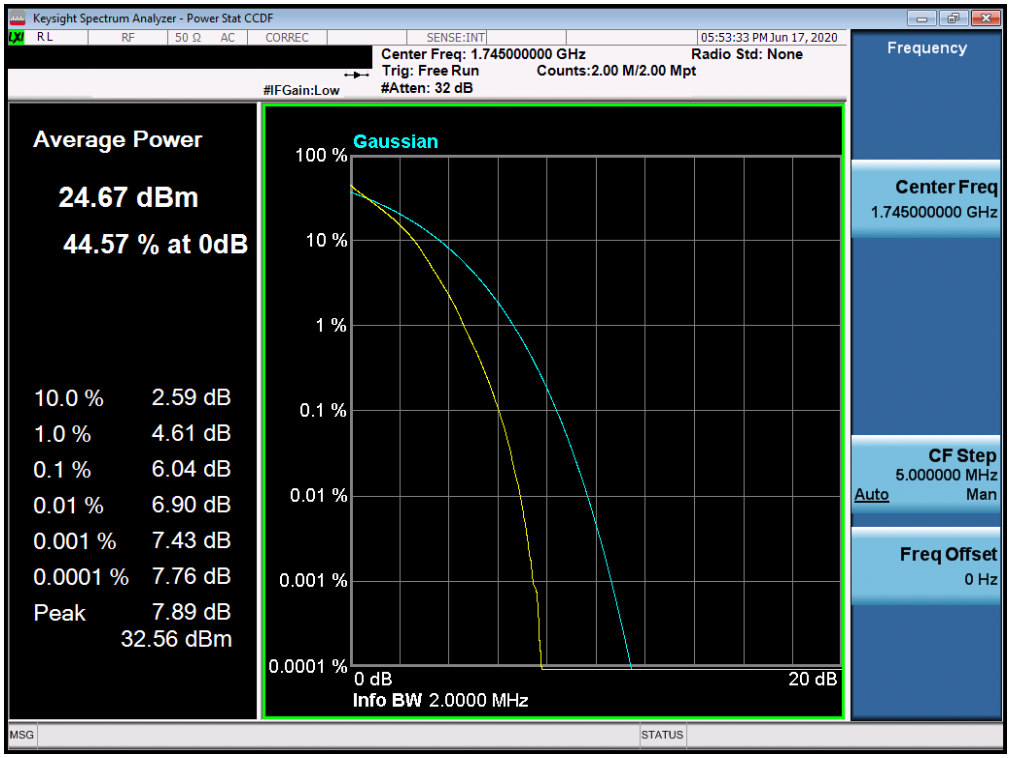


Plot 7-362. PAR Plot (Band 4 - 20.0MHz 16-QAM - Full RB Configuration)

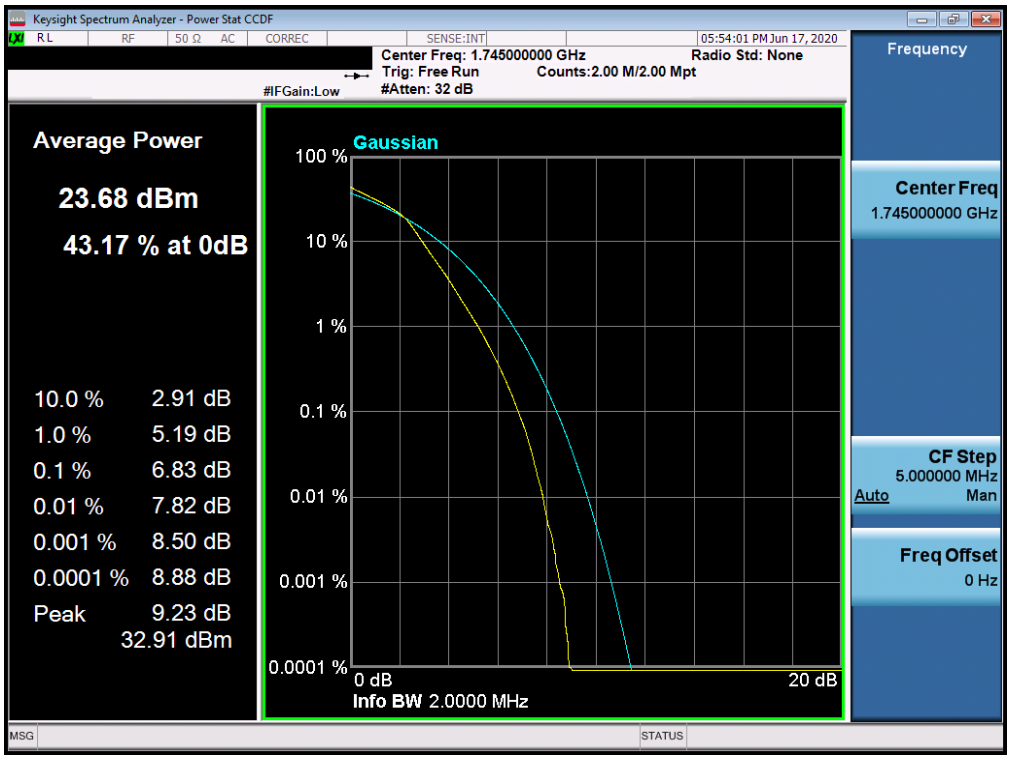


Plot 7-363. PAR Plot (Band 4 - 20.0MHz 64-QAM - Full RB Configuration)

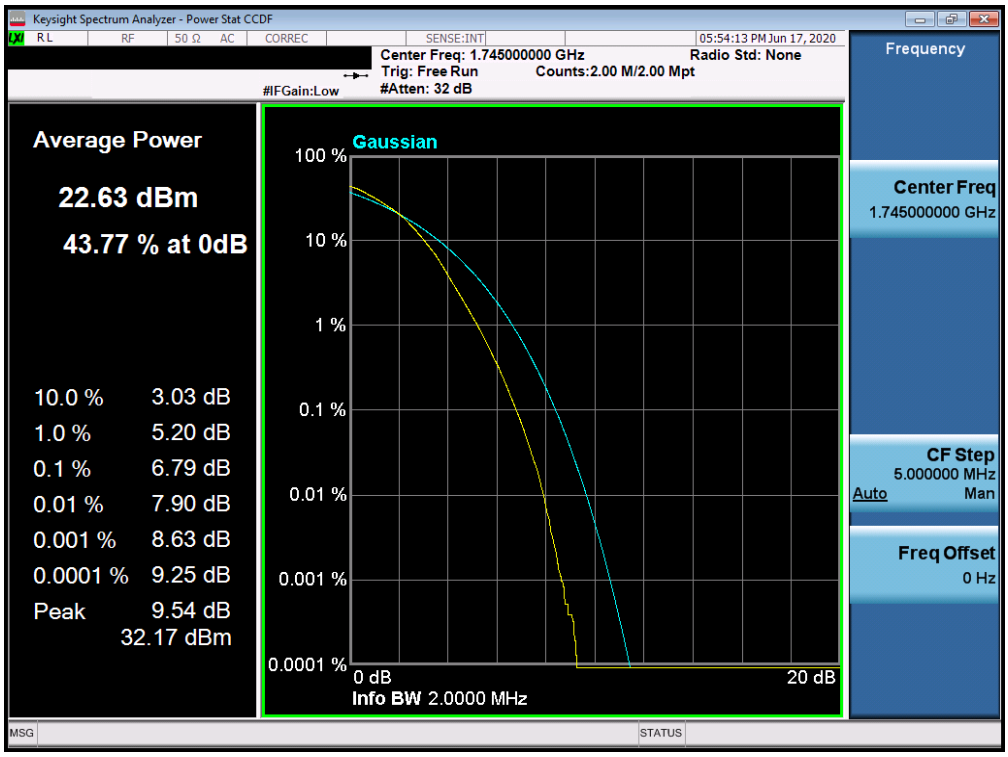
Band 66



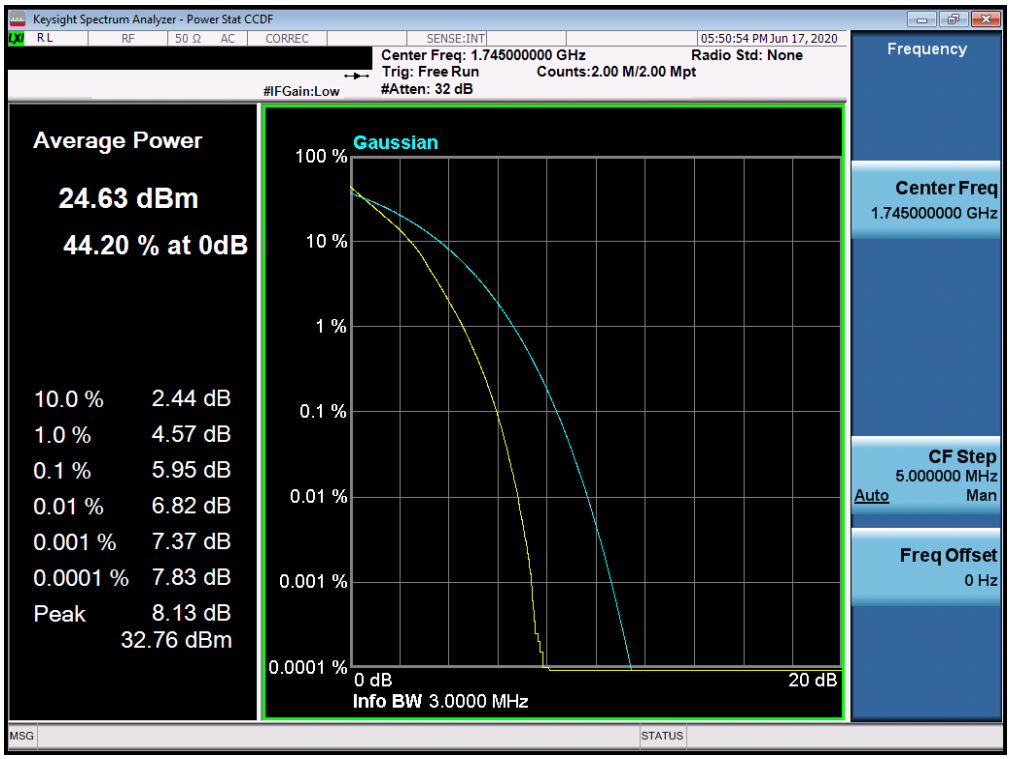
Plot 7-364. PAR Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



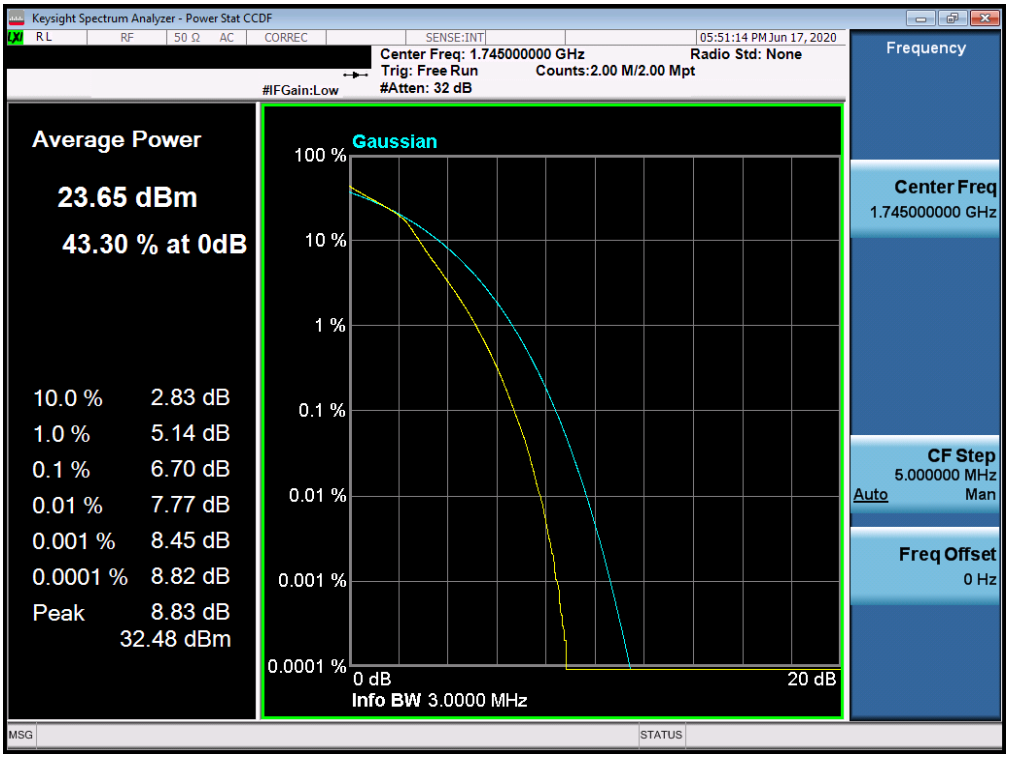
Plot 7-365. PAR Plot (Band 66 - 1.4MHz 16-QAM - Full RB Configuration)



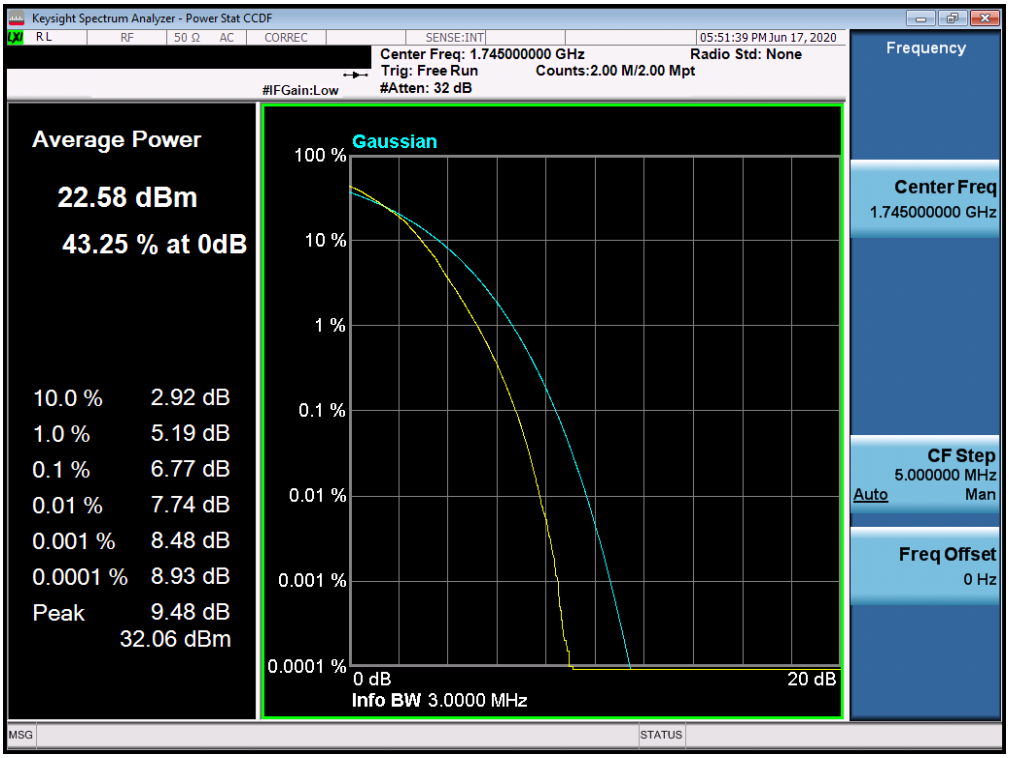
Plot 7-366. PAR Plot (Band 66 - 1.4MHz 64-QAM - Full RB Configuration)



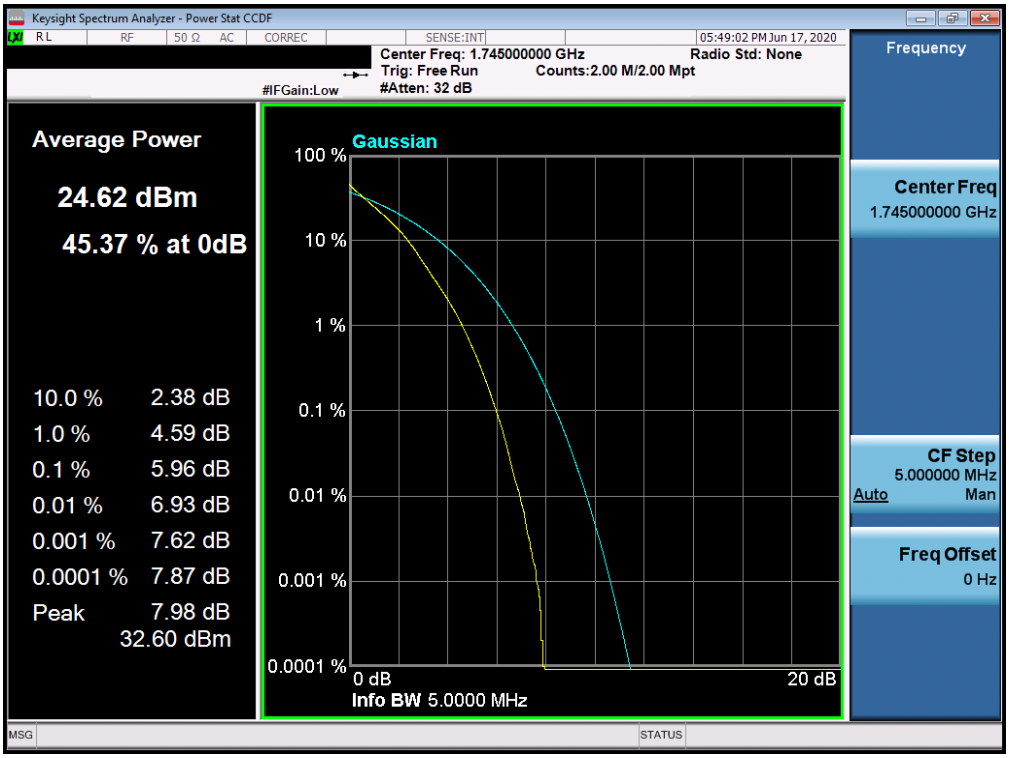
Plot 7-367. PAR Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



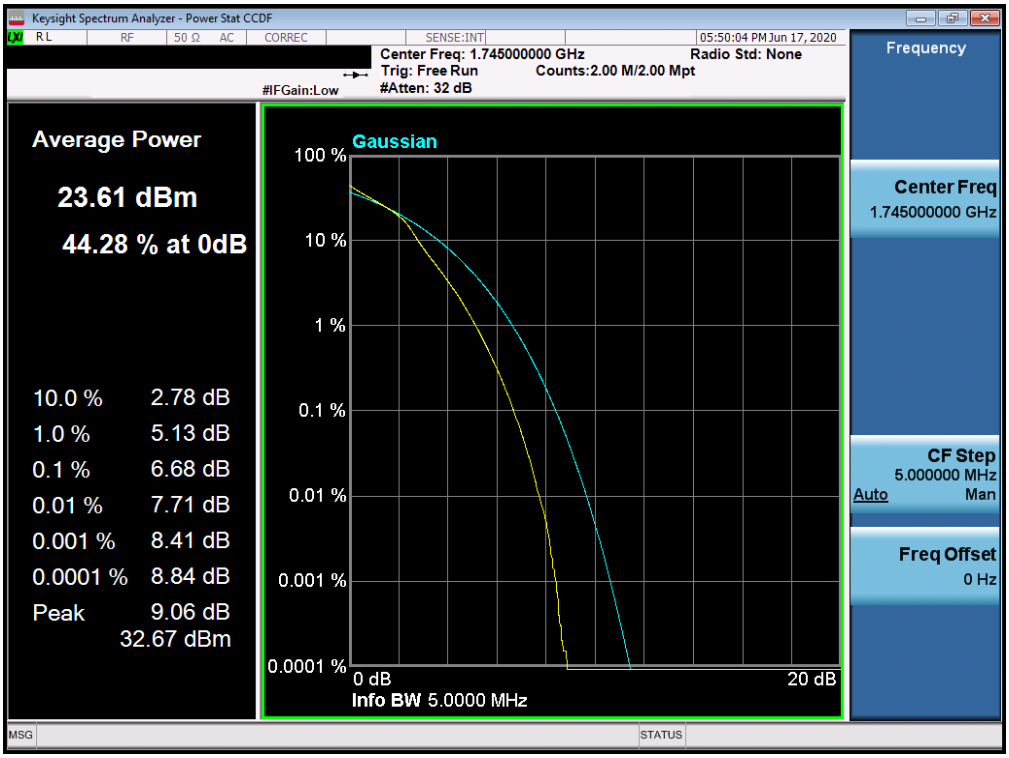
Plot 7-368. PAR Plot (Band 66 - 3.0MHz 16-QAM - Full RB Configuration)



