8. Radiated Spurious Emission

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232 and §27.50

LIMITS:

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.
27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.
27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

TEST PROCEDURE

ANSI/TIA-603-E Clause 2.2.17
KDB 971168 v02r01 RF power output using broadband peak and average power meter method.
KDB 971168 D01 Power Meas License Digital Systems v02r01, “Measurement Guidance for Certification of Licensed Digital Transmitters”

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- ☐ LTE Band5
- LTE Band 7

RESULTS

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB/ RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1850.7	-0.42	3.76	28.24	24.06	254.683	Vertical	Pass
		1880	-0.33	3.91	28.22	23.98	250.035	Vertical	Pass
		1909.3	-0.16	3.93	28.20	24.11	257.632	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-1.33	3.76	28.24	23.15	206.538	Vertical	Pass
		1880	-1.22	3.91	28.22	23.09	203.704	Vertical	Pass
		1909.3	-1.14	3.93	28.20	23.13	205.589	Vertical	Pass
3.0MHz Band QPSK	15/0	1851.5	-0.47	3.77	28.23	23.99	250.611	Vertical	Pass
		1880	-0.32	3.91	28.24	24.01	251.768	Vertical	Pass
		1908.5	-0.44	3.94	28.25	23.87	243.781	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-1.35	3.77	28.23	23.11	204.644	Vertical	Pass
		1880	-1.35	3.91	28.24	22.98	198.609	Vertical	Pass
		1908.5	-1.19	3.94	28.25	23.12	205.116	Vertical	Pass
5.0MHz Band QPSK	25/0	1852.5	-0.47	3.77	28.31	24.07	255.270	Vertical	Pass
		1880	-0.18	3.91	28.22	24.13	258.821	Vertical	Pass
		1907.5	-0.30	3.94	28.20	23.96	248.886	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-1.31	3.77	28.31	23.23	210.378	Vertical	Pass
		1880	-0.96	3.91	28.22	23.35	216.272	Vertical	Pass
		1907.5	-1.09	3.94	28.20	23.17	207.491	Vertical	Pass
10.0MHz Band QPSK	50/0	1855	-0.28	3.79	28.33	24.26	266.686	Vertical	Pass
		1880	0.06	3.95	28.22	24.33	271.019	Vertical	Pass
		1905	0.15	3.97	28.19	24.37	273.527	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1855	-1.03	3.79	28.33	23.51	224.388	Vertical	Pass
		1880	-1.08	3.95	28.22	23.19	208.449	Vertical	Pass
		1905	-0.96	3.97	28.19	23.26	211.836	Vertical	Pass
15.0MHz Band QPSK	75/0	1857.5	-0.20	3.79	28.34	24.35	272.270	Vertical	Pass
		1880	0.14	3.95	28.22	24.41	276.058	Vertical	Pass
		1902.5	0.18	3.97	28.18	24.39	274.789	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1857.5	-1.28	3.79	28.34	23.27	212.324	Vertical	Pass
		1880	-0.89	3.95	28.22	23.38	217.771	Vertical	Pass
		1902.5	-0.80	3.97	28.18	23.41	219.280	Vertical	Pass

20.0MHz Band QPSK	100/0	1860	-0.43	3.81	28.35	24.11	257.632	Vertical	Pass
		1880	0.00	3.96	28.22	24.26	266.686	Vertical	Pass
		1900	0.13	4.00	28.16	24.29	268.534	Vertical	Pass
20.0MHz Band 16 QAM	100/0	1860	-1.27	3.81	28.35	23.27	212.324	Vertical	Pass
		1880	-1.08	3.96	28.22	23.18	207.970	Vertical	Pass
		1900	-0.85	4.00	28.16	23.31	214.289	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 2									
Mode	RB/ RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1850.7	-0.63	3.76	28.24	23.85	242.661	Horizontal	Pass
		1880	-0.57	3.91	28.22	23.74	236.592	Horizontal	Pass
		1909.3	-0.58	3.93	28.20	23.69	233.884	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-1.53	3.76	28.24	22.95	197.242	Horizontal	Pass
		1880	-1.44	3.91	28.22	22.87	193.642	Horizontal	Pass
		1909.3	-1.60	3.93	28.20	22.67	184.927	Horizontal	Pass
3.0MHz Band QPSK	15/0	1851.5	-0.82	3.77	28.23	23.64	231.206	Horizontal	Pass
		1880	-0.66	3.91	28.24	23.67	232.809	Horizontal	Pass
		1908.5	-0.60	3.94	28.25	23.71	234.963	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-1.77	3.77	28.23	22.69	185.780	Horizontal	Pass
		1880	-1.59	3.91	28.24	22.74	187.932	Horizontal	Pass
		1908.5	-1.67	3.94	28.25	22.64	183.654	Horizontal	Pass
5.0MHz Band QPSK	25/0	1852.5	-1.03	3.77	28.31	23.51	224.388	Horizontal	Pass
		1880	-0.84	3.91	28.22	23.47	222.331	Horizontal	Pass
		1907.5	-0.60	3.94	28.20	23.66	232.274	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-1.99	3.77	28.31	22.55	179.887	Horizontal	Pass
		1880	-1.64	3.91	28.22	22.67	184.927	Horizontal	Pass
		1907.5	-1.90	3.94	28.20	22.36	172.187	Horizontal	Pass
10.0MHz Band QPSK	50/0	1855	-0.87	3.79	28.33	23.67	232.809	Horizontal	Pass
		1880	-0.56	3.95	28.22	23.71	234.963	Horizontal	Pass
		1905	-0.34	3.97	28.19	23.88	244.343	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1855	-1.53	3.79	28.33	23.01	199.986	Horizontal	Pass
		1880	-1.40	3.95	28.22	22.87	193.642	Horizontal	Pass
		1905	-1.53	3.97	28.19	22.69	185.780	Horizontal	Pass
15.0MHz Band QPSK	75/0	1857.5	-0.81	3.79	28.34	23.74	236.592	Horizontal	Pass
		1880	-0.50	3.95	28.22	23.77	238.232	Horizontal	Pass
		1902.5	-0.37	3.97	28.18	23.84	242.103	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1857.5	-2.06	3.79	28.34	22.49	177.419	Horizontal	Pass
		1880	-1.31	3.95	28.22	22.96	197.697	Horizontal	Pass
		1902.5	-1.54	3.97	28.18	22.67	184.927	Horizontal	Pass
20.0MHz Band	100/ 0	1860	-0.65	3.81	28.35	23.89	244.906	Horizontal	Pass
		1880	-0.35	3.96	28.22	23.91	246.037	Horizontal	Pass

QPSK		1900	-3.02	4.00	28.16	21.14	130.017	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1860	-3.59	3.81	28.35	20.95	124.451	Horizontal	Pass
		1880	-3.58	3.96	28.22	20.68	116.950	Horizontal	Pass
		1900	-3.43	4.00	28.16	20.73	118.304	Horizontal	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1710.7	-0.59	3.12	27.58	23.87	243.781	Vertical	Pass
		1732.5	-0.43	3.27	27.61	23.91	246.037	Vertical	Pass
		1754.3	-0.48	3.29	27.63	23.86	243.220	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-1.62	3.12	27.58	22.84	192.309	Vertical	Pass
		1732.5	-1.63	3.27	27.61	22.71	186.638	Vertical	Pass
		1754.3	-1.55	3.29	27.63	22.79	190.108	Vertical	Pass
3.0MHz Band QPSK	15/0	1711.5	-0.57	3.13	27.61	23.91	246.037	Vertical	Pass
		1732.5	-0.46	3.27	27.61	23.88	244.343	Vertical	Pass
		1753.5	-0.40	3.30	27.62	23.92	246.604	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-1.81	3.13	27.61	22.67	184.927	Vertical	Pass
		1732.5	-1.88	3.27	27.61	22.46	176.198	Vertical	Pass
		1753.5	-1.74	3.30	27.62	22.58	181.134	Vertical	Pass
5.0MHz Band QPSK	25/0	1712.5	-0.49	3.13	27.63	24.01	251.768	Vertical	Pass
		1732.5	-0.42	3.27	27.61	23.92	246.604	Vertical	Pass
		1752.5	-0.43	3.30	27.60	23.87	243.781	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-1.96	3.13	27.63	22.54	179.473	Vertical	Pass
		1732.5	-1.67	3.27	27.61	22.67	184.927	Vertical	Pass
		1752.5	-1.61	3.30	27.60	22.69	185.780	Vertical	Pass
10.0MHz Band QPSK	50/0	1715	-0.65	3.15	27.64	23.84	242.103	Vertical	Pass
		1732.5	-0.74	3.31	27.61	23.56	226.986	Vertical	Pass
		1750	-0.51	3.33	27.59	23.75	237.137	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1715	-1.75	3.15	27.64	22.74	187.932	Vertical	Pass
		1732.5	-1.69	3.31	27.61	22.61	182.390	Vertical	Pass
		1750	-1.67	3.33	27.59	22.59	181.552	Vertical	Pass
15.0MHz Band QPSK	75/0	1717.5	-0.56	3.15	27.65	23.94	247.742	Vertical	Pass
		1732.5	-1.12	3.31	27.61	23.18	207.970	Vertical	Pass
		1747.5	-0.13	3.33	27.57	24.11	257.632	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-1.79	3.15	27.65	22.71	186.638	Vertical	Pass
		1732.5	-1.84	3.31	27.61	22.46	176.198	Vertical	Pass
		1747.5	-1.65	3.33	27.57	22.59	181.552	Vertical	Pass

20.0MHz Band QPSK	100/0	1720	-0.46	3.17	27.66	24.03	252.930	Vertical	Pass
		1732.5	-0.34	3.32	27.61	23.95	248.313	Vertical	Pass
		1745	-0.33	3.36	27.56	23.87	243.781	Vertical	Pass
20.0MHz Band 16 QAM	100/0	1720	-1.78	3.17	27.66	22.71	186.638	Vertical	Pass
		1732.5	-1.71	3.32	27.61	22.58	181.134	Vertical	Pass
		1745	-1.57	3.36	27.56	22.63	183.231	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	1710.7	-0.95	3.12	27.58	23.51	224.388	Horizontal	Pass
		1732.5	-0.87	3.27	27.61	23.47	222.331	Horizontal	Pass
		1754.3	-1.06	3.29	27.63	23.28	212.814	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-2.02	3.12	27.58	22.44	175.388	Horizontal	Pass
		1732.5	-2.00	3.27	27.61	22.34	171.396	Horizontal	Pass
		1754.3	-2.18	3.29	27.63	22.16	164.437	Horizontal	Pass
3.0MHz Band QPSK	15/0	1711.5	-0.87	3.13	27.61	23.61	229.615	Horizontal	Pass
		1732.5	-0.75	3.27	27.61	23.59	228.560	Horizontal	Pass
		1753.5	-0.95	3.30	27.62	23.37	217.270	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-2.30	3.13	27.61	22.18	165.196	Horizontal	Pass
		1732.5	-2.28	3.27	27.61	22.06	160.694	Horizontal	Pass
		1753.5	-2.00	3.30	27.62	22.32	170.608	Horizontal	Pass
5.0MHz Band QPSK	25/0	1712.5	-0.86	3.13	27.63	23.64	231.206	Horizontal	Pass
		1732.5	-0.87	3.27	27.61	23.47	222.331	Horizontal	Pass
		1752.5	-0.91	3.30	27.60	23.39	218.273	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-2.37	3.13	27.63	22.13	163.305	Horizontal	Pass
		1732.5	-2.10	3.27	27.61	22.24	167.494	Horizontal	Pass
		1752.5	-2.03	3.30	27.60	22.27	168.655	Horizontal	Pass
10.0MHz Band QPSK	50/0	1715	-0.93	3.15	27.64	23.56	226.986	Horizontal	Pass
		1732.5	-0.88	3.31	27.61	23.42	219.786	Horizontal	Pass
		1750	-0.79	3.33	27.59	23.47	222.331	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1715	-2.15	3.15	27.64	22.34	171.396	Horizontal	Pass
		1732.5	-1.94	3.31	27.61	22.36	172.187	Horizontal	Pass
		1750	-2.01	3.33	27.59	22.25	167.880	Horizontal	Pass
15.0MHz Band QPSK	75/0	1717.5	-1.09	3.15	27.65	23.41	219.280	Horizontal	Pass
		1732.5	-0.92	3.31	27.61	23.38	217.771	Horizontal	Pass
		1747.5	-0.80	3.33	27.57	23.44	220.800	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-1.97	3.15	27.65	22.53	179.061	Horizontal	Pass
		1732.5	-2.14	3.31	27.61	22.16	164.437	Horizontal	Pass
		1747.5	-1.87	3.33	27.57	22.37	172.584	Horizontal	Pass
20.0MHz Band	100/0	1720	-0.81	3.17	27.66	23.68	233.346	Horizontal	Pass
		1732.5	-1.07	3.32	27.61	23.22	209.894	Horizontal	Pass

QPSK		1745	-0.65	3.36	27.56	23.55	226.464	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1720	-2.10	3.17	27.66	22.39	173.380	Horizontal	Pass
		1732.5	-2.05	3.32	27.61	22.24	167.494	Horizontal	Pass
		1745	-1.89	3.36	27.56	22.31	170.216	Horizontal	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.4 LTE BAND 5

Radiated Power (ERP) for Band 5										
Mode	RB/ RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	7.66	2.01	19.68	2.15	23.18	207.970	Vertical	Pass
		836.5	7.80	2.01	19.77	2.15	23.41	219.280	Vertical	Pass
		848.3	7.72	2.02	19.82	2.15	23.37	217.270	Vertical	Pass
1.4MHz Band 16 QAM	6/0	824.7	6.71	2.01	19.68	2.15	22.23	167.109	Vertical	Pass
		836.5	6.73	2.01	19.77	2.15	22.34	171.396	Vertical	Pass
		848.3	6.64	2.02	19.82	2.15	22.29	169.434	Vertical	Pass
3.0MHz Band QPSK	15/0	825.5	7.53	2.01	19.70	2.15	23.07	202.768	Vertical	Pass
		836.5	7.50	2.01	19.77	2.15	23.11	204.644	Vertical	Pass
		847.5	7.63	2.02	19.81	2.15	23.27	212.324	Vertical	Pass
3.0MHz Band 16 QAM	15/0	825.5	6.80	2.01	19.70	2.15	22.34	171.396	Vertical	Pass
		836.5	6.67	2.01	19.77	2.15	22.28	169.044	Vertical	Pass
		847.5	6.55	2.02	19.81	2.15	22.19	165.577	Vertical	Pass
5.0MHz Band QPSK	25/0	826.5	7.52	2.01	19.71	2.15	23.07	202.768	Vertical	Pass
		836.5	7.50	2.01	19.77	2.15	23.11	204.644	Vertical	Pass
		846.5	7.44	2.02	19.79	2.15	23.06	202.302	Vertical	Pass
5.0MHz Band 16 QAM	25/0	826.5	6.60	2.01	19.71	2.15	22.15	164.059	Vertical	Pass
		836.5	6.57	2.01	19.77	2.15	22.18	165.196	Vertical	Pass
		846.5	6.59	2.02	19.79	2.15	22.21	166.341	Vertical	Pass
10.0MHz Band QPSK	50/0	829	7.78	2.01	19.73	2.15	23.35	216.272	Vertical	Pass
		836.5	7.67	2.01	19.77	2.15	23.28	212.814	Vertical	Pass
		844	7.63	2.02	19.78	2.15	23.24	210.863	Vertical	Pass
10.0MHz Band 16 QAM	50/0	829	6.85	2.01	19.73	2.15	22.42	174.582	Vertical	Pass
		836.5	6.55	2.01	19.77	2.15	22.16	164.437	Vertical	Pass
		844	6.66	2.02	19.78	2.15	22.27	168.655	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (ERP) for Band 5										
Mode	RB/ RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	7.46	2.01	19.68	2.15	22.98	198.609	Horizontal	Pass
		836.5	7.43	2.01	19.77	2.15	23.04	201.372	Horizontal	Pass
		848.3	7.36	2.02	19.82	2.15	23.01	199.986	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	824.7	6.45	2.01	19.68	2.15	21.97	157.398	Horizontal	Pass
		836.5	6.13	2.01	19.77	2.15	21.74	149.279	Horizontal	Pass
		848.3	6.24	2.02	19.82	2.15	21.89	154.525	Horizontal	Pass
3.0MHz Band QPSK	15/0	825.5	7.31	2.01	19.70	2.15	22.85	192.752	Horizontal	Pass
		836.5	7.38	2.01	19.77	2.15	22.99	199.067	Horizontal	Pass
		847.5	7.29	2.02	19.81	2.15	22.93	196.336	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	825.5	6.25	2.01	19.70	2.15	21.79	151.008	Horizontal	Pass
		836.5	6.23	2.01	19.77	2.15	21.84	152.757	Horizontal	Pass
		847.5	6.19	2.02	19.81	2.15	21.83	152.405	Horizontal	Pass
5.0MHz Band QPSK	25/0	826.5	7.13	2.01	19.71	2.15	22.68	185.353	Horizontal	Pass
		836.5	7.15	2.01	19.77	2.15	22.76	188.799	Horizontal	Pass
		846.5	7.19	2.02	19.79	2.15	22.81	190.985	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	826.5	6.29	2.01	19.71	2.15	21.84	152.757	Horizontal	Pass
		836.5	6.08	2.01	19.77	2.15	21.69	147.571	Horizontal	Pass
		846.5	6.15	2.02	19.79	2.15	21.77	150.314	Horizontal	Pass
10.0MHz Band QPSK	50/0	829	7.47	2.01	19.73	2.15	23.04	201.372	Horizontal	Pass
		836.5	7.30	2.01	19.77	2.15	22.91	195.434	Horizontal	Pass
		844	7.20	2.02	19.78	2.15	22.81	190.985	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	829	6.09	2.01	19.73	2.15	21.66	146.555	Horizontal	Pass
		836.5	6.12	2.01	19.77	2.15	21.73	148.936	Horizontal	Pass
		844	6.04	2.02	19.78	2.15	21.65	146.218	Horizontal	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.5 LTE BAND 7

