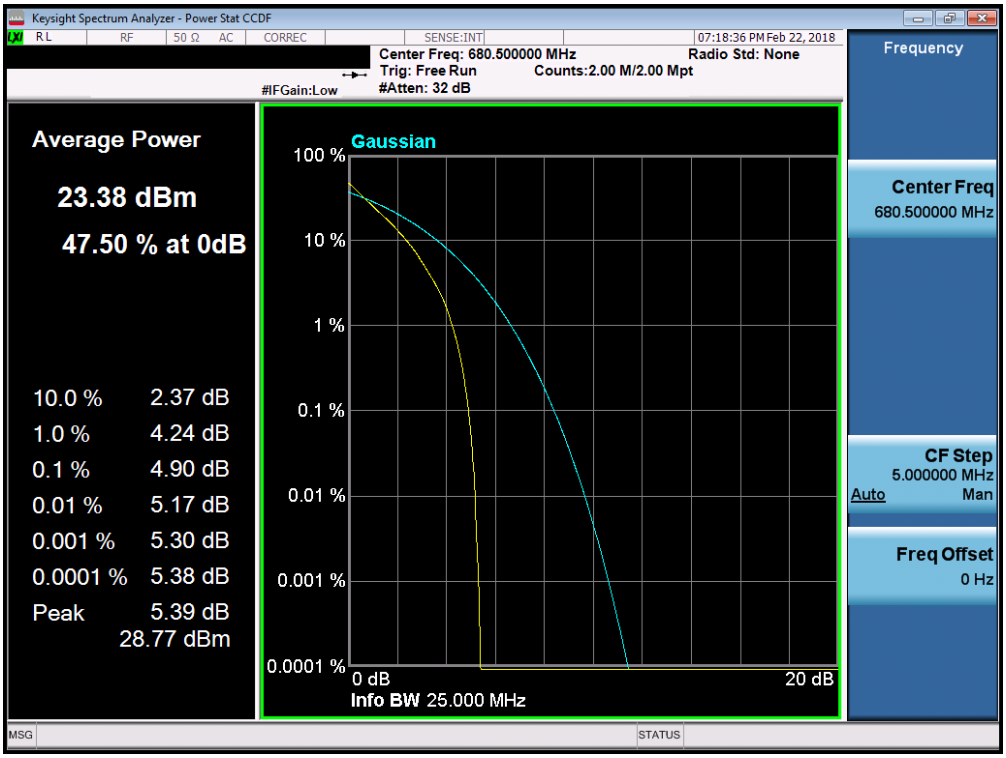
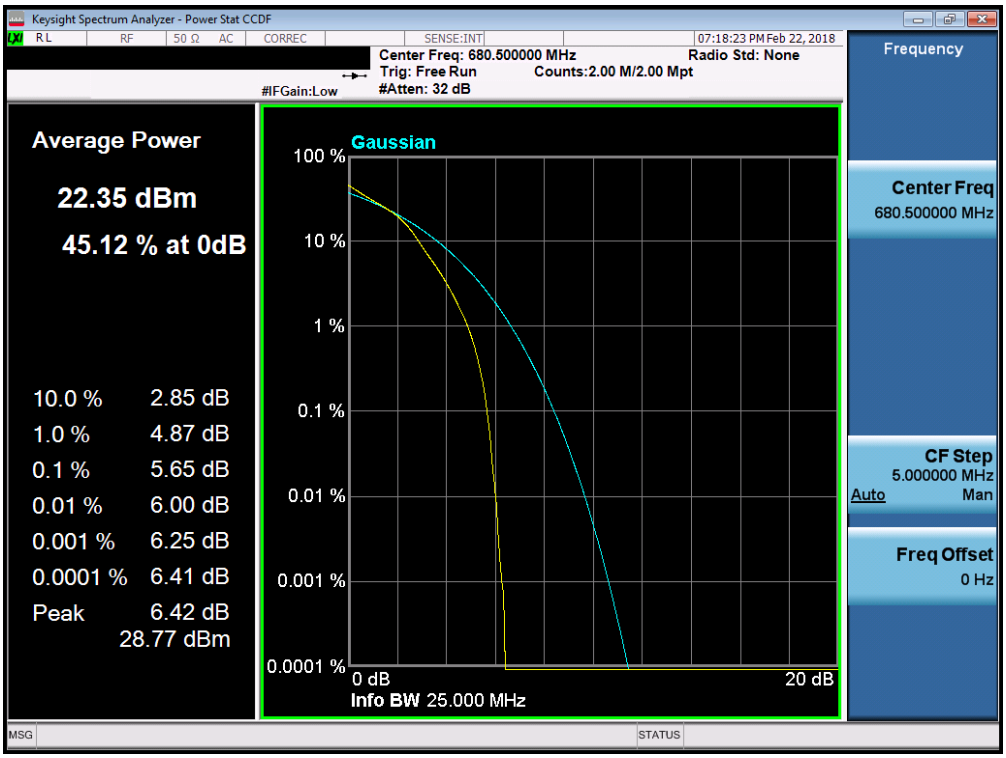
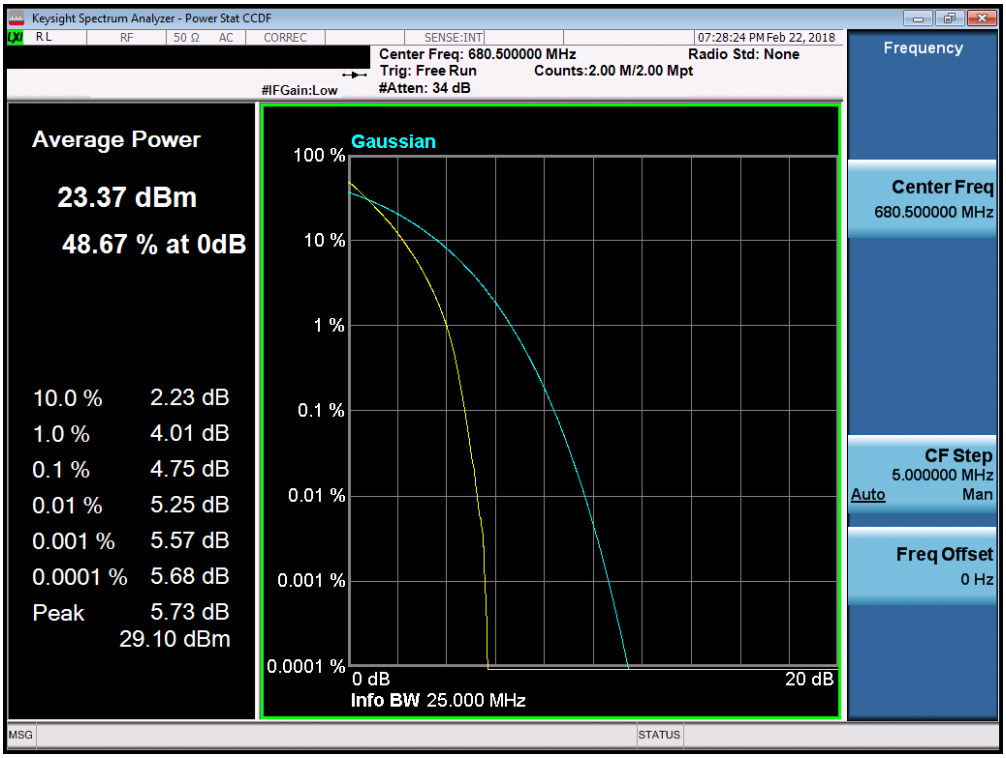


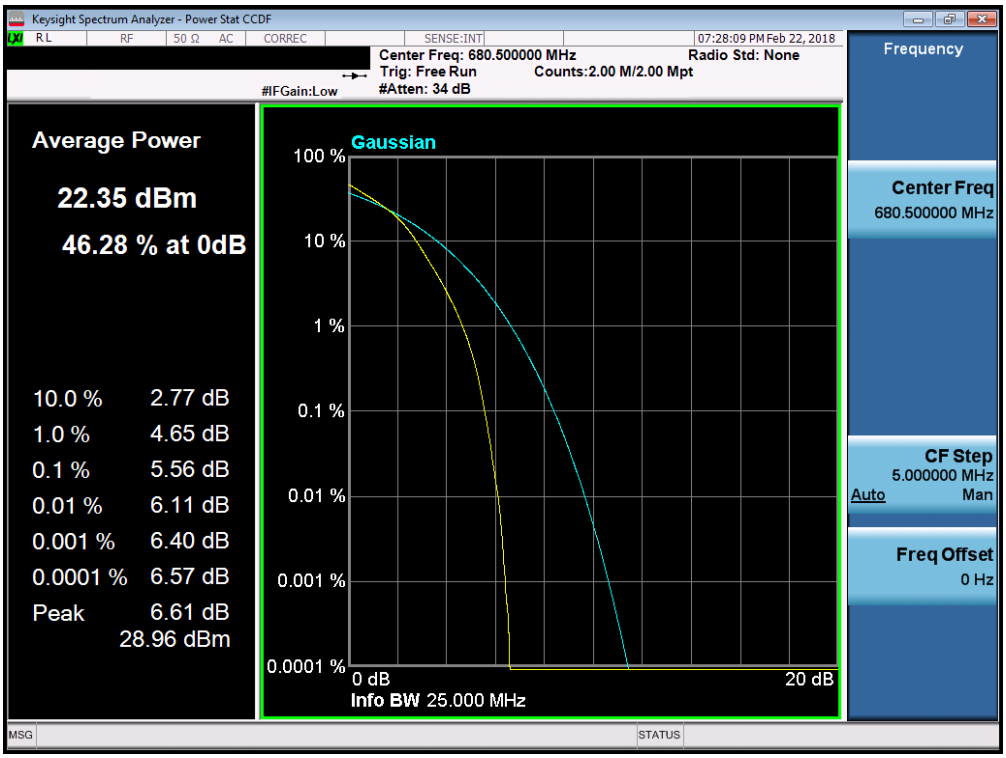
Plot 7-185. PAR Plot (Band 71- 15.0MHz QPSK - Full RB Configuration)



Plot 7-186. PAR Plot (Band 71 - 15.0MHz 16-QAM - Full RB Configuration)

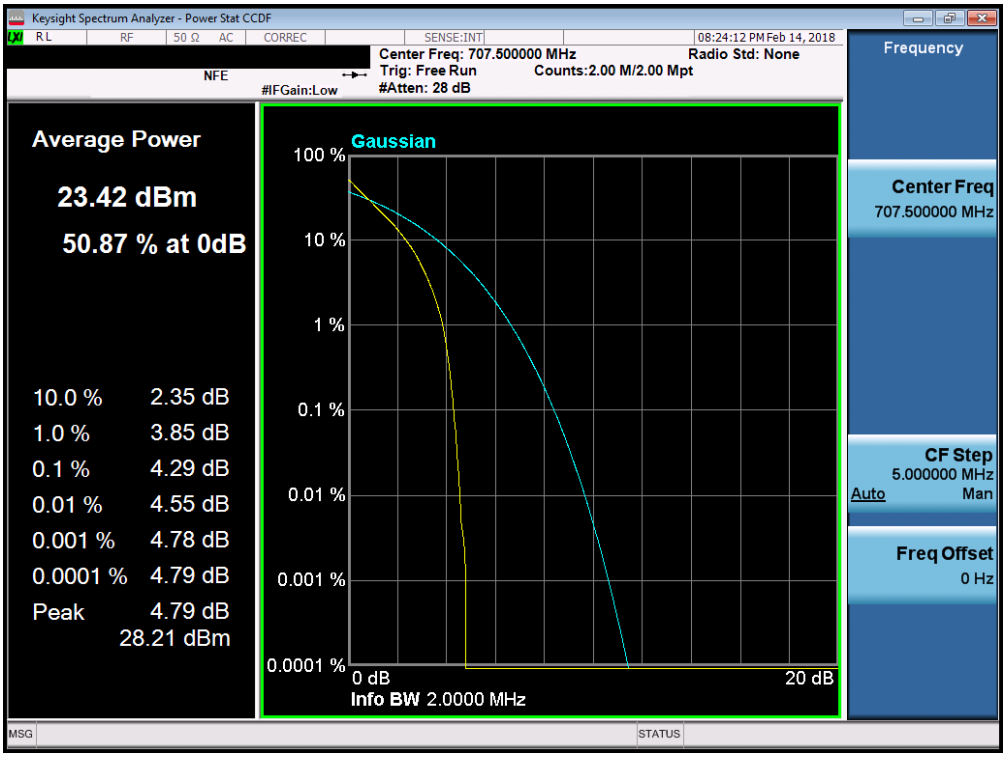


Plot 7-187. PAR Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)

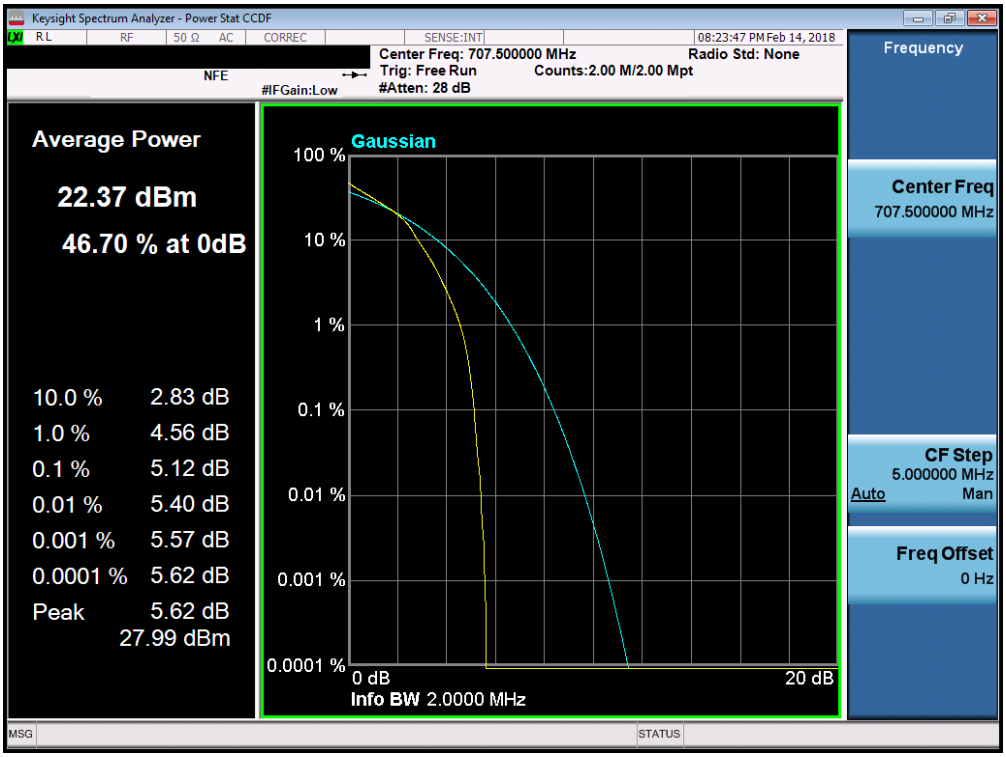


Plot 7-188. PAR Plot (Band 71 - 20.0MHz 16-QAM - Full RB Configuration)

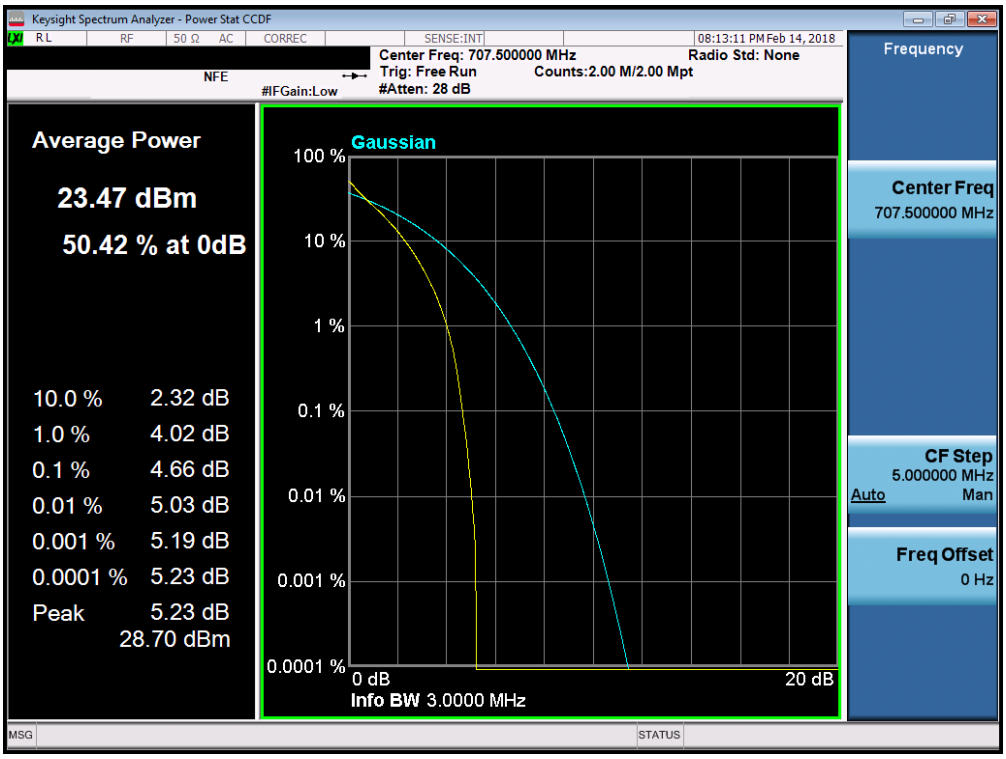
Band 12



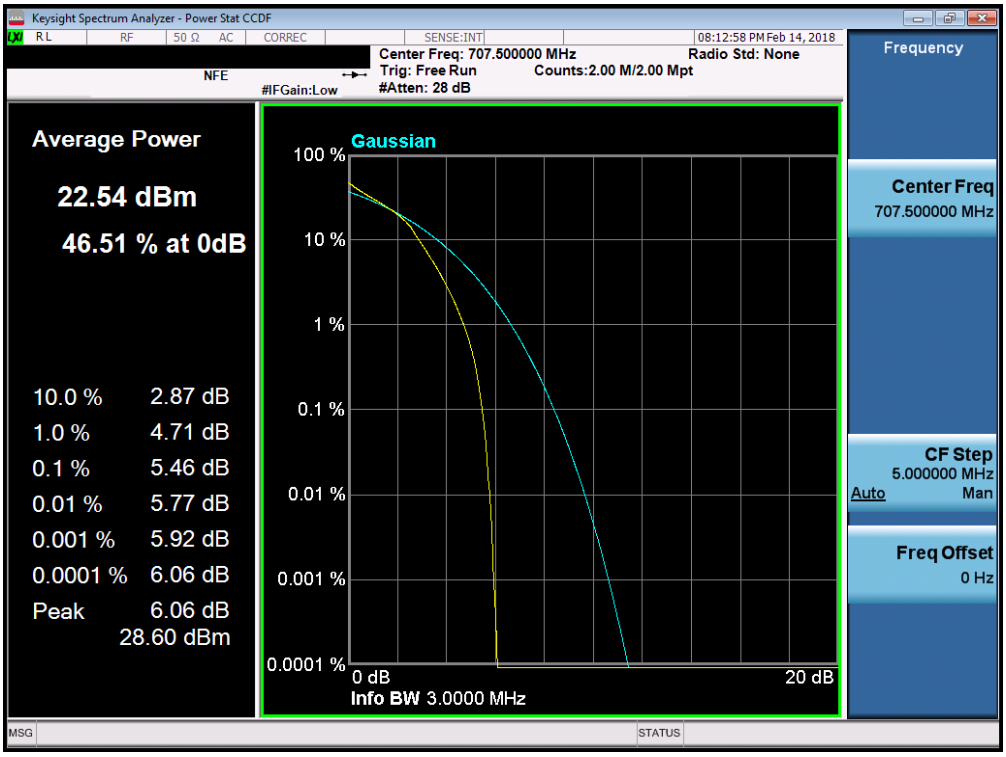
Plot 7-189. PAR Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