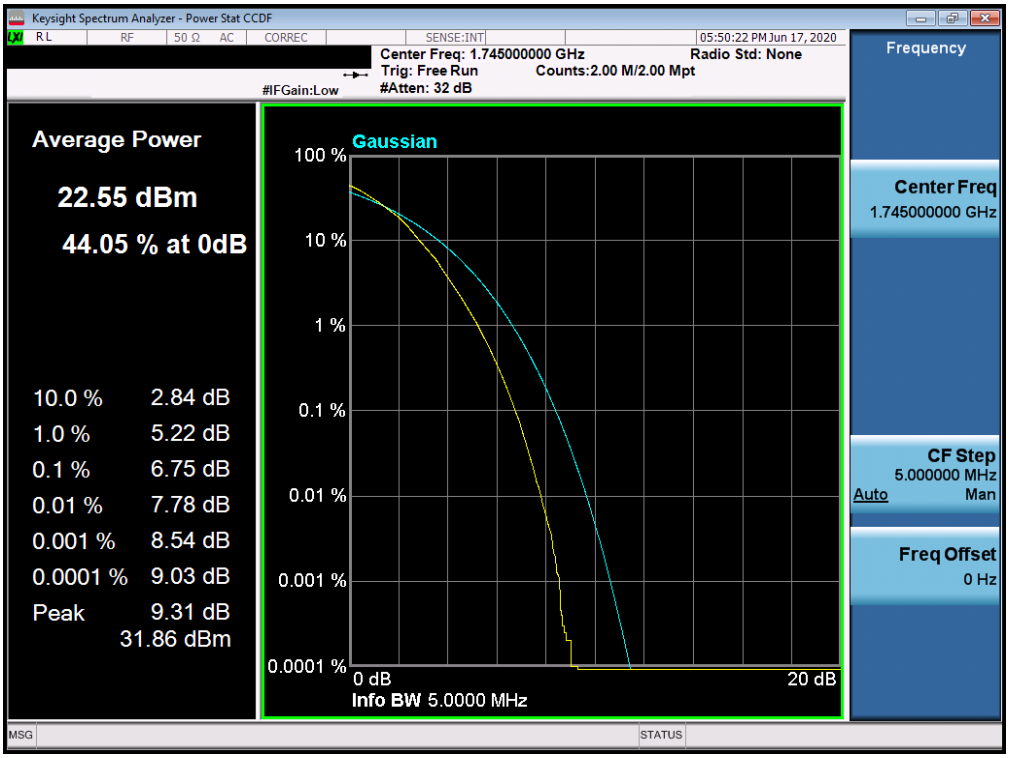
Plot 7-369. PAR Plot (Band 66 - 3.0MHz 64-QAM - Full RB Configuration)



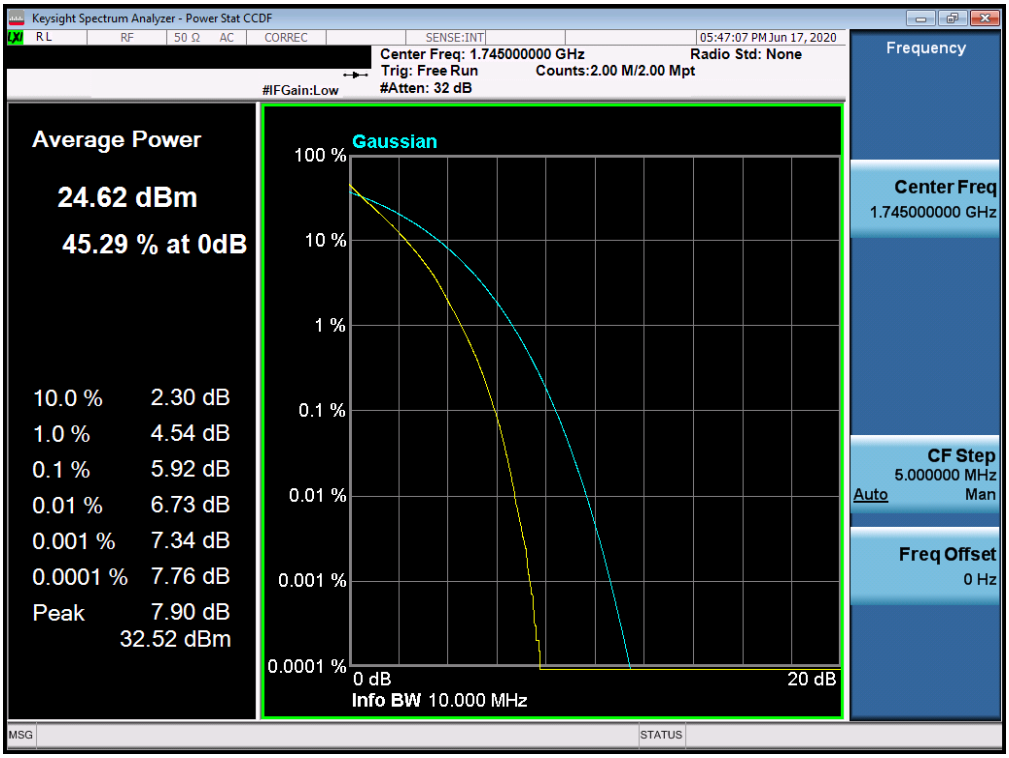
Plot 7-370. PAR Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



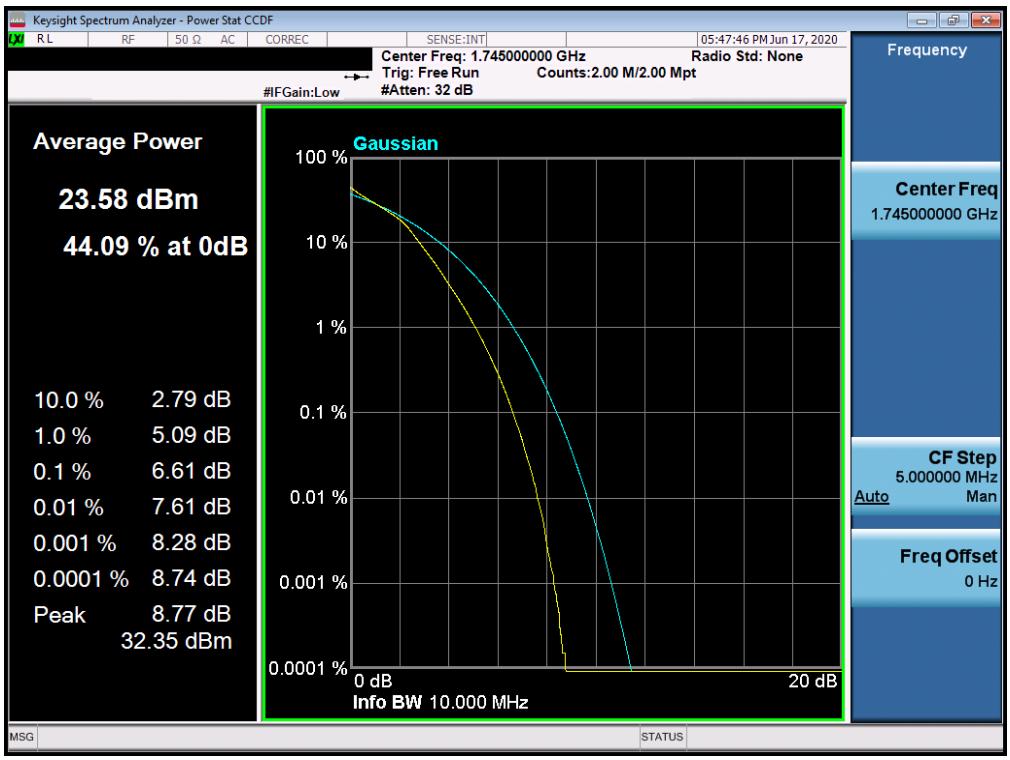
Plot 7-371. PAR Plot (Band 66 - 5.0MHz 16-QAM - Full RB Configuration)



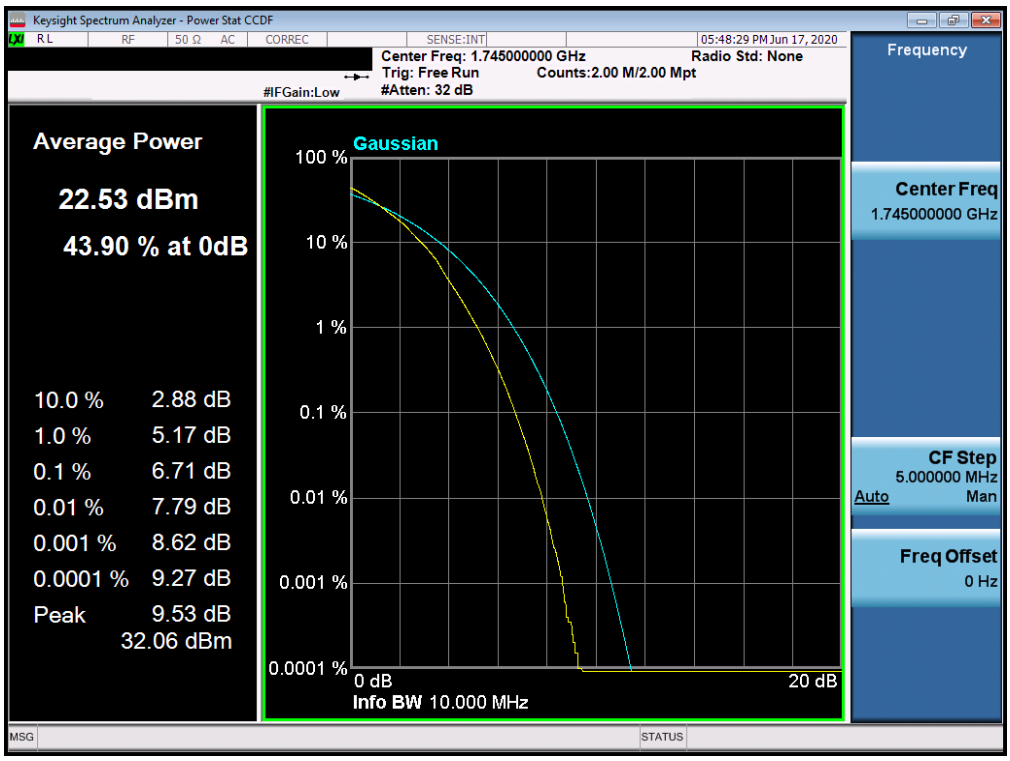
Plot 7-372. PAR Plot (Band 66 - 5.0MHz 64-QAM - Full RB Configuration)



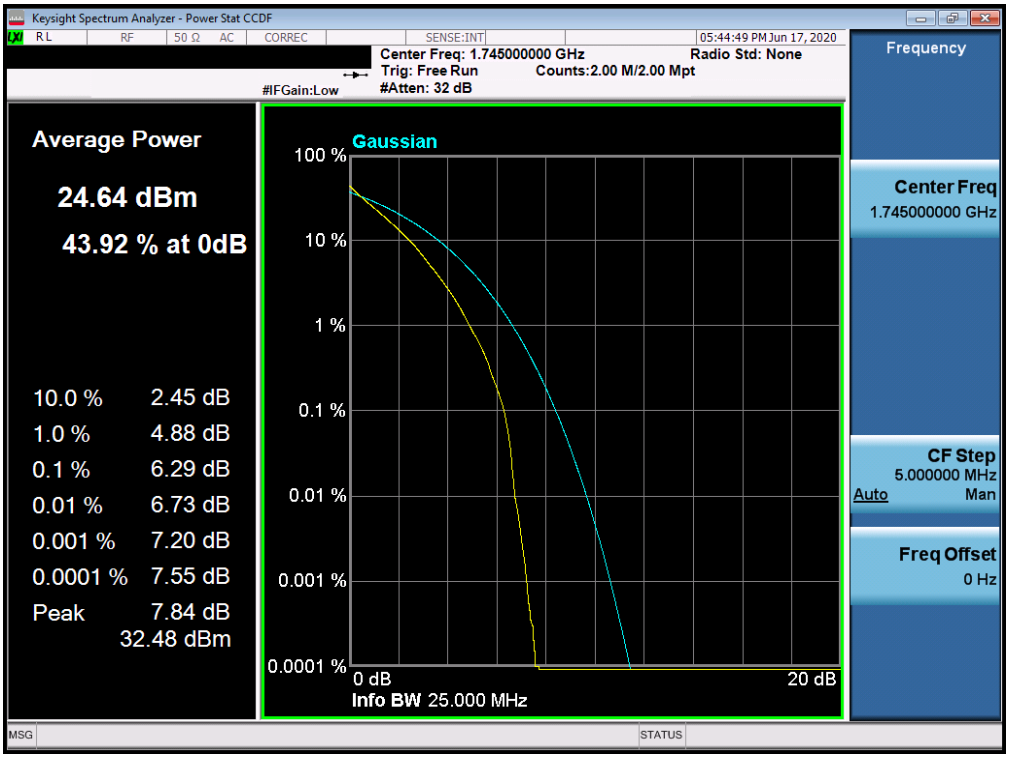
Plot 7-373. PAR Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)



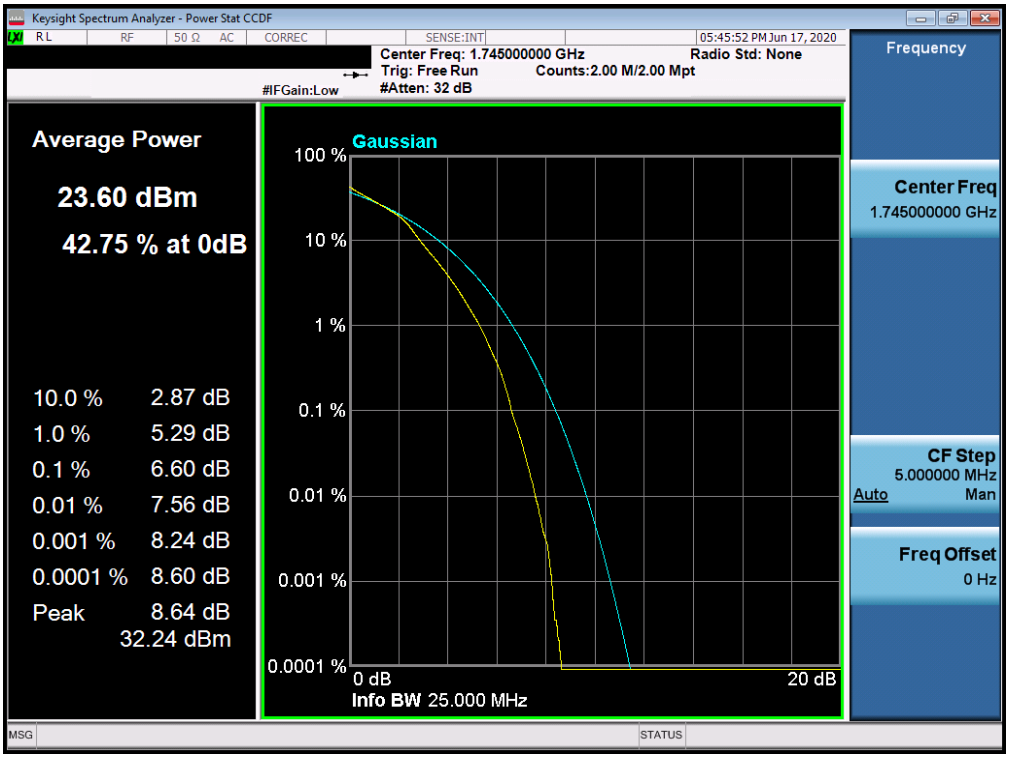
Plot 7-374. PAR Plot (Band 66 - 10.0MHz 16-QAM - Full RB Configuration)



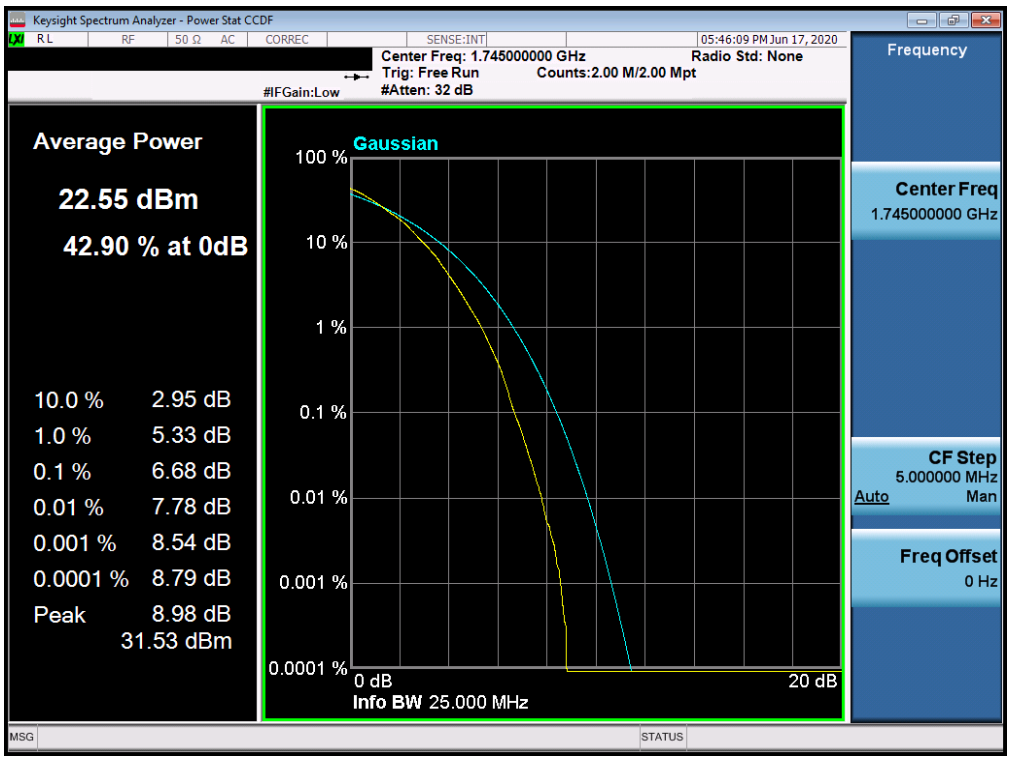
Plot 7-375. PAR Plot (Band 66 - 10.0MHz 64-QAM - Full RB Configuration)