Radiated Power (EIRP) for Band 7									
Mode	RB/ RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	25/0	2502.5	0.44	4.54	27.75	23.65	231.739	Vertical	Pass
		2535	0.68	4.69	27.72	23.71	234.963	Vertical	Pass
		2567.5	0.69	4.71	27.71	23.69	233.884	Vertical	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-0.70	4.54	27.75	22.51	178.238	Vertical	Pass
		2535	-0.40	4.69	27.72	22.63	183.231	Vertical	Pass
		2567.5	-0.32	4.71	27.71	22.68	185.353	Vertical	Pass
10.0MHz Band QPSK	50/0	2505	0.40	4.55	27.76	23.61	229.615	Vertical	Pass
		2535	0.55	4.69	27.72	23.58	228.034	Vertical	Pass
		2565	0.49	4.72	27.70	23.47	222.331	Vertical	Pass
10.0MHz Band 16 QAM	50/0	2505	-0.77	4.55	27.76	22.44	175.388	Vertical	Pass
		2535	-0.57	4.69	27.72	22.46	176.198	Vertical	Pass
		2565	-0.45	4.72	27.70	22.53	179.061	Vertical	Pass
15.0MHz Band QPSK	75/0	2507.5	0.39	4.55	27.77	23.61	229.615	Vertical	Pass
		2535	0.56	4.69	27.72	23.59	228.560	Vertical	Pass
		2562.5	0.74	4.72	27.69	23.71	234.963	Vertical	Pass
15.0MHz Band 16 QAM	75/0	2507.5	-0.65	4.55	27.77	22.57	180.717	Vertical	Pass
		2535	-0.65	4.69	27.72	22.38	172.982	Vertical	Pass
		2562.5	-0.58	4.72	27.69	22.39	173.380	Vertical	Pass
20.0MHz Band QPSK	100/ 0	2510	0.20	4.57	27.78	23.41	219.280	Vertical	Pass
		2535	0.47	4.73	27.72	23.46	221.820	Vertical	Pass
		2560	0.58	4.75	27.68	23.51	224.388	Vertical	Pass
20.0MHz Band 16 QAM	100/ 0	2510	-0.85	4.57	27.78	22.36	172.187	Vertical	Pass
		2535	-0.51	4.73	27.72	22.48	177.011	Vertical	Pass
		2560	-0.41	4.75	27.68	22.52	178.649	Vertical	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 7									
Mode	RB/ RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	25/0	2502.5	0.06	4.54	27.75	23.27	212.324	Horizontal	Pass
		2535	0.32	4.69	27.72	23.35	216.272	Horizontal	Pass
		2567.5	0.37	4.71	27.71	23.37	217.270	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-0.94	4.54	27.75	22.27	168.655	Horizontal	Pass
		2535	-0.87	4.69	27.72	22.16	164.437	Horizontal	Pass
		2567.5	-0.89	4.71	27.71	22.11	162.555	Horizontal	Pass
10.0MHz Band QPSK	50/0	2505	-0.03	4.55	27.76	23.18	207.970	Horizontal	Pass
		2535	0.08	4.69	27.72	23.11	204.644	Horizontal	Pass
		2565	0.11	4.72	27.70	23.09	203.704	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	2505	-1.09	4.55	27.76	22.12	162.930	Horizontal	Pass
		2535	-1.08	4.69	27.72	21.95	156.675	Horizontal	Pass
		2565	-0.91	4.72	27.70	22.07	161.065	Horizontal	Pass
15.0MHz Band QPSK	75/0	2507.5	-0.09	4.55	27.77	23.13	205.589	Horizontal	Pass
		2535	0.23	4.69	27.72	23.26	211.836	Horizontal	Pass
		2562.5	0.27	4.72	27.69	23.24	210.863	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	2507.5	-1.21	4.55	27.77	22.01	158.855	Horizontal	Pass
		2535	-1.06	4.69	27.72	21.97	157.398	Horizontal	Pass
		2562.5	-0.98	4.72	27.69	21.99	158.125	Horizontal	Pass
20.0MHz Band QPSK	100/0	2510	0.08	4.57	27.78	23.29	213.304	Horizontal	Pass
		2535	0.32	4.73	27.72	23.31	214.289	Horizontal	Pass
		2560	0.29	4.75	27.68	23.22	209.894	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	2510	-1.05	4.57	27.78	22.16	164.437	Horizontal	Pass
		2535	-0.94	4.73	27.72	22.05	160.325	Horizontal	Pass
		2560	-0.76	4.75	27.68	22.17	164.816	Horizontal	Pass

Note:
SG Level= Signal generator output
Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

9. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27.53

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

§27.53 (g) For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.

The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:
a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB; and
b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB at the channel edges and 55 + 10 Log10 (p) at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- ☐ LTE Band5
- LTE Band 7

RESULTS

PASS

9.1 LTE BAND 2

QPSK EIRP POWER FOR LTE BAND 2 (1.4.0MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
3701.4	-56.29	4.04	33.51	-26.82	-13	-13.82	Horizontal
3701.4	-55.41	4.04	33.51	-25.94	-13	-12.94	Vertical
5552.1	-55.85	5.24	35.84	-25.25	-13	-12.25	Vertical
5552.1	-59.82	5.24	35.84	-29.22	-13	-16.22	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760.0	-53.64	4.04	33.56	-24.12	-13	-11.12	Horizontal
3760.0	-57.41	4.04	33.56	-27.89	-13	-14.89	Vertical
5640.0	-55.58	5.24	35.91	-24.91	-13	-11.91	Vertical
5640.0	-56.98	5.24	35.91	-26.31	-13	-13.31	Horizontal
Test Results for High Channel 1754.3MHz							
3818.6	-54.12	4.04	34.00	-24.16	-13	-11.16	Horizontal
3818.6	-53.62	4.04	34.00	-23.66	-13	-10.66	Vertical
5727.9	-58.97	5.24	36.04	-28.17	-13	-15.17	Vertical
5727.9	-56.48	5.24	36.04	-25.68	-13	-12.68	Horizontal

QPSK EIRP POWER FOR LTE BAND 2 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
3720	-57.61	4.07	33.54	-28.14	-13	-15.14	Horizontal
3720	-54.62	4.07	33.54	-25.15	-13	-12.15	Vertical
5580	-57.62	5.28	35.86	-27.04	-13	-14.04	Vertical
5580	-56.13	5.28	35.86	-25.55	-13	-12.55	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760	-55.52	4.04	33.56	-26.00	-13	-13.00	Horizontal
3760	-54.48	4.04	33.56	-24.96	-13	-11.96	Vertical
5640	-56.96	5.24	35.91	-26.29	-13	-13.29	Vertical
5640	-57.13	5.24	35.91	-26.46	-13	-13.46	Horizontal
Test Results for High Channel 1754.3MHz							
3800	-57.94	4.04	34.00	-27.98	-13	-14.98	Horizontal
3800	-57.48	4.04	34.00	-27.52	-13	-14.52	Vertical
5700	-57.63	5.24	36.04	-26.83	-13	-13.83	Vertical
5700	-57.41	5.24	36.04	-26.61	-13	-13.61	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. We test both H direction and V direction, recorded worst case direction.

9.2 LTE BAND 4

QPSK EIRP POWER FOR LTE BAND 4 (1.4.0MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
3421.4	-53.62	4.02	29.80	-27.84	-13	-14.84	Horizontal
3421.4	-56.69	4.02	29.80	-30.91	-13	-17.91	Vertical
5132.1	-57.84	5.24	35.84	-27.24	-13	-14.24	Vertical
5132.1	-56.62	5.24	35.84	-26.02	-13	-13.02	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-52.13	4.03	30.00	-26.16	-13	-13.16	Horizontal
3465.0	-53.62	4.03	30.00	-27.65	-13	-14.65	Vertical
5197.5	-57.46	5.25	35.86	-26.85	-13	-13.85	Vertical
5197.5	-55.28	5.25	35.86	-24.67	-13	-11.67	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-54.11	4.05	30.01	-28.15	-13	-15.15	Horizontal
3508.6	-56.62	4.05	30.01	-30.66	-13	-17.66	Vertical
5262.9	-53.92	5.26	35.86	-23.32	-13	-10.32	Vertical
5262.9	-52.87	5.26	35.86	-22.27	-13	-9.27	Horizontal

QPSK EIRP POWER FOR LTE BAND 4 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
3440.0	-53.69	4.02	29.80	-27.91	-13	-14.91	Horizontal
3440.0	-53.74	4.02	29.80	-27.96	-13	-14.96	Vertical
5160.0	-59.98	5.24	35.84	-29.38	-13	-16.38	Vertical
5160.0	-57.84	5.24	35.84	-27.24	-13	-14.24	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-52.24	4.03	30.00	-26.27	-13	-13.27	Horizontal
3465.0	-55.11	4.03	30.00	-29.14	-13	-16.14	Vertical
5197.5	-56.62	5.25	35.86	-26.01	-13	-13.01	Vertical
5197.5	-54.49	5.25	35.86	-23.88	-13	-10.88	Horizontal
Test Results for High Channel 1754.3MHz							
2490.0	-52.32	2.91	27.68	-27.55	-13	-14.55	Horizontal
3490.0	-53.64	2.91	27.68	-28.87	-13	-15.87	Vertical
5235.0	-54.41	5.26	35.86	-23.81	-13	-10.81	Vertical
5235.0	-55.58	5.26	35.86	-24.98	-13	-11.98	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. We test both H direction and V direction, recorded worst case direction.

9.3 LTE BAND 5

QPSK EIRP POWER FOR LTE BAND 5 (1.4MHZ BANDWIDTH)

Test Results for Low Channel 824.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
1649.4	-54.41	2.78	27.50	-29.69	-13	-16.69	Horizontal
1649.4	-55.28	2.78	27.50	-30.56	-13	-17.56	Vertical
2474.1	-53.96	2.90	27.80	-29.06	-13	-16.06	Vertical
2474.1	-51.47	2.90	27.80	-26.57	-13	-13.57	Horizontal
Test Results For Mid Channel 836.5MHz							
1673.0	-52.98	2.78	27.48	-28.28	-13	-15.28	Horizontal
1673.0	-51.11	2.78	27.48	-26.41	-13	-13.41	Vertical
2509.5	-53.62	2.91	27.70	-28.83	-13	-15.83	Vertical
2509.5	-53.68	2.91	27.70	-28.89	-13	-15.89	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-53.52	2.78	27.43	-28.87	-13	-15.87	Horizontal
1696.6	-56.58	2.78	27.43	-31.93	-13	-18.93	Vertical
2544.9	-52.42	2.92	27.74	-27.60	-13	-14.60	Vertical
2544.9	-53.67	2.92	27.74	-28.85	-13	-15.85	Horizontal

QPSK EIRP POWER FOR LTE BAND 5 (10MHZ BANDWIDTH)

Test Results for Low Channel 824.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
1658.0	-54.49	2.78	27.50	-29.77	-13	-16.77	Horizontal
1658.0	-53.62	2.78	27.50	-28.90	-13	-15.90	Vertical
2487.0	-55.52	2.90	27.80	-30.62	-13	-17.62	Vertical
2487.0	-53.14	2.90	27.80	-28.24	-13	-15.24	Horizontal
Test Results For Mid Channel 836.5MHz							
1673.0	-52.64	2.78	27.48	-27.94	-13	-14.94	Horizontal
1673.0	-53.47	2.78	27.48	-28.77	-13	-15.77	Vertical
2509.5	-54.26	2.91	27.70	-29.47	-13	-16.47	Vertical
2509.5	-53.98	2.91	27.70	-29.19	-13	-16.19	Horizontal
Test Results for High Channel 848.3MHz							
1688.0	-52.29	2.78	27.43	-27.64	-13	-14.64	Horizontal
1688.0	-51.63	2.78	27.43	-26.98	-13	-13.98	Vertical
2532.0	-55.26	2.92	27.74	-30.44	-13	-17.44	Vertical
2532.0	-53.74	2.92	27.74	-28.92	-13	-15.92	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. We test both H direction and V direction, recorded worst case direction.

9.4 LTE BAND 7

QPSK EIRP POWER FOR LTE BAND 7 (5.0MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
5005.0	-53.62	5.23	35.81	-23.04	-13	-10.04	Horizontal
5005.0	-51.11	5.23	35.81	-20.53	-13	-7.53	Vertical
7507.5	-54.46	5.67	36.85	-23.28	-13	-10.28	Vertical
7507.5	-53.92	5.67	36.85	-22.74	-13	-9.74	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070.0	-53.74	5.23	35.82	-23.15	-13	-10.15	Horizontal
5070.0	-54.49	5.23	35.82	-23.90	-13	-10.90	Vertical
7605.0	-55.52	5.67	36.85	-24.34	-13	-11.34	Vertical
7605.0	-56.82	5.67	36.85	-25.64	-13	-12.64	Horizontal
Test Results for High Channel 1754.3MHz							
5135.0	-56.29	5.24	35.83	-25.70	-13	-12.70	Horizontal
5135.0	-53.61	5.24	35.83	-23.02	-13	-10.02	Vertical
7702.5	-54.47	5.68	36.87	-23.28	-13	-10.28	Vertical
7702.5	-58.13	5.68	36.87	-26.94	-13	-13.94	Horizontal

QPSK EIRP POWER FOR LTE BAND 7 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit （dBm）	Margin(dBm)	Polarity
5020	-57.11	5.23	35.82	-26.52	-13	-13.52	Horizontal
5020	-56.26	5.23	35.82	-25.67	-13	-12.67	Vertical
7530	-56.23	5.67	36.86	-25.04	-13	-12.04	Vertical
7530	-52.47	5.67	36.86	-21.28	-13	-8.28	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-53.84	5.23	35.82	-23.25	-13	-10.25	Horizontal
5070	-54.49	5.23	35.82	-23.90	-13	-10.90	Vertical
7605	-54.73	5.67	36.85	-23.55	-13	-10.55	Vertical
7605	-53.92	5.67	36.85	-22.74	-13	-9.74	Horizontal
Test Results for High Channel 1754.3MHz							
5120	-56.98	5.24	35.83	-26.39	-13	-13.39	Horizontal
5120	-54.41	5.24	35.83	-23.82	-13	-10.82	Vertical
7680	-58.52	5.70	36.88	-27.34	-13	-14.34	Vertical
7680	-56.96	5.70	36.88	-25.78	-13	-12.78	Horizontal

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

. We test both H direction and V direction, recorded worst case direction.

10. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage =low voltage,DC 3.66V, Normal, DC 3.85V and High voltage, DC 4.43V.

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to -30ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

- LTE Band 2

LTE Band 4

- LTE Band5

LTE Band 7

RESULTS

See the following pages.