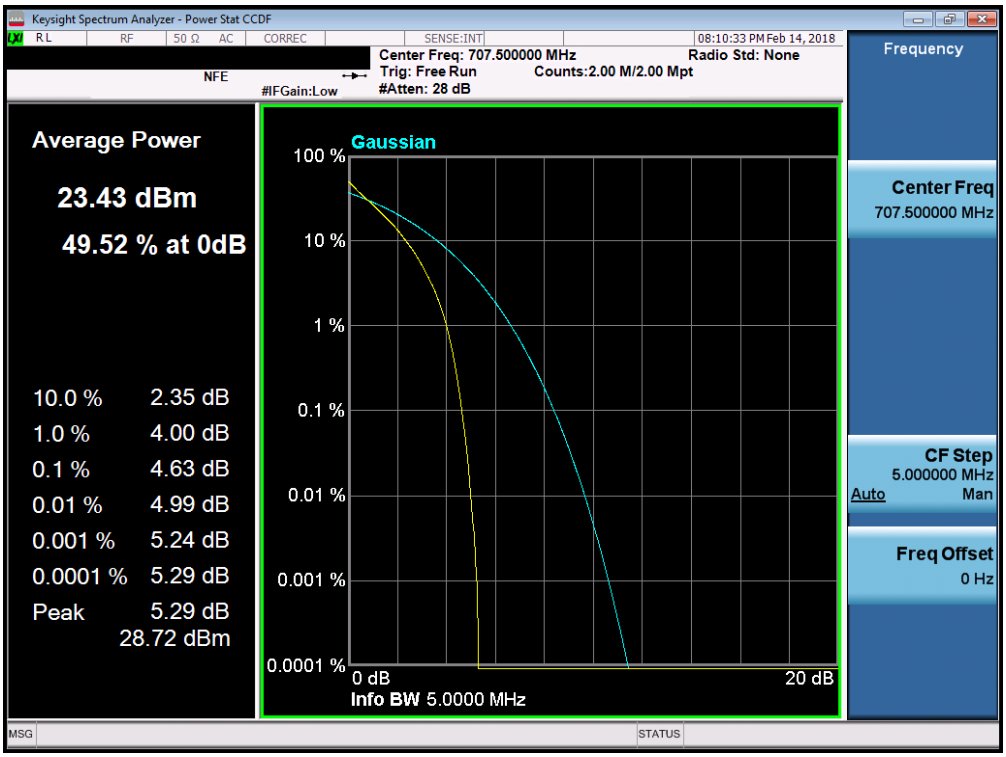
Plot 7-190. PAR Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)



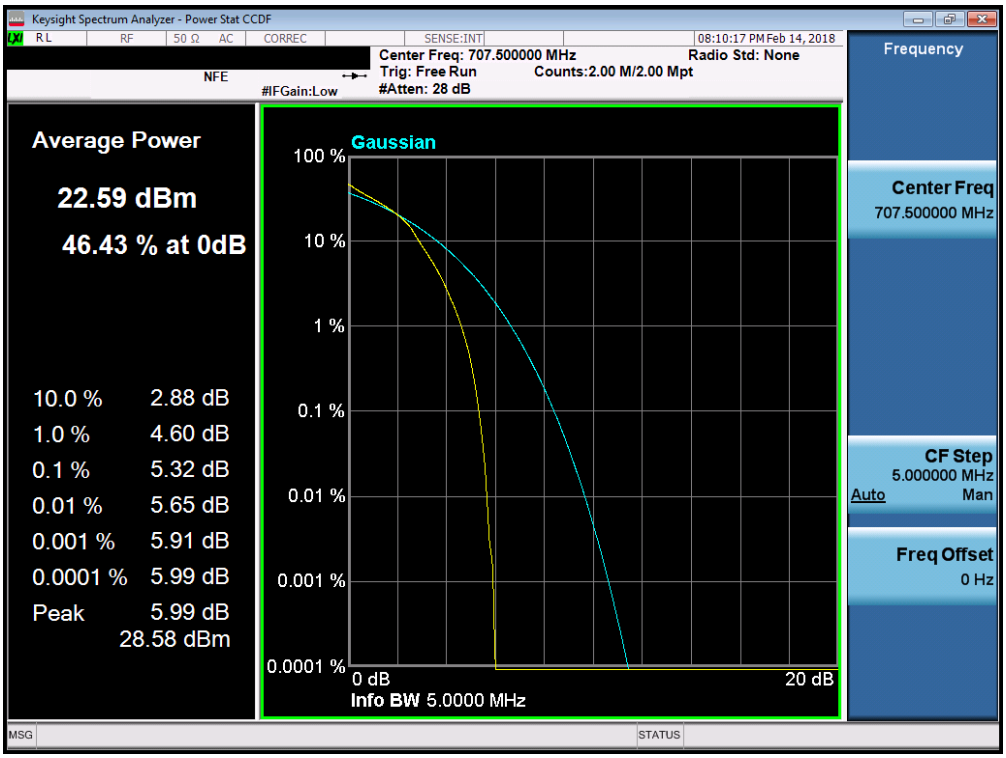
Plot 7-191. PAR Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



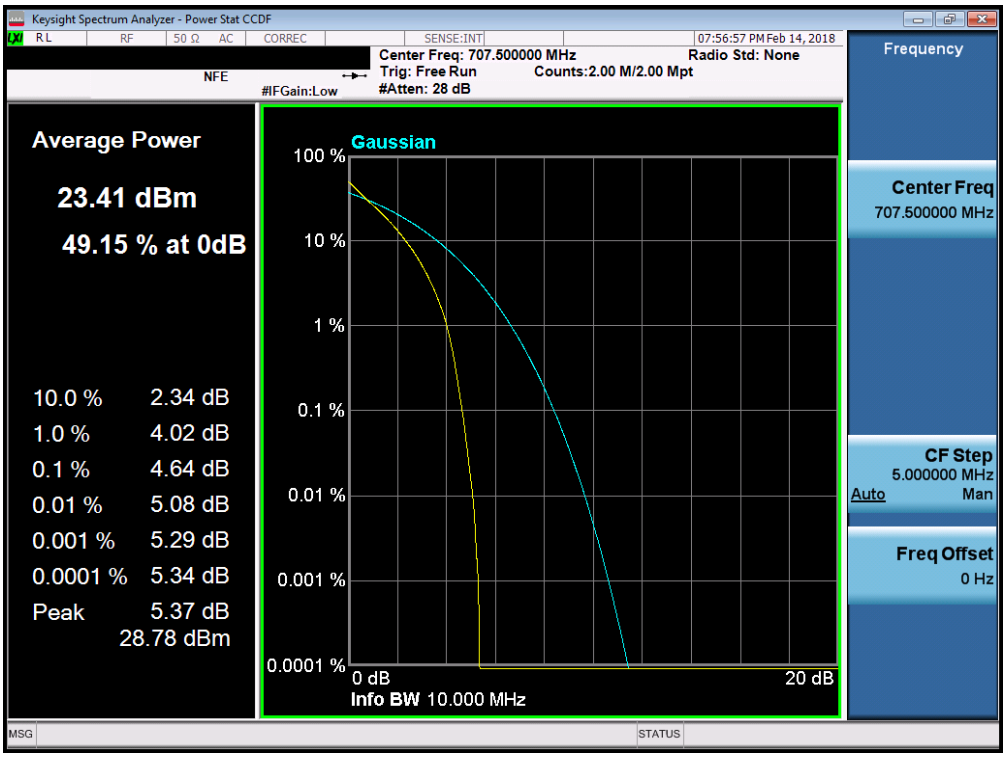
Plot 7-192. PAR Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)



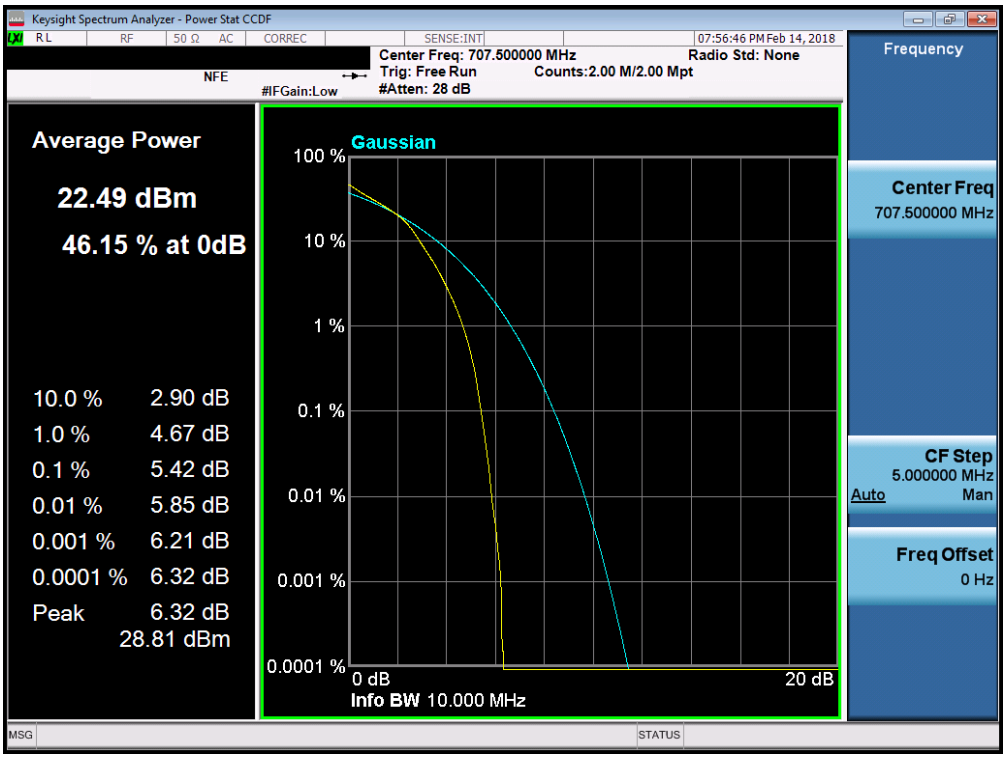
Plot 7-193. PAR Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-194. PAR Plot (Band 12 - 5.0MHz 16-QAM - Full RB Configuration)

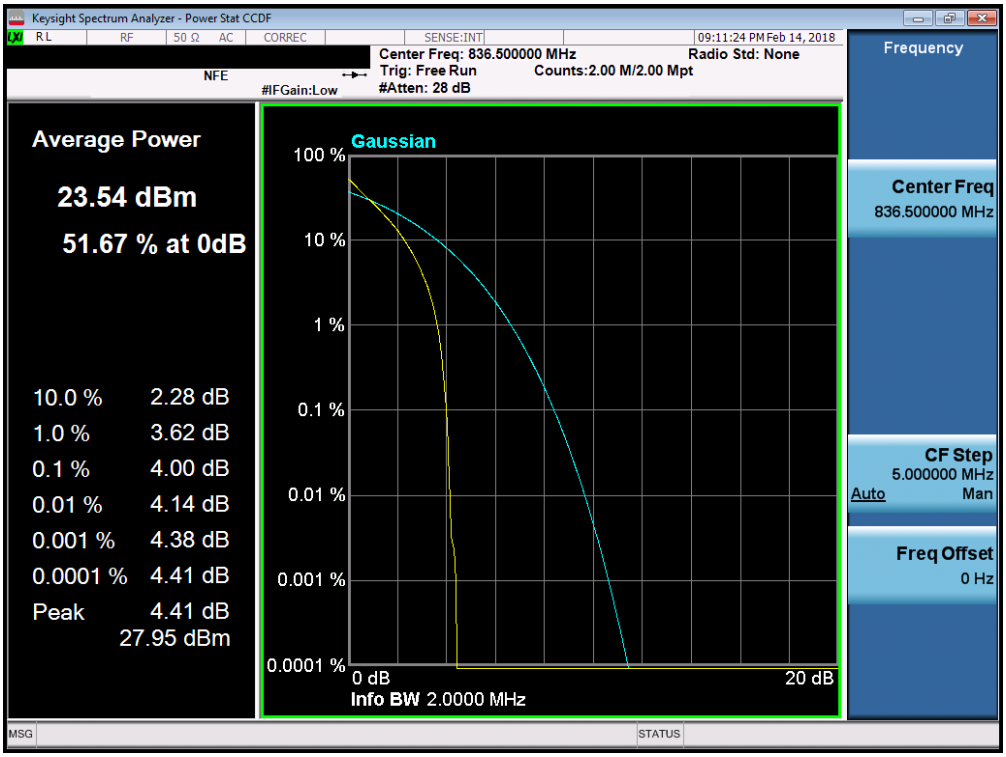


Plot 7-195. PAR Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

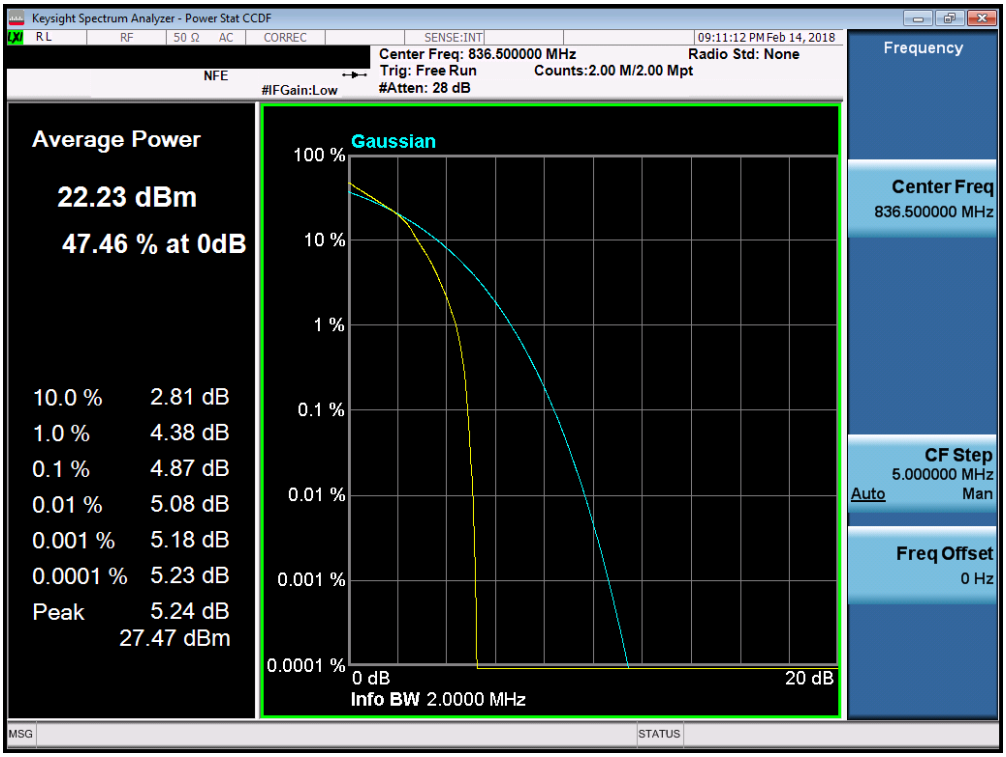


Plot 7-196. PAR Plot (Band 12 - 10.0MHz 16-QAM - Full RB Configuration)

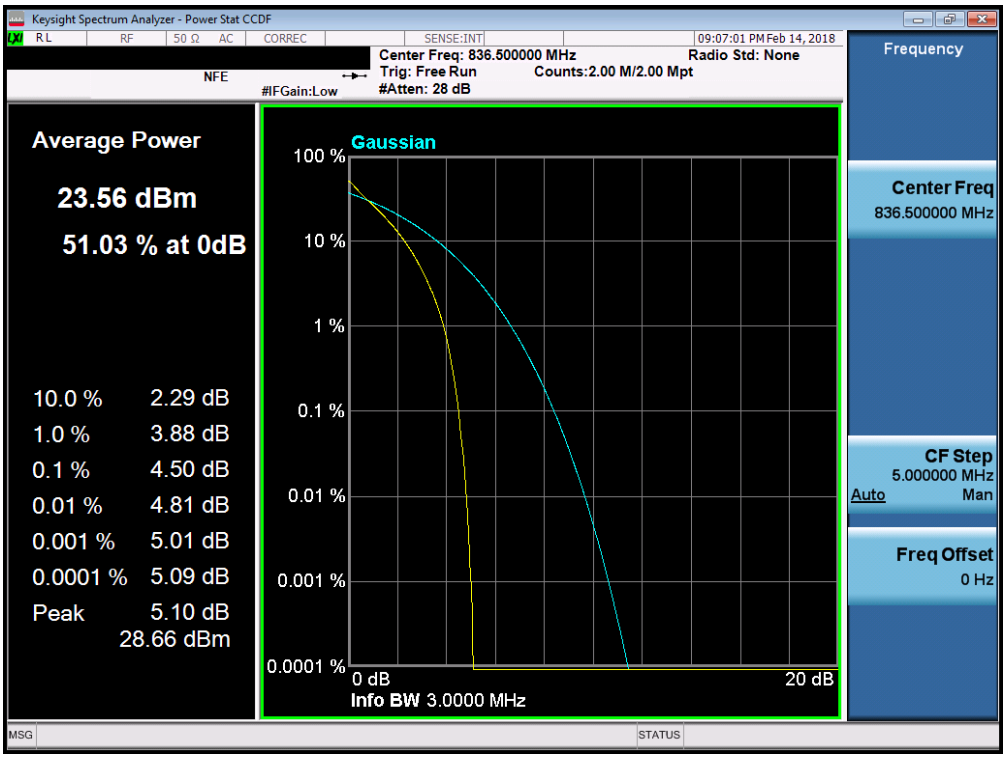
Band 5



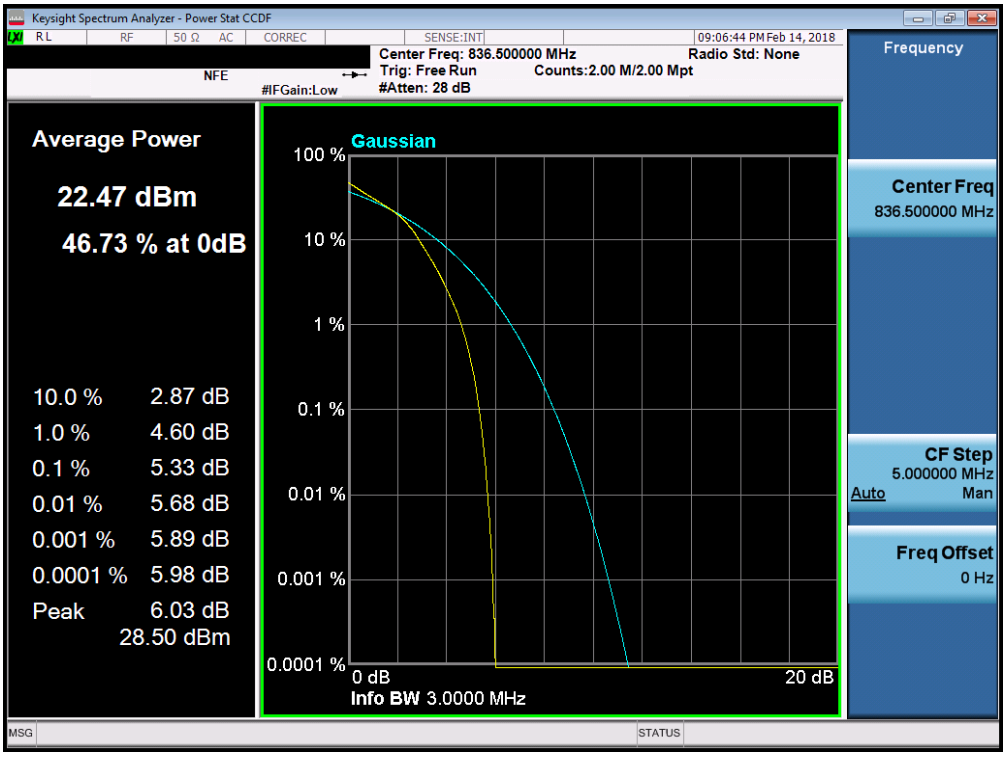
Plot 7-197. PAR Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