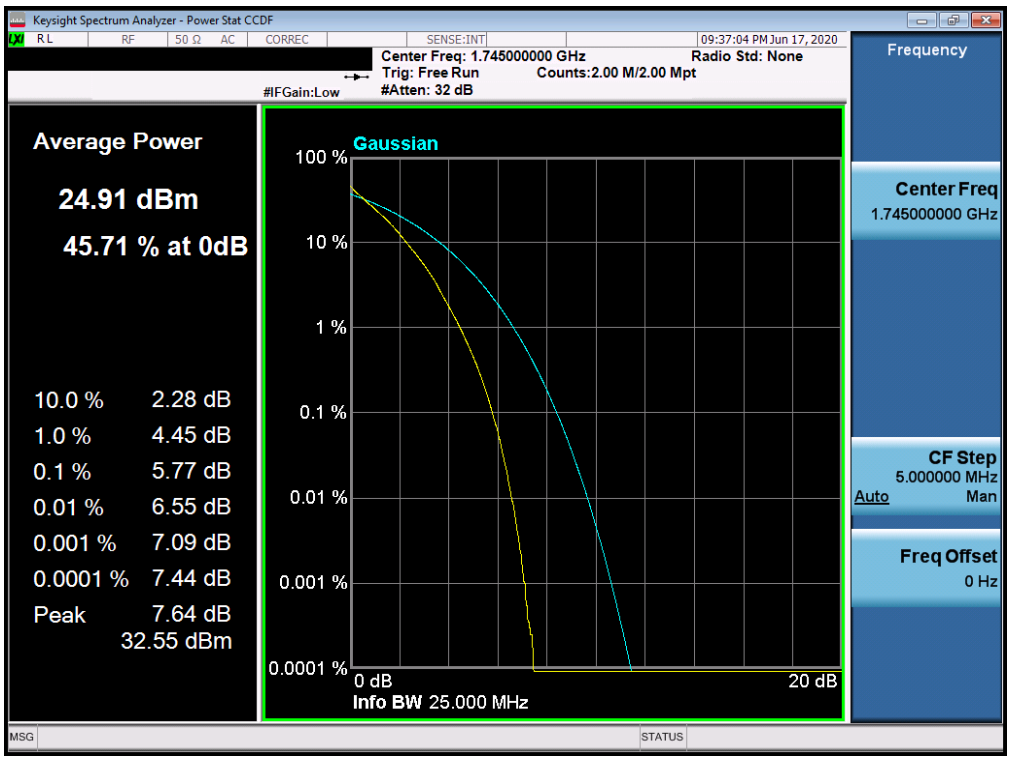
Plot 7-376. PAR Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



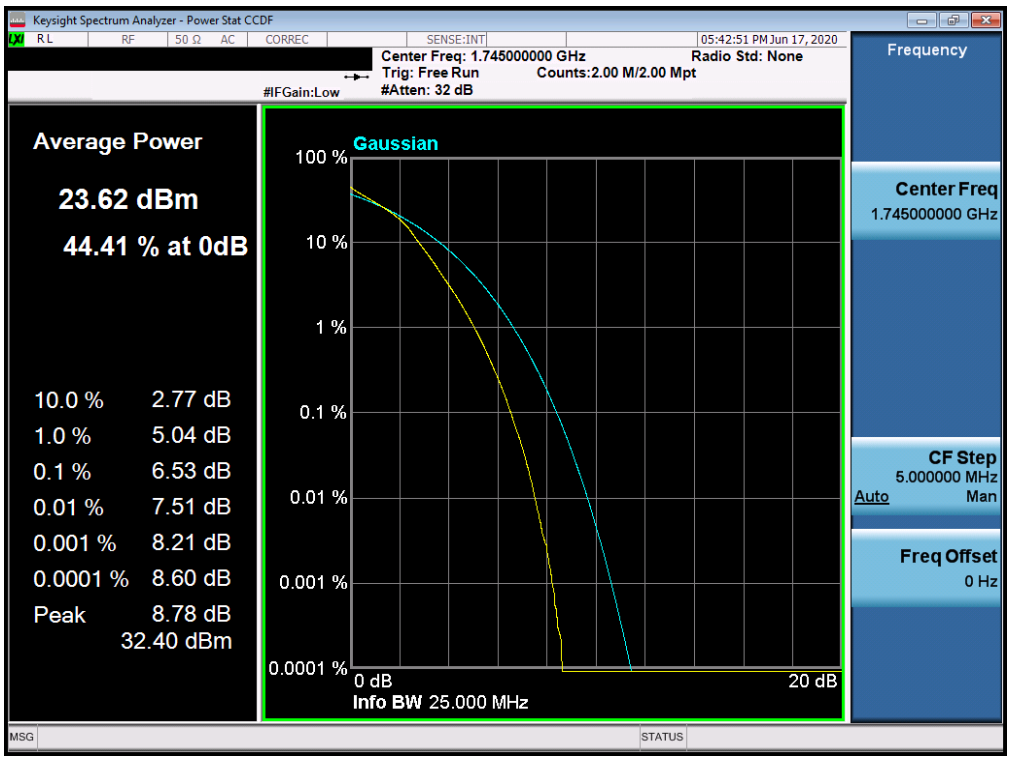
Plot 7-377. PAR Plot (Band 66 - 15.0MHz 16-QAM - Full RB Configuration)



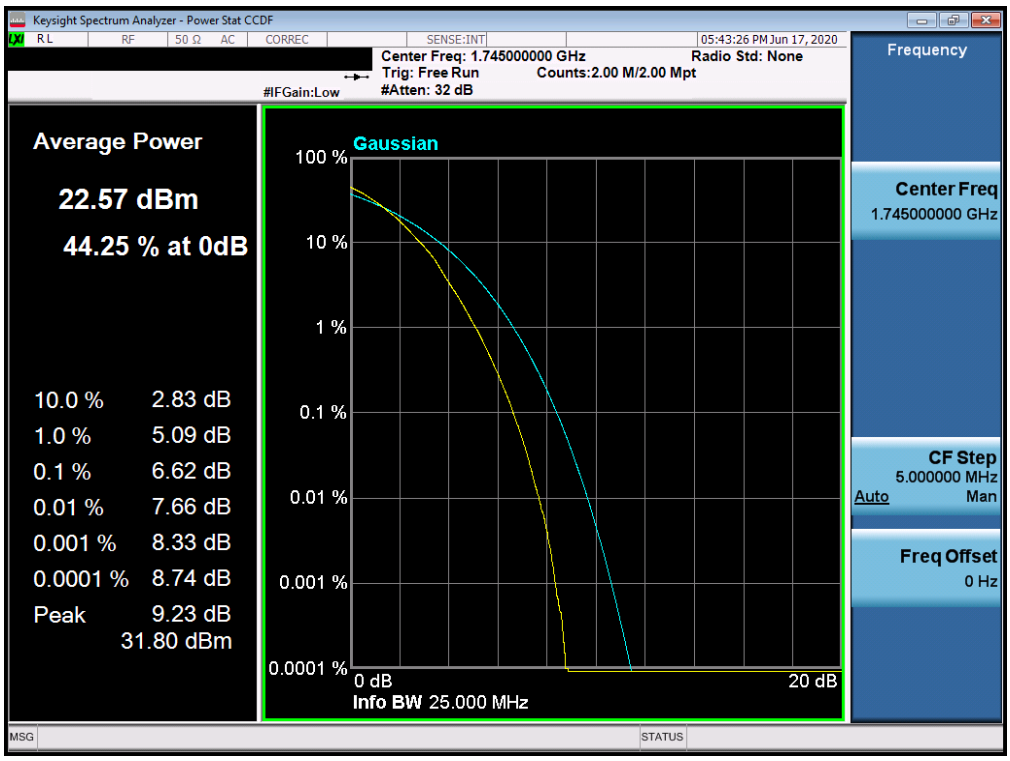
Plot 7-378. PAR Plot (Band 66 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-379. PAR Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

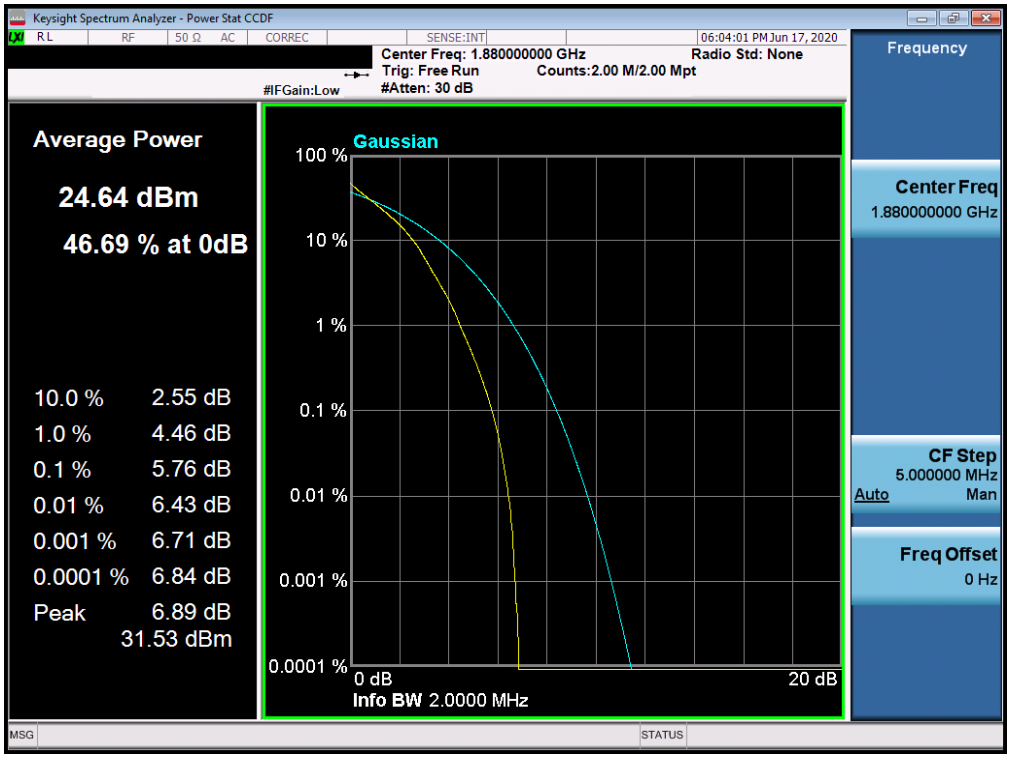


Plot 7-380. PAR Plot (Band 66 - 20.0MHz 16-QAM - Full RB Configuration)

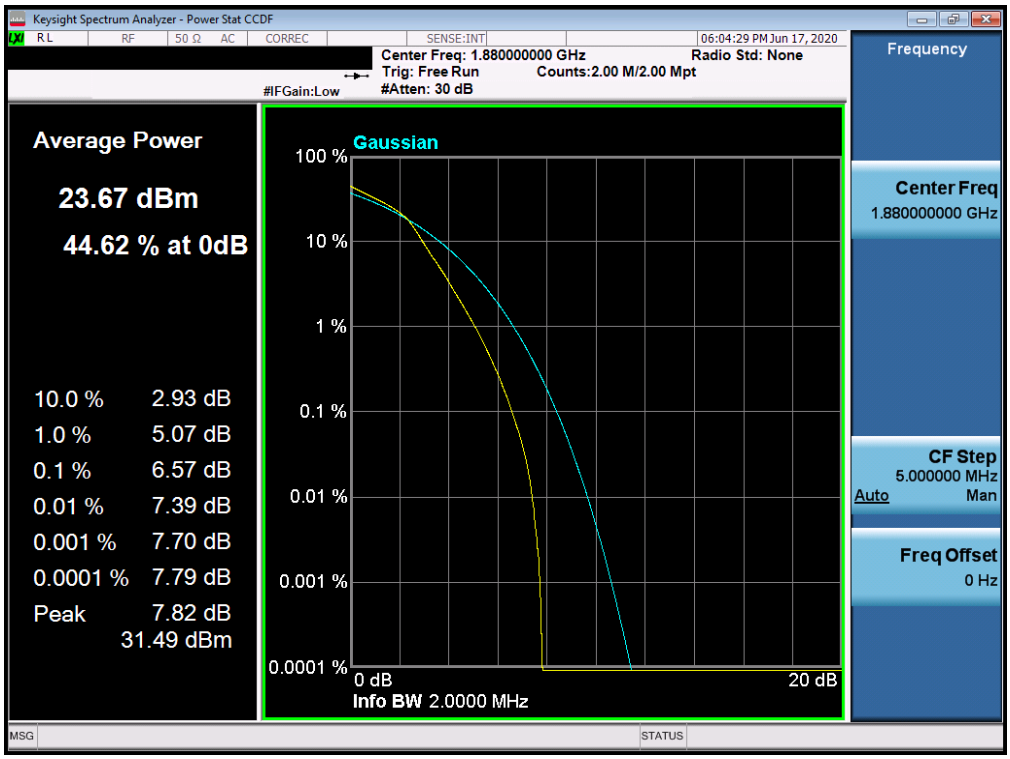


Plot 7-381. PAR Plot (Band 66 - 20.0MHz 64-QAM - Full RB Configuration)

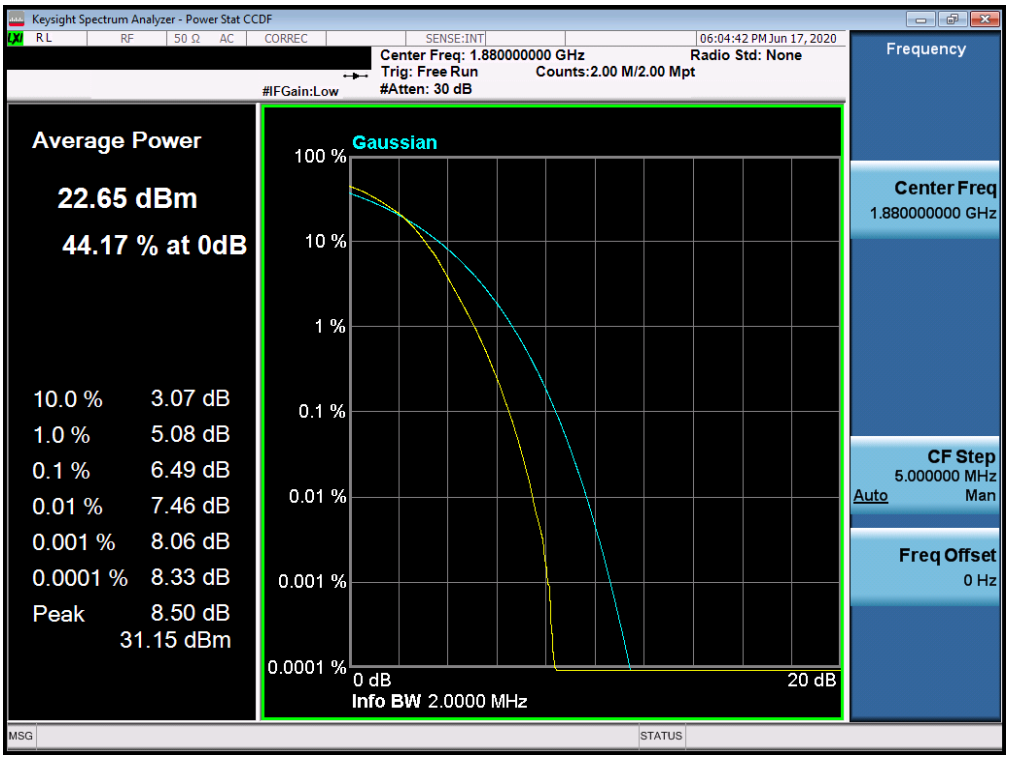
Band 2



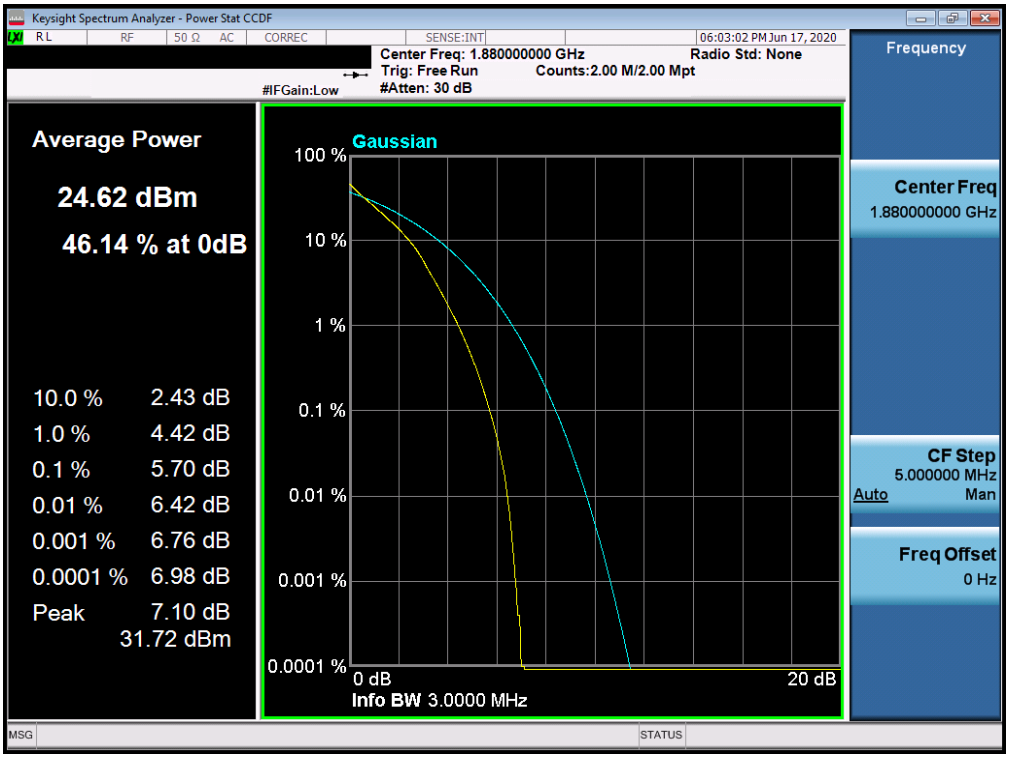
Plot 7-382. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



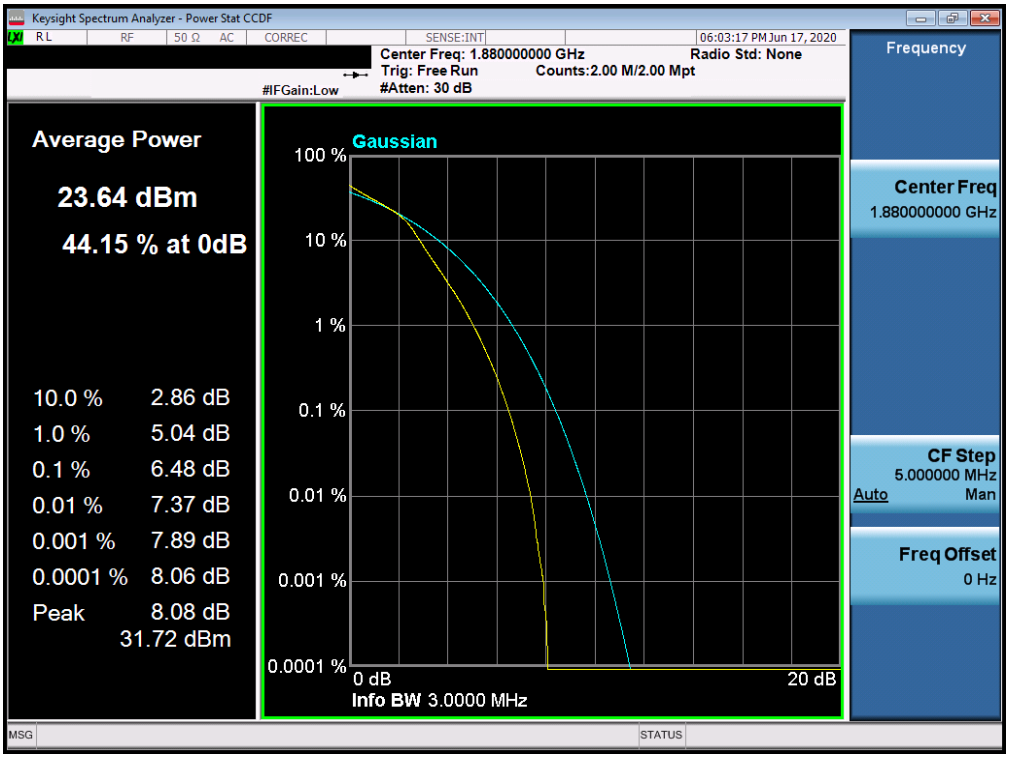
Plot 7-383. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)