10.1 LTE BAND 2

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.45	1880	6.5	0.003457	2.5
3.8	1880	-12.4	-0.006596	2.5
4.35	1880	9.8	0.005213	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	7.7	0.004096	2.5
Extreme (50C)	1880	-6.5	-0.003457	2.5
Extreme (40C)	1880	-7.7	-0.004096	2.5
Extreme (30C)	1880	-7.3	-0.003883	2.5
Extreme (10C)	1880	8.4	0.004468	2.5
Extreme (0C)	1880	11.1	0.005904	2.5
Extreme (-10C)	1880	10.0	0.005319	2.5
Extreme (-20C)	1880	9.5	0.005053	2.5
Extreme (-30C)	1880	-6.8	-0.003617	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.45	1880	10.3	0.005479	2.5
3.8	1880	5.6	0.002979	2.5
4.35	1880	7.1	0.003777	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	-6.9	-0.003670	2.5
Extreme (50C)	1880	4.7	0.002500	2.5
Extreme (40C)	1880	-5.8	-0.003085	2.5
Extreme (30C)	1880	9.0	0.004787	2.5
Extreme (10C)	1880	-11.2	-0.005957	2.5
Extreme (0C)	1880	-9.6	-0.005106	2.5
Extreme (-10C)	1880	-10.5	-0.005585	2.5
Extreme (-20C)	1880	-7.3	-0.003883	2.5
Extreme (-30C)	1880	6.8	0.003617	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.2 LTE BAND 4

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.45	1732.5	11.1	0.006407	2.5
3.8	1732.5	5.2	0.003001	2.5
4.35	1732.5	6.9	0.003983	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	-11.2	-0.006465	2.5
Extreme (50C)	1732.5	6.0	0.003463	2.5
Extreme (40C)	1732.5	7.1	0.004098	2.5
Extreme (30C)	1732.5	-8.5	-0.004906	2.5
Extreme (10C)	1732.5	-10.3	-0.005945	2.5
Extreme (0C)	1732.5	11.2	0.006465	2.5
Extreme (-10C)	1732.5	8.9	0.005137	2.5
Extreme (-20C)	1732.5	10.1	0.005830	2.5
Extreme (-30C)	1732.5	4.6	0.002655	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.45	1732.5	7.4	0.004271	2.5
3.8	1732.5	-6.3	-0.003636	2.5
4.35	1732.5	-4.0	-0.002309	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	11.0	0.006349	2.5
Extreme (50C)	1732.5	9.4	0.005426	2.5
Extreme (40C)	1732.5	7.8	0.004502	2.5
Extreme (30C)	1732.5	-10.2	-0.005887	2.5
Extreme (10C)	1732.5	-6.9	-0.003983	2.5
Extreme (0C)	1732.5	-11.4	-0.006580	2.5
Extreme (-10C)	1732.5	8.5	0.004906	2.5
Extreme (-20C)	1732.5	7.9	0.004560	2.5
Extreme (-30C)	1732.5	8.0	0.004618	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.3 LTE BAND 5

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.45	836.5	9.0	0.010759	2.5
3.8	836.5	8.5	0.010161	2.5
4.35	836.5	7.7	0.009205	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 QPSK, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	836.5	-6.9	-0.008249	2.5
Extreme (50C)	836.5	-10.1	-0.012074	2.5
Extreme (40C)	836.5	-11.4	-0.013628	2.5
Extreme (30C)	836.5	5.2	0.006216	2.5
Extreme (10C)	836.5	6.4	0.007651	2.5
Extreme (0C)	836.5	8.8	0.010520	2.5
Extreme (-10C)	836.5	-6.3	-0.007531	2.5
Extreme (-20C)	836.5	7.4	0.008846	2.5
Extreme (-30C)	836.5	-5.3	-0.006336	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.45	836.5	6.6	0.007890	2.5
3.8	836.5	7.4	0.008846	2.5
4.35	836.5	-11.3	-0.013509	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 16QAM, (CH 20525 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	836.5	12.4	0.014824	2.5
Extreme (50C)	836.5	6.7	0.008010	2.5
Extreme (40C)	836.5	9.5	0.011357	2.5
Extreme (30C)	836.5	-8.5	-0.010161	2.5
Extreme (10C)	836.5	-6.4	-0.007651	2.5
Extreme (0C)	836.5	4.6	0.005499	2.5
Extreme (-10C)	836.5	6.0	0.007173	2.5
Extreme (-20C)	836.5	7.9	0.009444	2.5
Extreme (-30C)	836.5	9.2	0.010998	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.4 LTE BAND 7

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.45	2535	-8.2	-0.003235	2.5
3.8	2535	6.7	0.002643	2.5
4.35	2535	9.3	0.003669	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 QPSK, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	2535	6.5	0.002564	2.5
Extreme (50C)	2535	8.1	0.003195	2.5
Extreme (40C)	2535	-10.0	-0.003945	2.5
Extreme (30C)	2535	-11.2	-0.004418	2.5
Extreme (10C)	2535	-8.9	-0.003511	2.5
Extreme (0C)	2535	-5.6	-0.002209	2.5
Extreme (-10C)	2535	10.5	0.004142	2.5
Extreme (-20C)	2535	12.4	0.004892	2.5
Extreme (-30C)	2535	8.7	0.003432	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.45	2535	-11.4	-0.004497	2.5
3.8	2535	-8.5	-0.003353	2.5
4.35	2535	6.9	0.002722	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 7 16QAM, (CH 21100 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	2535	6.4	0.002525	2.5
Extreme (50C)	2535	7.0	0.002761	2.5
Extreme (40C)	2535	7.8	0.003077	2.5
Extreme (30C)	2535	8.1	0.003195	2.5
Extreme (10C)	2535	-11.2	-0.004418	2.5
Extreme (0C)	2535	-8.9	-0.003511	2.5
Extreme (-10C)	2535	-9.3	-0.003669	2.5
Extreme (-20C)	2535	4.1	0.001617	2.5
Extreme (-30C)	2535	6.5	0.002564	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

11. Peak-to-Average Ratio

11.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

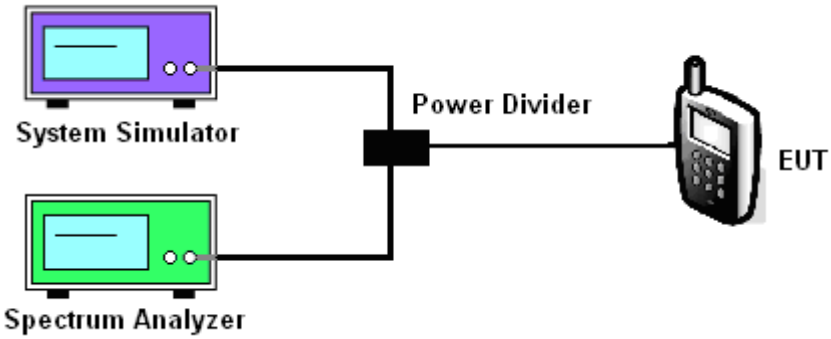
11.2 Measuring Instruments

See list of measuring instruments of this test report.

11.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. For GSM/EGPRS operating modes:
   a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
   b. Set EUT in maximum power output, and triggered the burst signal.
   c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS operating modes:
   a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
   b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

11.4 Test Setup



MODES TESTED

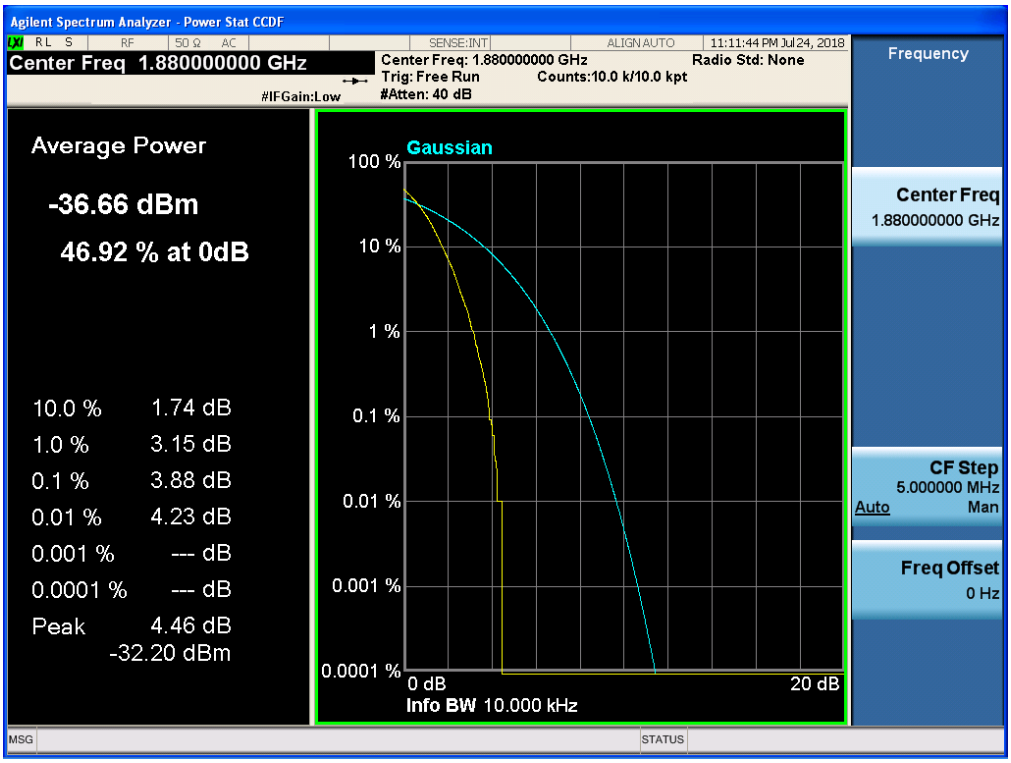
- ☐ LTE Band2
- LTE Band 4
- ☐ LTE Band5
- ☐ LTE Band 7

BAND	CHANNEL	Frequency [MHz]	BANDWIDTH	NO. RB	RB POS.	MODULATION	PAR [dB]
2	18900	1880.0	1.4	1	Low	QPSK	3.87
2	18900	1880.0	1.4	1	Low	16-QAM	4.22
2	18900	1880.0	3.0	1	Low	QPSK	4.39
2	18900	1880.0	3.0	1	Low	16-QAM	4.54
2	18900	1880.0	5.0	1	Low	QPSK	1.97
2	18900	1880.0	5.0	1	Low	16-QAM	2.09
2	18900	1880.0	10.0	1	Low	QPSK	1.32
2	18900	1880.0	10.0	1	Low	16-QAM	1.52
2	18900	1880.0	15.0	1	Low	QPSK	1.43
2	18900	1880.0	15.0	1	Low	16-QAM	1.62
2	18900	1880.0	20.0	1	Low	QPSK	1.47
2	18900	1880.0	20.0	1	Low	16-QAM	1.50
4	20175	1732.5	1.4	1	Low	QPSK	4.84
4	20175	1732.5	1.4	1	Low	16-QAM	5.09
4	20175	1732.5	3.0	1	Low	QPSK	6.10
4	20175	1732.5	3.0	1	Low	16-QAM	5.61
4	20175	1732.5	5.0	1	Low	QPSK	2.42
4	20175	1732.5	5.0	1	Low	16-QAM	2.21
4	20175	1732.5	10.0	1	Low	QPSK	1.29
4	20175	1732.5	10.0	1	Low	16-QAM	1.37

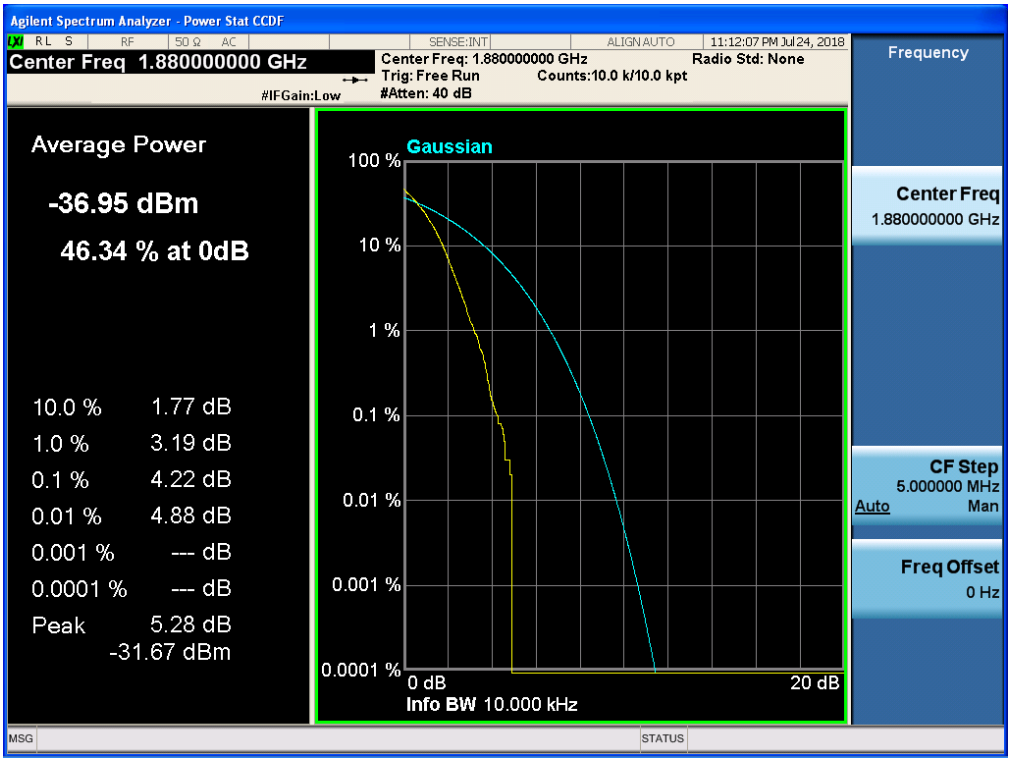
4	20175	1732.5	15.0	1	Low	QPSK	1.34
4	20175	1732.5	15.0	1	Low	16-QAM	1.31
4	20175	1732.5	20.0	1	Low	QPSK	1.21
4	20175	1732.5	20.0	1	Low	16-QAM	1.47
5	20525	836.5	1.4	1	Low	QPSK	8.21
5	20525	836.5	1.4	1	Low	16-QAM	8.37
5	20525	836.5	3.0	1	Low	QPSK	10.00
5	20525	836.5	3.0	1	Low	16-QAM	9.40
5	20525	836.5	5.0	1	Low	QPSK	3.31
5	20525	836.5	5.0	1	Low	16-QAM	3.73
5	20525	836.5	10.0	1	Low	QPSK	2.37
5	20525	836.5	10.0	1	Low	16-QAM	2.56
7	21100	2535.0	5.0	1	Low	QPSK	7.25
7	21100	2535.0	5.0	1	Low	16-QAM	7.68
7	21100	2535.0	10.0	1	Low	QPSK	7.59
7	21100	2535.0	10.0	1	Low	16-QAM	1.70
7	21100	2535.0	15.0	1	Low	QPSK	2.45
7	21100	2535.0	15.0	1	Low	16-QAM	2.47
7	21100	2535.0	20.0	1	Low	QPSK	2.20
7	21100	2535.0	20.0	1	Low	16-QAM	2.21

11.5 LTE BAND 2

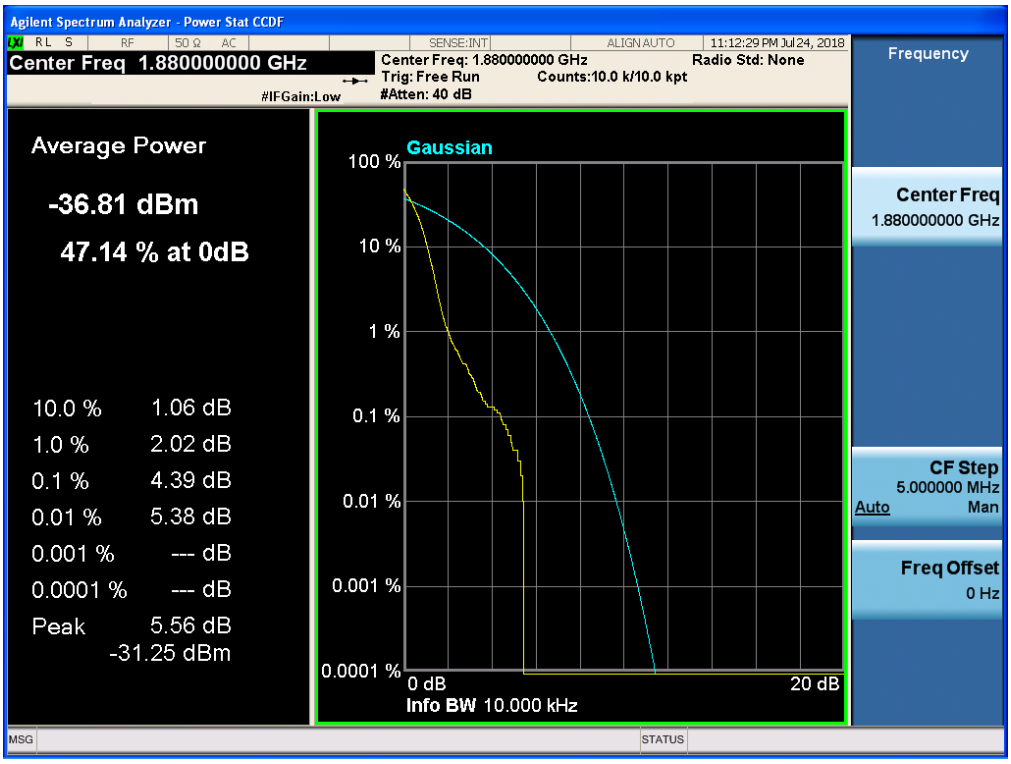
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 1.4,NO. RB 1,RB POS. Low,QPSK



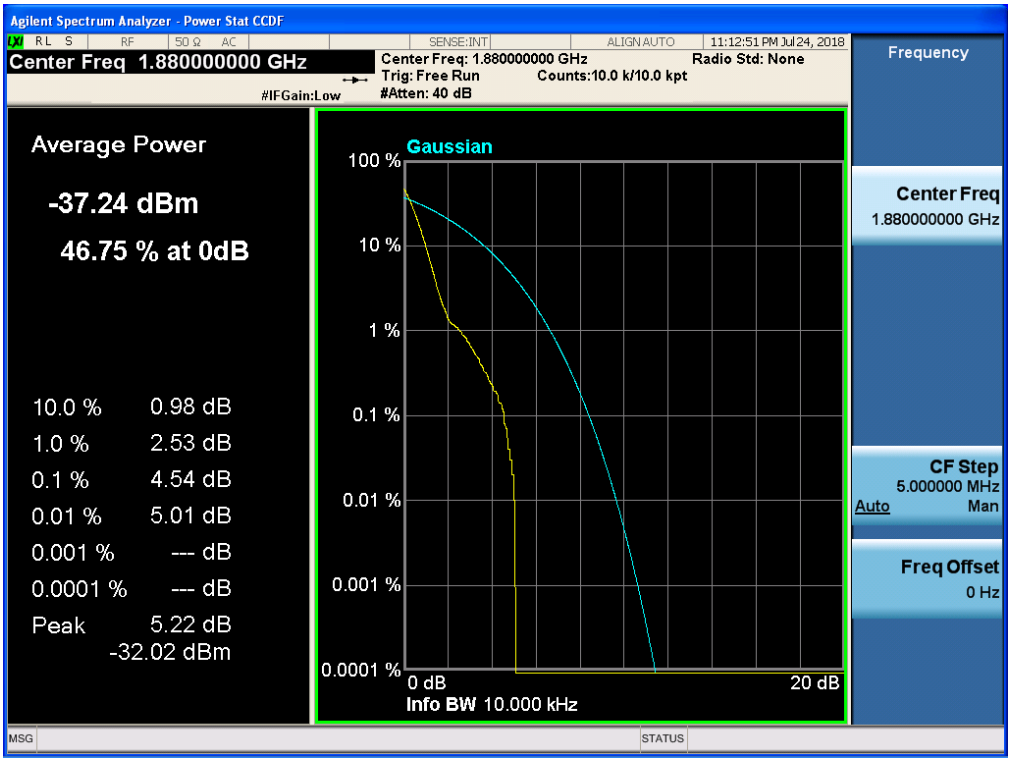
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 1.4,NO. RB 1,RB POS. Low,16-QAM