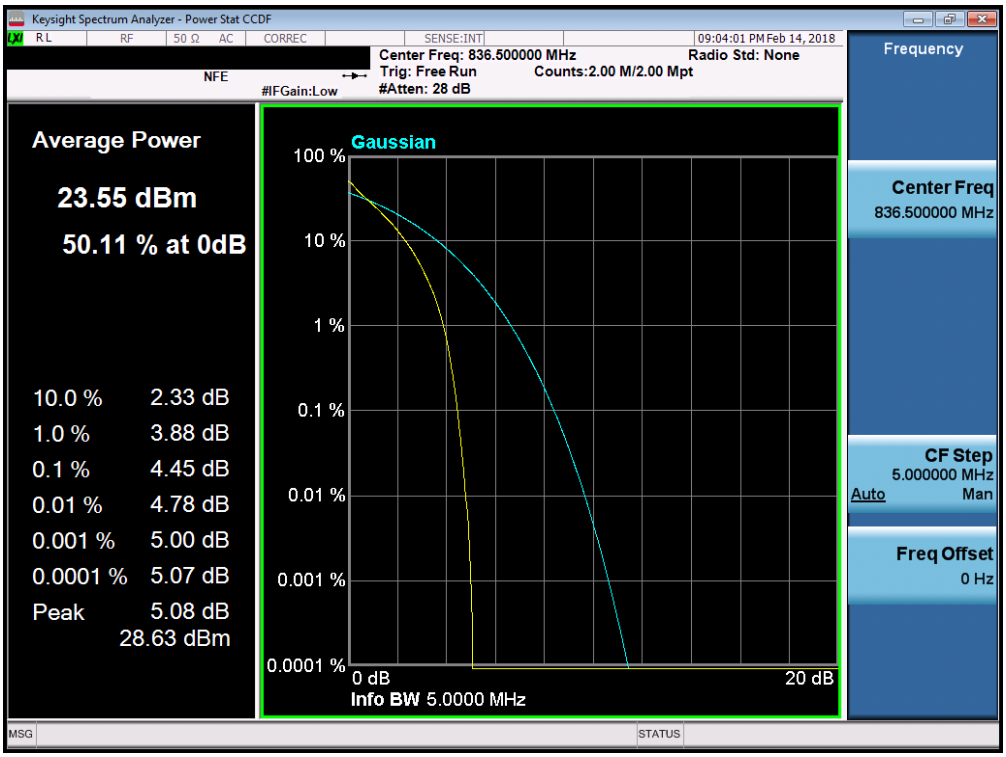
Plot 7-198. PAR Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)



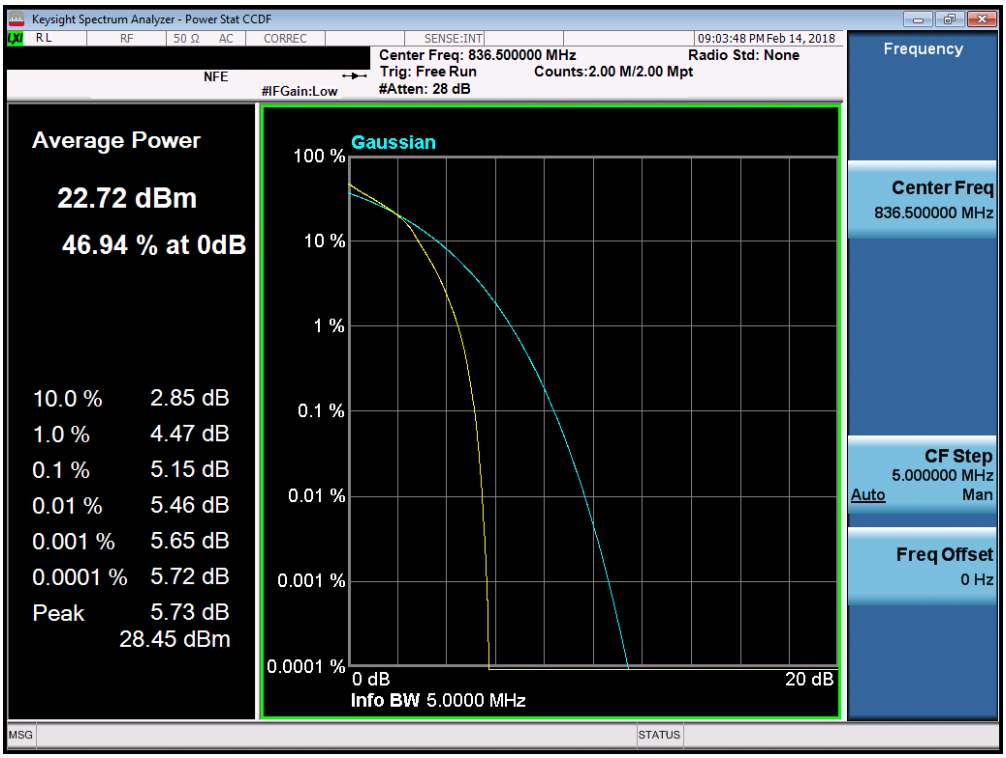
Plot 7-199. PAR Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



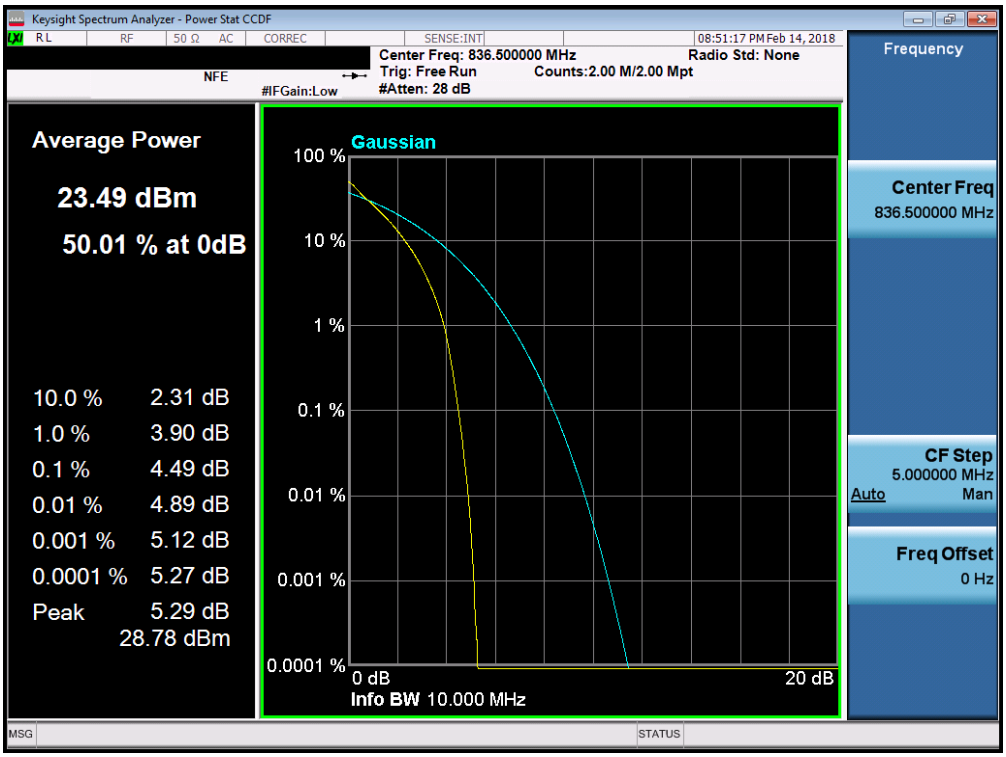
Plot 7-200. PAR Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)



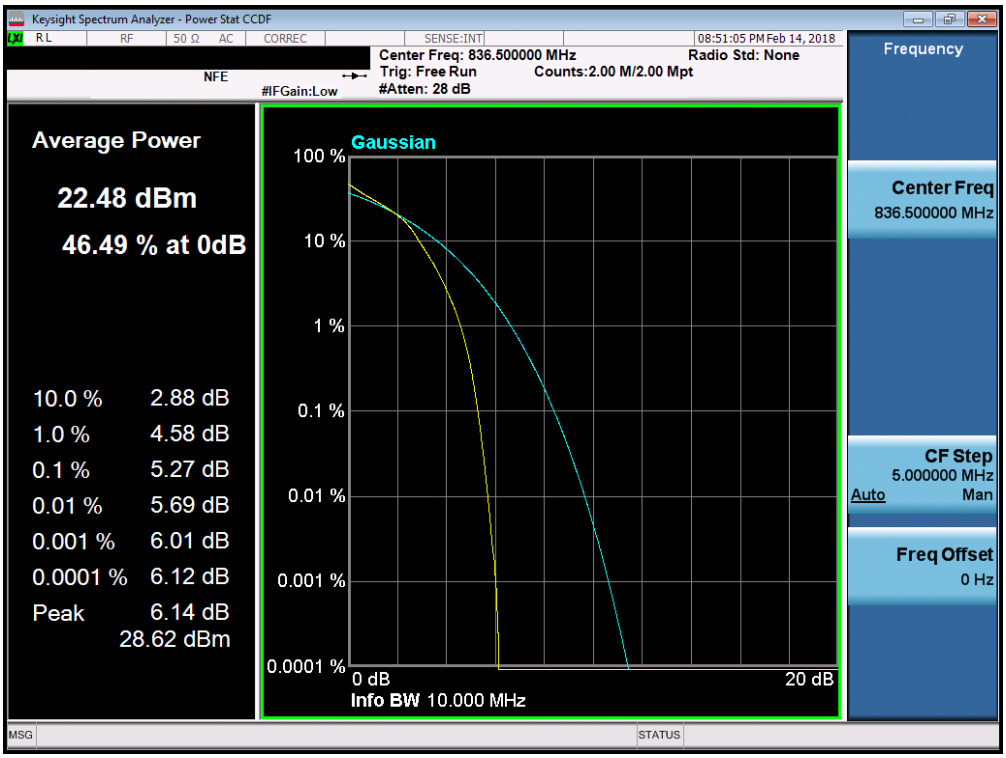
Plot 7-201. PAR Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-202. PAR Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)

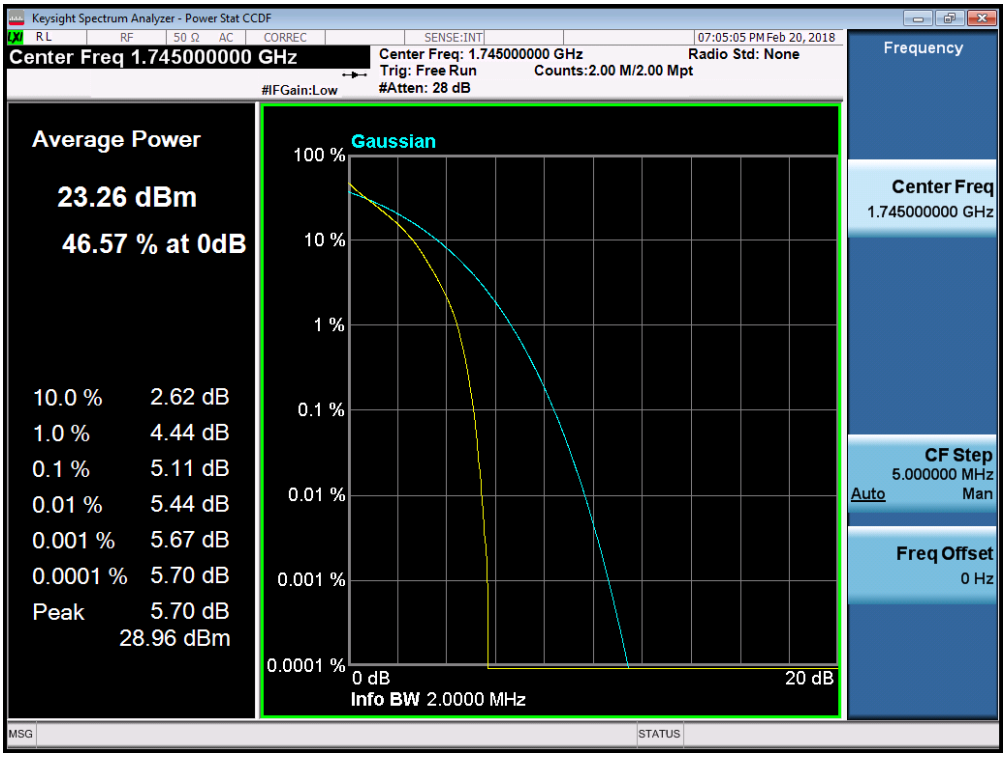


Plot 7-203. PAR Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

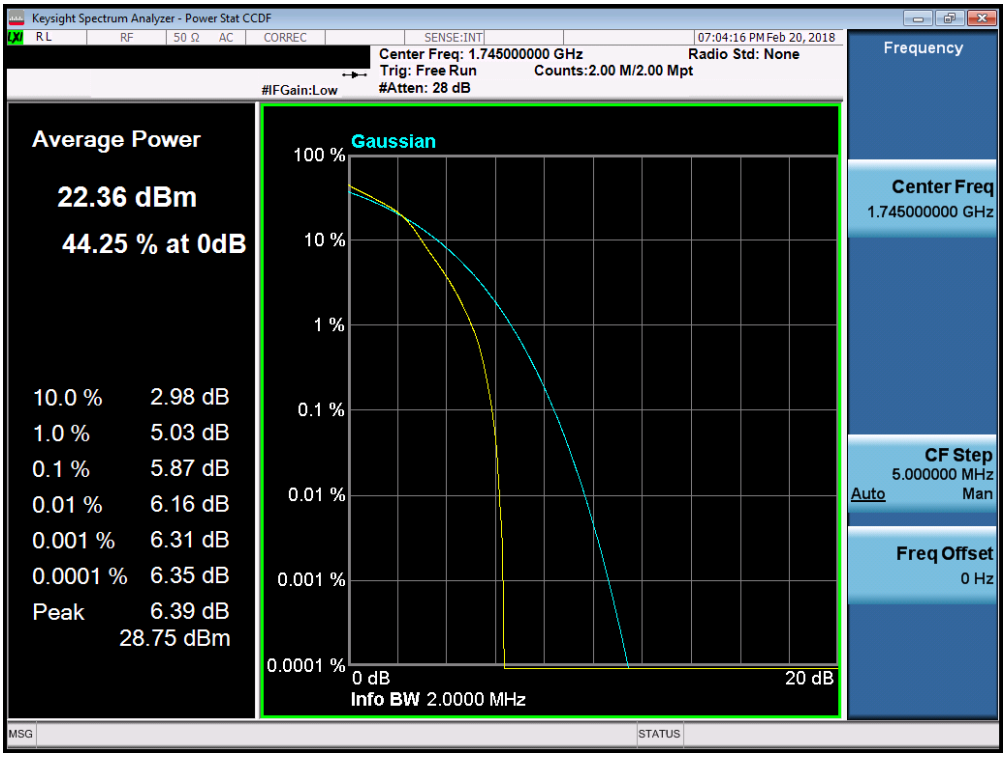


Plot 7-204. PAR Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)