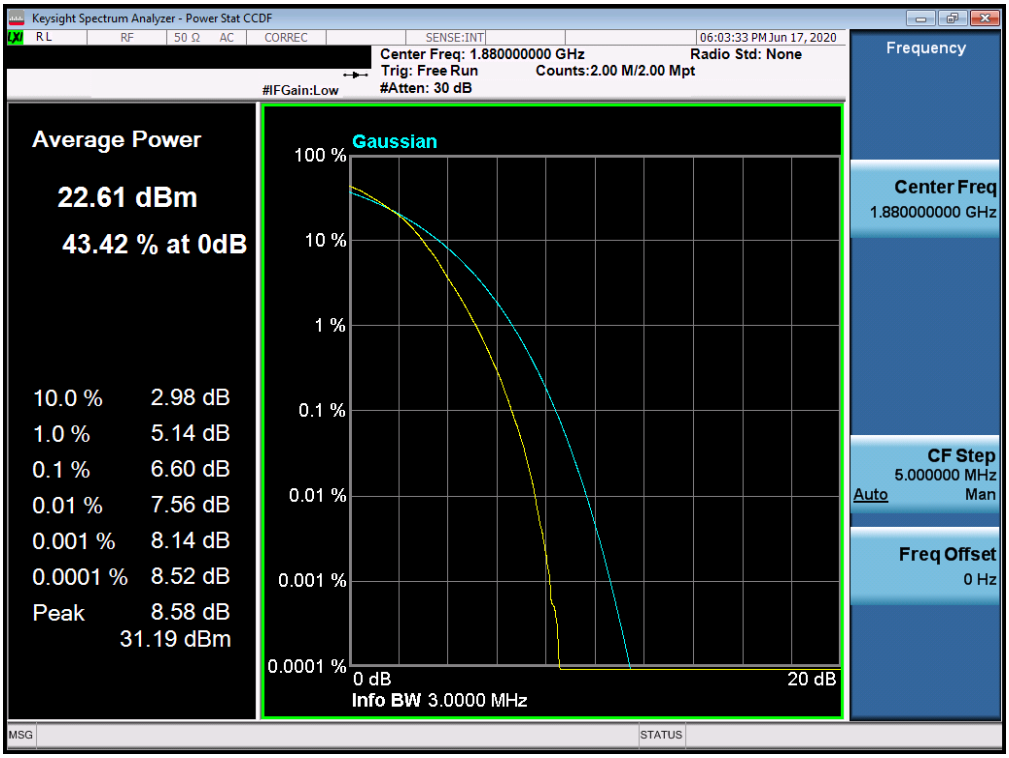
Plot 7-384. PAR Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



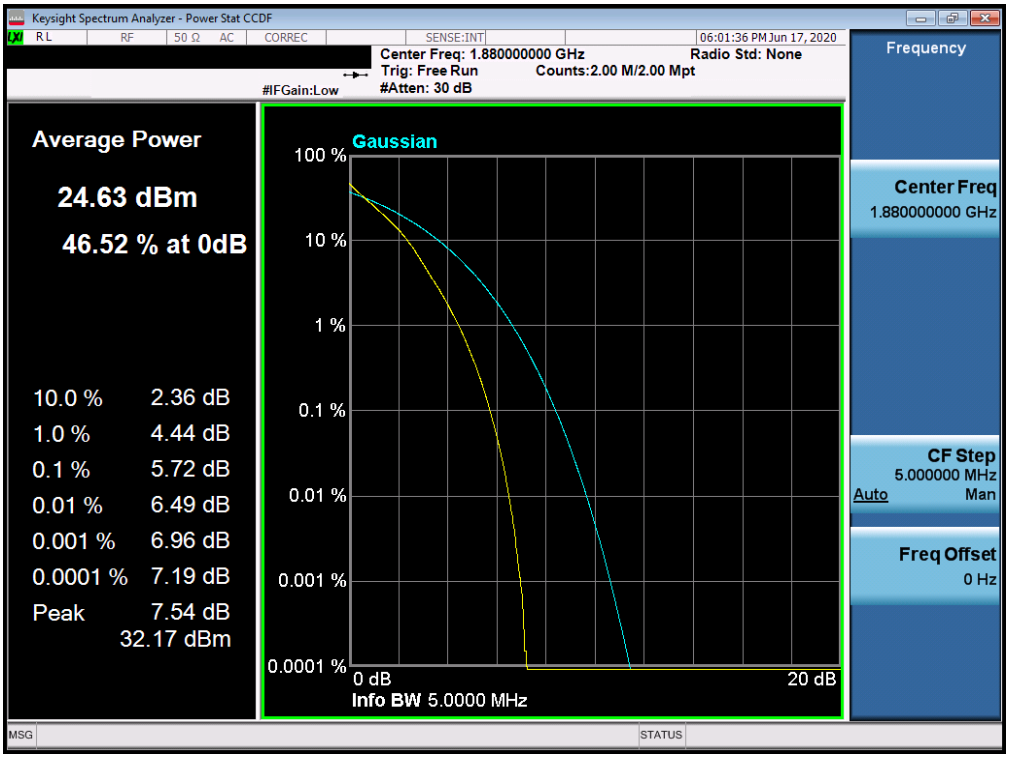
Plot 7-385. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



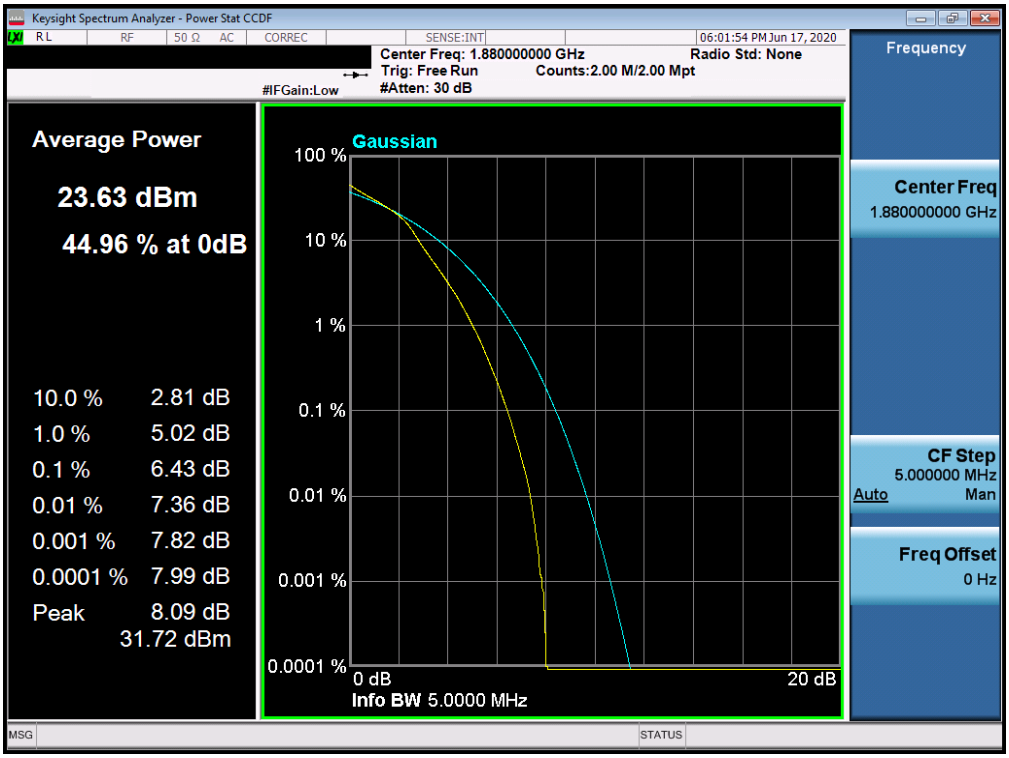
Plot 7-386. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



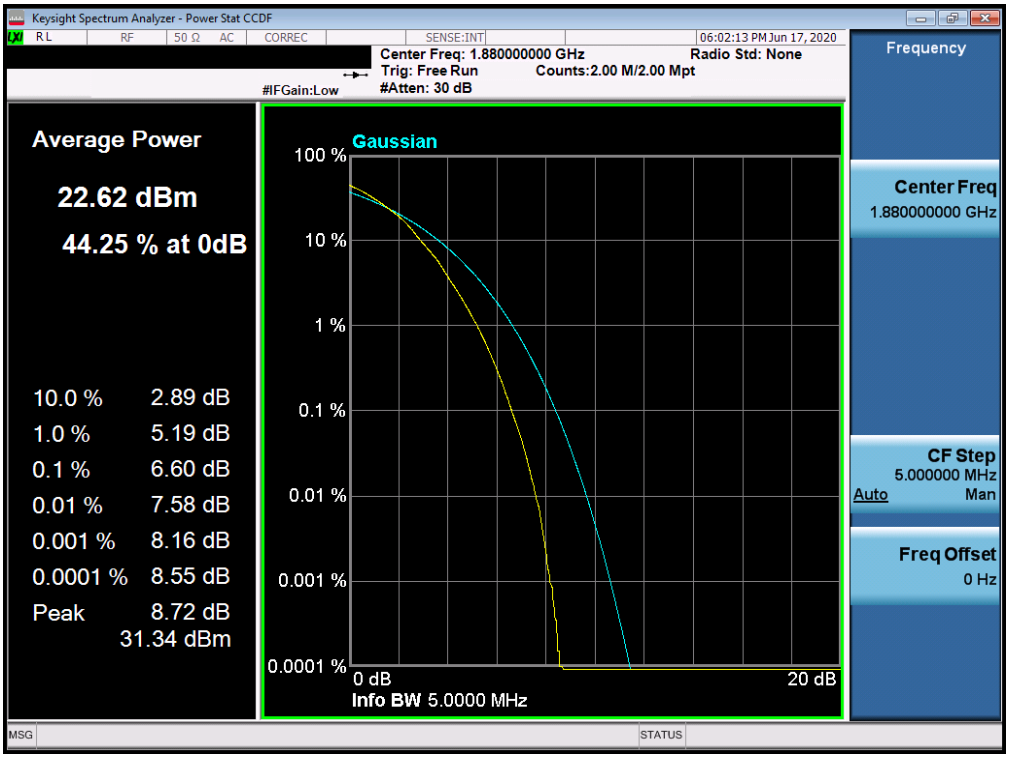
Plot 7-387. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)



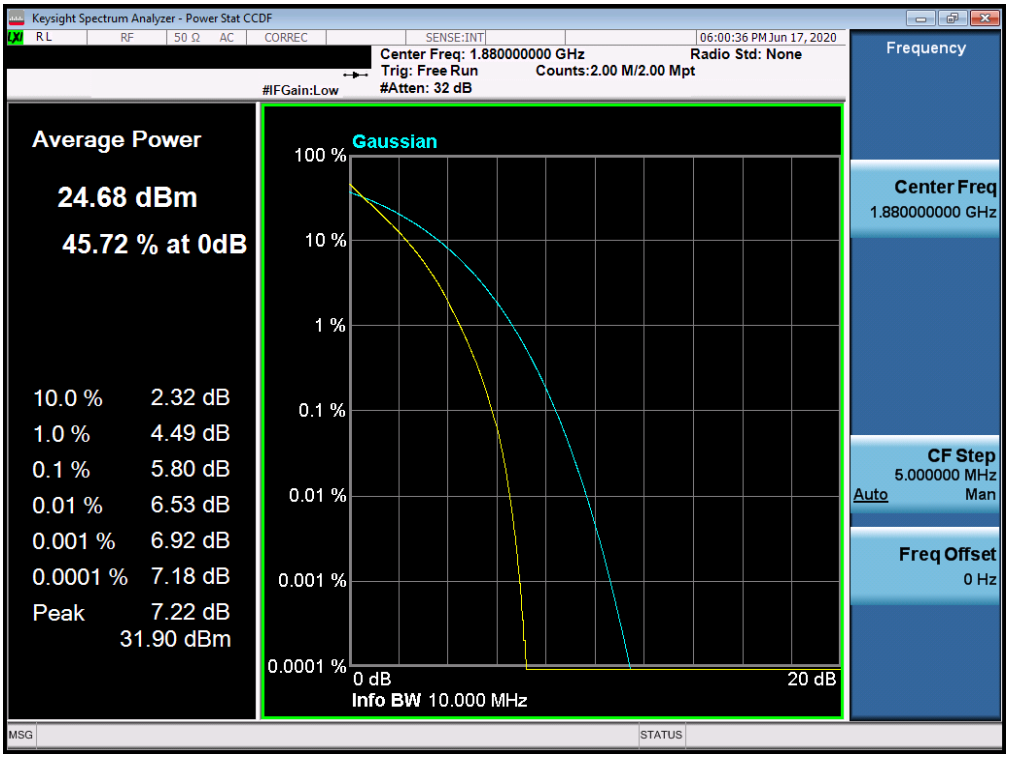
Plot 7-388. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



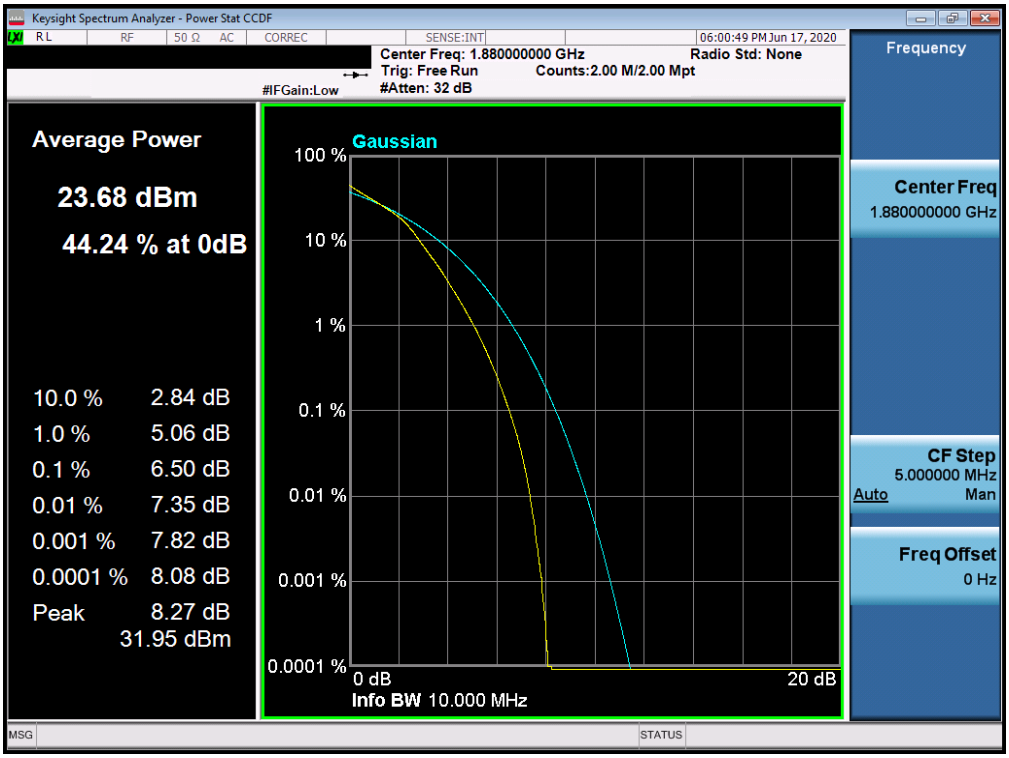
Plot 7-389. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)



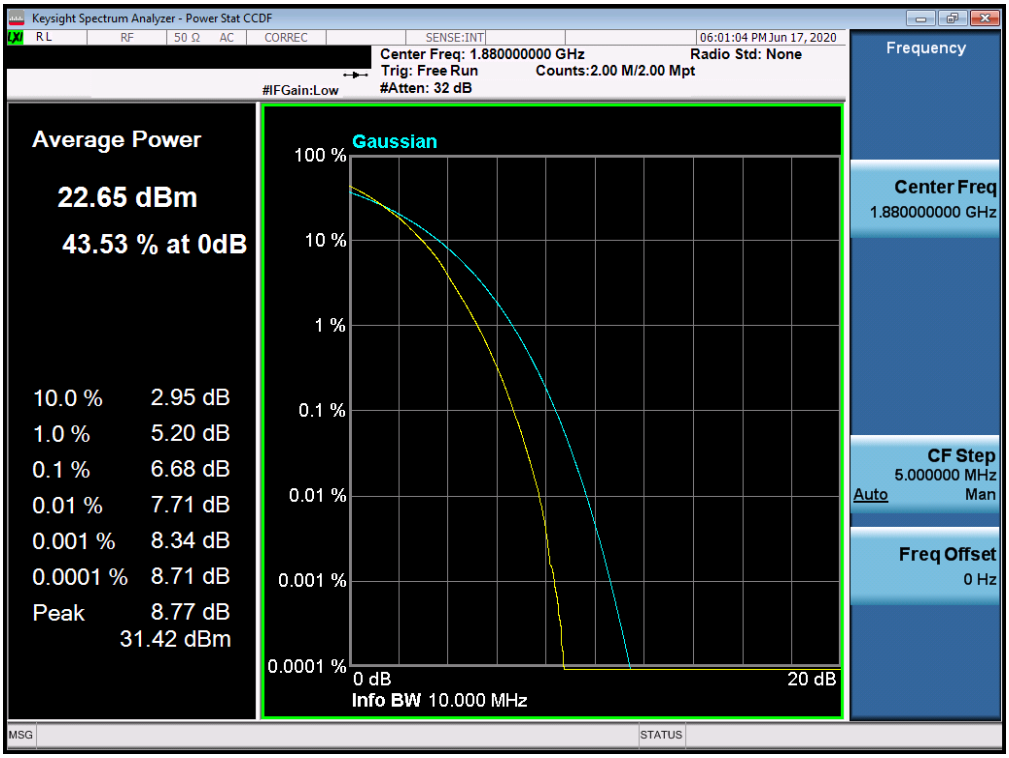
Plot 7-390. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