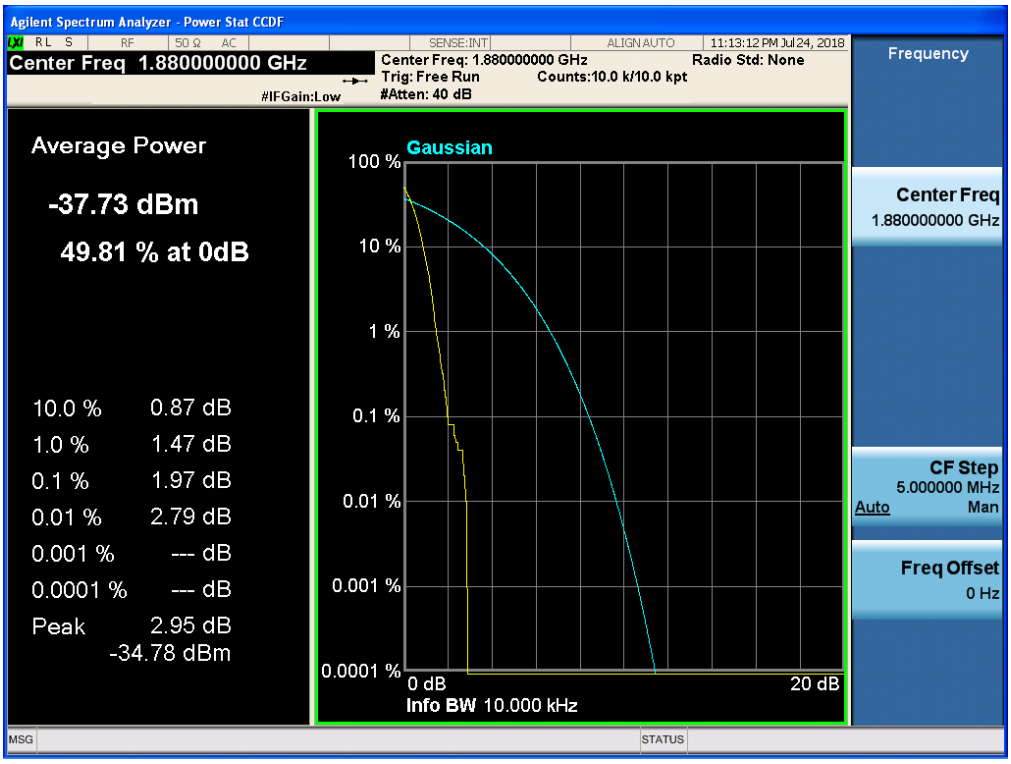
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 3.0,NO. RB 1,RB POS. Low,QPSK



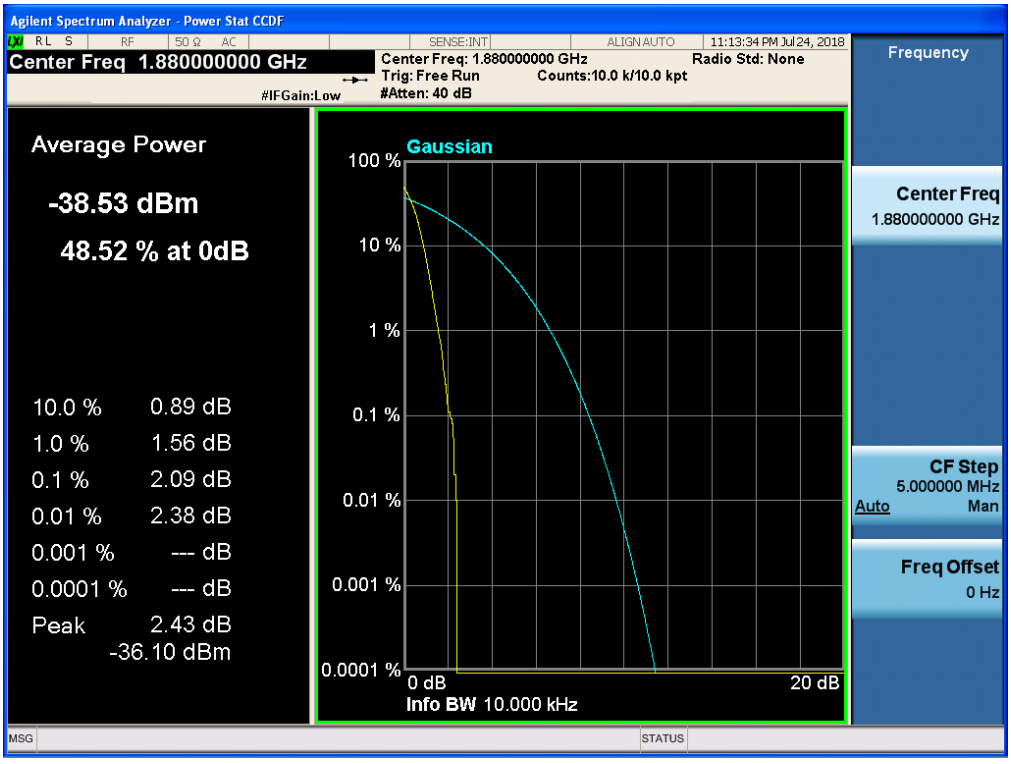
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 3.0,NO. RB 1,RB POS. Low,16-QAM



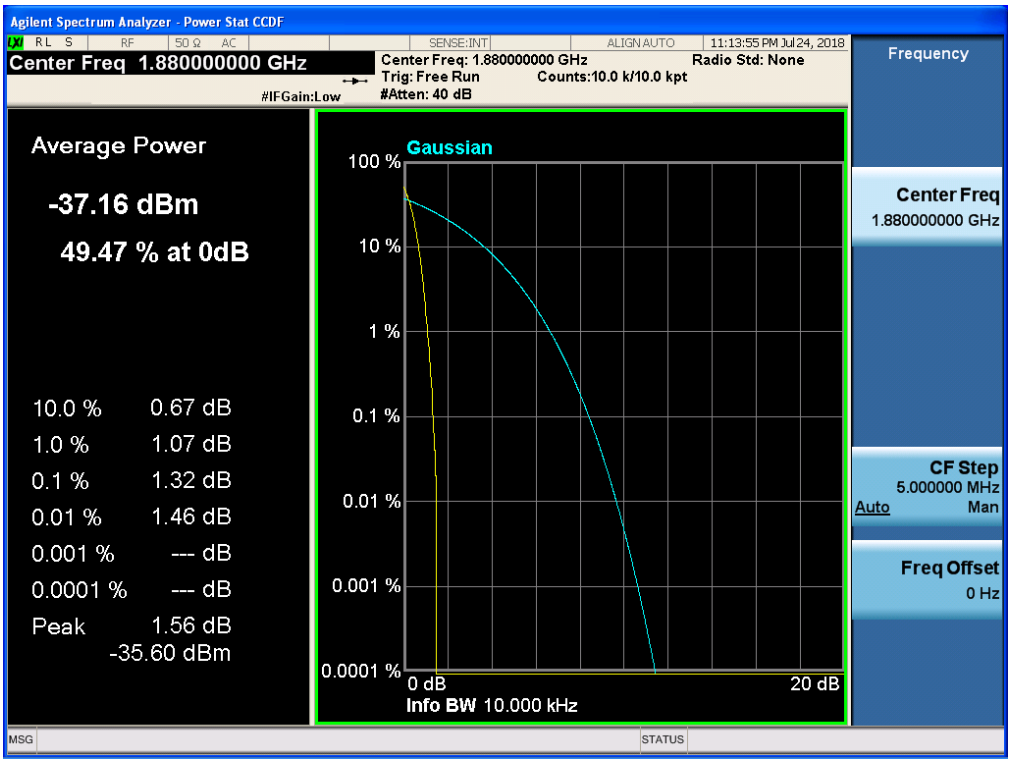
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 5.0,NO. RB 1,RB POS. Low,QPSK



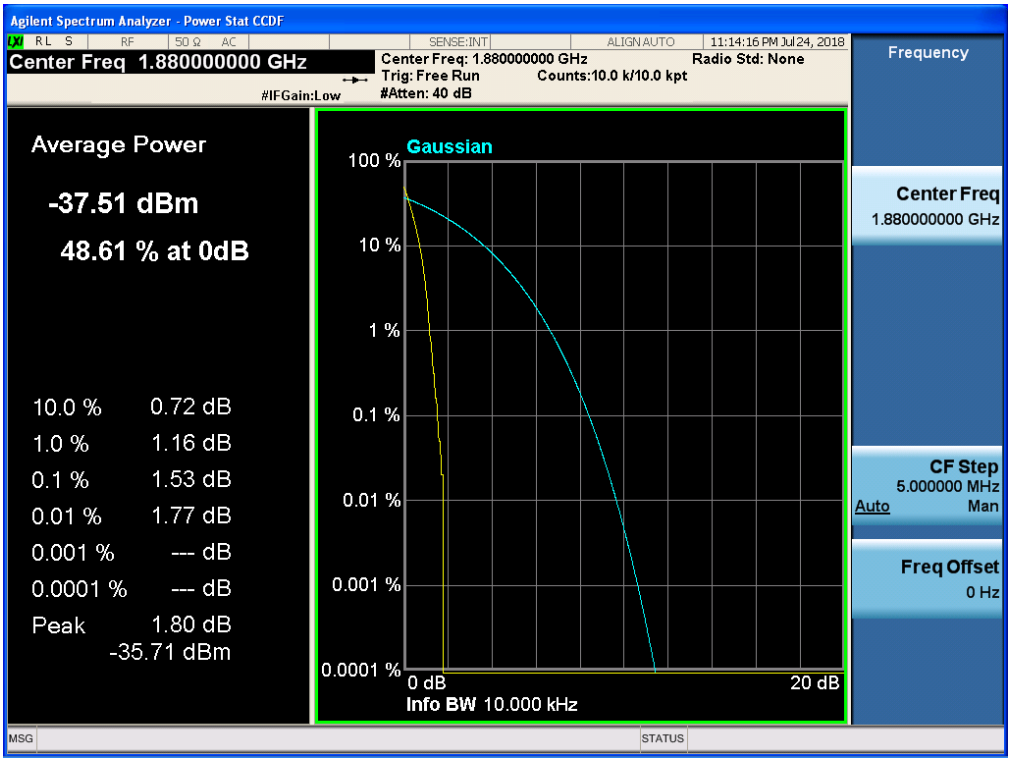
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



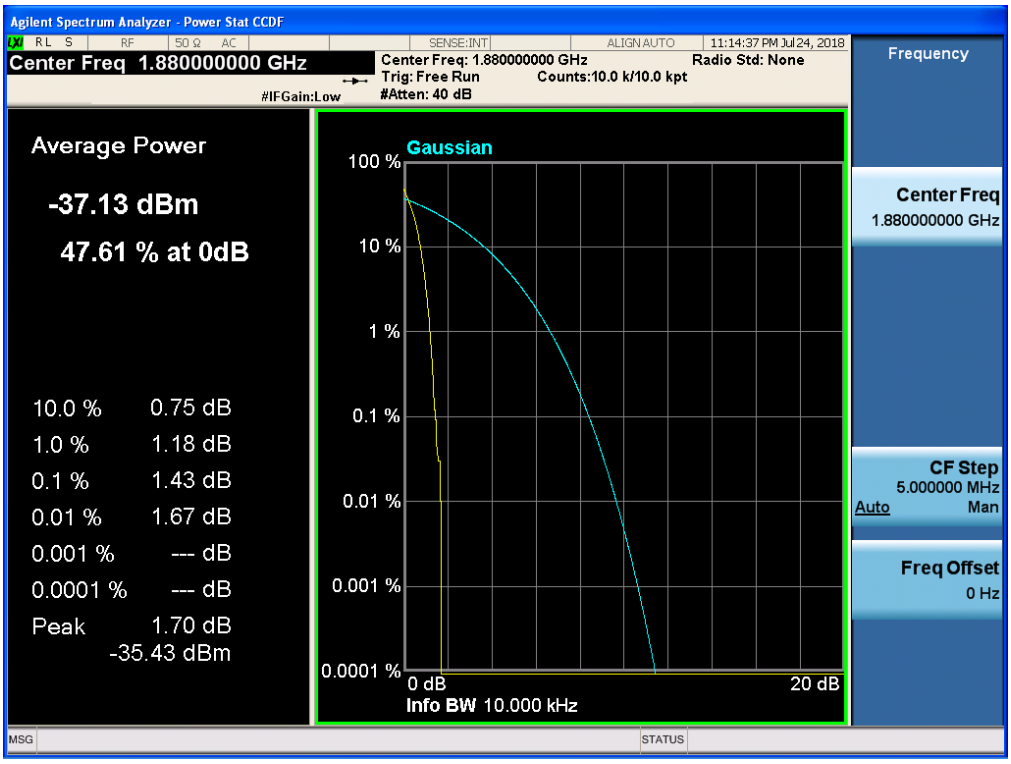
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 10.0,NO. RB 1,RB POS. Low,QPSK



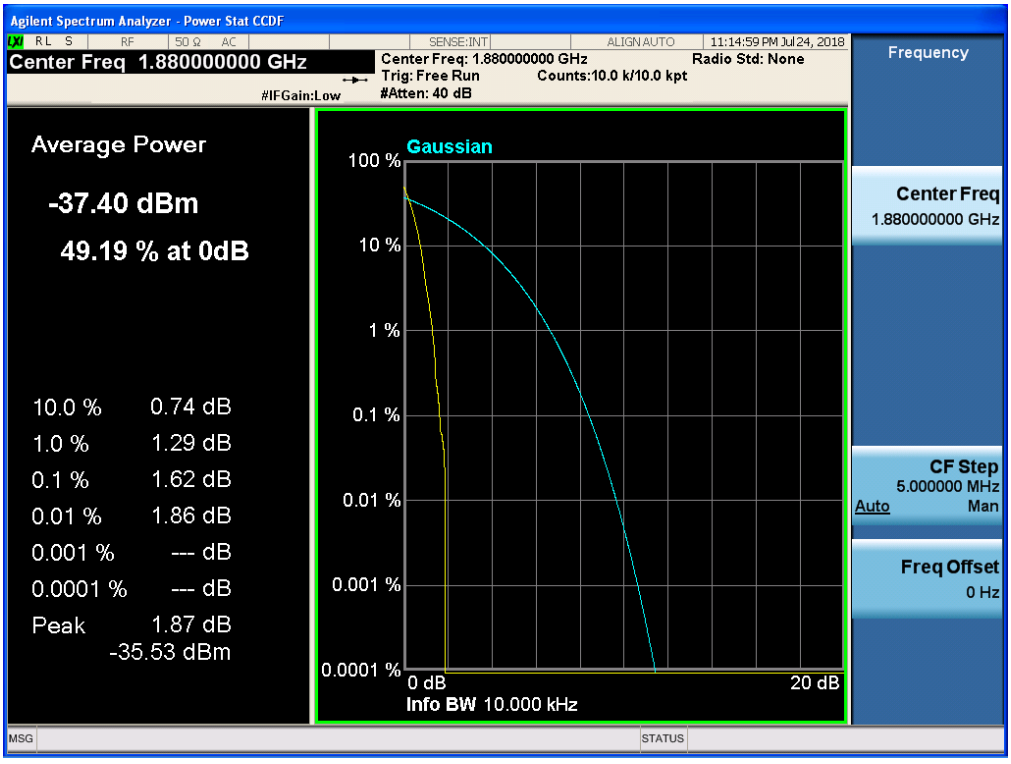
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