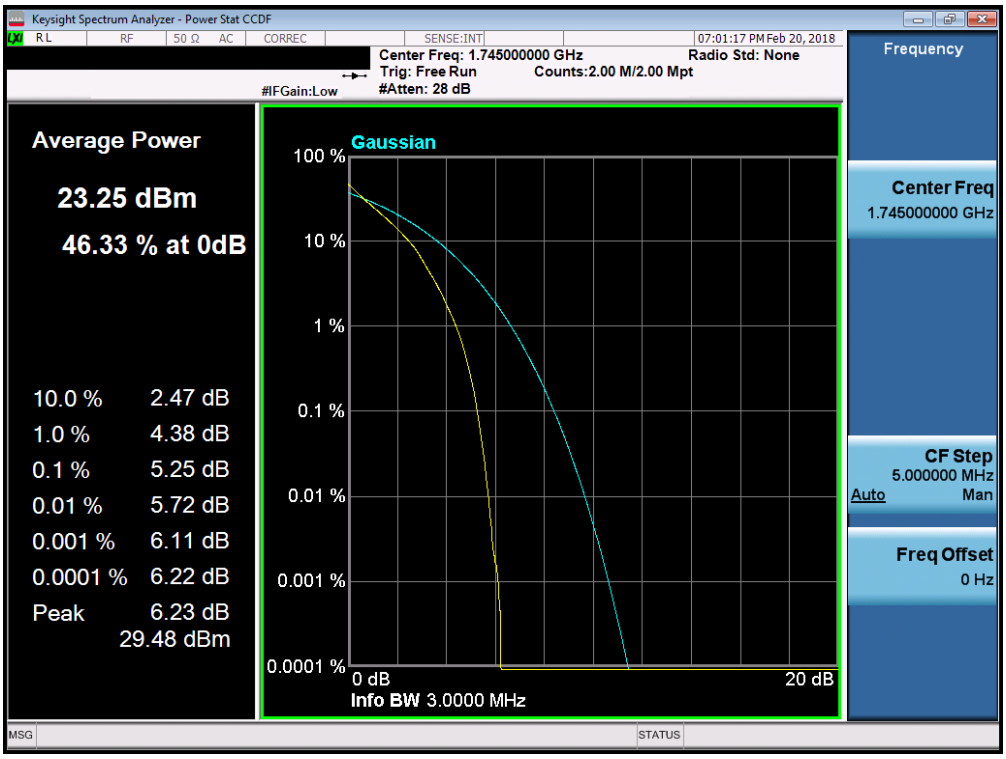
Band 66/4



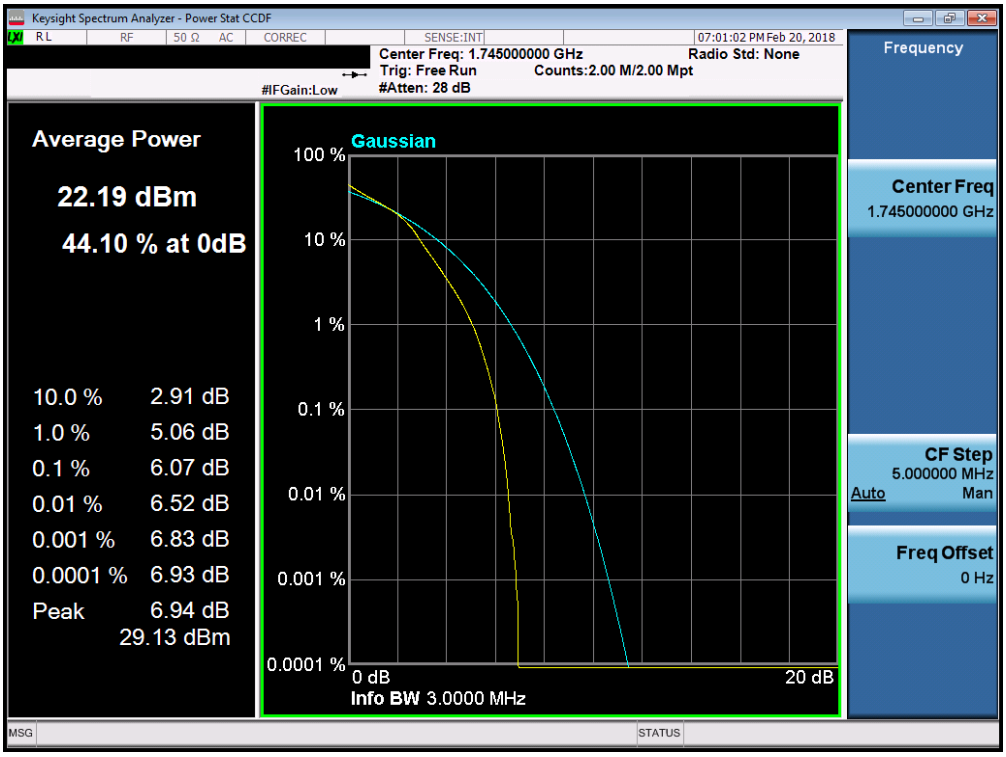
Plot 7-205. PAR Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



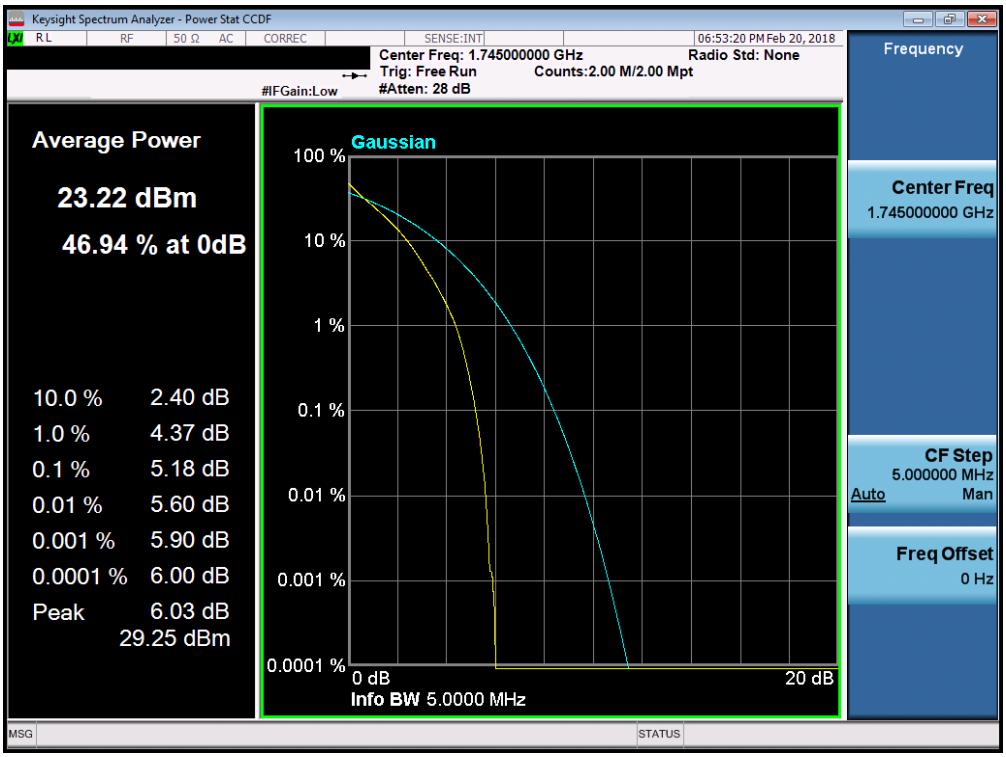
Plot 7-206. PAR Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)



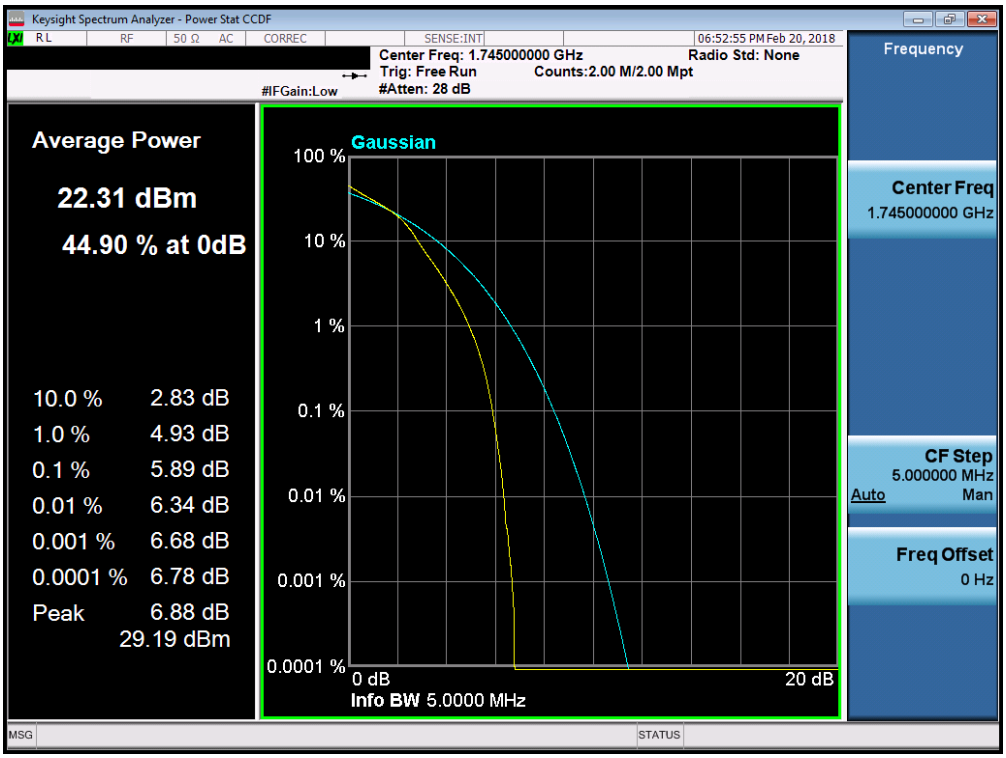
Plot 7-207. PAR Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



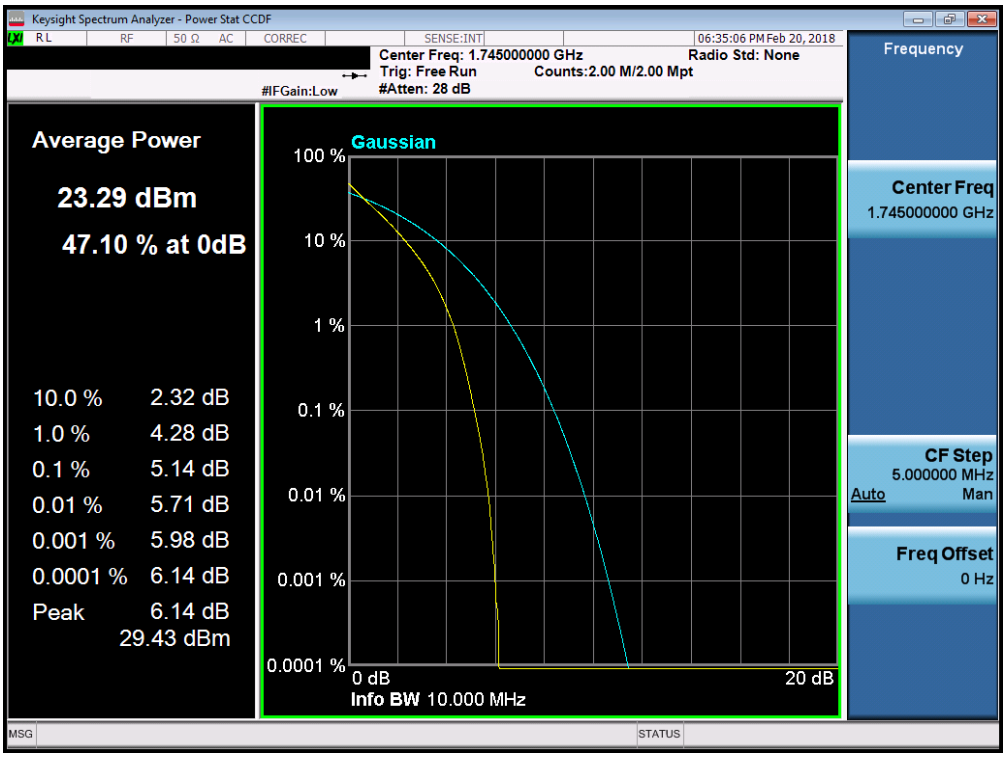
Plot 7-208. PAR Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)



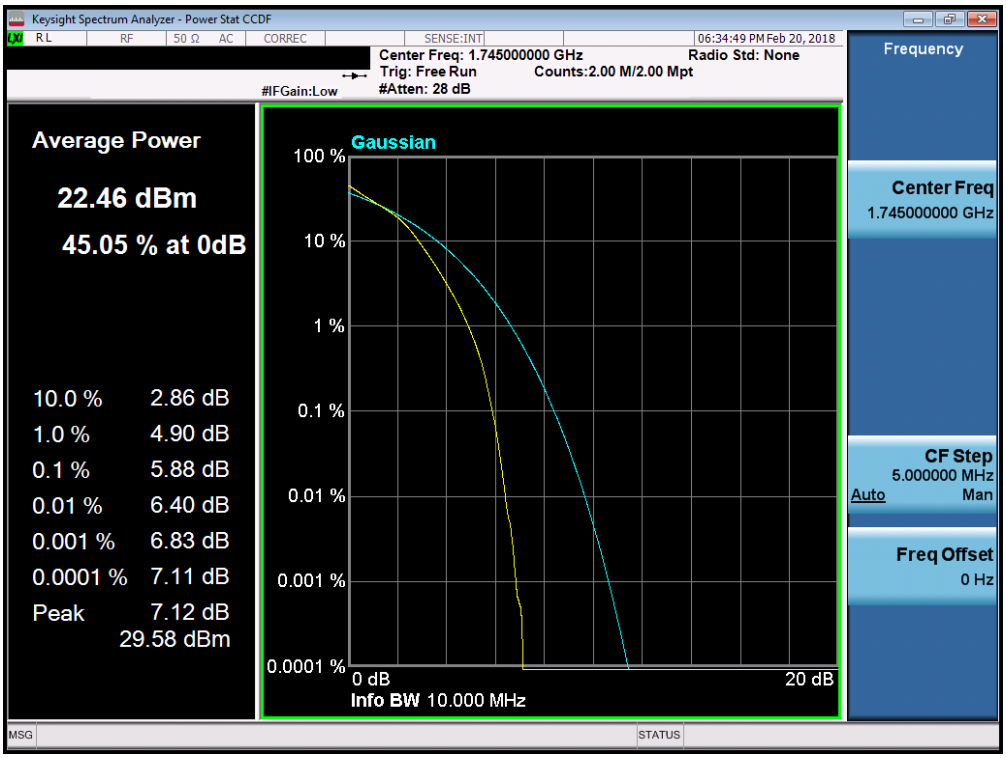
Plot 7-209. PAR Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



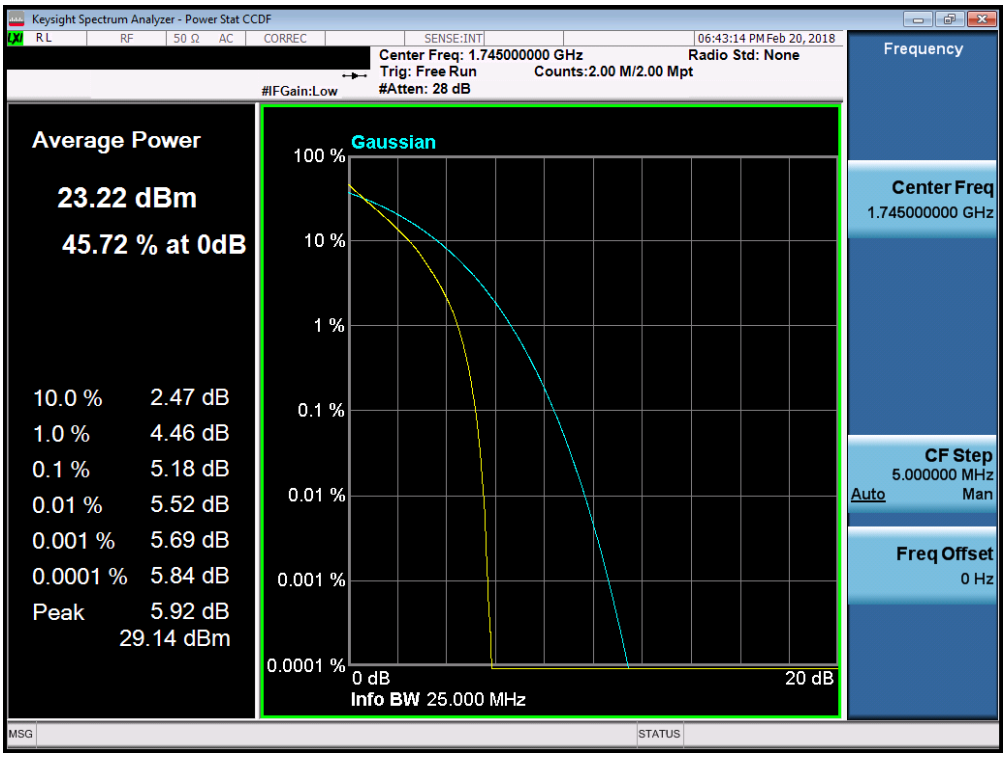
Plot 7-210. PAR Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)



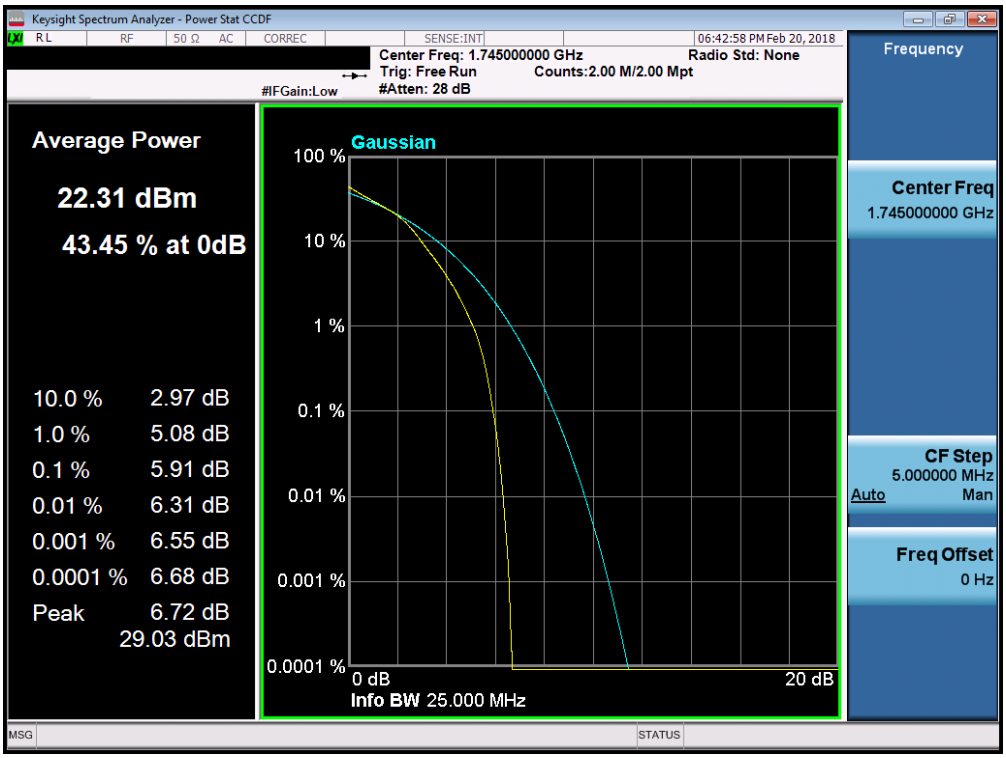
Plot 7-211. PAR Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



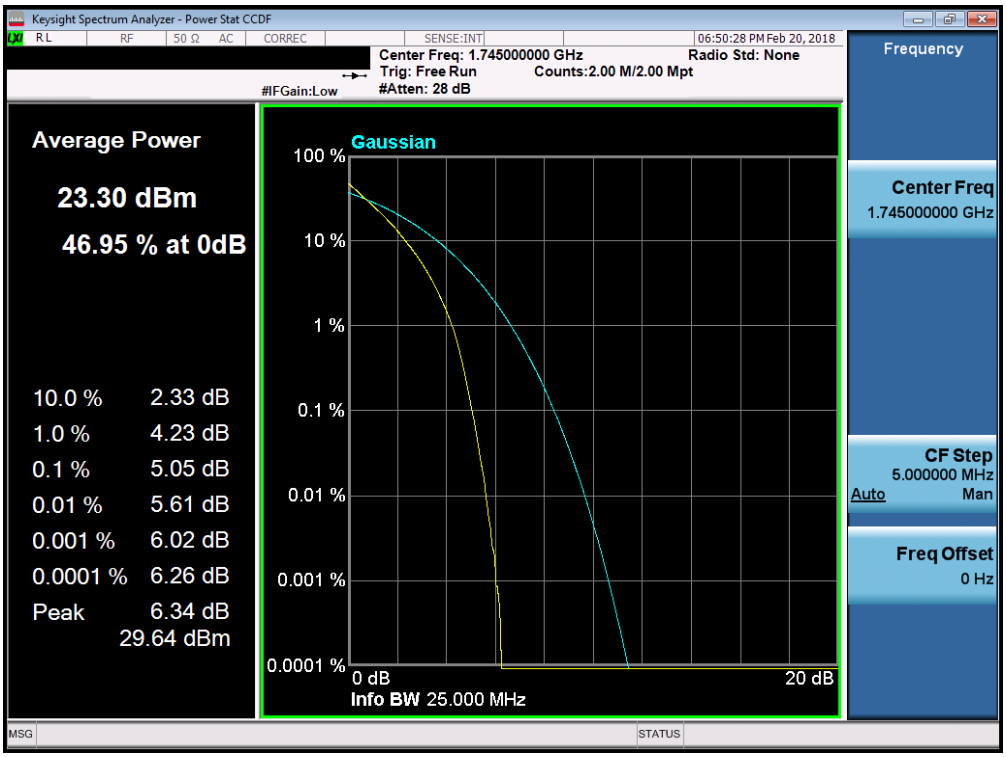
Plot 7-212. PAR Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)