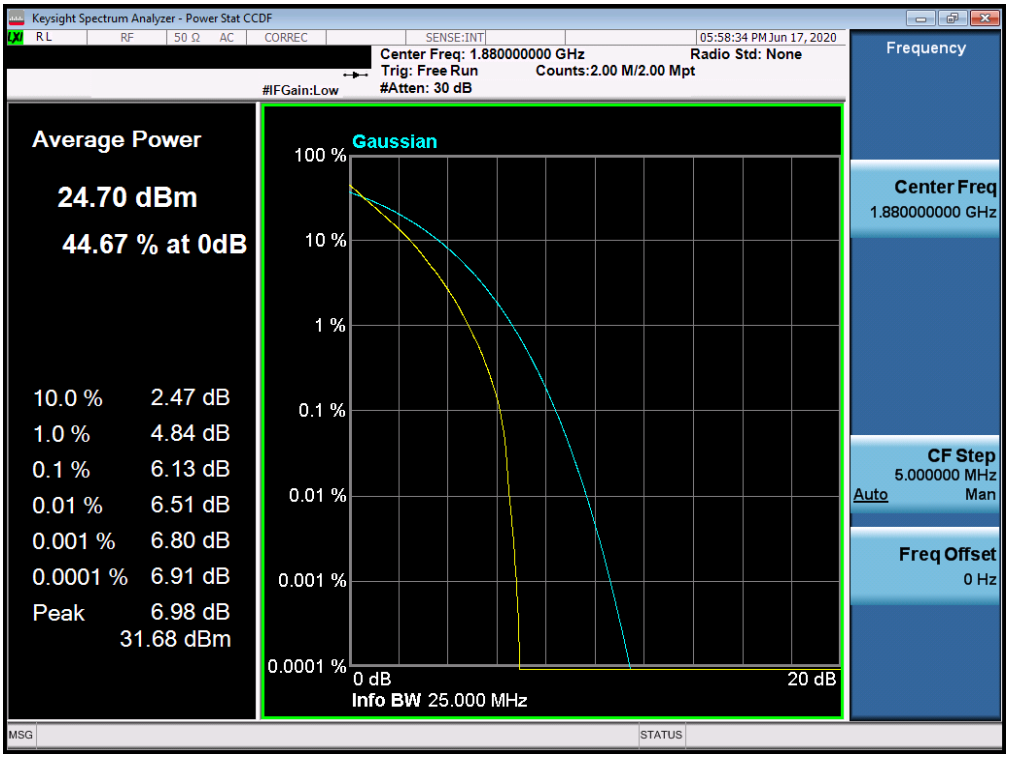
Plot 7-391. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



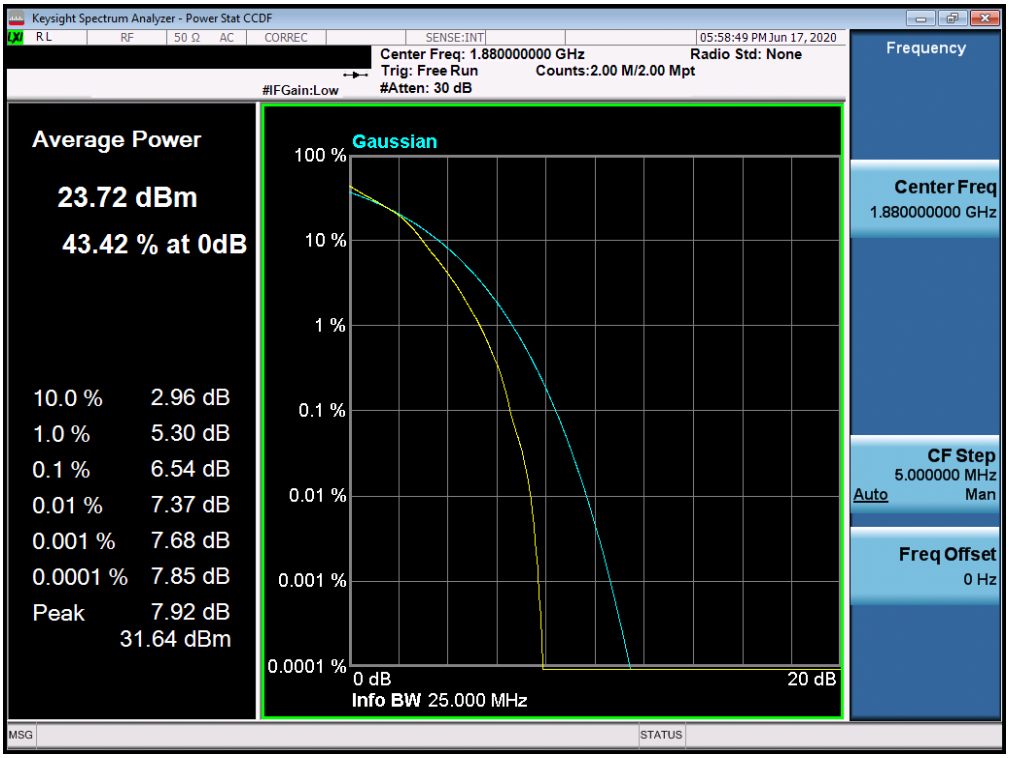
Plot 7-392. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



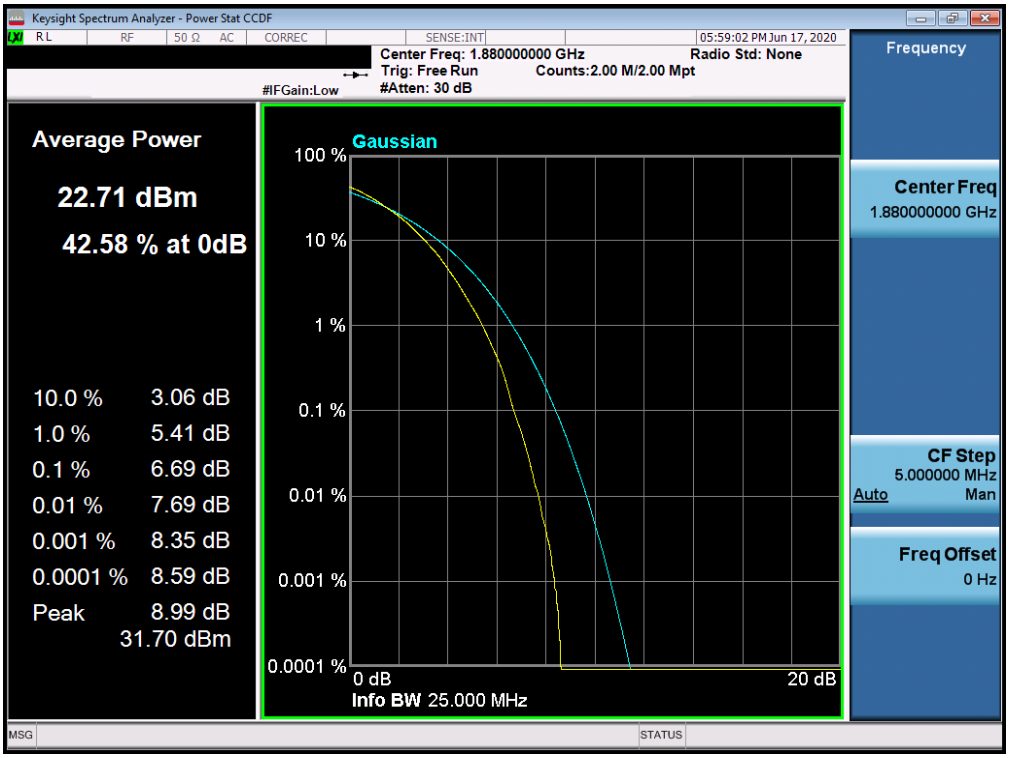
Plot 7-393. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)



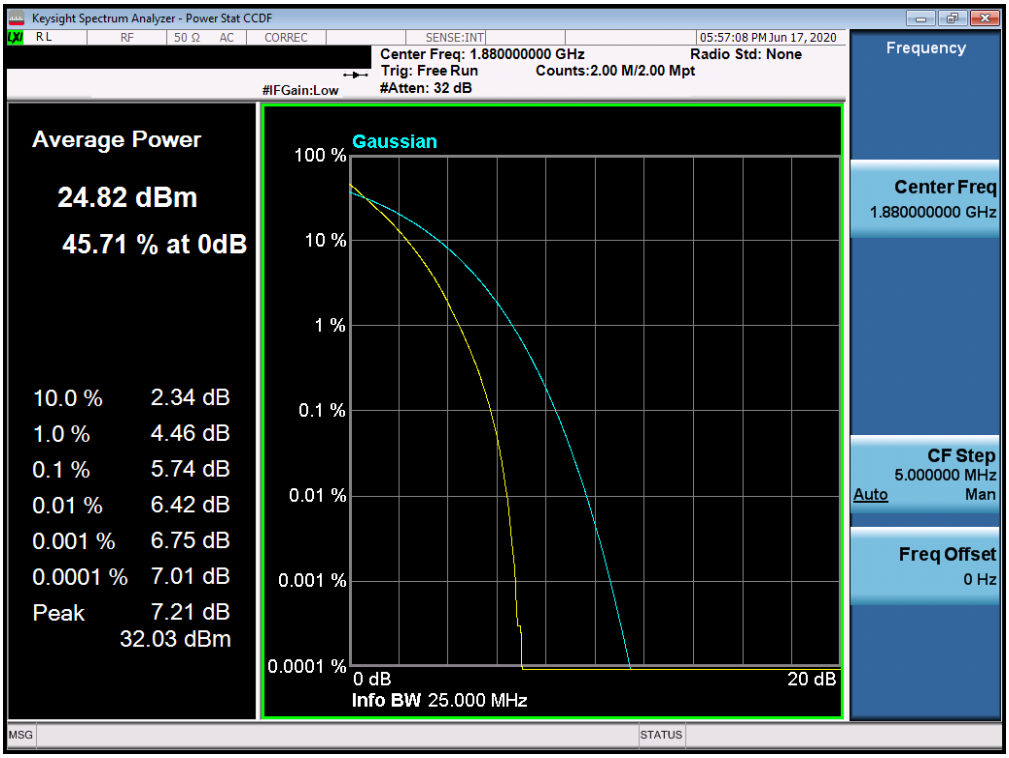
Plot 7-394. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



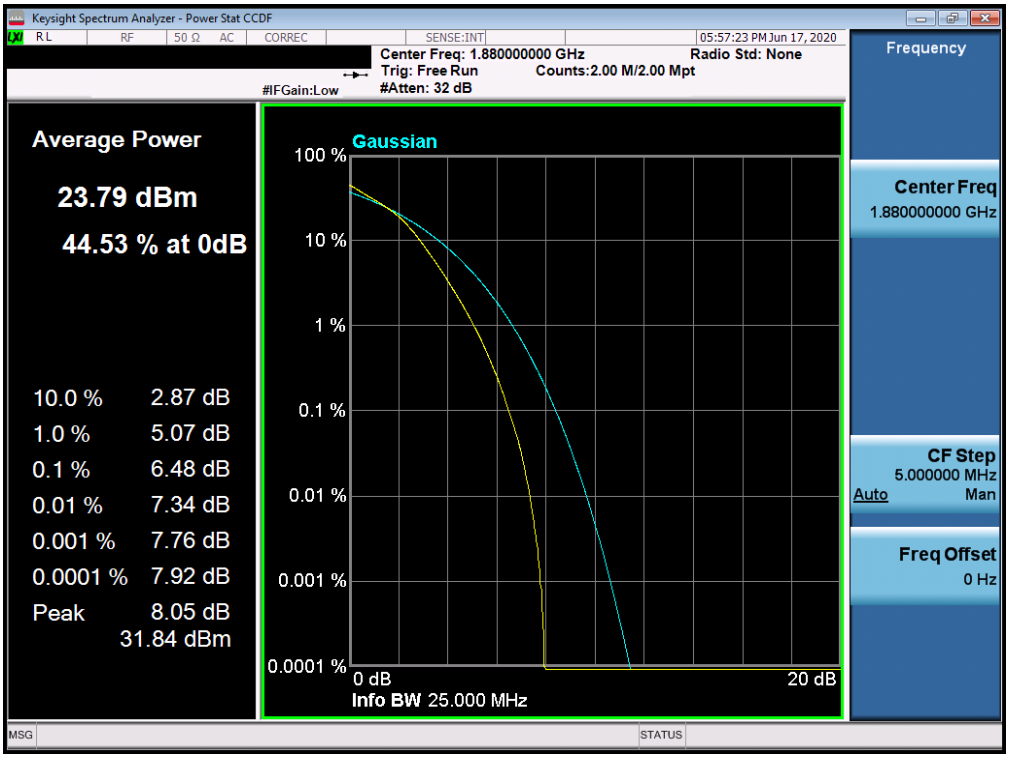
Plot 7-395. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)



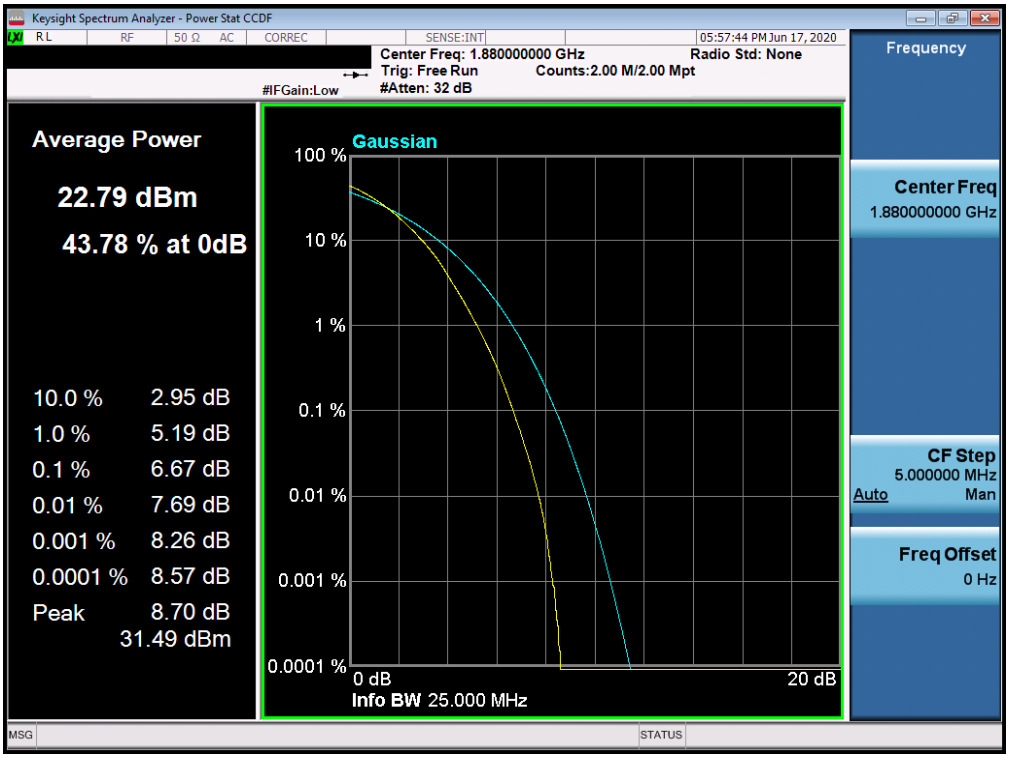
Plot 7-396. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-397. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