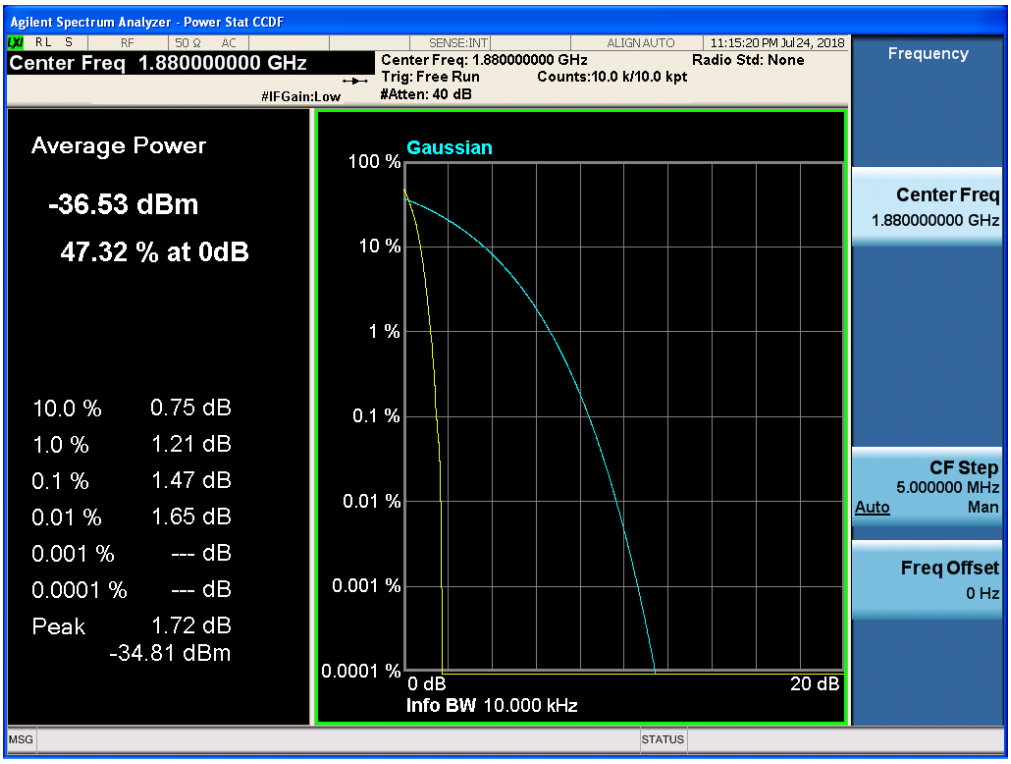
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 15.0,NO. RB 1,RB POS. Low,QPSK



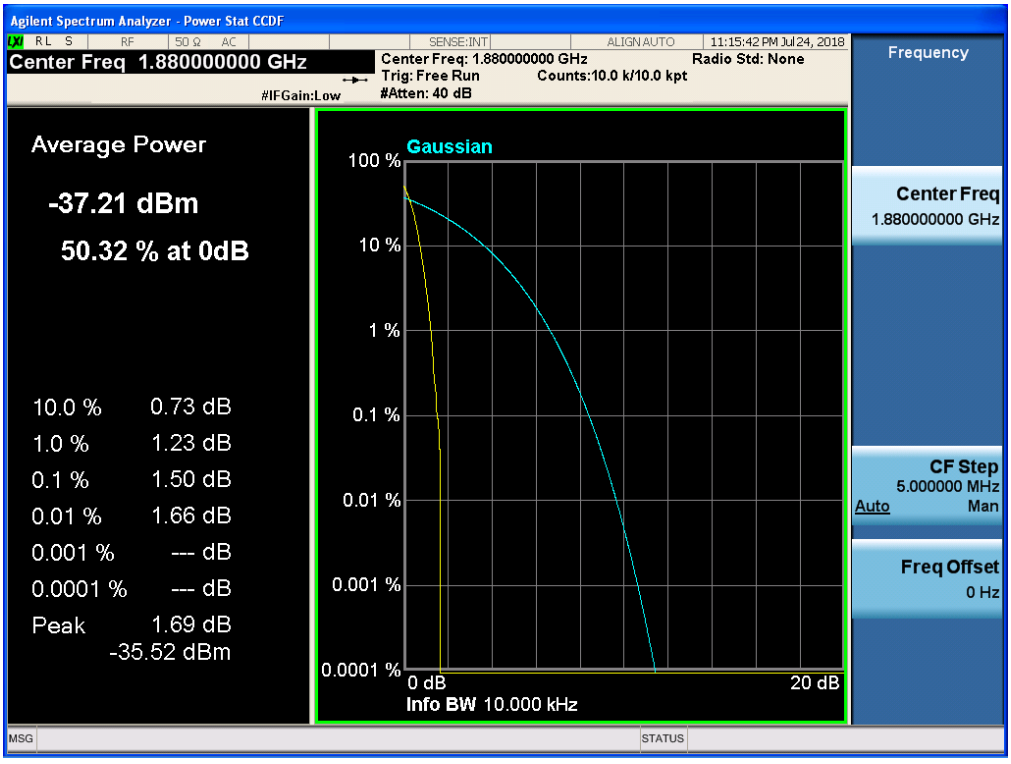
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 15.0,NO. RB 1,RB POS. Low,16-QAM



Band 2,UL Channel 18900,UL Frequency 1880.0,BW 20.0,NO. RB 1,RB POS. Low,QPSK

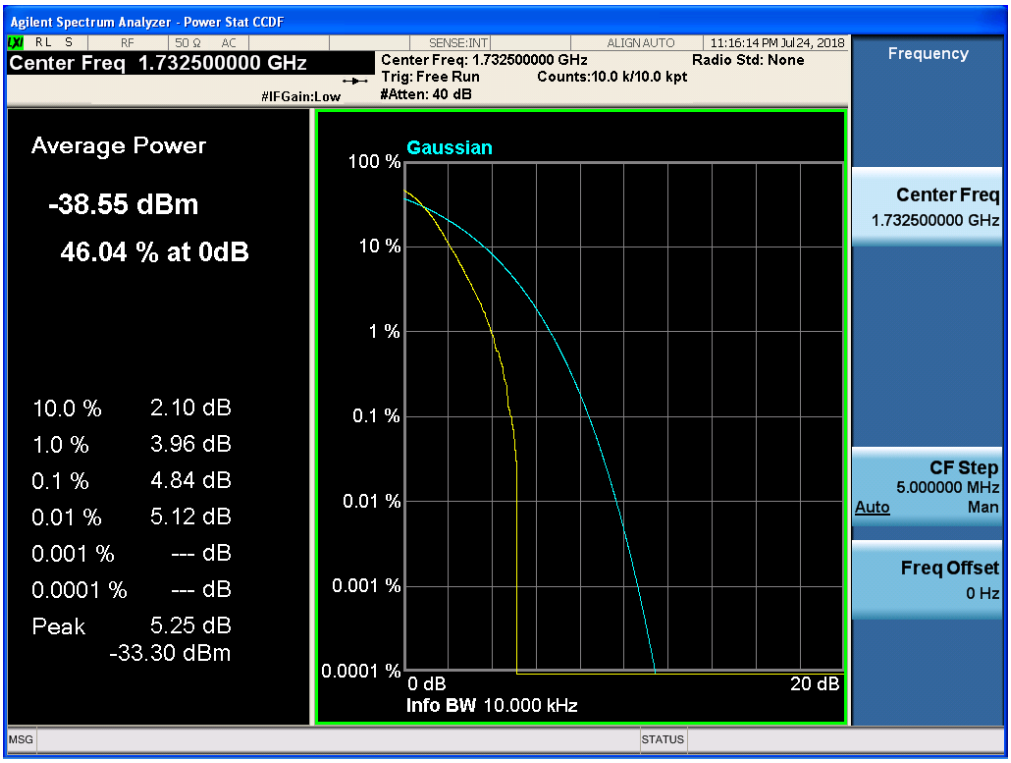


Band 2,UL Channel 18900,UL Frequency 1880.0,BW 20.0,NO. RB 1,RB POS. Low,16-QAM

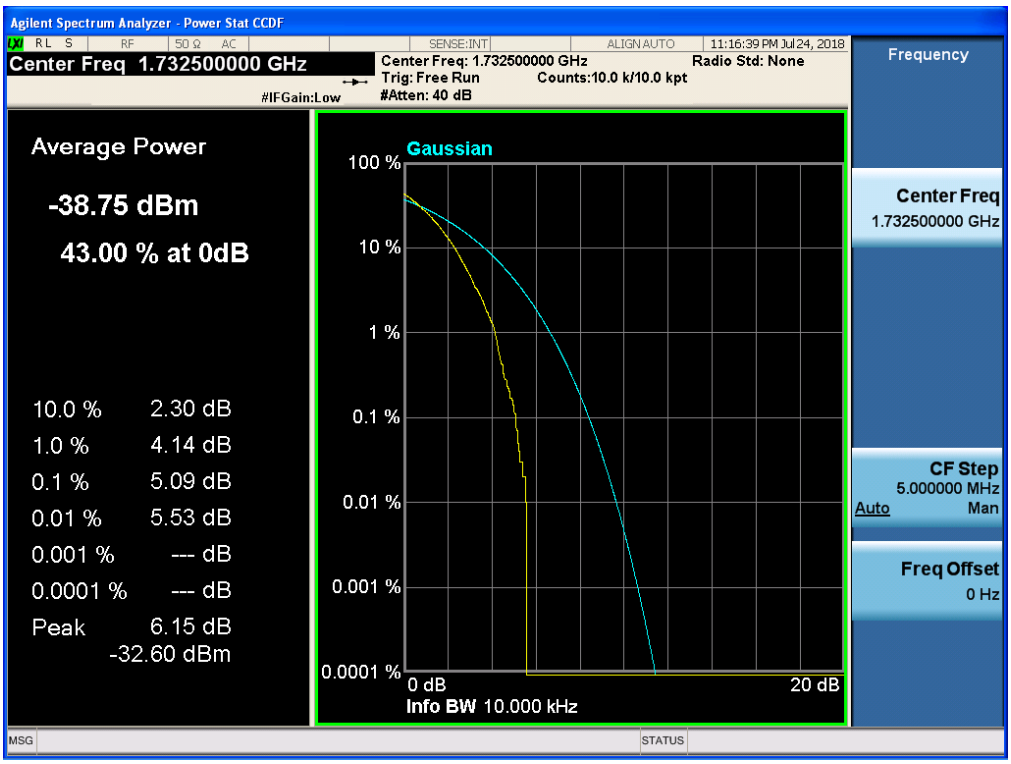


11.6 LTE BAND 4

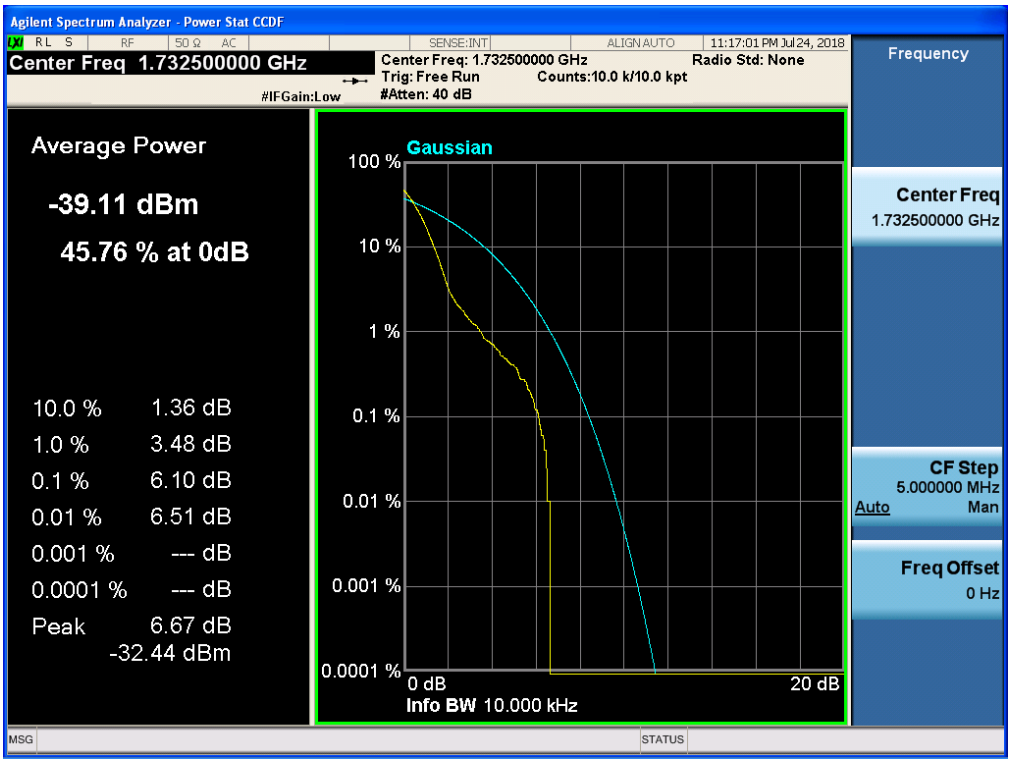
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 1.4,NO. RB 1,RB POS. Low,QPSK



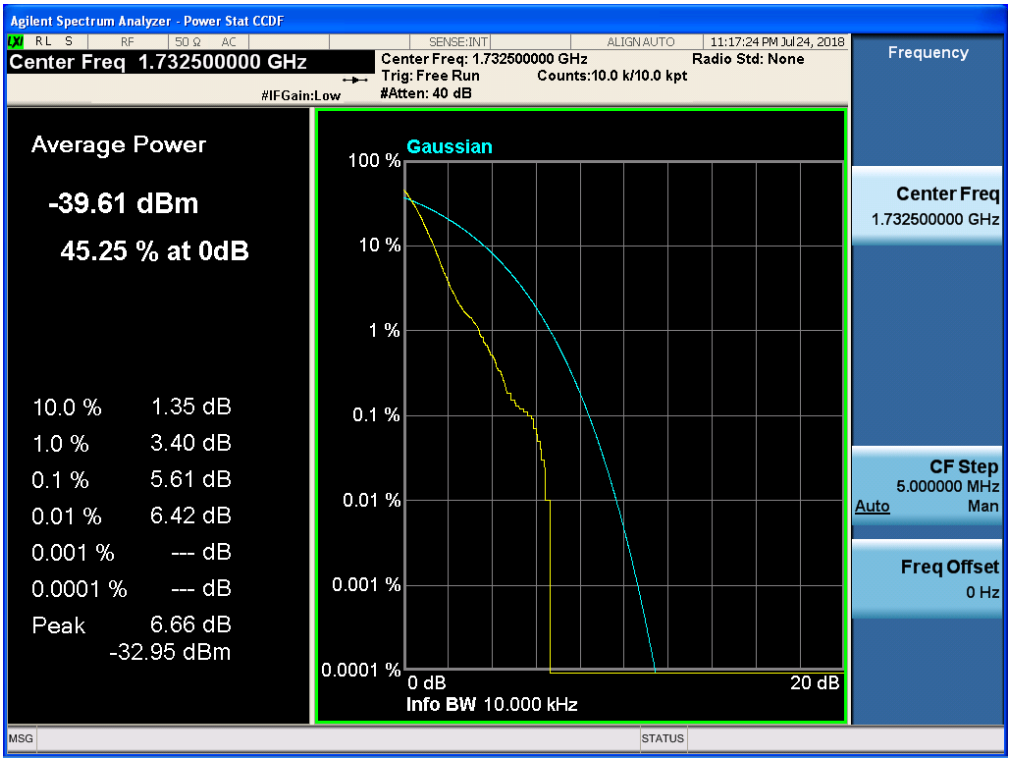
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 1.4,NO. RB 1,RB POS. Low,16-QAM



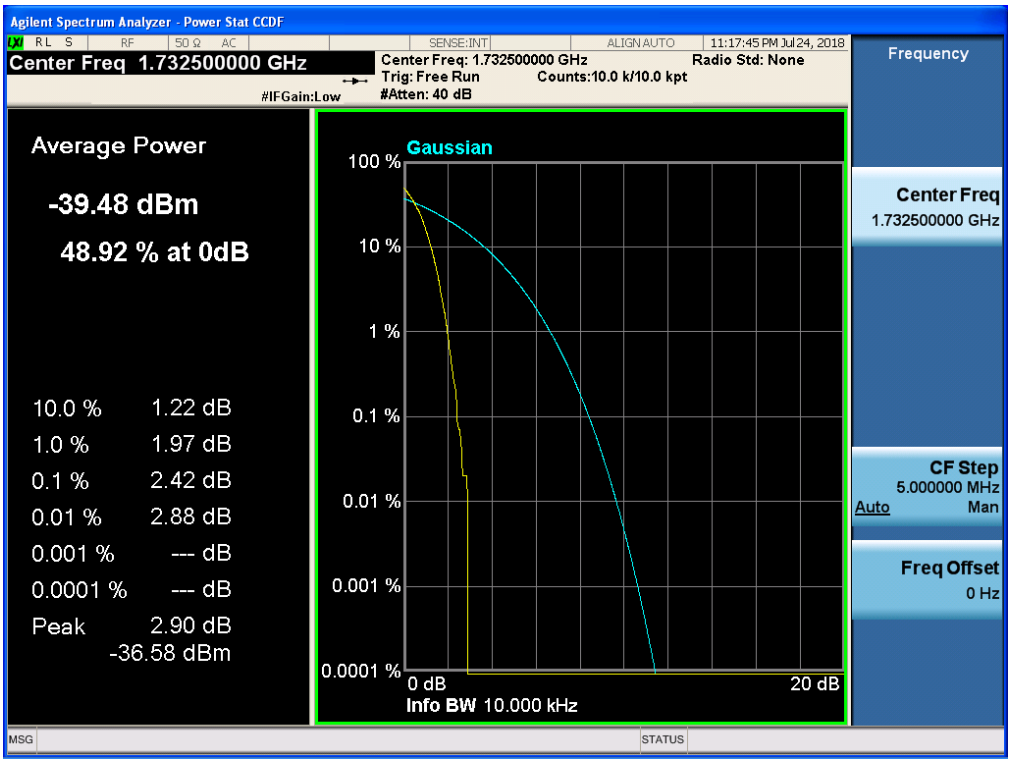
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 3.0,NO. RB 1,RB POS. Low,QPSK