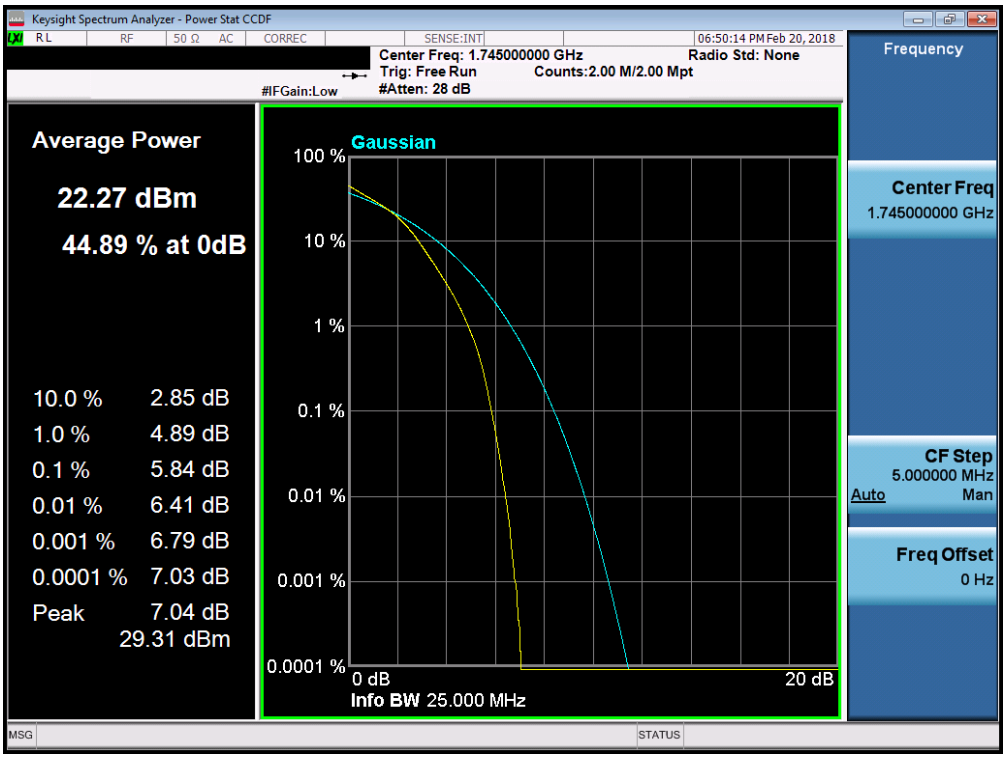
Plot 7-213. PAR Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-214. PAR Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

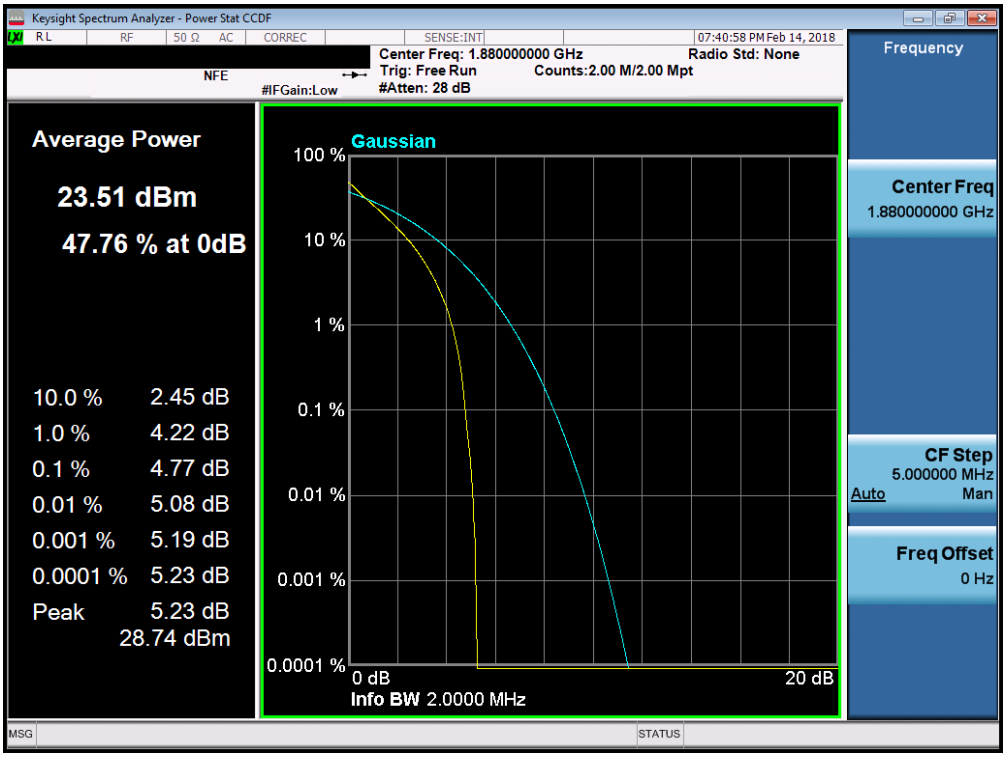


Plot 7-215. PAR Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

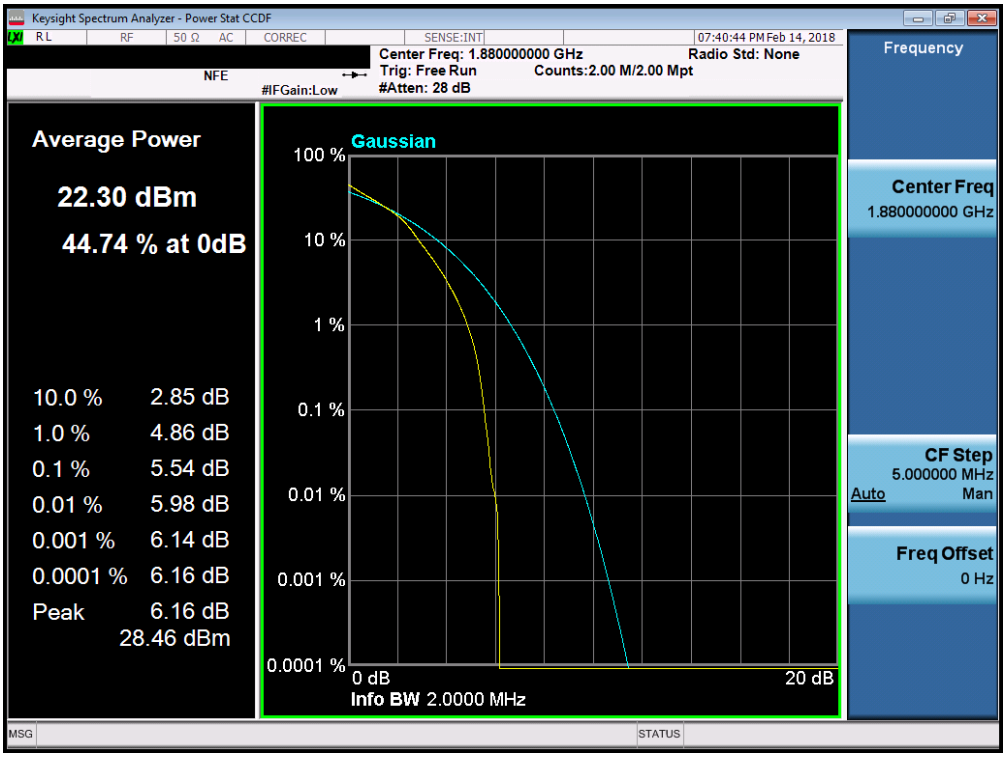


Plot 7-216. PAR Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

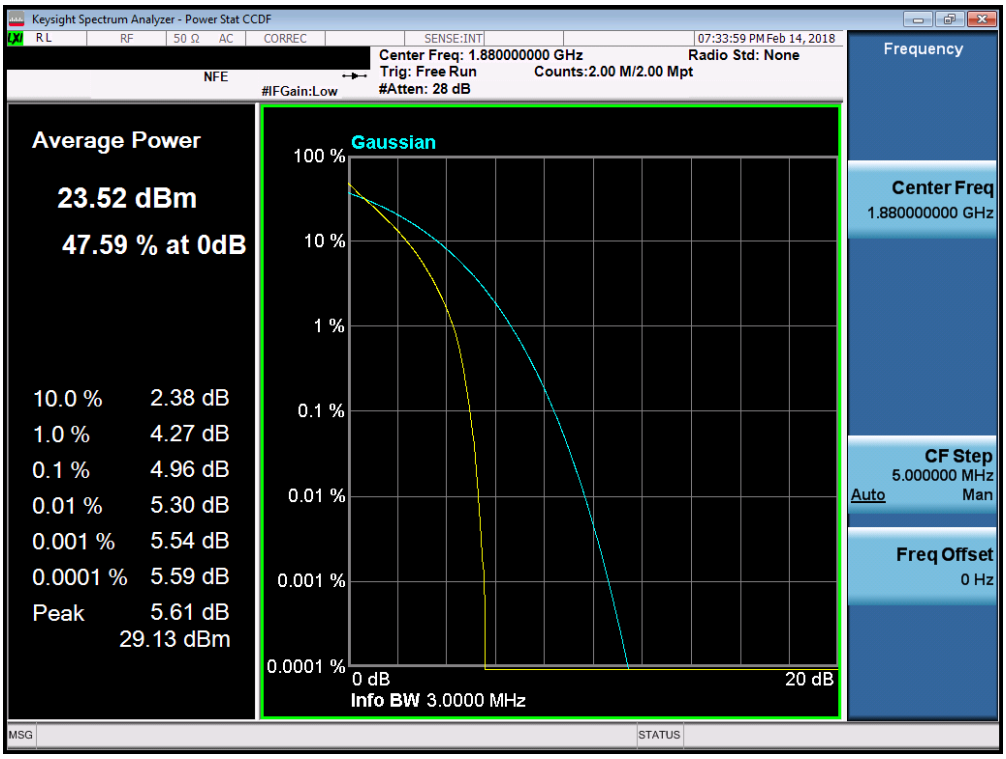
Band 2



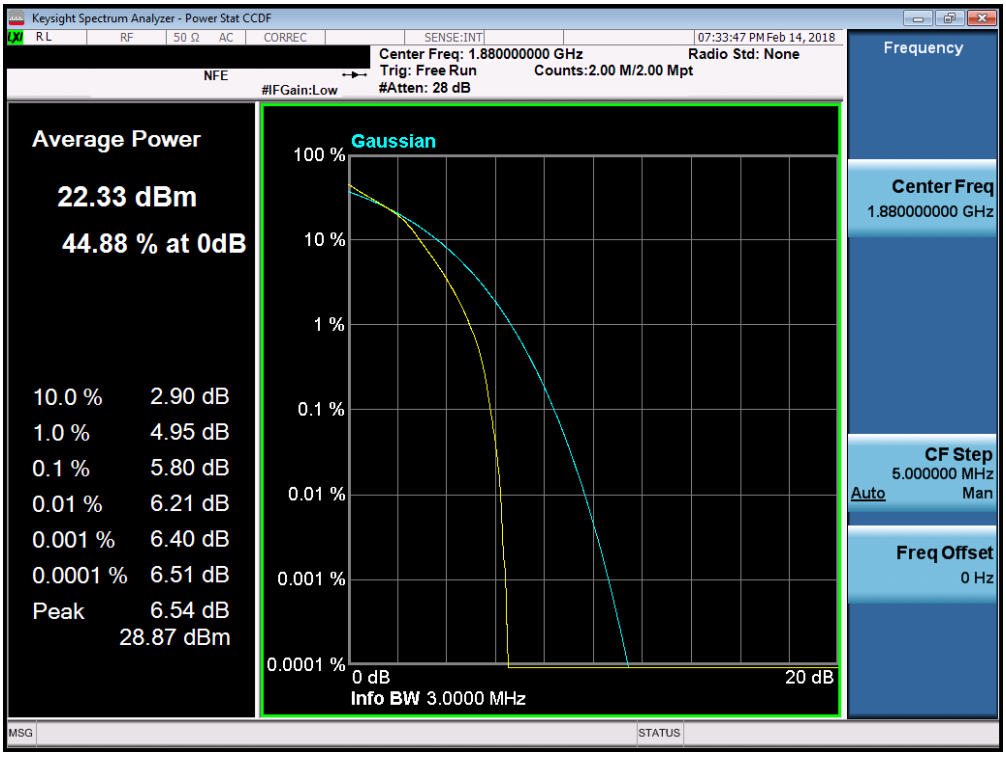
Plot 7-217. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



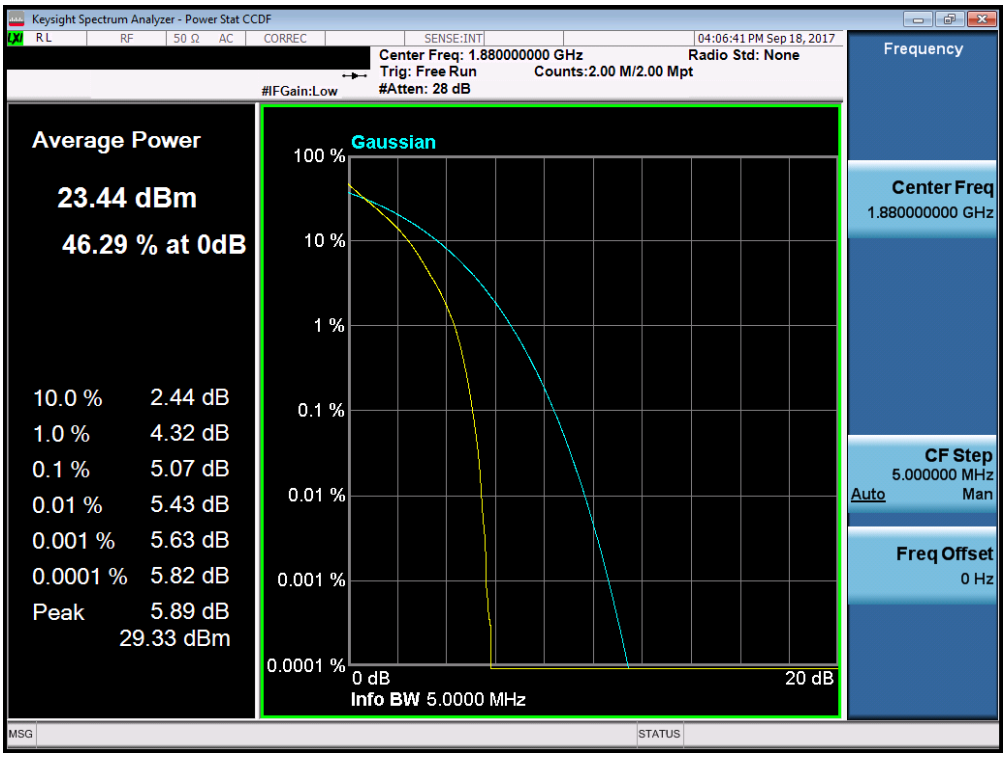
Plot 7-218. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)



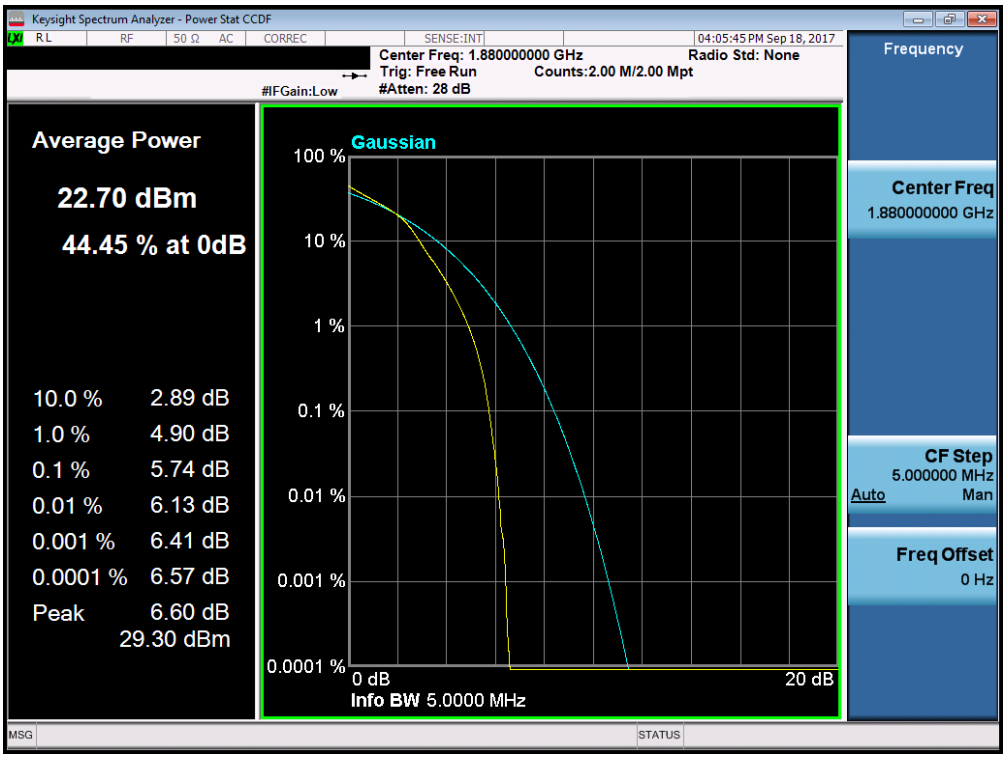
Plot 7-219. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