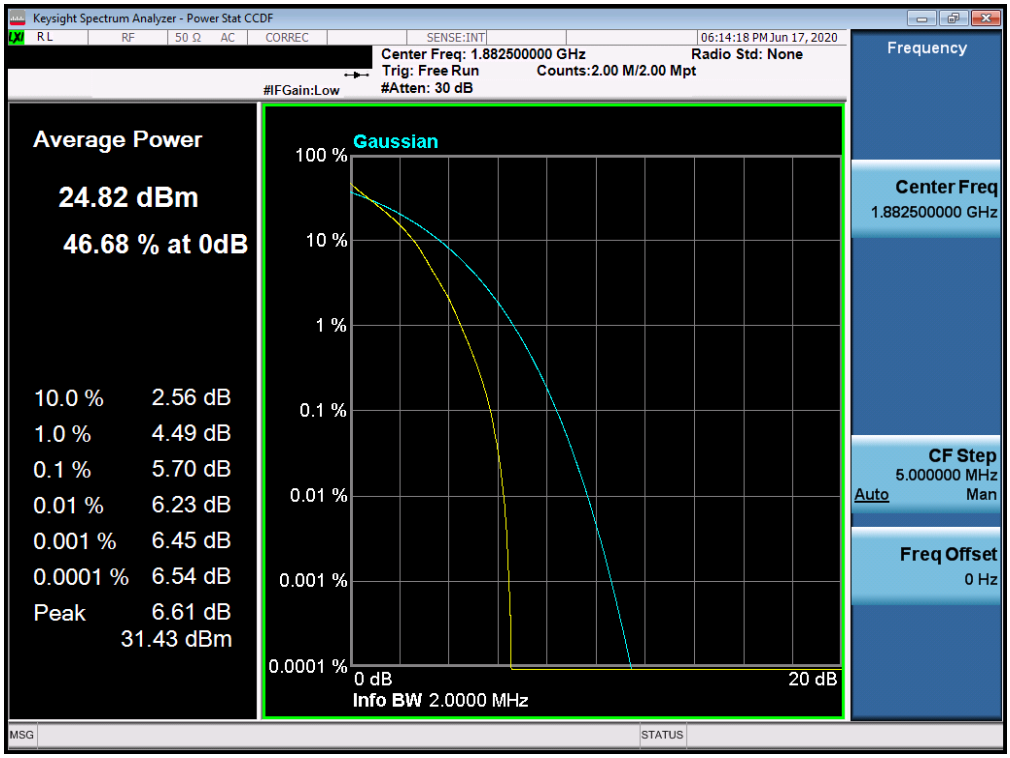


Plot 7-398. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

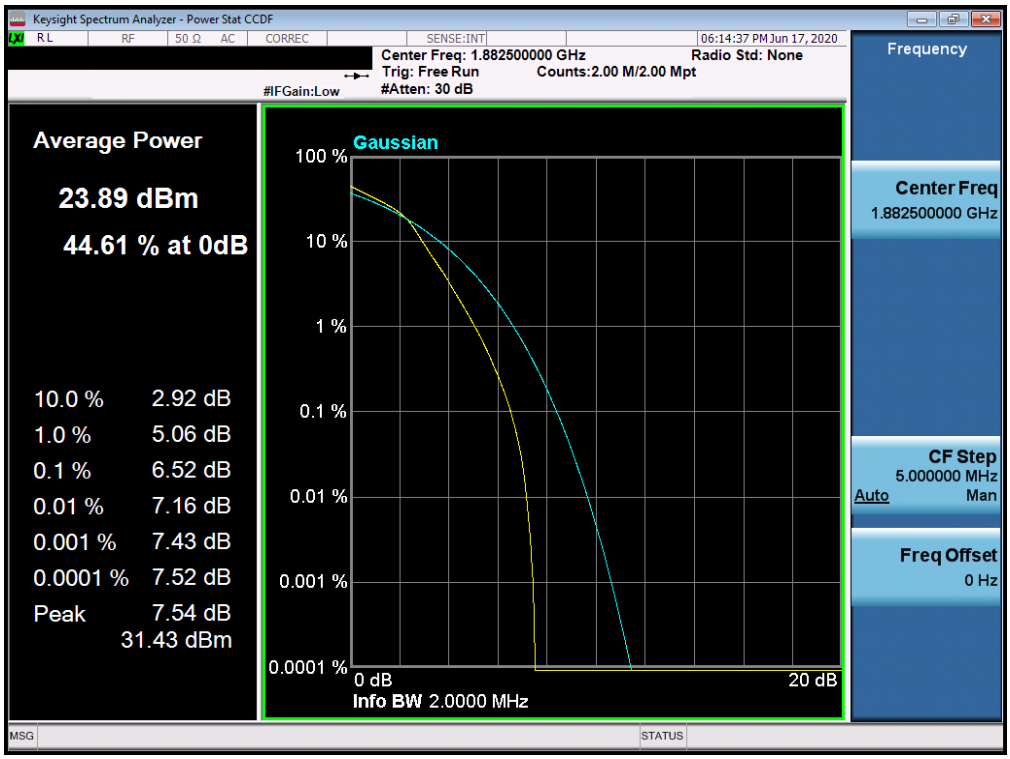


Plot 7-399. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

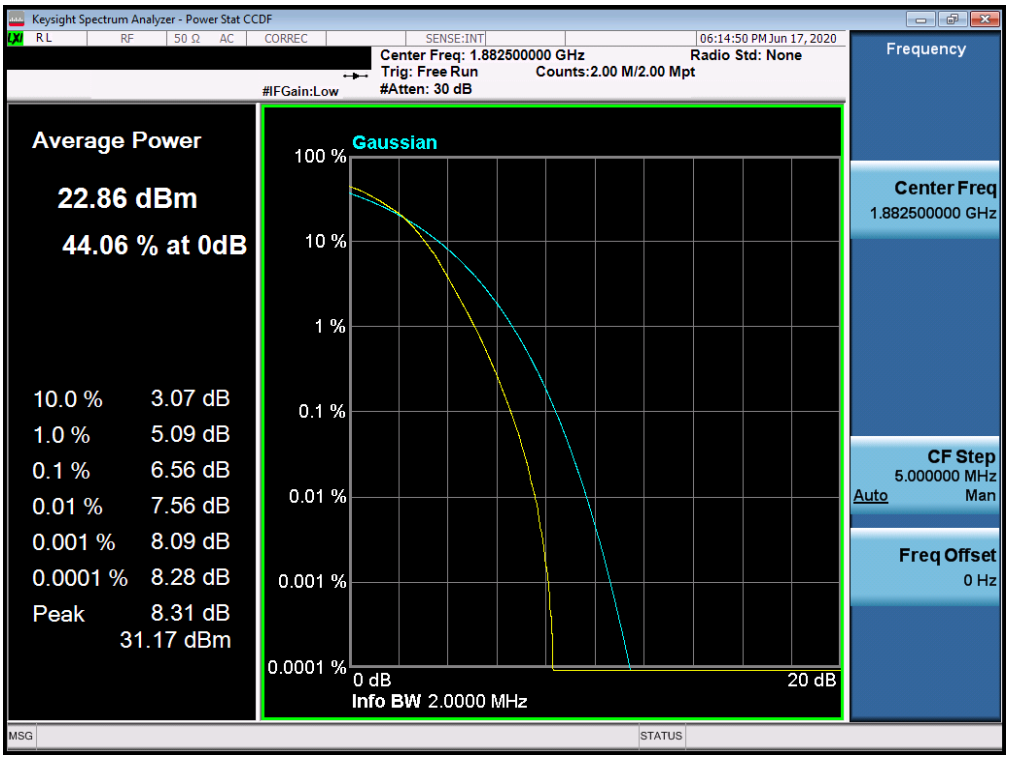
Band 25



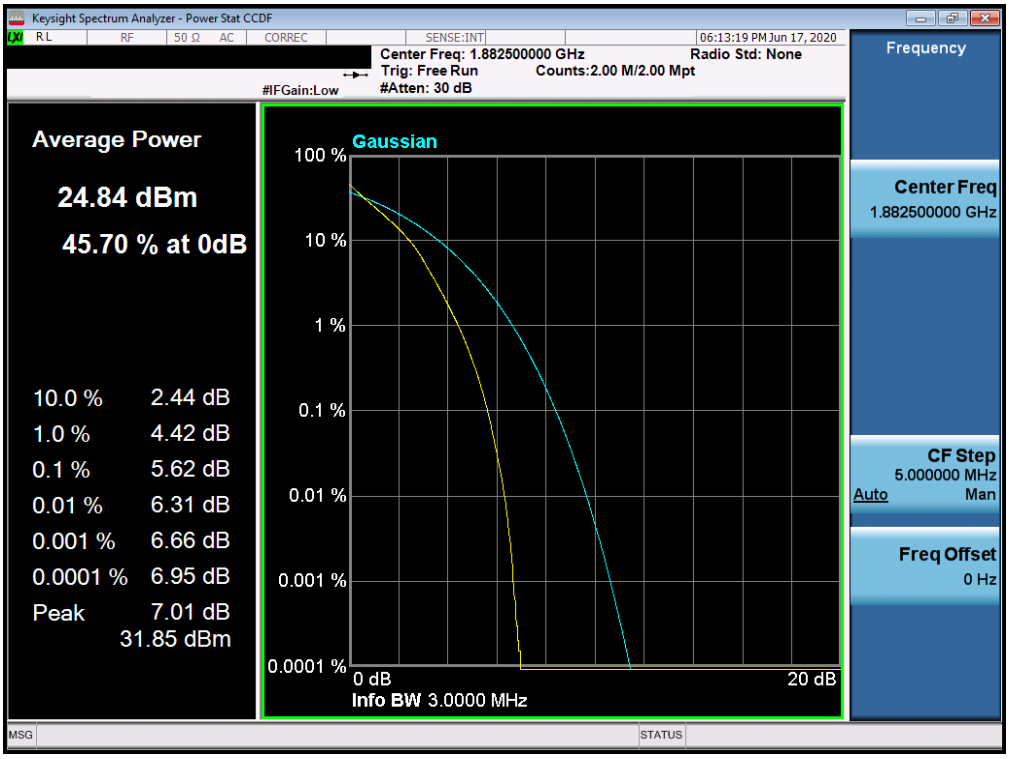
Plot 7-400. PAR Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)



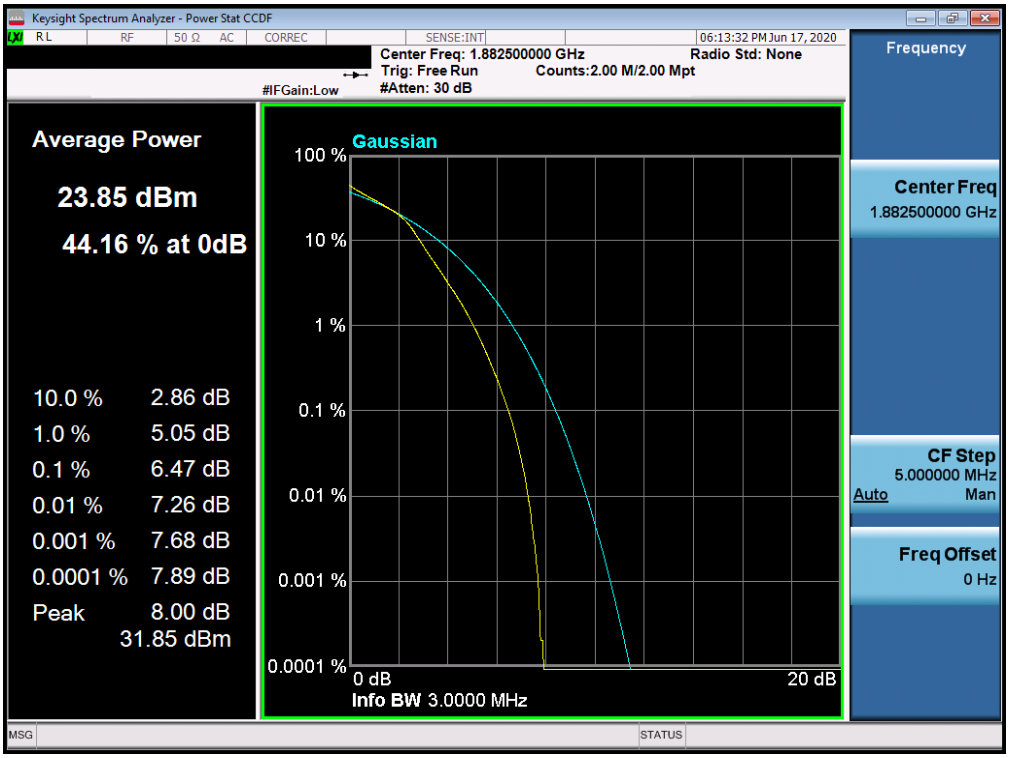
Plot 7-401. PAR Plot (Band 25 - 1.4MHz 16-QAM - Full RB Configuration)



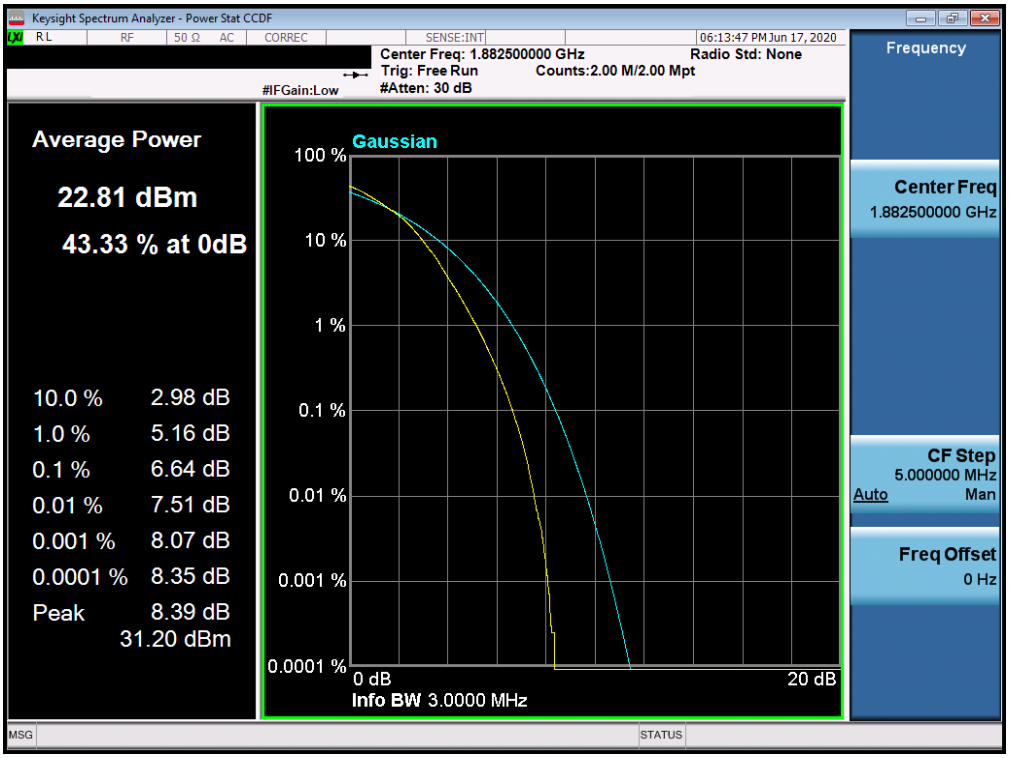
Plot 7-402. PAR Plot (Band 25 - 1.4MHz 64-QAM - Full RB Configuration)



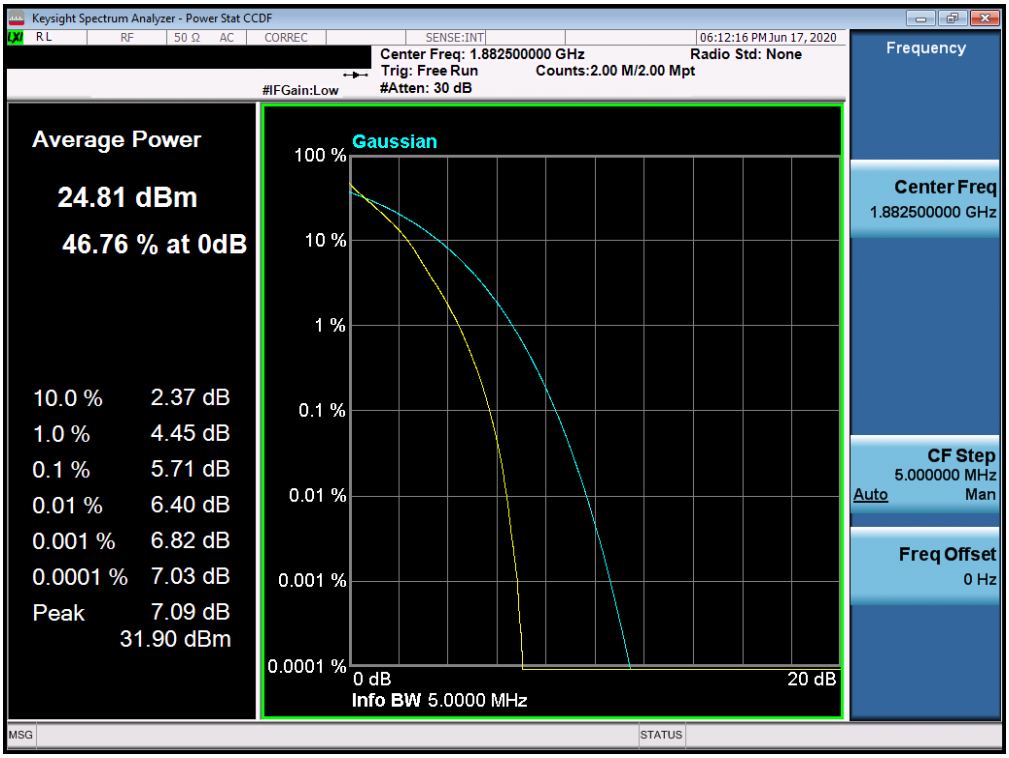
Plot 7-403. PAR Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)



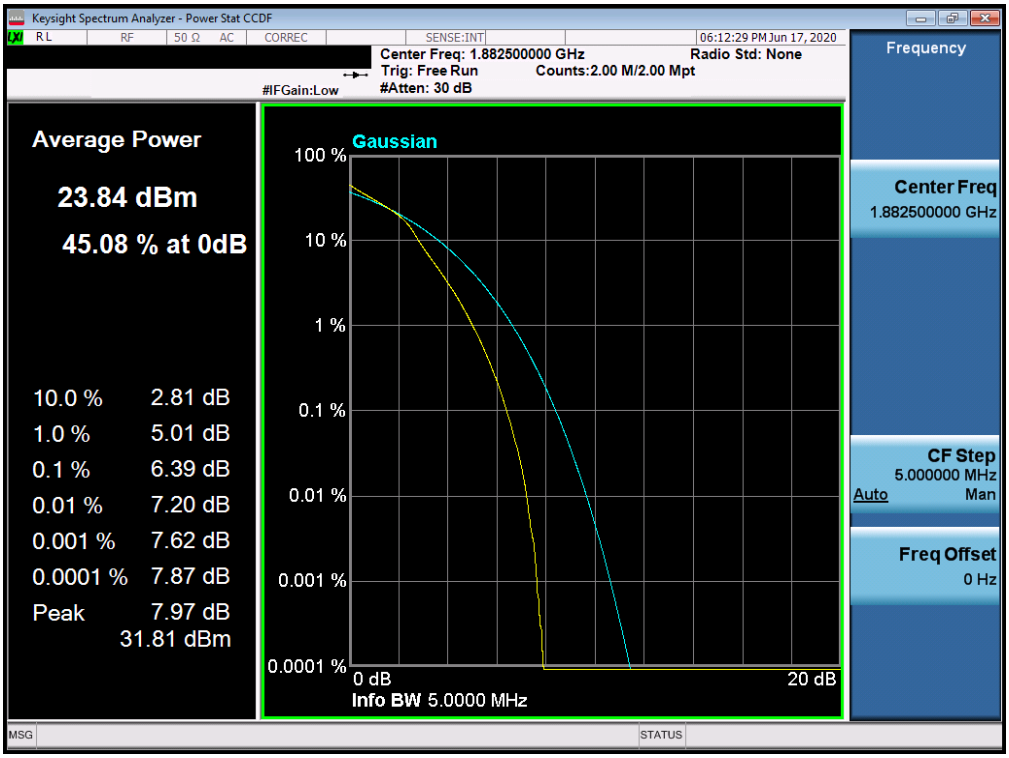
Plot 7-404. PAR Plot (Band 25 - 3.0MHz 16-QAM - Full RB Configuration)



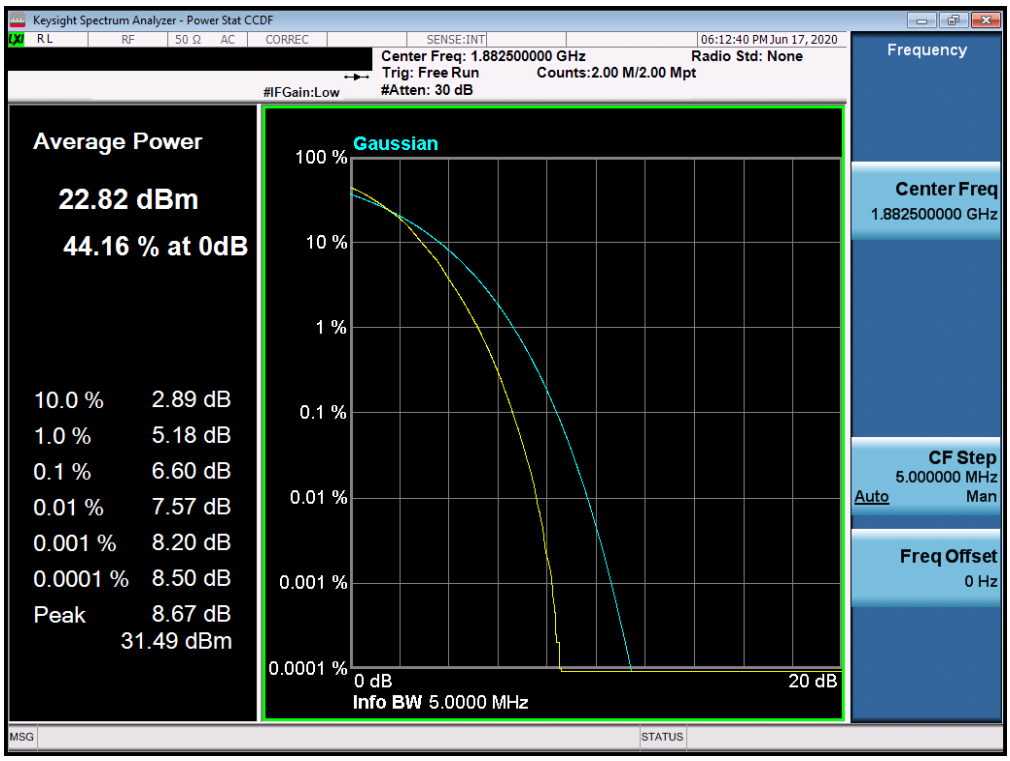
Plot 7-405. PAR Plot (Band 25 - 3.0MHz 64-QAM - Full RB Configuration)



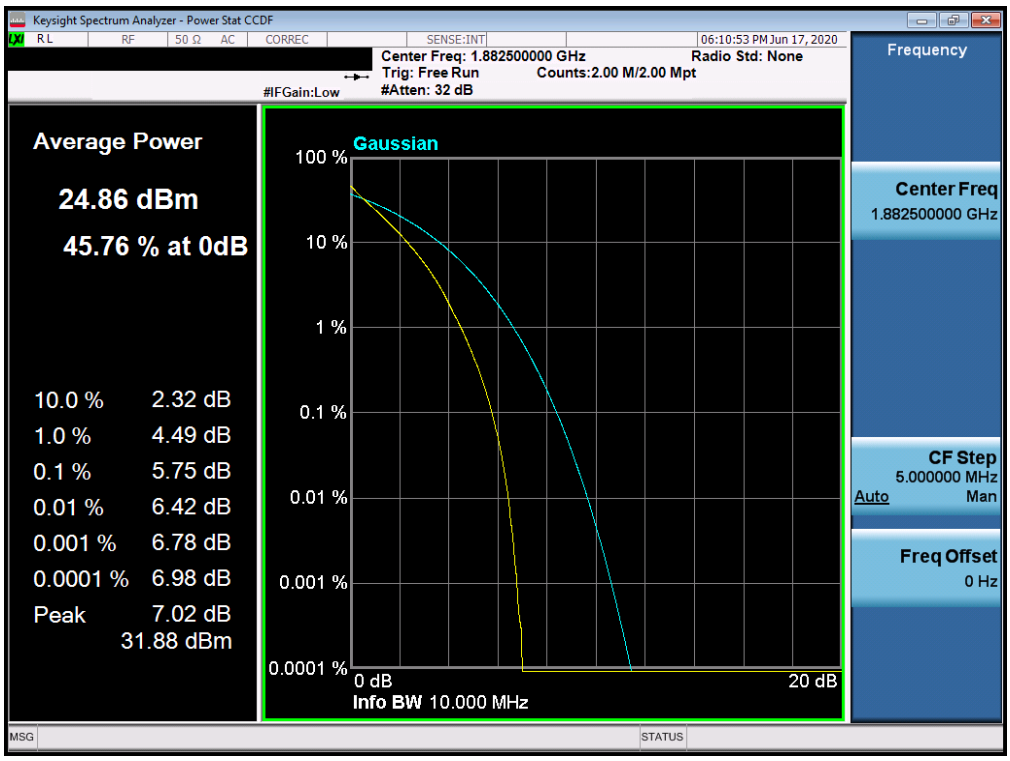
Plot 7-406. PAR Plot (Band 25 - 5.0MHz QPSK - Full RB Configuration)