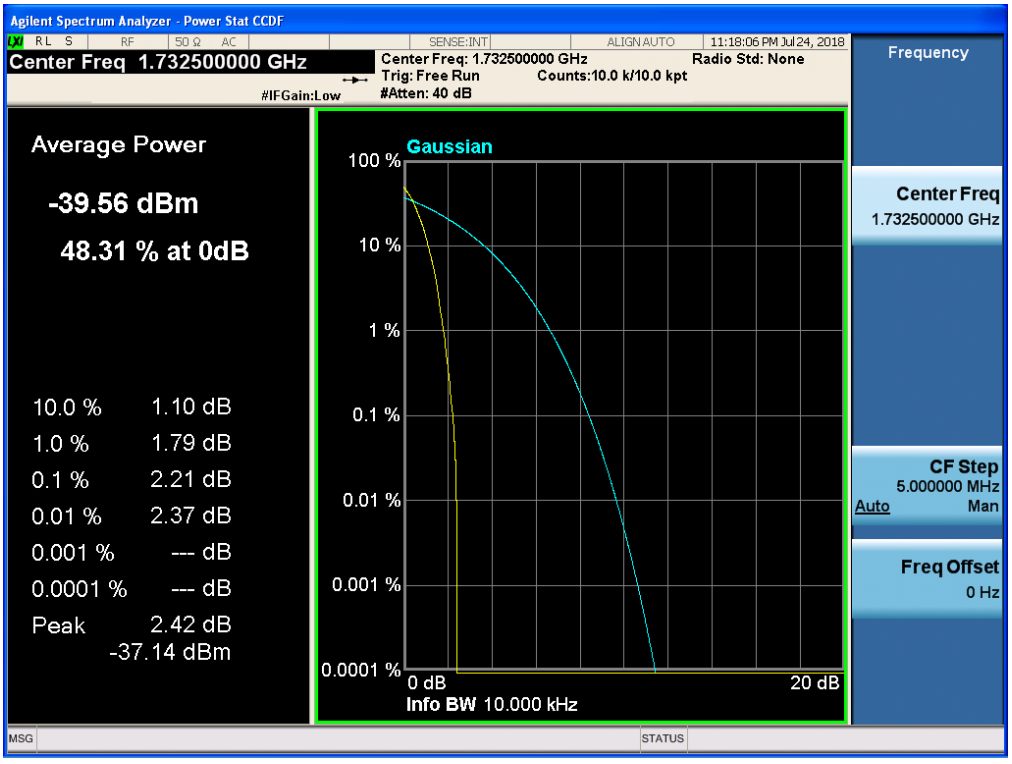
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 3.0,NO. RB 1,RB POS. Low,16-QAM



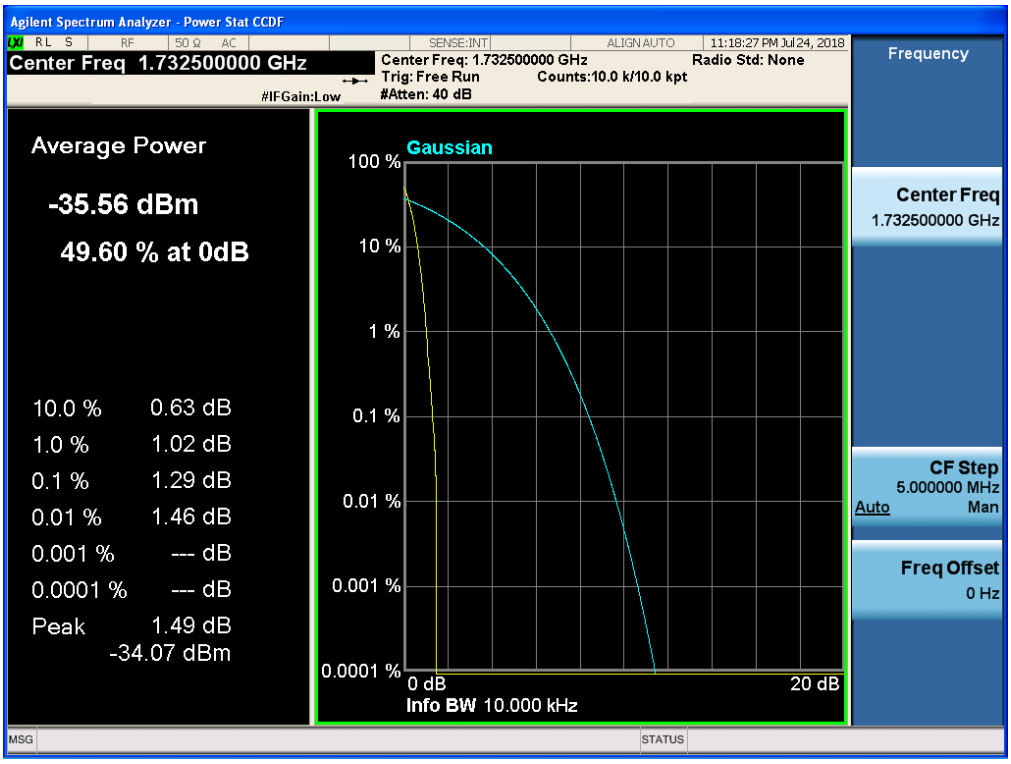
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 5.0,NO. RB 1,RB POS. Low,QPSK



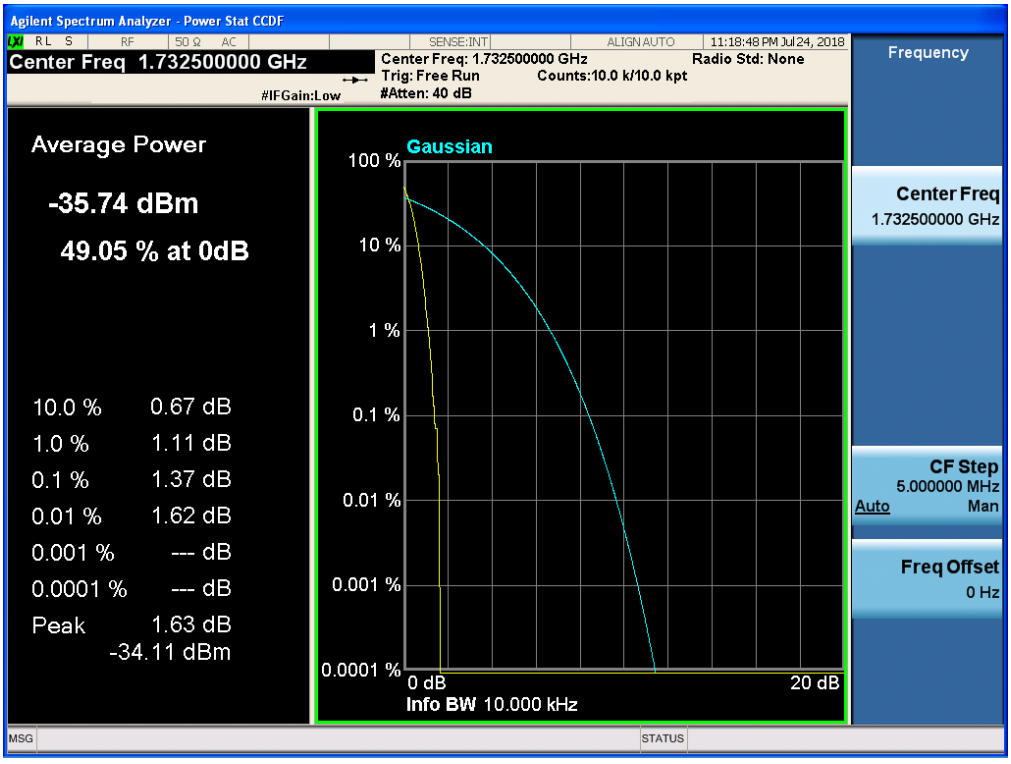
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



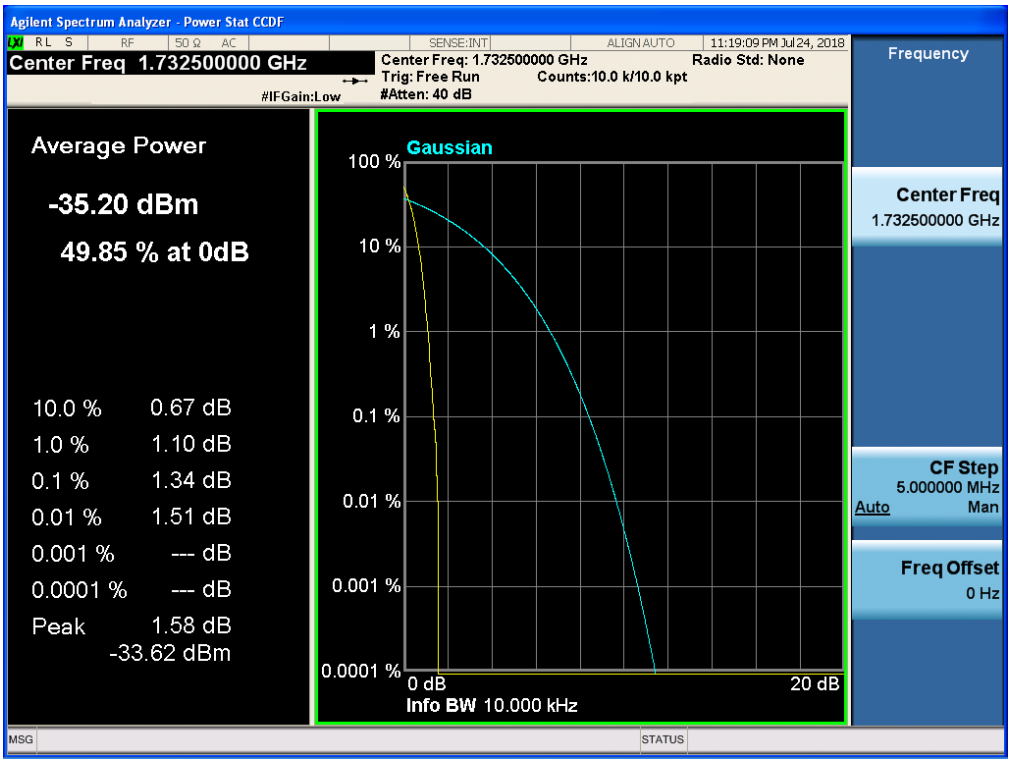
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 10.0,NO. RB 1,RB POS. Low,QPSK



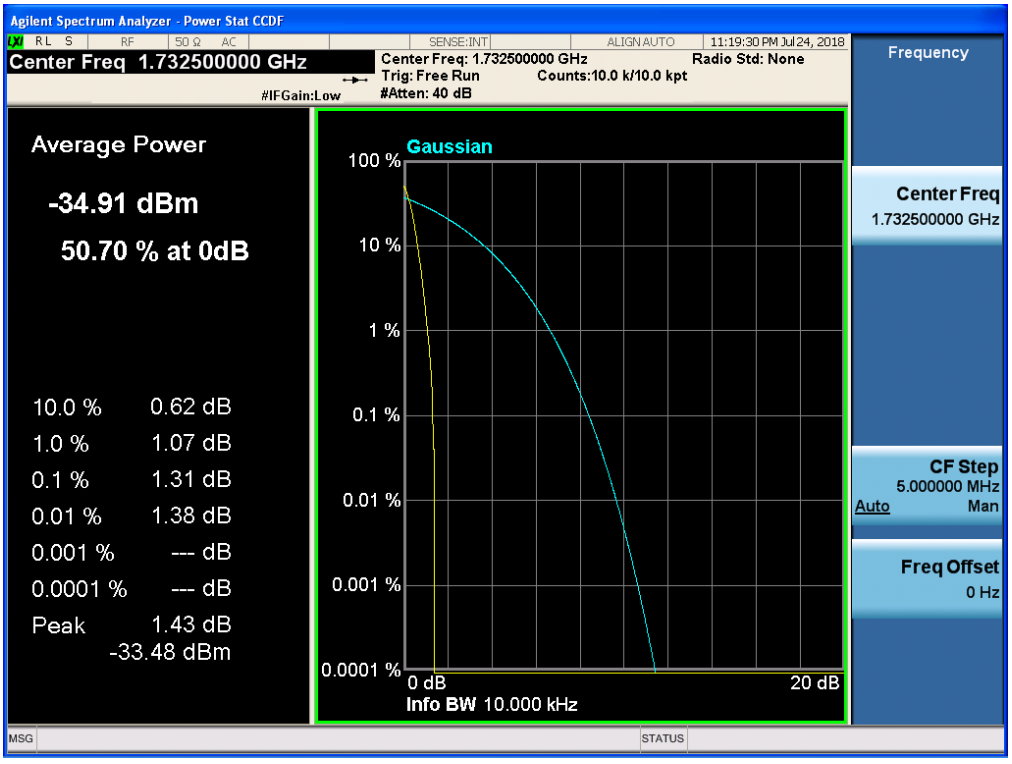
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



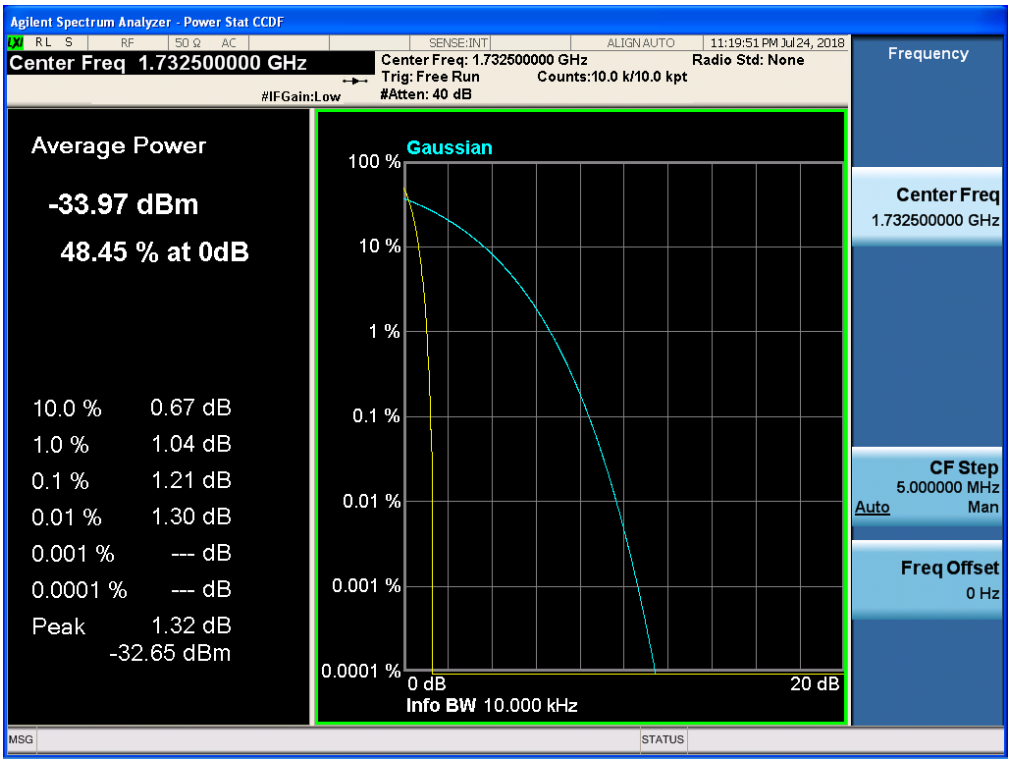
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 15.0,NO. RB 1,RB POS. Low,QPSK



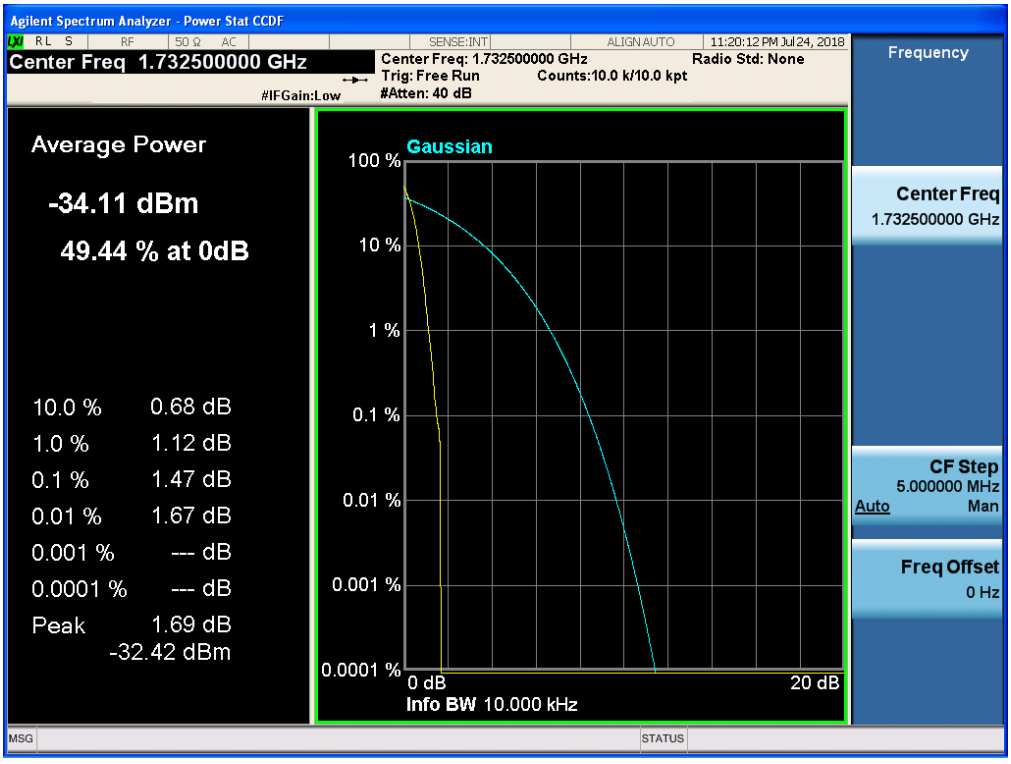
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 15.0,NO. RB 1,RB POS. Low,16-QAM