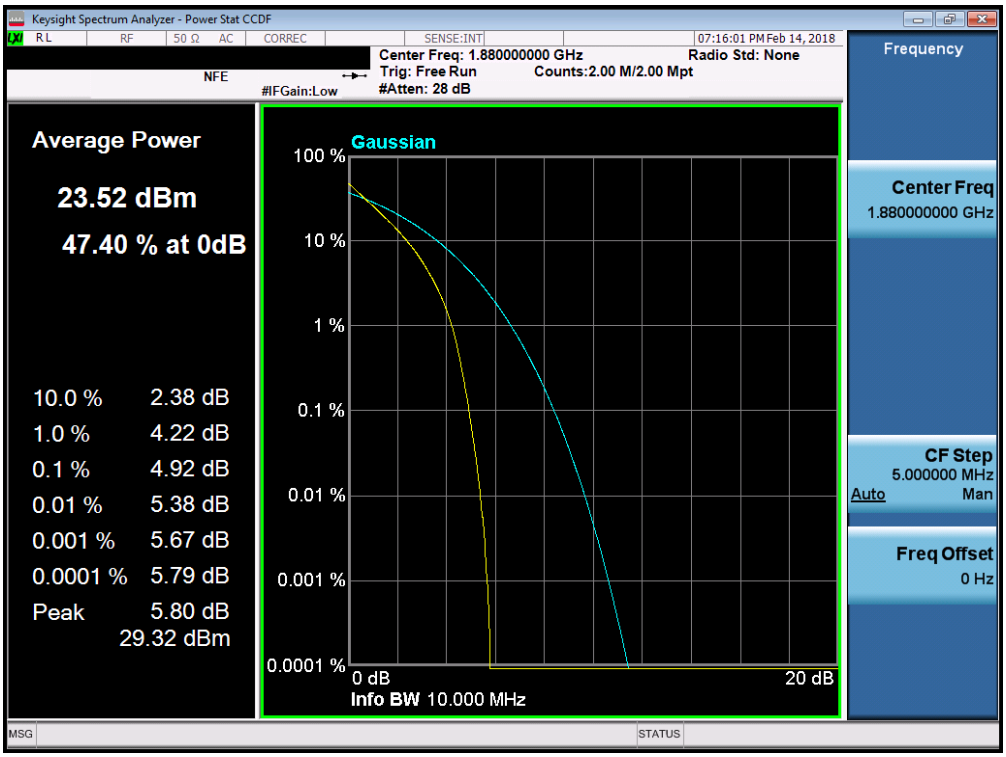
Plot 7-220. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



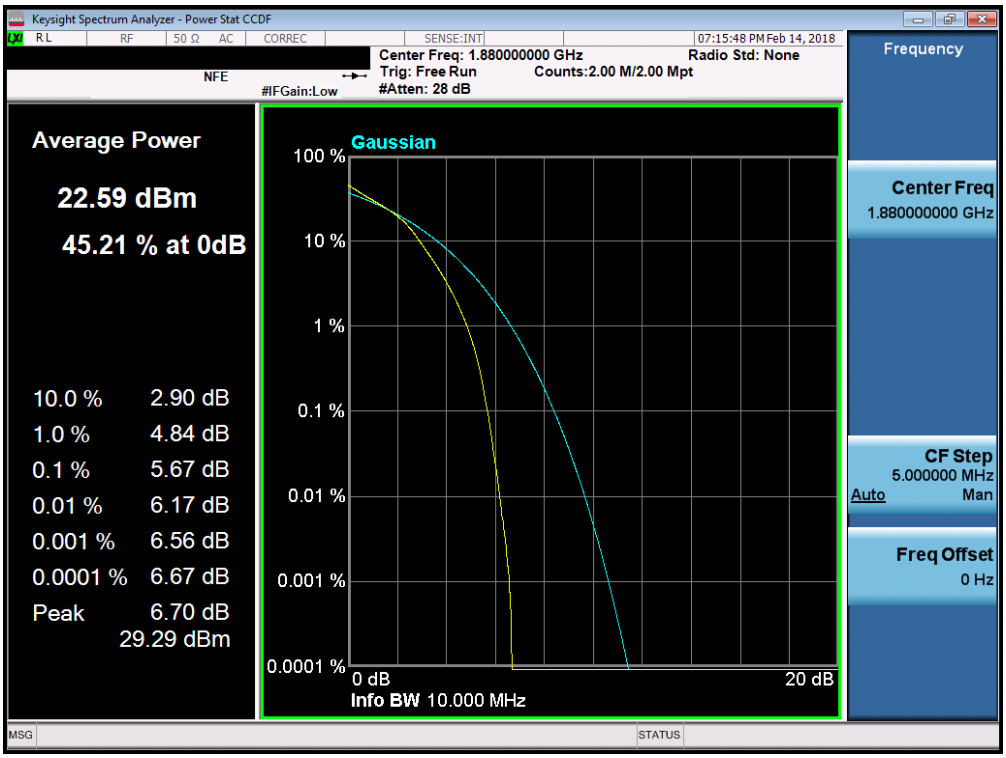
Plot 7-221. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



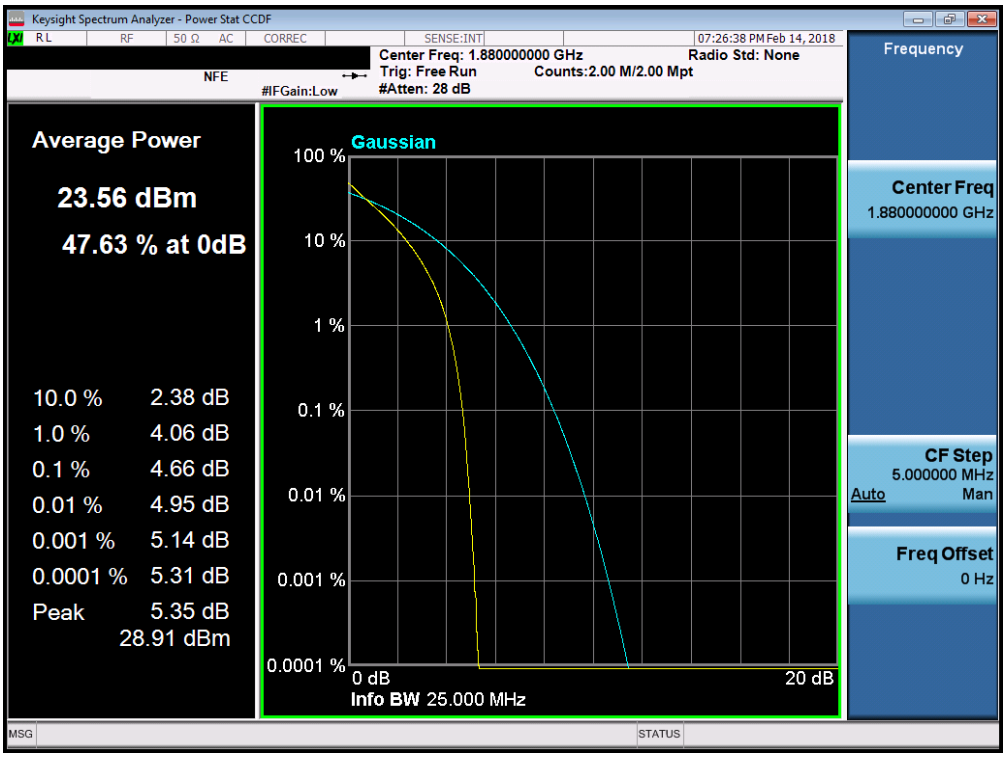
Plot 7-222. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)



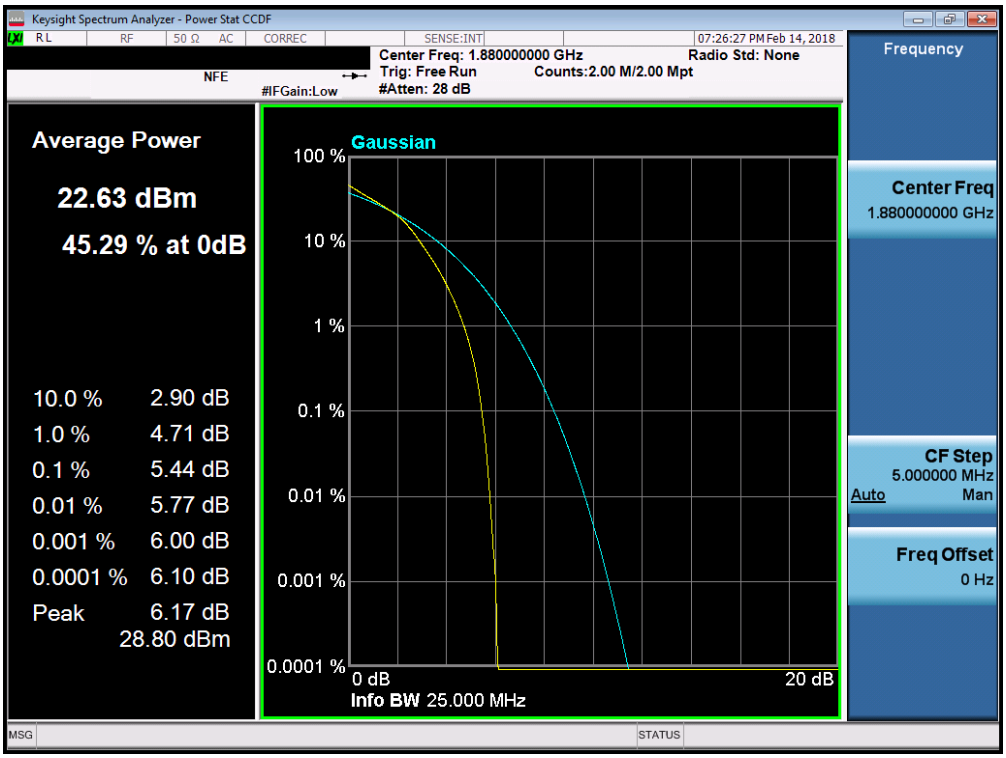
Plot 7-223. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



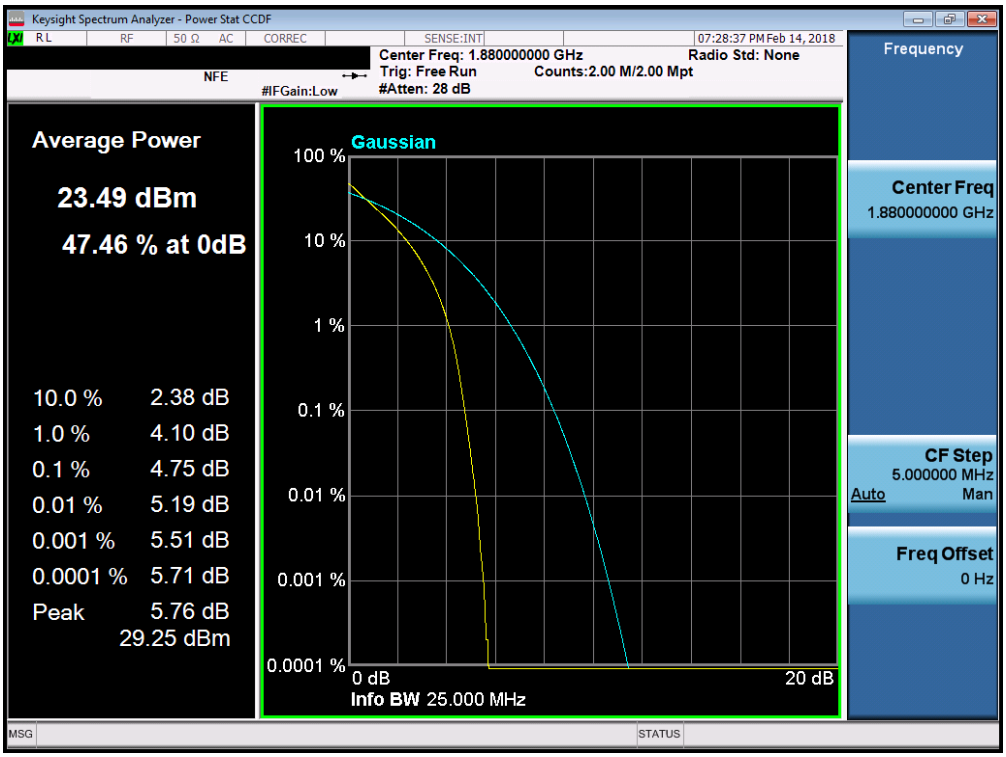
Plot 7-224. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



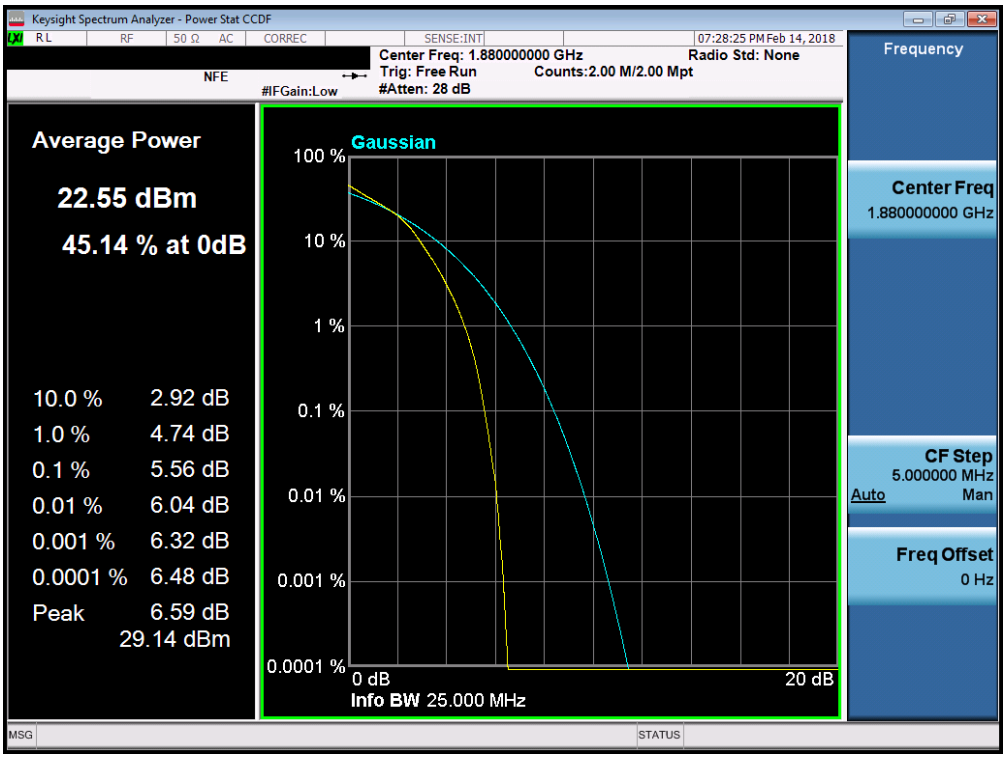
Plot 7-225. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-226. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)



Plot 7-227. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-228. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

7.6 Radiated Power (ERP/EIRP)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

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

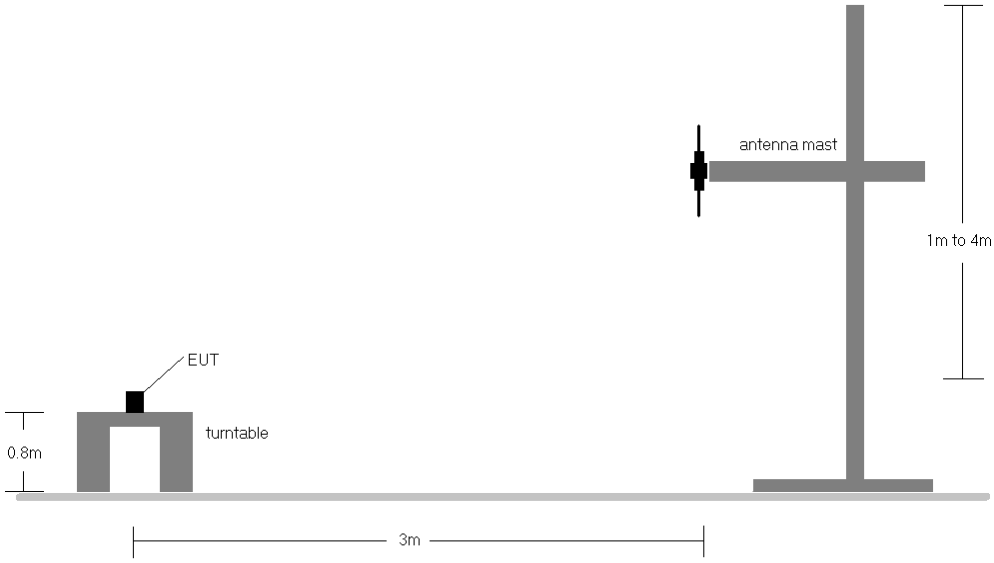


Figure 7-5. Radiated Test Setup <1GHz

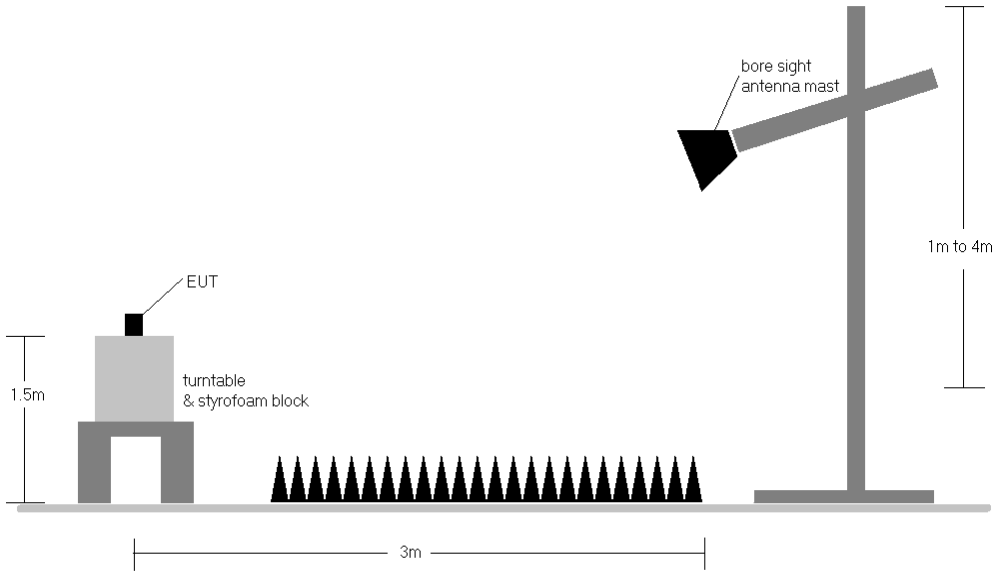


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
665.50	5	QPSK	H	150	6	1 / 12	20.27	1.10	**19.22**	34.77	-15.55
680.50	5	QPSK	H	150	3	1 / 0	20.16	1.10	19.11	34.77	-15.66
695.50	5	QPSK	H	150	13	1 / 12	19.16	1.10	18.11	34.77	-16.66
665.50	5	16-QAM	H	150	6	1 / 12	18.89	1.10	**17.84**	34.77	-16.93
668.00	10	QPSK	H	150	3	1 / 49	20.38	1.10	19.33	34.77	-15.44
680.50	10	QPSK	H	150	3	1 / 25	20.42	1.10	**19.37**	34.77	-15.40
693.00	10	QPSK	H	150	13	1 / 0	19.67	1.10	18.62	34.77	-16.15
680.50	10	16-QAM	H	150	3	1 / 25	18.39	1.10	**17.34**	34.77	-17.43
670.50	15	QPSK	H	150	3	1 / 36	20.26	1.10	19.21	34.77	-15.56
680.50	15	QPSK	H	150	4	1 / 36	20.40	1.10	**19.35**	34.77	-15.42
690.50	15	QPSK	H	150	3	1 / 0	19.73	1.10	18.68	34.77	-16.09
680.50	15	16-QAM	H	150	4	1 / 36	19.03	1.10	**17.98**	34.77	-16.79
673.00	20	QPSK	H	150	4	1 / 50	20.31	1.10	19.26	34.77	-15.51
680.50	20	QPSK	H	150	10	1 / 50	20.33	1.10	**19.28**	34.77	-15.49
688.00	20	QPSK	H	150	7	1 / 0	19.83	1.10	18.78	34.77	-15.99
680.50	20	16-QAM	H	150	10	1 / 50	19.31	1.10	**18.26**	34.77	-16.51
680.50	10	QPSK	V	150	6	1 / 0	19.46	1.10	18.41	34.77	-16.36