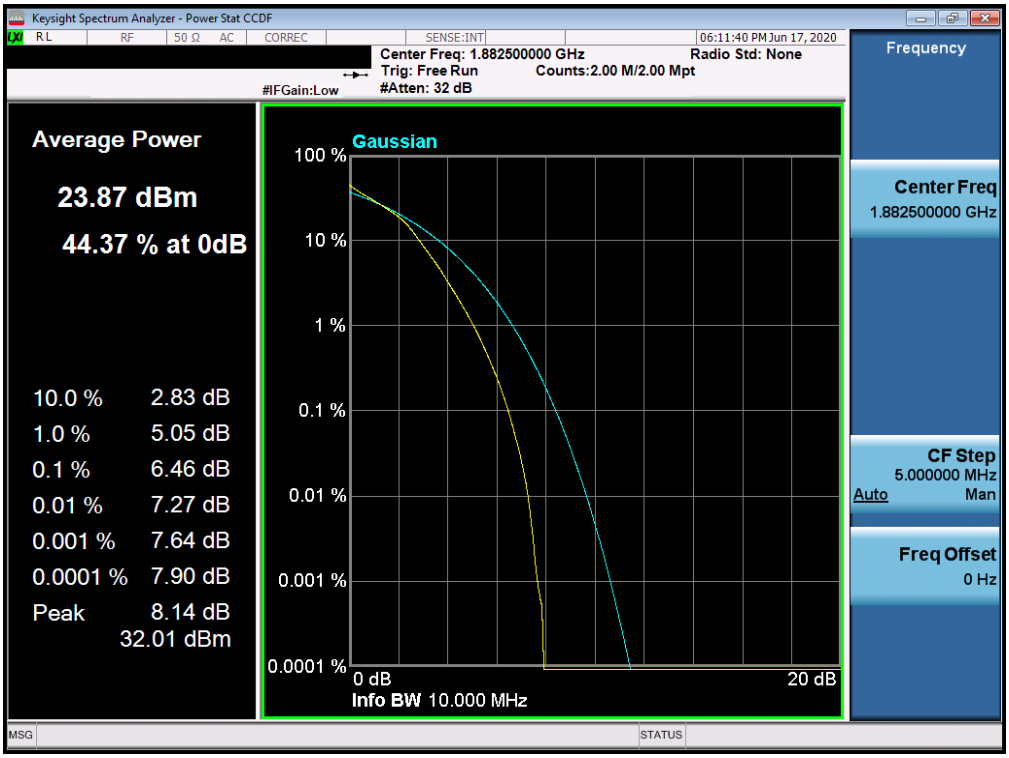
Plot 7-407. PAR Plot (Band 25 - 5.0MHz 16-QAM - Full RB Configuration)



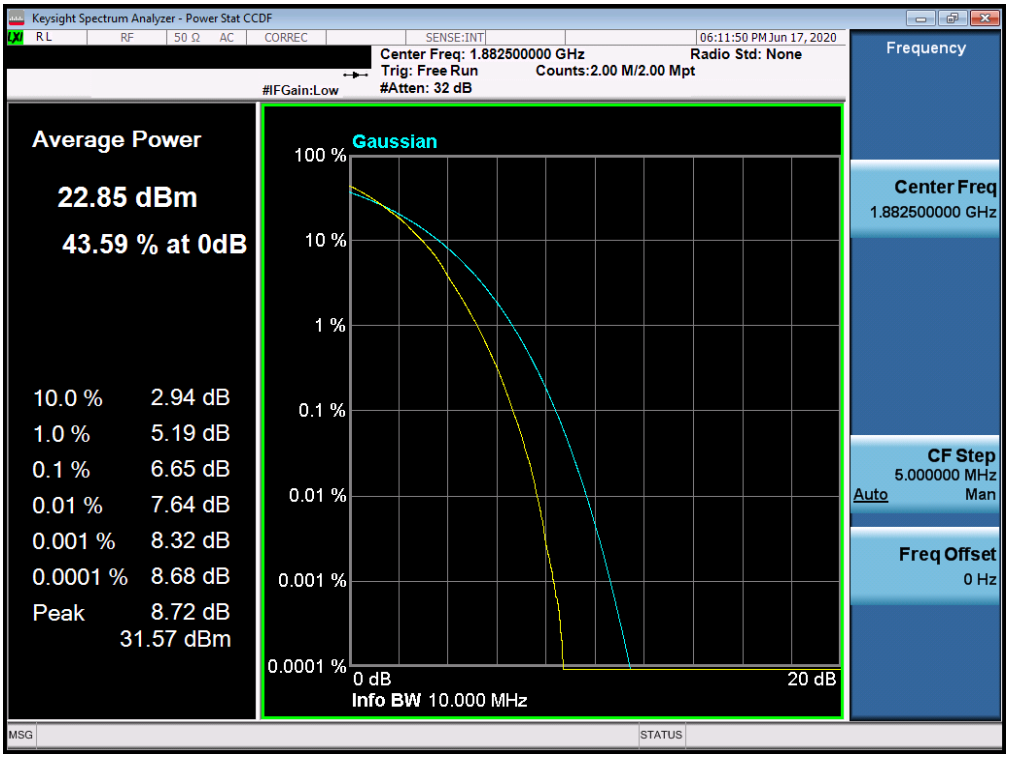
Plot 7-408. PAR Plot (Band 25 - 5.0MHz 64-QAM - Full RB Configuration)



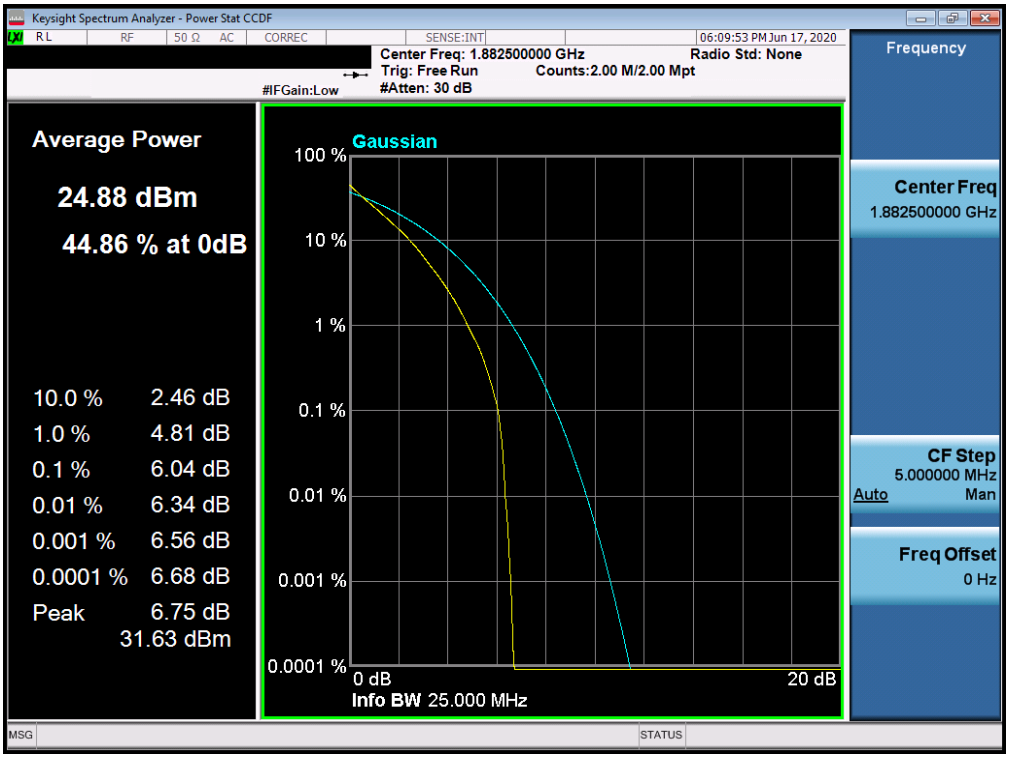
Plot 7-409. PAR Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)



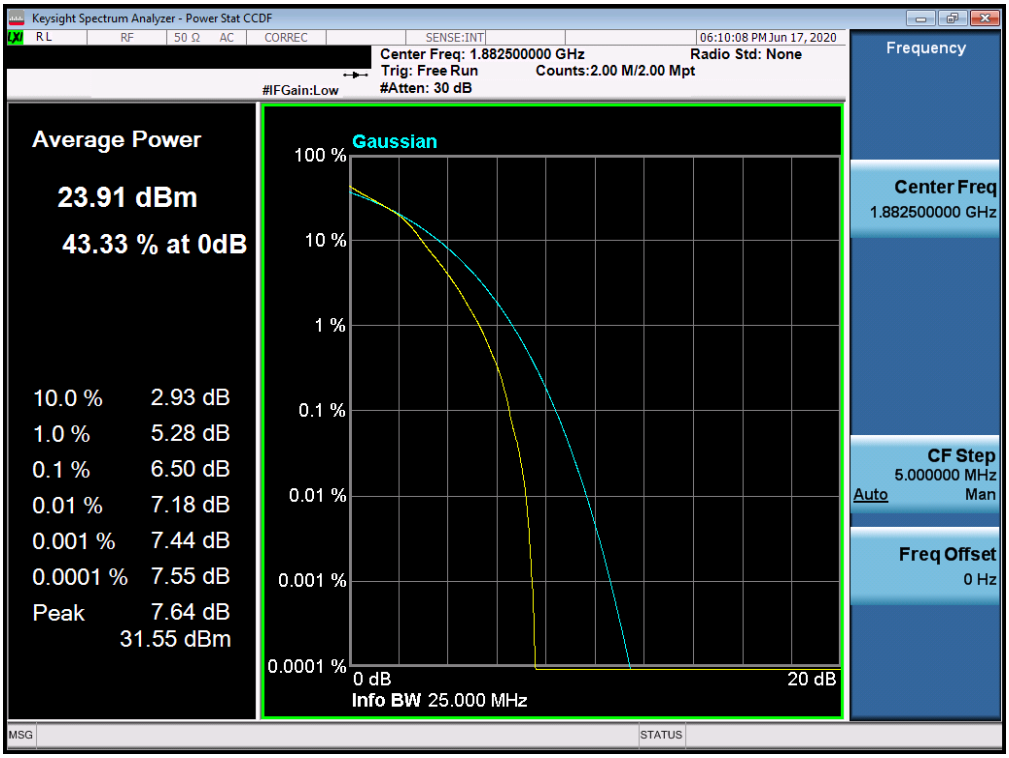
Plot 7-410. PAR Plot (Band 25 - 10.0MHz 16-QAM - Full RB Configuration)



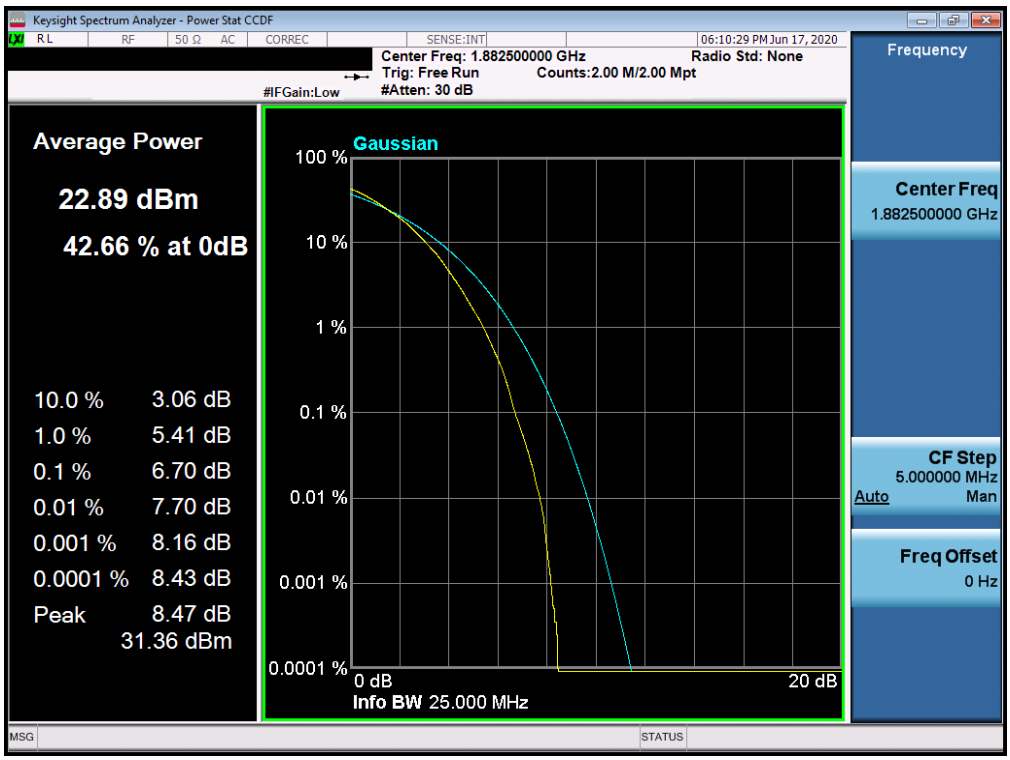
Plot 7-411. PAR Plot (Band 25 - 10.0MHz 64-QAM - Full RB Configuration)



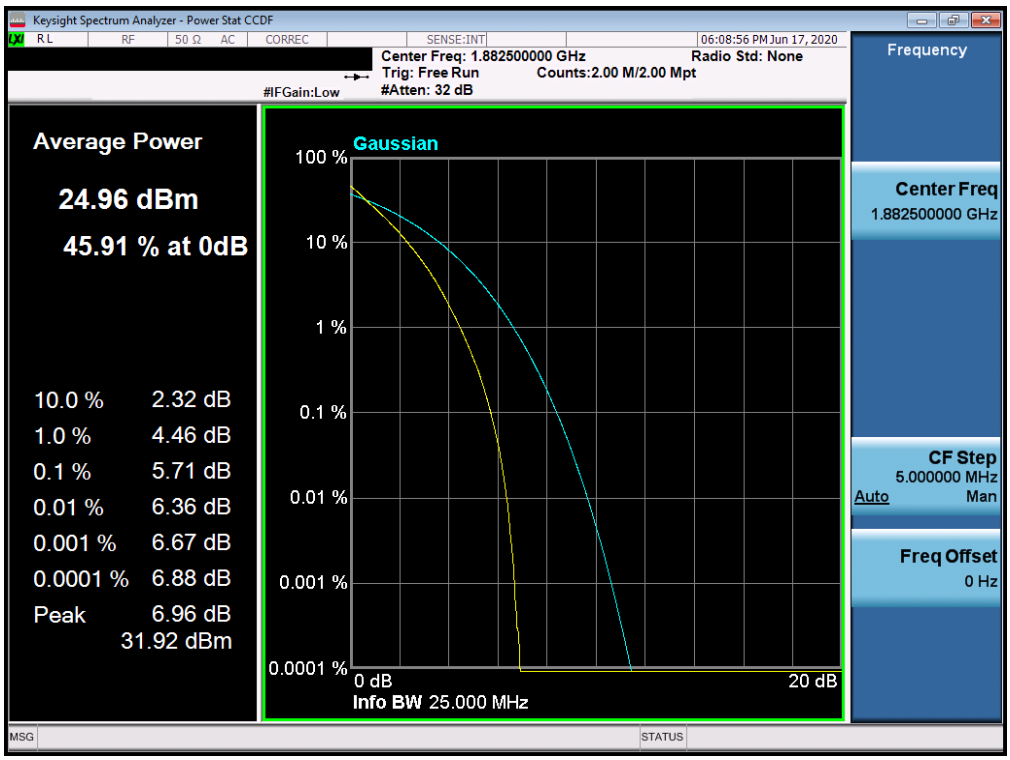
Plot 7-412. PAR Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)



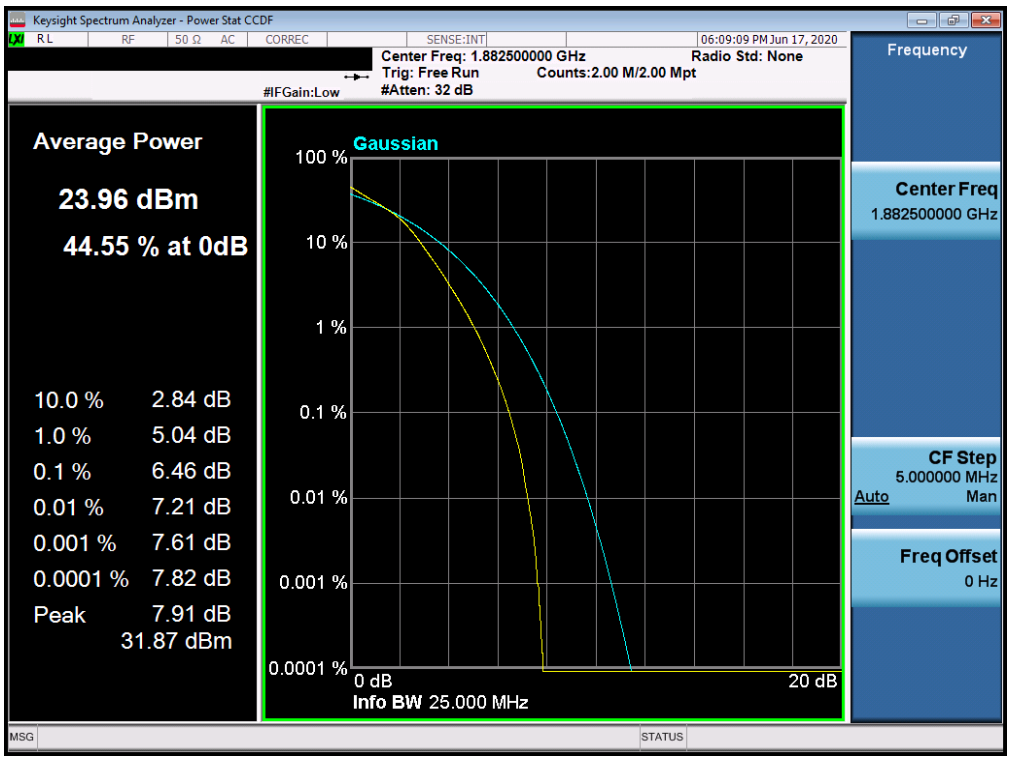
Plot 7-413. PAR Plot (Band 25 - 15.0MHz 16-QAM - Full RB Configuration)



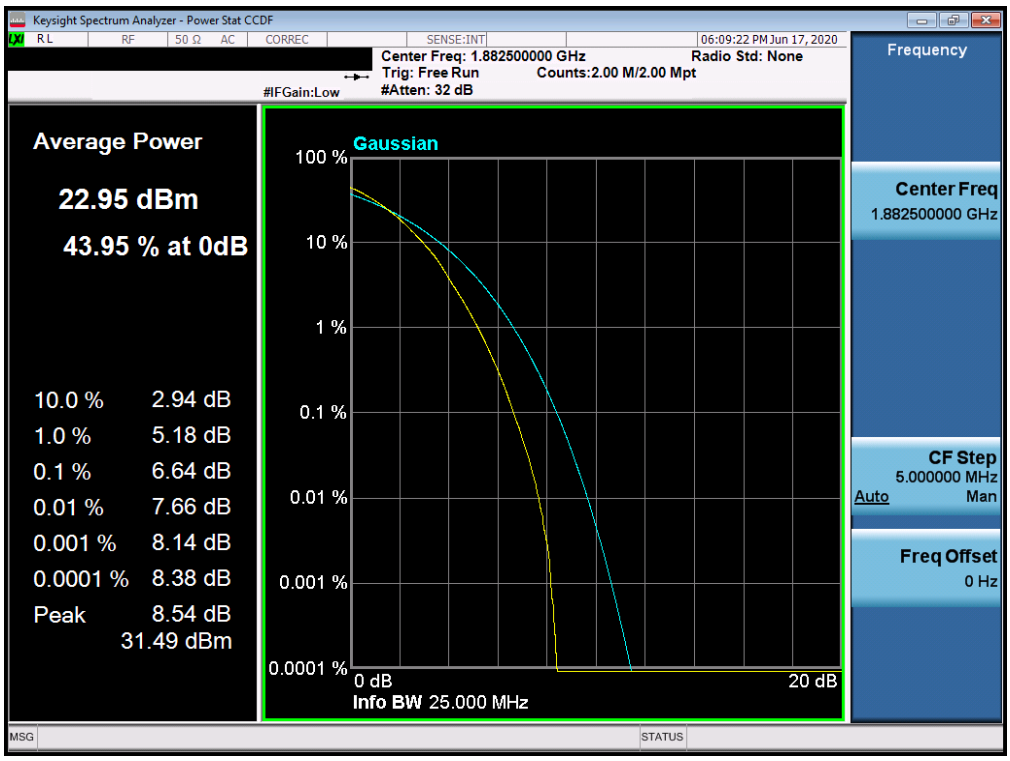
Plot 7-414. PAR Plot (Band 25 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-415. PAR Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-416. PAR Plot (Band 25 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-417. PAR Plot (Band 25 - 20.0MHz 64-QAM - Full RB Configuration)

7.6 Additional Maximum Power Reduction (A-MPR)

§2.1046

Test Overview

A-MPR is implemented in this device when operating at Power Class 2 in LTE Band 41 per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Conducted power measurements are performed to measure the average output power of the EUT. The averaging is to be performed only over duration of active transmissions at maximum output power level. The average measurements do not include averaging over periods when the transmitter is quiescent or when operating at reduced power level.