Band 4,UL Channel 20175,UL Frequency 1732.5,BW 20.0,NO. RB 1,RB POS. Low,QPSK

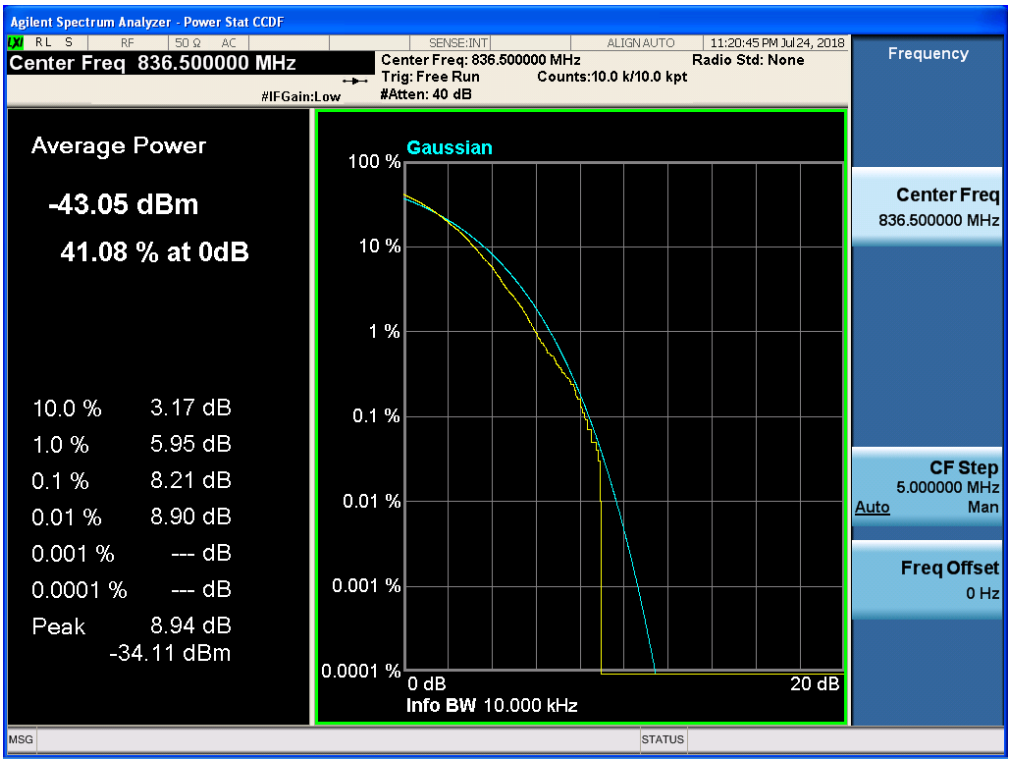


Band 4,UL Channel 20175,UL Frequency 1732.5,BW 20.0,NO. RB 1,RB POS. Low,16-QAM

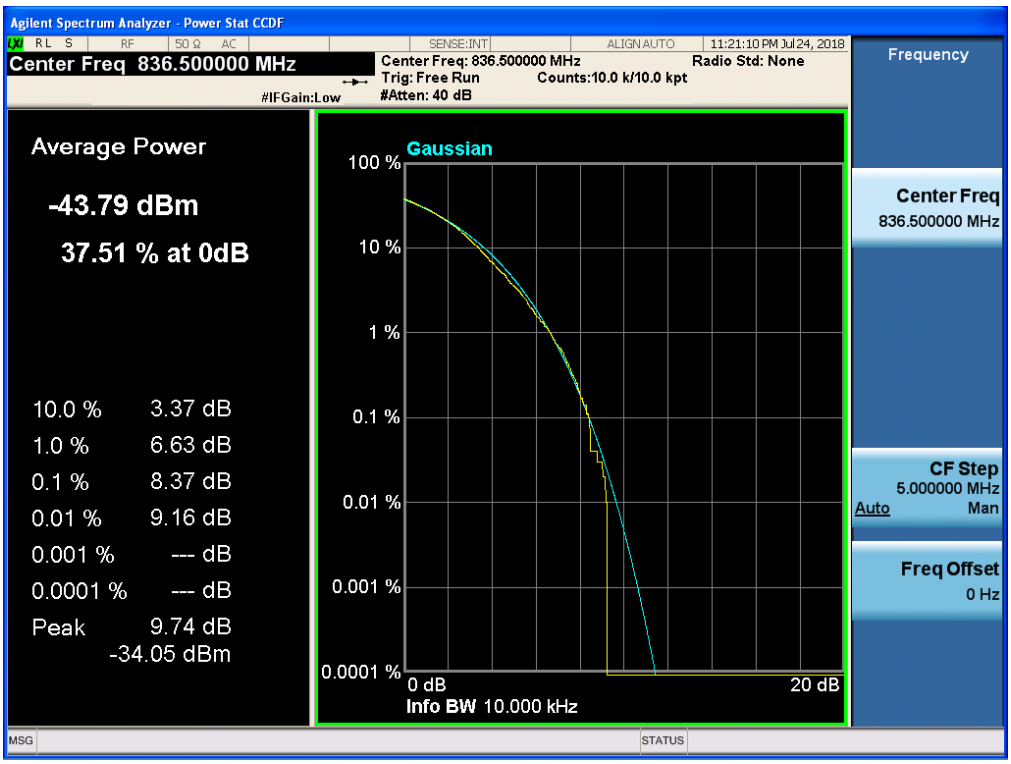


11.7 LTE BAND 5

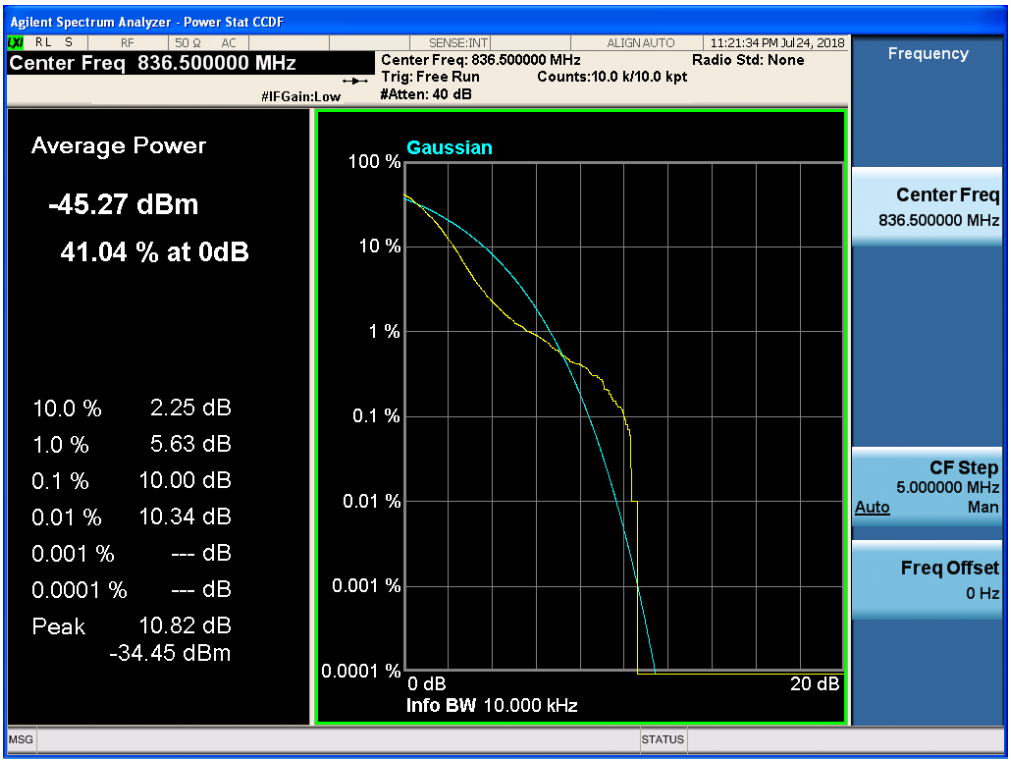
Band 5,UL Channel 20525,UL Frequency 836.5,BW 1.4,NO. RB 1,RB POS. Low,QPSK



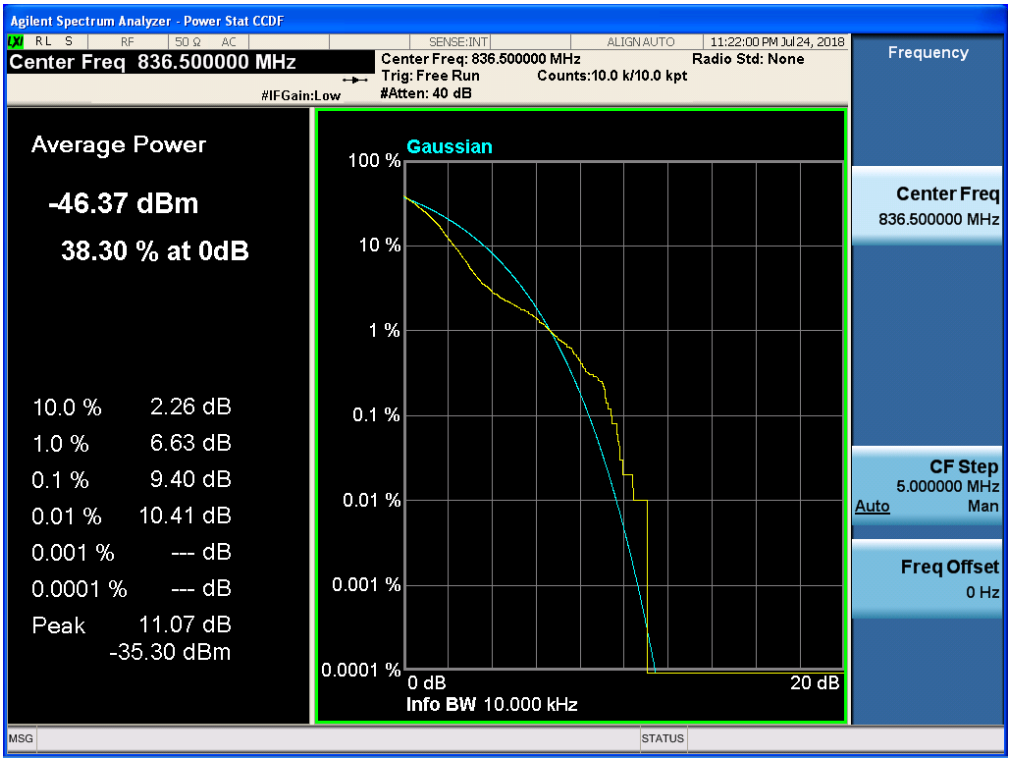
Band 5,UL Channel 20525,UL Frequency 836.5,BW 1.4,NO. RB 1,RB POS. Low,16-QAM



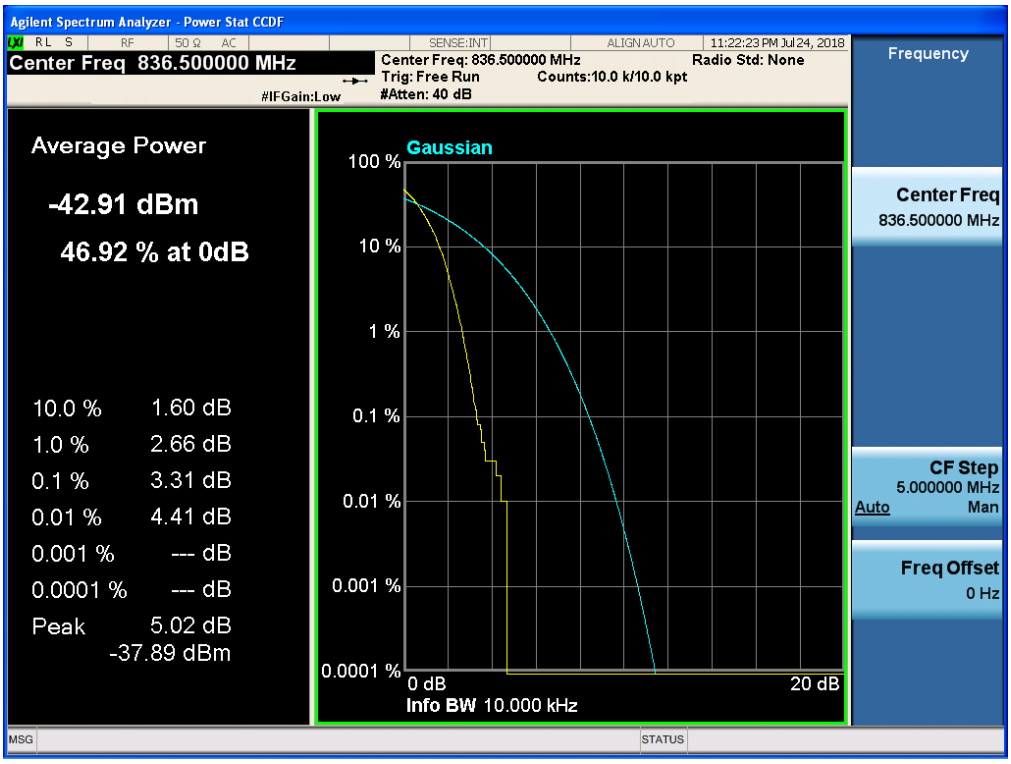
Band 5,UL Channel 20525,UL Frequency 836.5,BW 3.0,NO. RB 1,RB POS. Low,QPSK



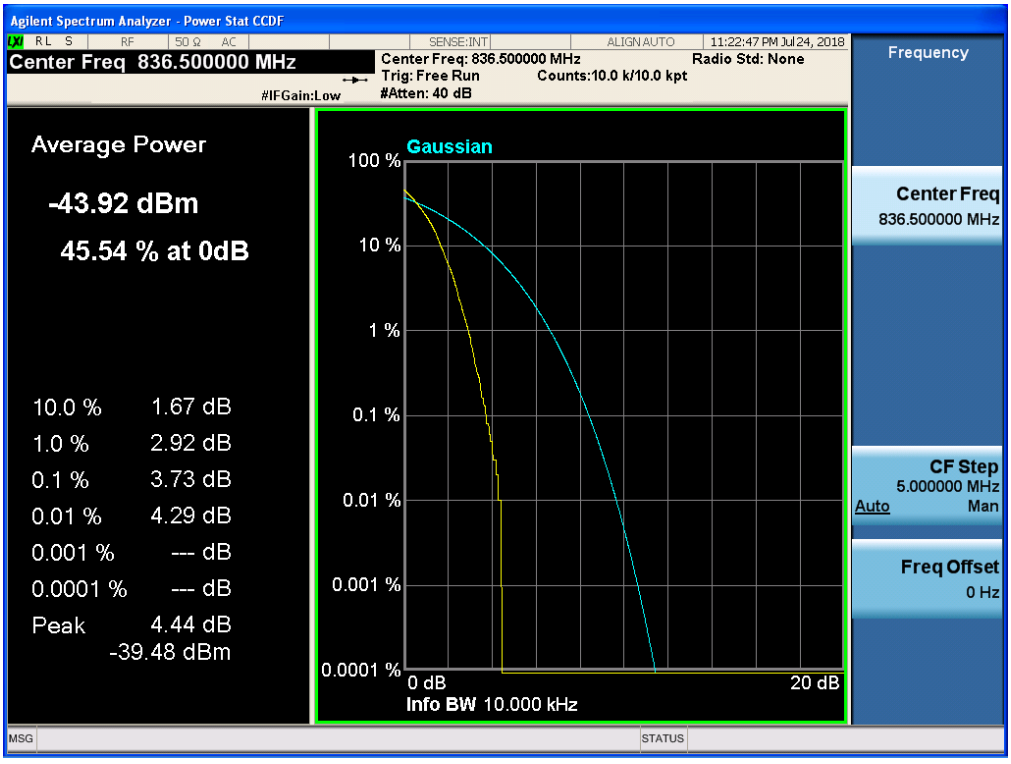
Band 5,UL Channel 20525,UL Frequency 836.5,BW 3.0,NO. RB 1,RB POS. Low,16-QAM