Table 7-3. ERP/EIRP Data (Band 71)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	150	182	1 / 3	19.81	1.10	**18.76**	34.77	-16.01	**20.91**	36.99	-16.08
707.50	1.4	QPSK	H	150	10	3 / 2	19.61	1.13	18.59	34.77	-16.18	20.74	36.99	-16.25
715.30	1.4	QPSK	H	150	16	3 / 2	17.68	1.16	16.69	34.77	-18.08	18.84	36.99	-18.15
699.70	1.4	16-QAM	H	150	182	1 / 3	18.65	1.10	**17.60**	34.77	-17.17	**19.75**	36.99	-17.24
700.50	3	QPSK	H	150	176	1 / 14	19.80	1.10	**18.75**	34.77	-16.02	**20.90**	36.99	-16.09
707.50	3	QPSK	H	150	3	1 / 0	19.47	1.13	18.45	34.77	-16.32	20.60	36.99	-16.39
714.50	3	QPSK	H	150	17	1 / 8	19.39	1.16	18.40	34.77	-16.37	20.55	36.99	-16.44
700.50	3	16-QAM	H	150	176	1 / 14	18.57	1.10	**17.52**	34.77	-17.25	**19.67**	36.99	-17.32
701.50	5	QPSK	H	150	174	1 / 0	20.03	1.11	**18.99**	34.77	-15.79	**21.14**	36.99	-15.85
707.50	5	QPSK	H	150	181	1 / 12	19.92	1.13	18.90	34.77	-15.87	21.05	36.99	-15.94
713.50	5	QPSK	H	150	16	1 / 12	18.73	1.15	17.73	34.77	-17.04	19.88	36.99	-17.11
701.50	5	16-QAM	H	150	174	1 / 0	18.94	1.11	**17.90**	34.77	-16.88	**20.05**	36.99	-16.94
704.00	10	QPSK	H	150	175	1 / 25	20.39	1.12	**19.36**	34.77	-15.41	**21.51**	36.99	-15.48
707.50	10	QPSK	H	150	3	1 / 25	20.06	1.13	19.04	34.77	-15.73	21.19	36.99	-15.80
711.00	10	QPSK	H	150	17	1 / 25	19.46	1.14	18.45	34.77	-16.32	20.60	36.99	-16.39
704.00	10	16-QAM	H	150	175	1 / 0	18.89	1.12	**17.86**	34.77	-16.91	**20.01**	36.99	-16.98
704.00	10	QPSK	V	150	147	1 / 25	14.73	1.13	13.71	34.77	-21.06	15.86	36.99	-21.13

Table 7-4. ERP/EIRP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	150	351	1 / 5	22.03	1.50	**21.38**	**0.137**	38.45	-17.07	**23.53**	**0.225**	40.61	-17.08
836.50	1.4	QPSK	H	150	354	1 / 5	21.65	1.50	21.00	0.126	38.45	-17.45	23.15	0.207	40.61	-17.46
848.30	1.4	QPSK	H	150	9	1 / 5	19.85	1.50	19.20	0.083	38.45	-19.25	21.35	0.136	40.61	-19.26
824.70	1.4	16-QAM	H	150	351	1 / 5	20.82	1.50	**20.17**	0.104	38.45	-18.28	**22.32**	0.171	40.61	-18.29
825.50	3	QPSK	H	150	356	1 / 0	21.54	1.50	**20.89**	0.123	38.45	-17.56	**23.04**	0.201	40.61	-17.57
836.50	3	QPSK	H	150	353	1 / 0	21.23	1.50	20.58	0.114	38.45	-17.87	22.73	0.187	40.61	-17.88
847.50	3	QPSK	H	150	354	1 / 0	21.40	1.50	20.75	0.119	38.45	-17.70	22.90	0.195	40.61	-17.71
836.50	3	16-QAM	H	150	353	1 / 0	20.62	1.50	**19.97**	0.099	38.45	-18.48	**22.12**	0.163	40.61	-18.49
826.50	5	QPSK	H	150	353	1 / 0	21.57	1.50	**20.92**	0.124	38.45	-17.53	**23.07**	0.203	40.61	-17.54
836.50	5	QPSK	H	150	353	1 / 0	21.54	1.50	20.89	0.123	38.45	-17.56	23.04	0.201	40.61	-17.57
846.50	5	QPSK	H	150	353	1 / 0	21.14	1.50	20.49	0.112	38.45	-17.96	22.64	0.184	40.61	-17.97
836.50	5	16-QAM	H	150	353	1 / 0	20.01	1.50	**19.36**	0.086	38.45	-19.09	**21.51**	0.142	40.61	-19.10
829.00	10	QPSK	H	150	350	1 / 0	21.25	1.50	20.60	0.115	38.45	-17.85	22.75	0.188	40.61	-17.86
836.50	10	QPSK	H	150	353	1 / 0	21.63	1.50	**20.98**	0.125	38.45	-17.47	**23.13**	0.206	40.61	-17.48
844.00	10	QPSK	H	150	350	1 / 0	21.33	1.50	20.68	0.117	38.45	-17.77	22.83	0.192	40.61	-17.78
836.50	10	16-QAM	H	150	353	1 / 0	20.24	1.50	**19.59**	0.091	38.45	-18.86	**21.74**	0.149	40.61	-18.87
824.70	1.4	QPSK	V	150	170	1 / 0	21.32	1.50	20.67	0.117	38.45	-17.78	22.82	0.191	40.61	-17.79

Table 7-5. ERP/EIRP Data (Band 5)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	104	1 / 0	17.91	5.56	**23.47**	0.222	30.00	-6.53
1745.00	1.4	QPSK	H	150	103	1 / 0	17.56	5.32	22.88	0.194	30.00	-7.12
1779.30	1.4	QPSK	H	150	102	1 / 0	16.27	5.09	21.36	0.137	30.00	-8.64
1710.70	1.4	16-QAM	H	150	104	1 / 0	17.08	5.56	**22.64**	0.184	30.00	-7.36
1711.50	3	QPSK	H	150	103	1 / 0	18.06	5.55	**23.61**	**0.230**	30.00	-6.39
1745.00	3	QPSK	H	150	105	1 / 0	17.39	5.32	22.71	0.187	30.00	-7.29
1778.50	3	QPSK	H	150	101	1 / 0	16.42	5.10	21.52	0.142	30.00	-8.48
1711.50	3	16-QAM	H	150	103	1 / 0	17.09	5.55	**22.64**	0.184	30.00	-7.36
1712.50	5	QPSK	H	150	103	1 / 0	17.98	5.55	**23.53**	0.225	30.00	-6.47
1745.00	5	QPSK	H	150	98	1 / 0	17.63	5.32	22.95	0.197	30.00	-7.05
1777.50	5	QPSK	H	150	97	1 / 0	16.06	5.10	21.16	0.131	30.00	-8.84
1712.50	5	16-QAM	H	150	103	1 / 0	16.93	5.55	**22.48**	0.177	30.00	-7.52
1715.00	10	QPSK	H	150	105	1 / 0	17.91	5.53	**23.44**	0.221	30.00	-6.56
1745.00	10	QPSK	H	150	100	1 / 0	17.61	5.32	22.93	0.196	30.00	-7.07
1775.00	10	QPSK	H	150	100	1 / 0	16.47	5.12	21.59	0.144	30.00	-8.41
1715.00	10	16-QAM	H	150	105	1 / 0	16.82	5.53	**22.35**	0.172	30.00	-7.65
1717.50	15	QPSK	H	150	101	1 / 0	17.77	5.51	23.28	0.213	30.00	-6.72
1745.00	15	QPSK	H	150	101	1 / 0	17.97	5.32	**23.29**	0.213	30.00	-6.71
1772.50	15	QPSK	H	150	102	1 / 0	16.86	5.14	22.00	0.158	30.00	-8.00
1745.00	15	16-QAM	H	150	101	1 / 0	17.36	5.32	**22.68**	0.185	30.00	-7.32
1720.00	20	QPSK	H	150	102	1 / 0	17.90	5.49	**23.39**	0.218	30.00	-6.61
1745.00	20	QPSK	H	150	103	1 / 0	17.66	5.32	22.98	0.199	30.00	-7.02
1770.00	20	QPSK	H	150	100	1 / 0	16.97	5.15	22.12	0.163	30.00	-7.88
1720.00	20	16-QAM	H	150	102	1 / 0	16.80	5.49	**22.29**	0.170	30.00	-7.71
1711.50	3	QPSK	V	150	99	1 / 0	17.46	5.55	23.01	0.200	30.00	-6.99

Table 7-6. EIRP Data (Band 66/4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	150	98	1 / 0	19.66	4.82	**24.48**	0.280	33.01	-8.53
1880.00	1.4	QPSK	H	150	96	1 / 0	19.12	4.74	23.86	0.243	33.01	-9.15
1909.30	1.4	QPSK	H	150	92	1 / 0	18.15	4.68	22.83	0.192	33.01	-10.18
1850.70	1.4	16-QAM	H	150	98	1 / 0	18.45	4.82	**23.27**	0.212	33.01	-9.74
1851.50	3	QPSK	H	150	100	1 / 0	19.66	4.82	**24.48**	0.280	33.01	-8.53
1880.00	3	QPSK	H	150	95	1 / 0	19.70	4.74	24.44	0.278	33.01	-8.57
1908.50	3	QPSK	H	150	95	1 / 0	18.58	4.68	23.26	0.212	33.01	-9.75
1851.50	3	16-QAM	H	150	100	1 / 0	18.46	4.82	**23.28**	0.213	33.01	-9.73
1852.50	5	QPSK	H	100	97	1 / 0	19.77	4.81	**24.58**	0.287	33.01	-8.43
1880.00	5	QPSK	H	100	95	1 / 0	19.58	4.74	24.32	0.270	33.01	-8.69
1907.50	5	QPSK	H	100	88	1 / 0	18.11	4.68	22.79	0.190	33.01	-10.22
1852.50	5	16-QAM	H	100	97	1 / 0	18.43	4.81	**23.24**	0.211	33.01	-9.77
1855.00	10	QPSK	H	150	100	1 / 0	19.78	4.81	**24.59**	0.287	33.01	-8.42
1880.00	10	QPSK	H	150	95	1 / 0	19.57	4.74	24.31	0.270	33.01	-8.70
1905.00	10	QPSK	H	150	95	1 / 0	19.16	4.68	23.84	0.242	33.01	-9.17
1880.00	10	16-QAM	H	150	95	1 / 0	18.53	4.74	**23.27**	0.212	33.01	-9.74
1857.50	15	QPSK	H	150	98	1 / 0	20.36	4.80	**25.16**	**0.328**	33.01	-7.85
1880.00	15	QPSK	H	150	100	1 / 0	19.66	4.74	24.40	0.275	33.01	-8.61
1902.50	15	QPSK	H	150	96	1 / 0	18.97	4.69	23.66	0.232	33.01	-9.35
1857.50	15	16-QAM	H	150	98	1 / 0	19.46	4.80	**24.26**	0.267	33.01	-8.75
1860.00	20	QPSK	H	150	97	1 / 0	20.04	4.79	24.83	0.304	33.01	-8.18
1880.00	20	QPSK	H	150	99	1 / 0	20.13	4.74	**24.87**	0.307	33.01	-8.14
1900.00	20	QPSK	H	150	92	1 / 0	19.48	4.69	24.17	0.261	33.01	-8.84
1880.00	20	16-QAM	H	150	99	1 / 0	19.25	4.74	**23.99**	0.251	33.01	-9.02
1857.50	15	QPSK	V	150	16	1 / 0	17.91	4.74	22.65	0.184	33.01	-10.36

Table 7-7. EIRP Data (Band 2)

7.7 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

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

Test Setup

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

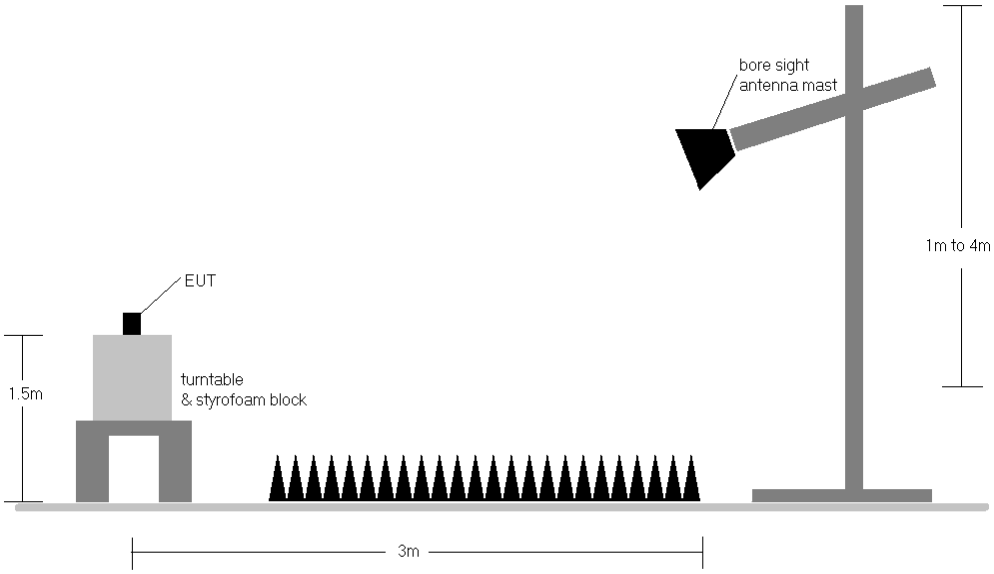


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

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

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

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

Band 71

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1336.00	H	150	239	-67.89	3.88	-64.00	-51.0
2004.00	H	150	13	-59.10	4.74	-54.37	-41.4
2672.00	H	-	-	-65.79	5.36	-60.43	-47.4

Table 7-8. Radiated Spurious Data (Band 71 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1361.00	H	150	220	-66.78	3.90	-62.88	-49.9
2041.50	H	150	13	-61.31	4.78	-56.54	-43.5
2722.00	H	-	-	-65.19	5.49	-59.71	-46.7

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1386.00	H	150	327	-67.62	3.82	-63.80	-50.8
2079.00	H	150	12	-62.65	4.80	-57.85	-44.9
2772.00	H	-	-	-65.84	5.66	-60.18	-47.2

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

Band 12

OPERATING FREQUENCY: 704.00 MHz
CHANNEL: 23060
MODULATION SIGNAL: QPSK
BANDWIDTH: 10.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1408.00	H	150	289	-66.86	3.84	-63.01	-50.0
2112.00	H	150	239	-64.69	4.79	-59.90	-46.9
2816.00	H	-	-	-65.57	5.69	-59.89	-46.9

Table 7-11. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY: 707.50 MHz
CHANNEL: 23095
MODULATION SIGNAL: QPSK
BANDWIDTH: 10.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	-	-	-69.15	3.90	-65.25	-52.2
2122.50	H	150	96	-65.90	4.78	-61.12	-48.1
2830.00	H	-	-	-65.49	5.73	-59.76	-46.8

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

OPERATING FREQUENCY:	711.00	MHz
CHANNEL:	23130	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1422.00	H	150	222	-67.72	3.97	-63.75	-50.8
2133.00	H	150	243	-64.82	4.78	-60.05	-47.0
2844.00	H	-	-	-65.77	5.77	-60.00	-47.0

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

Band 5

OPERATING FREQUENCY:	824.70	MHz
CHANNEL:	20407	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1649.40	H	109	33	-62.76	8.99	-53.77	-40.8
2474.10	H	109	7	-48.05	9.12	-38.92	-25.9
3298.80	H	-	-	-76.25	9.37	-66.89	-53.9
4123.50	H	288	221	-74.71	9.89	-64.82	-51.8
4948.20	H	-	-	-76.24	11.24	-65.00	-52.0

Table 7-14. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
CHANNEL:	20525	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	100	39	-63.20	8.85	-54.35	-41.4
2509.50	H	121	32	-50.13	9.17	-40.96	-28.0
3346.00	H	-	-	-77.86	9.36	-68.50	-55.5
4182.50	H	100	25	-70.32	10.19	-60.13	-47.1
5019.00	H	-	-	-75.71	11.10	-64.61	-51.6

Table 7-15. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	848.30	MHz
CHANNEL:	20643	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1696.60	H	100	36	-63.79	8.70	-55.08	-42.1
2544.90	H	163	9	-63.34	9.26	-54.08	-41.1
3393.20	H	-	-	-75.24	9.44	-65.80	-52.8
4241.50	H	121	224	-75.18	10.43	-64.75	-51.8
5089.80	H	-	-	-75.28	10.90	-64.38	-51.4

Table 7-16. Radiated Spurious Data (Band 5 – High Channel)

Band 66/4

OPERATING FREQUENCY: 1711.50 MHz
CHANNEL: 131987
MODULATION SIGNAL: QPSK
BANDWIDTH: 3.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3423.00	V	209	83	-69.24	9.78	-59.47	-46.5
5134.50	V	400	349	-70.61	10.70	-59.91	-46.9
6846.00	V	-	-	-71.88	11.69	-60.19	-47.2

Table 7-17. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY: 1745.00 MHz
CHANNEL: 132322
MODULATION SIGNAL: QPSK
BANDWIDTH: 3.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	V	179	87	-69.86	9.90	-59.96	-47.0
5235.00	V	116	340	-69.32	10.63	-58.69	-45.7
6980.00	V	-	-	-72.08	11.77	-60.31	-47.3

Table 7-18. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1778.50	MHz
CHANNEL:	132657	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3557.00	V	167	122	-71.37	9.90	-61.48	-48.5
5335.50	V	110	341	-71.58	10.71	-60.87	-47.9
7114.00	V	-	-	-71.83	11.79	-60.05	-47.0

Table 7-19. Radiated Spurious Data (Band 66/4 – High Channel)

Band 2

OPERATING FREQUENCY:	1857.50	MHz
CHANNEL:	18675	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3715.00	H	112	161	-61.01	9.51	-51.50	-38.5
5572.50	H	112	356	-66.93	11.06	-55.87	-42.9
7430.00	H	-	-	-70.20	10.97	-59.23	-46.2

Table 7-20. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	18900	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	129	198	-58.54	9.39	-49.15	-36.2
5640.00	H	110	355	-66.12	11.22	-54.90	-41.9
7520.00	H	-	-	-69.27	11.10	-58.17	-45.2

Table 7-21. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1902.50	MHz
CHANNEL:	19125	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3805.00	H	117	208	-56.29	9.31	-46.98	-34.0
5707.50	H	110	153	-68.65	11.33	-57.33	-44.3
7610.00	H	-	-	-69.26	11.31	-57.95	-44.9

Table 7-22. Radiated Spurious Data (Band 2 – High Channel)