Test Procedure Used

KDB 971168 D01 v03

Test Setup

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

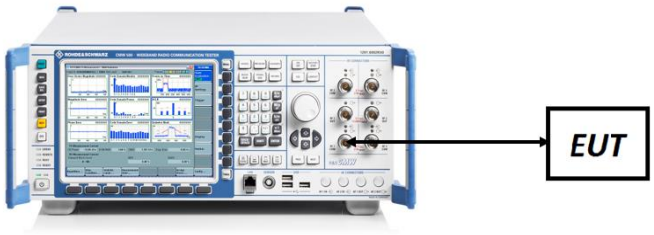


Figure 7-5. Conducted Power Measurement Setup

Test Notes

All ports were tested and only the worst case data were reported.

Test Case	NS	MCC	MNC	Channel BW [MHz]	Channel Number	Channel Frequency [MHz]	Modulation	RB Size	RB Offset	MPR [dB]	A-MPR [dB]	Measured Power [dBm]	Lowest Typical Power [dBm]	Delta [dB]
1	01	312	530	5	39675	2498.5	QPSK	1	0	0	≤ 3	25.09	23.0	**2.09**
							16-QAM			≤ 1		23.98	22.0	**1.98**
							64-QAM			≤ 2		22.96	21.0	**1.96**
2				5	39675	2498.5	QPSK	1	9	0	0	27.00	26.0	**1.00**
							16-QAM			≤ 1		25.95	25.0	**0.95**
							64-QAM			≤ 2		24.97	24.0	**0.97**
3				10	39700	2501	QPSK	1	0	0	≤ 5	23.97	21.0	**2.97**
							16-QAM	1	0	≤ 1		22.99	20.0	**2.99**
							64-QAM	1	0	≤ 2		21.92	19.0	**2.92**
4				10	39700	2501	QPSK	20	0	0	≤ 2	24.83	23.0	**1.83**
							16-QAM	20	0	≤ 1		23.83	22.0	**1.83**
							64-QAM	20	0	≤ 2		22.81	21.0	**1.81**
5				10	39700	2501	QPSK	50	0	0	≤ 3	23.78	22.0	**1.78**
							16-QAM	50	0	≤ 1		22.74	21.0	**1.74**
							64-QAM	50	0	≤ 2		21.75	20.0	**1.75**
6				10	39700	2501	QPSK	25	20	0	≤ 1	24.80	24.0	**0.80**
							16-QAM	25	20	≤ 1		23.81	23.0	**0.81**
							64-QAM	25	20	≤ 2		22.77	22.0	**0.77**
7				10	39700	2501	QPSK	1	36	0	0	26.97	26.0	**0.97**
							16-QAM	1	36	≤ 1		26.11	25.0	**1.11**
							64-QAM	1	36	≤ 2		24.99	24.0	**0.99**
8				15	39725	2503.5	QPSK	1	0	0	≤ 5	23.86	21.0	**2.86**
							16-QAM	1	0	≤ 1		22.81	20.0	**2.81**
							64-QAM	1	0	≤ 2		21.81	19.0	**2.81**
9				15	39725	2503.5	QPSK	20	0	0	≤ 2	24.80	23.0	**1.80**
							16-QAM	20	0	≤ 1		23.93	22.0	**1.93**
							64-QAM	20	0	≤ 2		22.79	21.0	**1.79**
10				15	39725	2503.5	QPSK	75	0	0	≤ 4	22.81	21.0	**1.81**
							16-QAM	75	0	≤ 1		21.79	20.0	**1.79**
							64-QAM	75	0	≤ 2		20.77	19.0	**1.77**
11				15	39725	2503.5	QPSK	50	15	0	≤ 3	24.79	22.0	**2.79**
							16-QAM	50	15	≤ 1		23.83	21.0	**2.83**
							64-QAM	50	15	≤ 2		22.78	20.0	**2.78**
12				15	39725	2503.5	QPSK	1	60	0	0	26.82	26.0	**0.82**
							16-QAM	1	60	≤ 1		25.87	25.0	**0.87**
							64-QAM	1	60	≤ 2		24.81	24.0	**0.81**
13				20	39750	2506	QPSK	1	0	0	≤ 5	23.83	21.0	**2.83**
							16-QAM	1	0	≤ 1		22.92	20.0	**2.92**
							64-QAM	1	0	≤ 2		21.82	19.0	**2.82**
14				20	39750	2506	QPSK	20	0	0	≤ 2	24.84	23.0	**1.84**
							16-QAM	20	0	≤ 1		23.88	22.0	**1.88**
							64-QAM	20	0	≤ 2		22.87	21.0	**1.87**
15				20	39750	2506	QPSK	100	0	0	≤ 4	22.99	21.0	**1.99**
							16-QAM	100	0	≤ 1		21.87	20.0	**1.87**
							64-QAM	100	0	≤ 2		20.84	19.0	**1.84**
16				20	39750	2506	QPSK	75	24	0	≤ 3	24.84	22.0	**2.84**
							16-QAM	75	24	≤ 1		23.84	21.0	**2.84**
							64-QAM	75	24	≤ 2		22.83	20.0	**2.83**
17				20	39750	2506	QPSK	1	77	0	0	26.84	26.0	**0.84**
							16-QAM	1	77	≤ 1		25.93	25.0	**0.93**
							64-QAM	1	77	≤ 2		24.9	24.0	**0.90**
18	01	311	490	5	39675	2498.5	QPSK	1	0	0	≤ 3	25.02	23.0	**2.02**
							16-QAM			≤ 1		23.85	22.0	**1.85**
							64-QAM			≤ 2		22.99	21.0	**1.99**
19	01	001	01	5	39675	2498.5	QPSK	1	0	0	0	27	26.0	**1.00**
							16-QAM			≤ 1		25.96	25.0	**0.96**
							64-QAM			≤ 2		25.11	24.0	**1.11**

Table 7-7. A-MPR Conducted Power Measurements

7.7 Uplink Carrier Aggregation Conducted Measurements

§27.53(m)

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For Band 38/41, the minimum permissible attenuation level of any spurious emission is 55 + 10 $log_{10}(P_{[Watts]})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

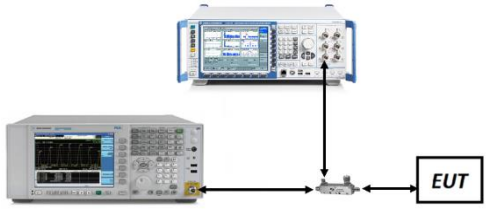


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

1. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.

2. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in the tables below, with both carriers set to transmit using 1RB.

3. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Antenna C (Port A)

PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
20850	2510.0	20	QPSK	1	99	21048	2529.8	20	QPSK	1	0	25.00
21100	2535.0	20	QPSK	1	99	21298	2554.8	20	QPSK	1	0	25.00
21350	2560.0	20	QPSK	1	0	21152	2540.2	20	QPSK	1	99	24.95

Table 7-8. Conducted Powers (B7 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
20850	2510.0	20	QPSK	100	0	21048	2529.8	20	QPSK	100	0	23.00
20850	2510.0	20	16-QAM	100	0	21048	2529.8	20	16-QAM	100	0	21.98
20850	2510.0	20	64-QAM	100	0	21048	2529.8	20	64-QAM	100	0	21.99

Table 7-9. Conducted Powers (B7 with Various Combinations for 20MHz Channel Bandwidth)

PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
39750	2506.0	20	QPSK	1	99	39948	2525.8	20	QPSK	1	0	25.00
40620	2593.0	20	QPSK	1	99	40818	2612.8	20	QPSK	1	0	24.79
41490	2680.0	20	QPSK	1	0	41292	2660.2	20	QPSK	1	99	24.58

Table 7-10. Conducted Powers (B41 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
39750	2506.0	20	QPSK	100	0	39948	2525.8	20	QPSK	100	0	22.99
39750	2506.0	20	16-QAM	100	0	39948	2525.8	20	16-QAM	100	0	22.00
39750	2506.0	20	64-QAM	100	0	39948	2525.8	20	64-QAM	100	0	22.00

Table 7-11. Conducted Powers (B41 with Various Combinations for 20MHz Channel Bandwidth)

Antenna D (Port B)

PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
20850	2510.0	20	QPSK	1	99	21048	2529.8	20	QPSK	1	0	22.54
21100	2535.0	20	QPSK	1	99	21298	2554.8	20	QPSK	1	0	22.71
21350	2560.0	20	QPSK	1	0	21152	2540.2	20	QPSK	1	99	22.74

Table 7-12. Conducted Powers (B7 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
20850	2510.0	20	QPSK	100	0	21048	2529.8	20	QPSK	100	0	20.75
20850	2510.0	20	16-QAM	100	0	21048	2529.8	20	16-QAM	100	0	19.75
20850	2510.0	20	64-QAM	100	0	21048	2529.8	20	64-QAM	100	0	19.75

Table 7-13. Conducted Powers (B7 with Various Combinations for 20MHz Channel Bandwidth)

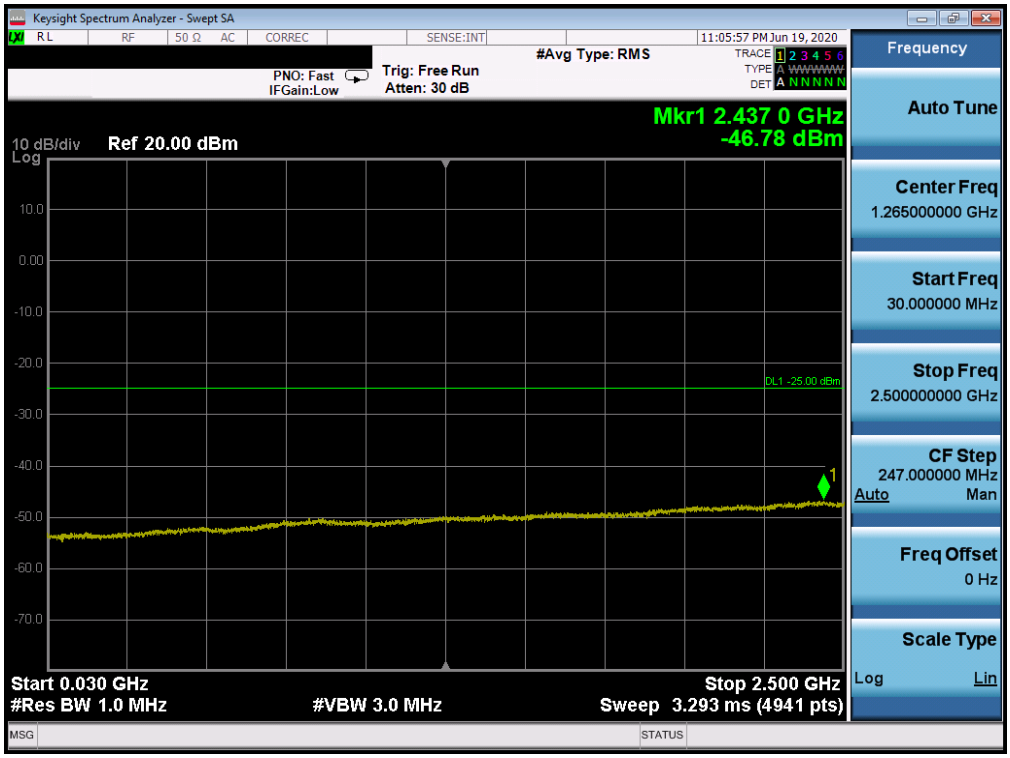
PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
39750	2506.0	20	QPSK	1	99	39948	2525.8	20	QPSK	1	0	22.54
40620	2593.0	20	QPSK	1	99	40818	2612.8	20	QPSK	1	0	22.57
41490	2680.0	20	QPSK	1	0	41292	2660.2	20	QPSK	1	99	22.47

Table 7-14. Conducted Powers (B41 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

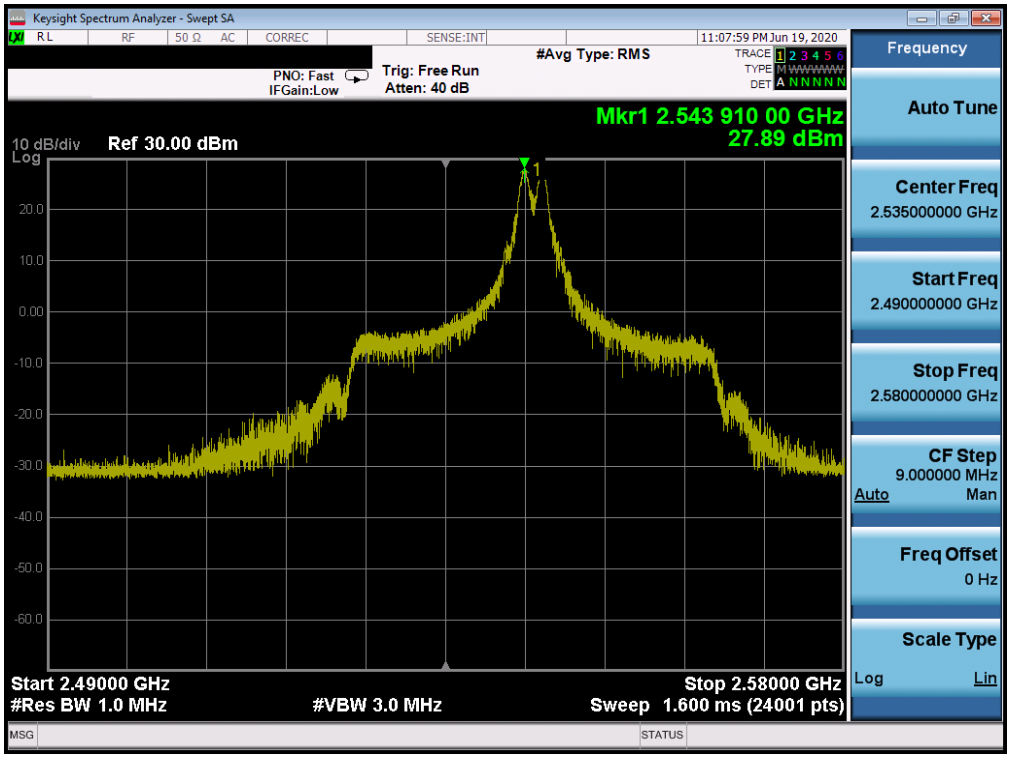
PCC						SCC						Power
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
39750	2506.0	20	QPSK	100	0	39948	2525.8	20	QPSK	100	0	20.50
39750	2506.0	20	16-QAM	100	0	39948	2525.8	20	16-QAM	100	0	19.56
39750	2506.0	20	64-QAM	100	0	39948	2525.8	20	64-QAM	100	0	19.54

Table 7-15. Conducted Powers (B41 with Various Combinations for 20MHz Channel Bandwidth)

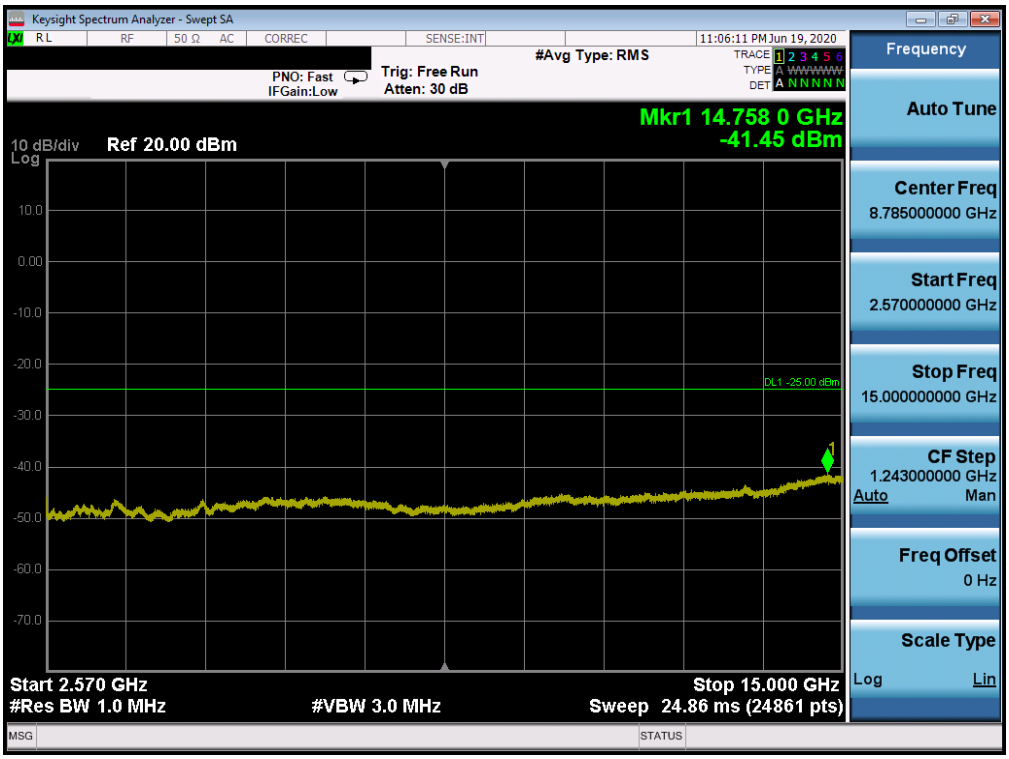
Band 7



Plot 7-418. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-419. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-420. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

Plot 7-421. Conducted Spurious Plot (Band 7 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)