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 22, RSS-132, RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, RSS-130, RSS-139, 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

Band 71 Frequency Stability Measurements

OPERATING FREQUENCY: 680,500,000 Hz

CHANNEL: 133297

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	680,499,942	-58	-0.0000086
100 %		- 30	680,499,933	-67	-0.0000099
100 %		- 20	680,499,844	-156	-0.0000229
100 %		- 10	680,499,835	-165	-0.0000243
100 %		0	680,499,944	-56	-0.0000082
100 %		+ 10	680,499,865	-135	-0.0000198
100 %		+ 20	680,499,902	-98	-0.0000143
100 %		+ 30	680,499,988	-12	-0.0000018
100 %		+ 40	680,499,948	-52	-0.0000076
100 %		+ 50	680,499,861	-139	-0.0000205
BATT. ENDPOINT	3.45	+ 20	680,499,815	-185	-0.0000272

Table 7-23. Frequency Stability Data (Band 71)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 71 Frequency Stability Measurements

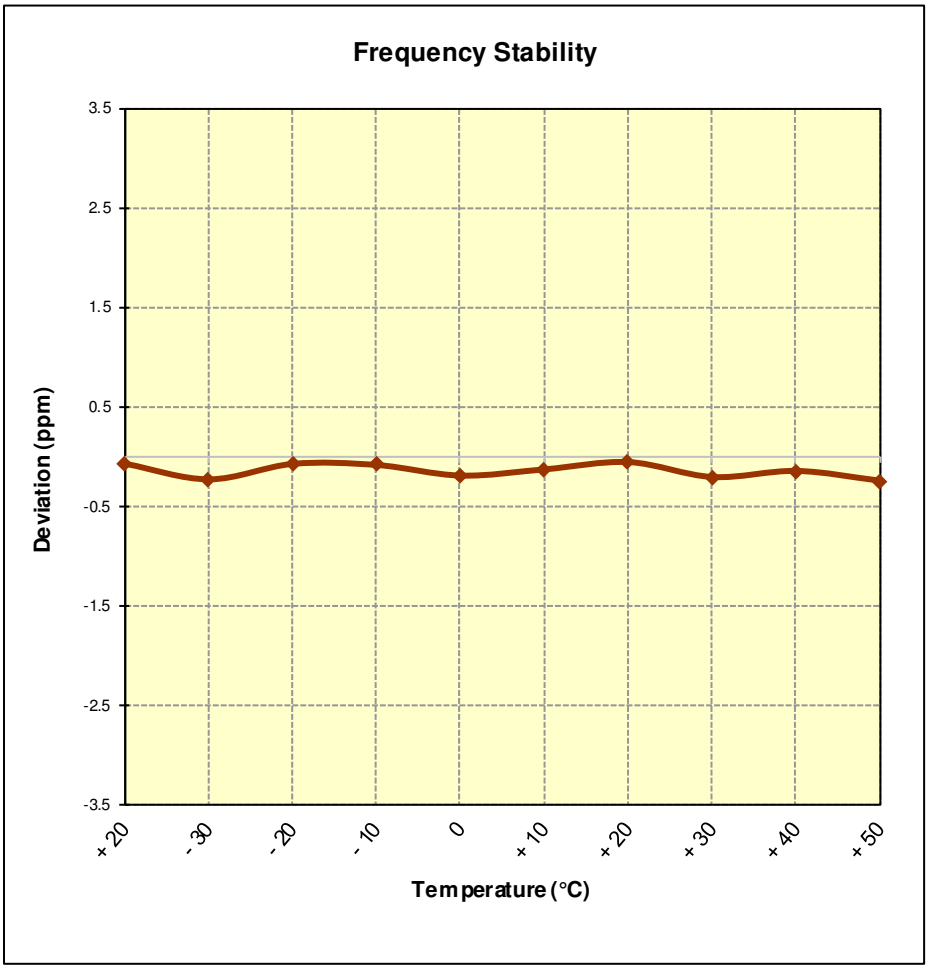


Figure 7-8. Frequency Stability Graph (Band 71)

Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,949	-51	-0.0000072
100 %		- 30	707,499,832	-168	-0.0000238
100 %		- 20	707,499,949	-51	-0.0000073
100 %		- 10	707,499,940	-60	-0.0000085
100 %		0	707,499,860	-140	-0.0000198
100 %		+ 10	707,499,907	-93	-0.0000131
100 %		+ 20	707,499,962	-38	-0.0000054
100 %		+ 30	707,499,849	-151	-0.0000213
100 %		+ 40	707,499,895	-105	-0.0000148
100 %		+ 50	707,499,821	-179	-0.0000252
BATT. ENDPOINT	3.45	+ 20	707,499,994	-6	-0.0000008

Table 7-24. Frequency Stability Data (Band 12)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 12 Frequency Stability Measurements

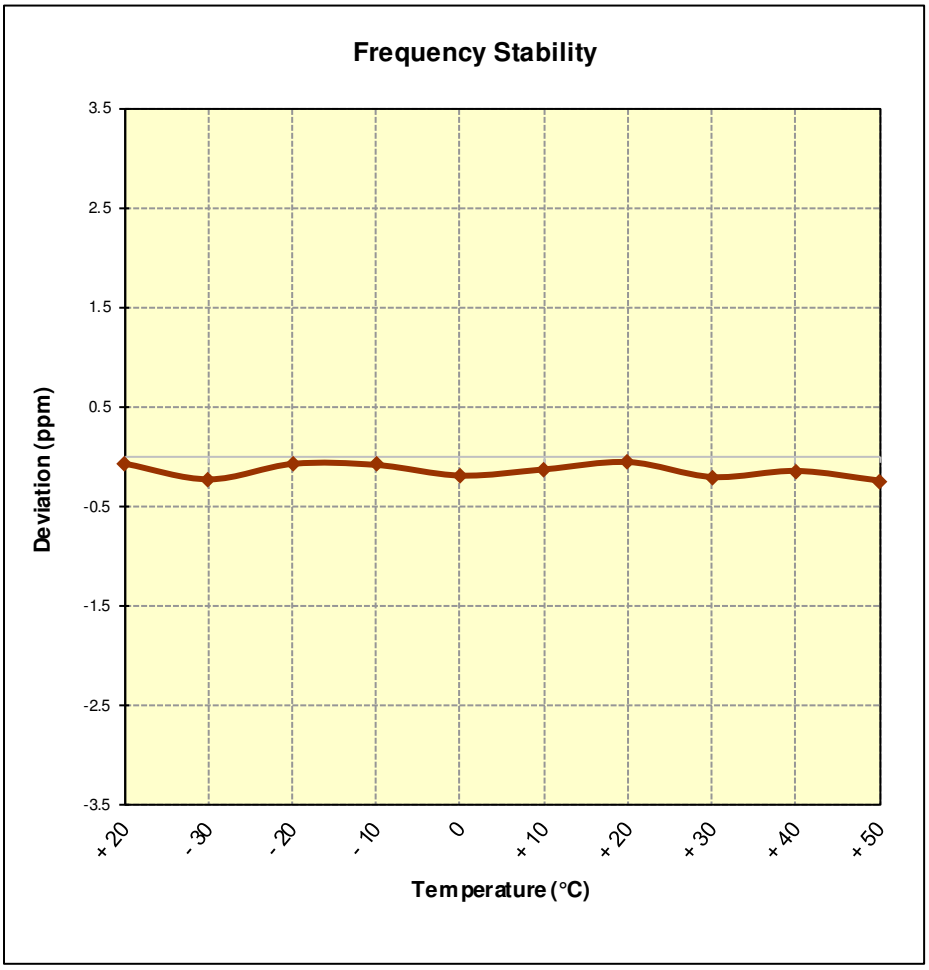


Figure 7-9. Frequency Stability Graph (Band 12)

Band 5 Frequency Stability Measurements

OPERATING FREQUENCY: 836,500,000 Hz

CHANNEL: 20525

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,499,962	-38	-0.0000045
100 %		- 30	836,499,921	-79	-0.0000094
100 %		- 20	836,499,858	-142	-0.0000170
100 %		- 10	836,499,865	-135	-0.0000161
100 %		0	836,499,815	-185	-0.0000221
100 %		+ 10	836,499,891	-109	-0.0000130
100 %		+ 20	836,499,906	-94	-0.0000112
100 %		+ 30	836,499,983	-17	-0.0000021
100 %		+ 40	836,499,853	-147	-0.0000176
100 %		+ 50	836,499,942	-58	-0.0000070
BATT. ENDPOINT	3.45	+ 20	836,499,950	-50	-0.0000060

Table 7-25. Frequency Stability Data (Band 5)

Band 5 Frequency Stability Measurements

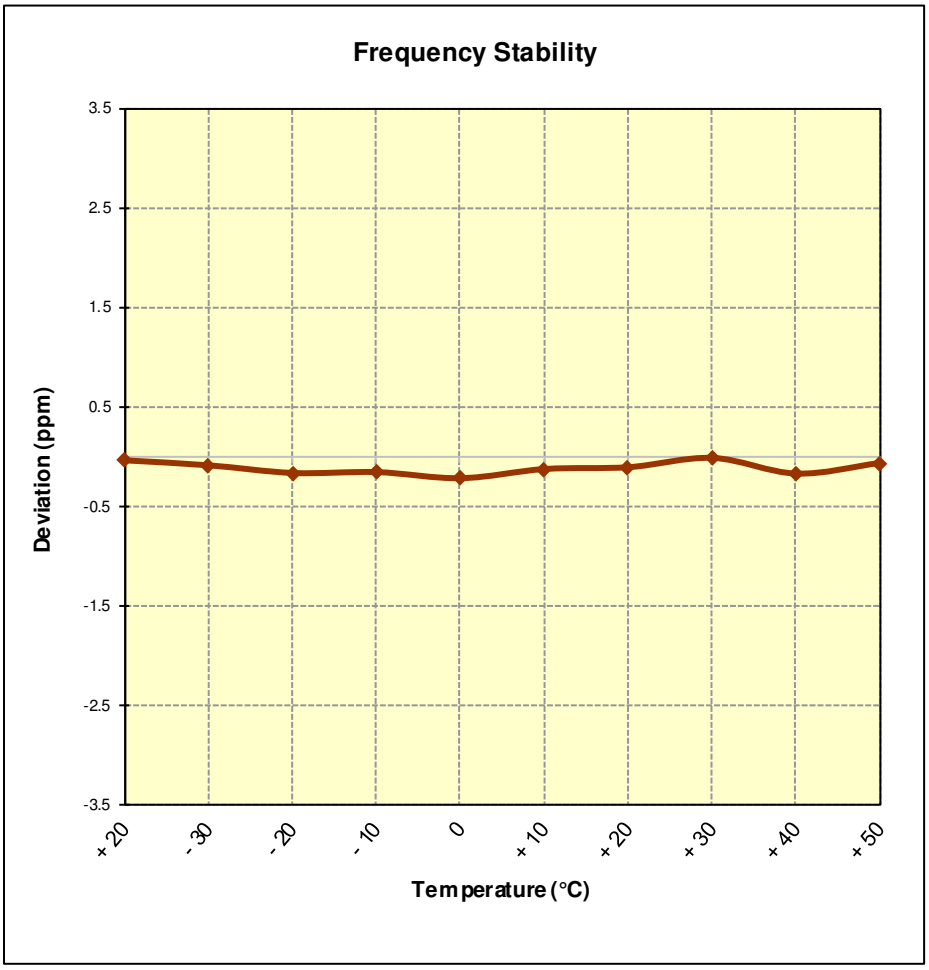


Figure 7-10. Frequency Stability Graph (Band 5)

Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,948	-52	-0.0000030
100 %		- 30	1,744,999,920	-80	-0.0000046
100 %		- 20	1,744,999,807	-193	-0.0000111
100 %		- 10	1,744,999,988	-12	-0.0000007
100 %		0	1,744,999,833	-167	-0.0000095
100 %		+ 10	1,744,999,854	-146	-0.0000084
100 %		+ 20	1,744,999,852	-148	-0.0000085
100 %		+ 30	1,744,999,964	-36	-0.0000021
100 %		+ 40	1,744,999,824	-176	-0.0000101
100 %		+ 50	1,744,999,826	-174	-0.0000100
BATT. ENDPOINT	3.45	+ 20	1,744,999,879	-121	-0.0000069

Table 7-26. Frequency Stability Data (Band 66/4)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 66/4 Frequency Stability Measurements

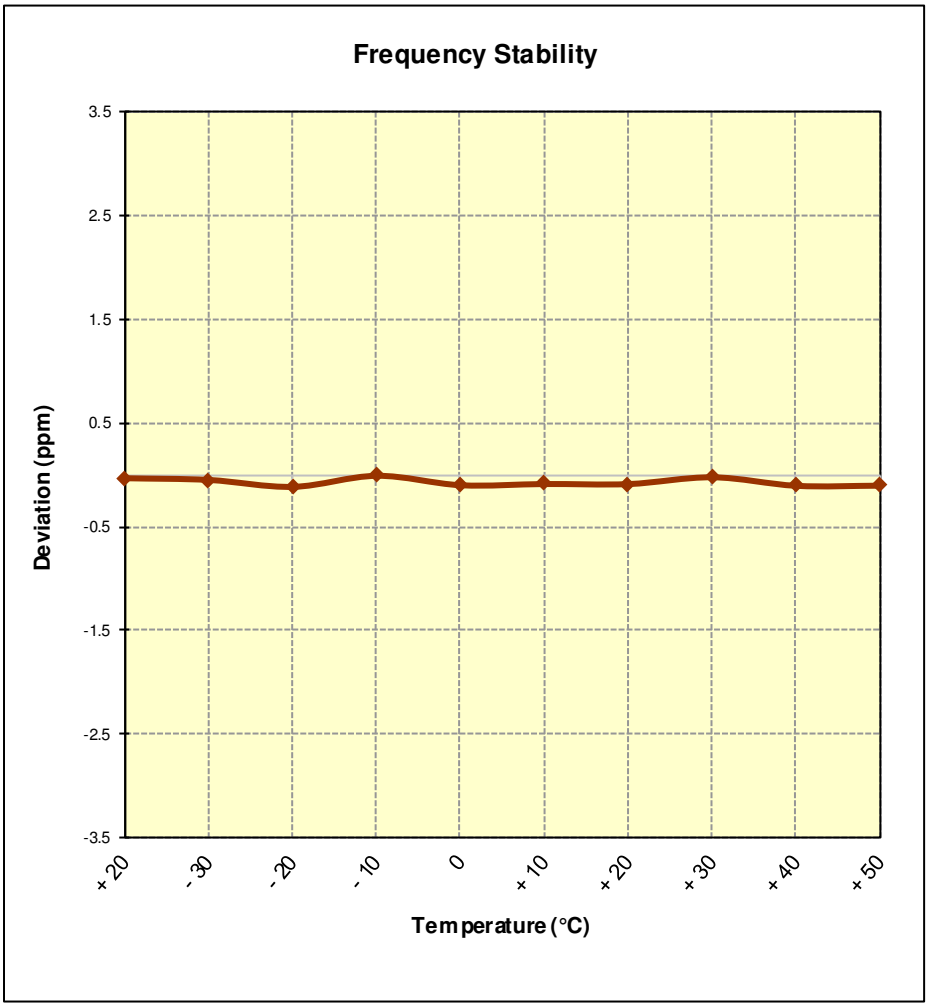


Figure 7-11. Frequency Stability Graph (Band 66/4)

Band 2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,999	-1	-0.0000001
100 %		- 30	1,879,999,988	-12	-0.0000006
100 %		- 20	1,879,999,890	-110	-0.0000058
100 %		- 10	1,879,999,847	-153	-0.0000081
100 %		0	1,879,999,853	-147	-0.0000078
100 %		+ 10	1,879,999,853	-147	-0.0000078
100 %		+ 20	1,879,999,914	-86	-0.0000046
100 %		+ 30	1,879,999,809	-191	-0.0000101
100 %		+ 40	1,879,999,975	-25	-0.0000013
100 %		+ 50	1,879,999,969	-31	-0.0000016
BATT. ENDPOINT	3.45	+ 20	1,879,999,836	-164	-0.0000087

Table 7-27. Frequency Stability Data (Band 2)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 2 Frequency Stability Measurements

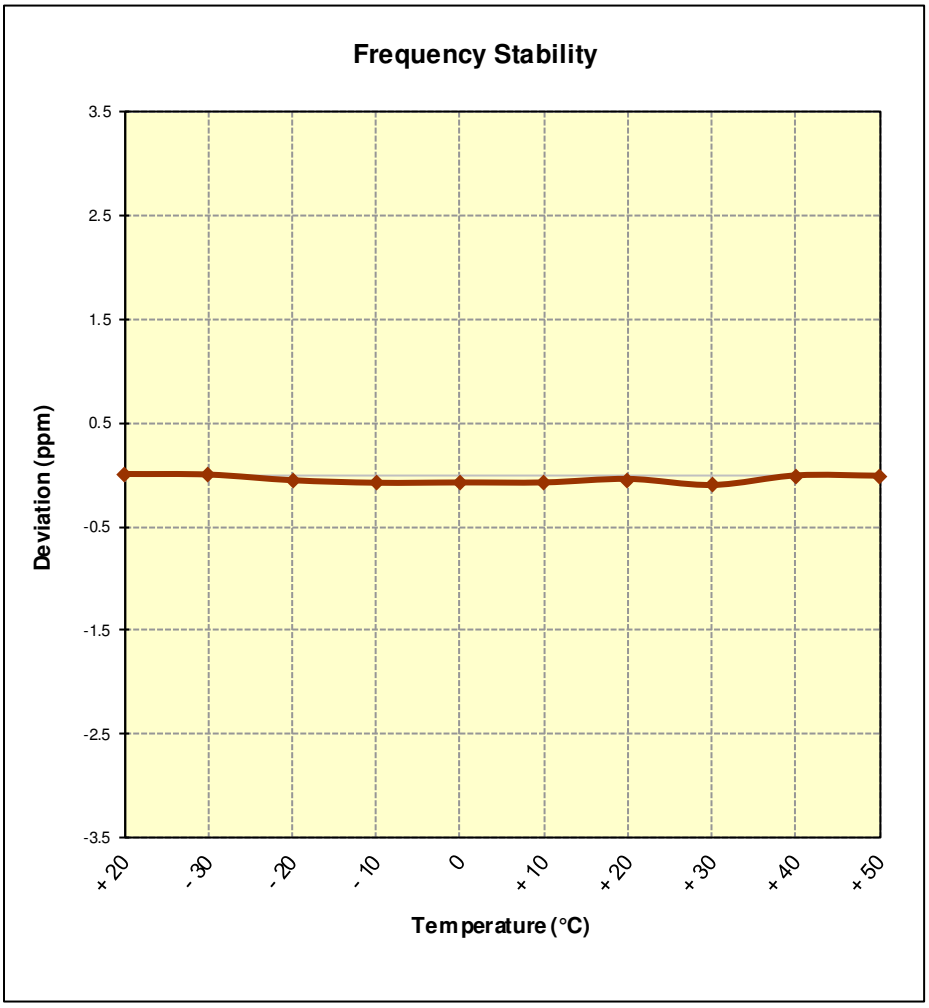


Figure 7-12. Frequency Stability Graph (Band 2)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFX212TA** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.