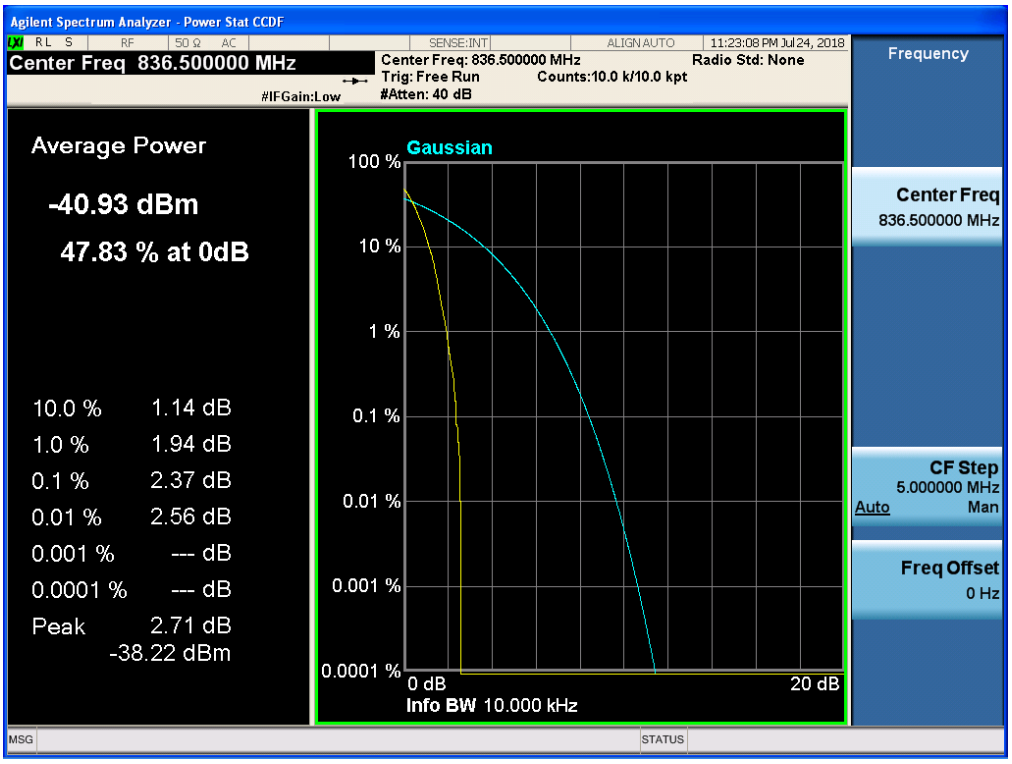
Band 5,UL Channel 20525,UL Frequency 836.5,BW 5.0,NO. RB 1,RB POS. Low,QPSK



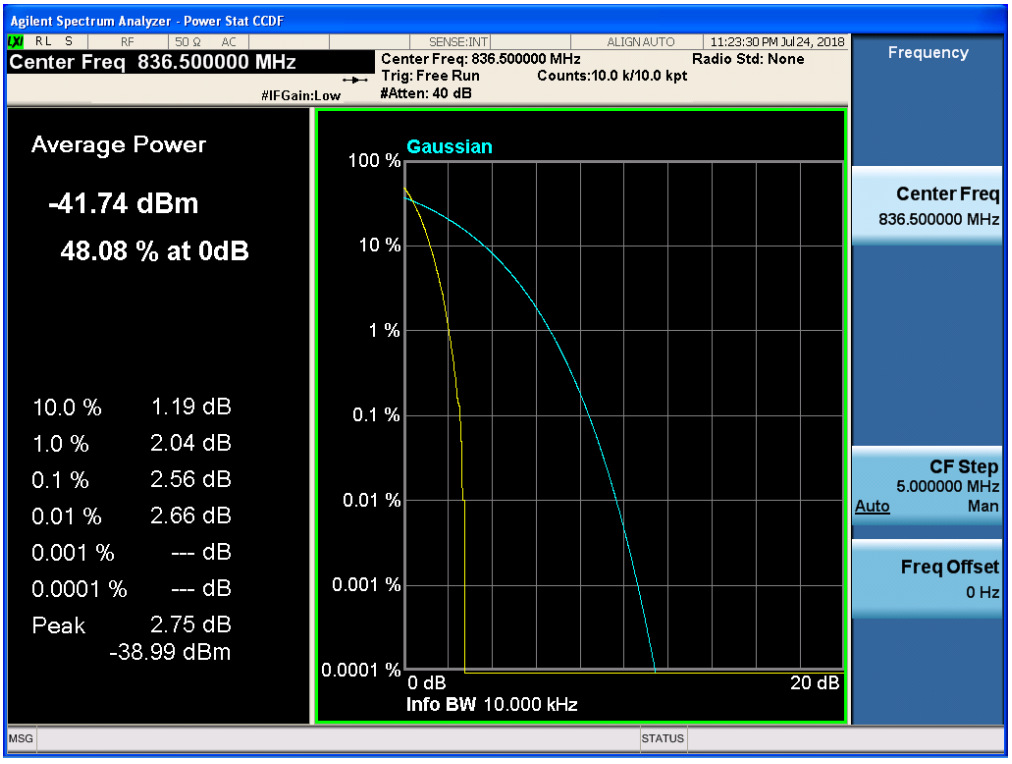
Band 5,UL Channel 20525,UL Frequency 836.5,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 1,RB POS. Low,QPSK

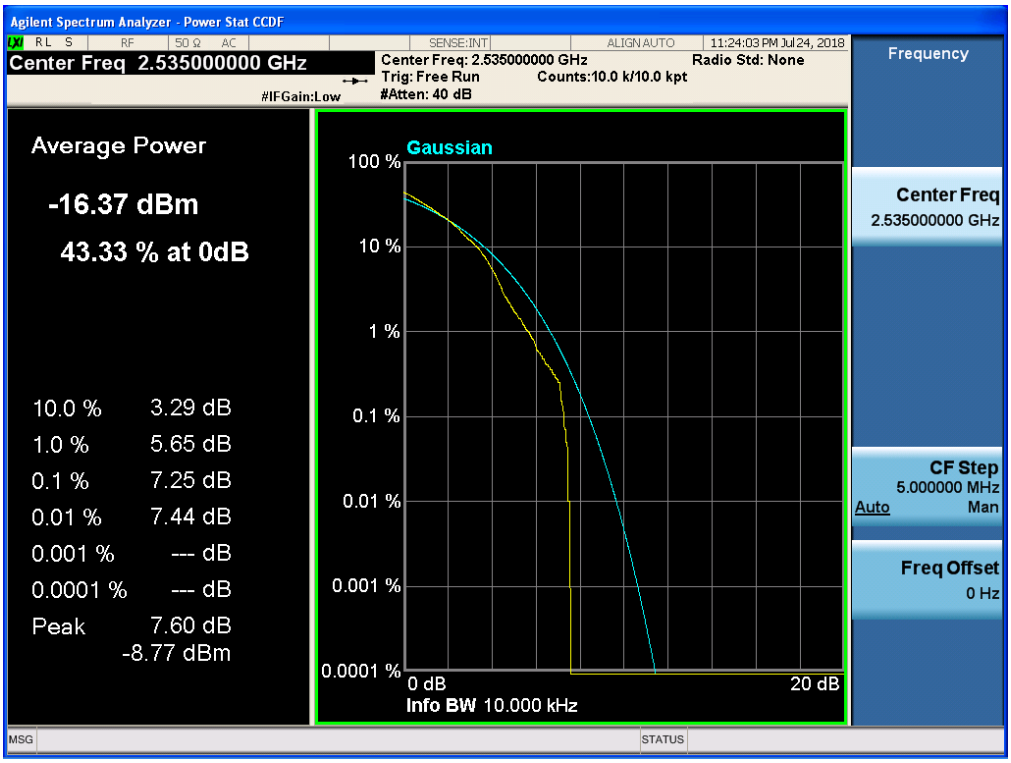


Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM

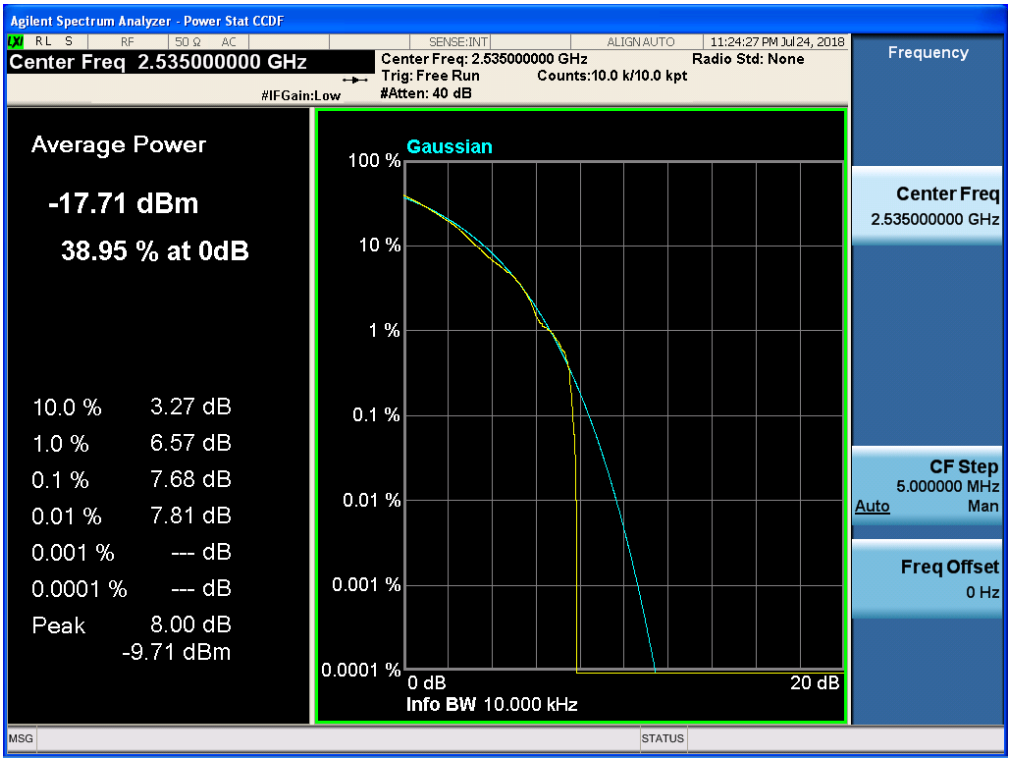


11.8 LTE BAND 7

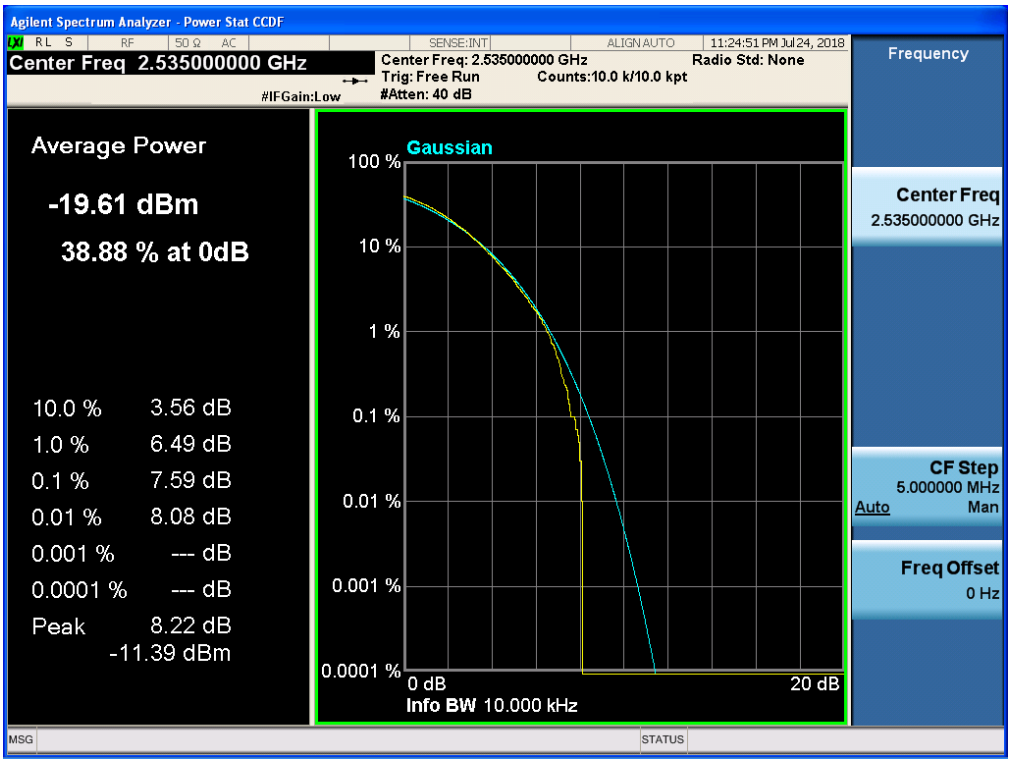
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 5.0,NO. RB 25,RB POS. Low,QPSK



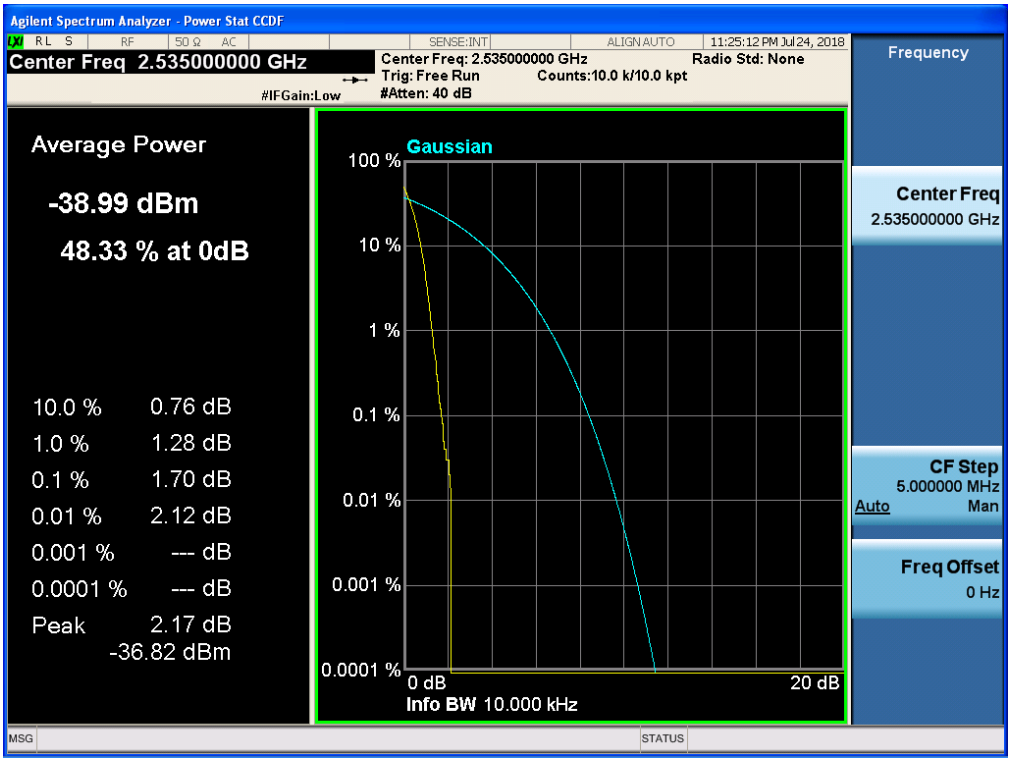
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 5.0,NO. RB 25,RB POS. Low,16-QAM



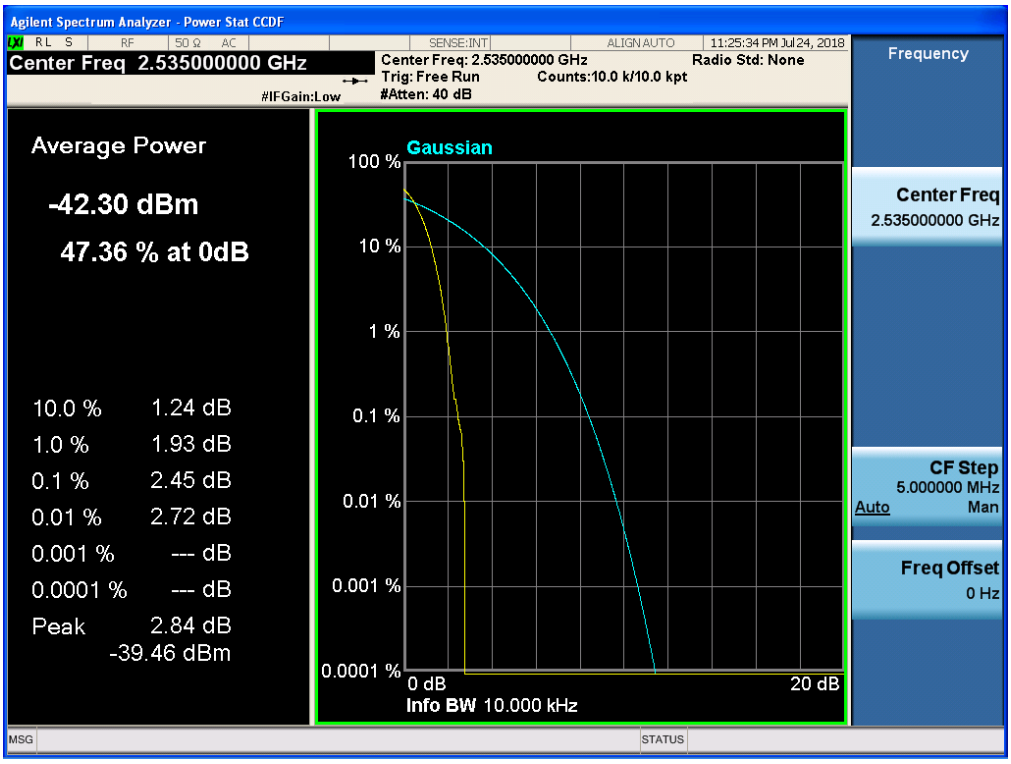
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK



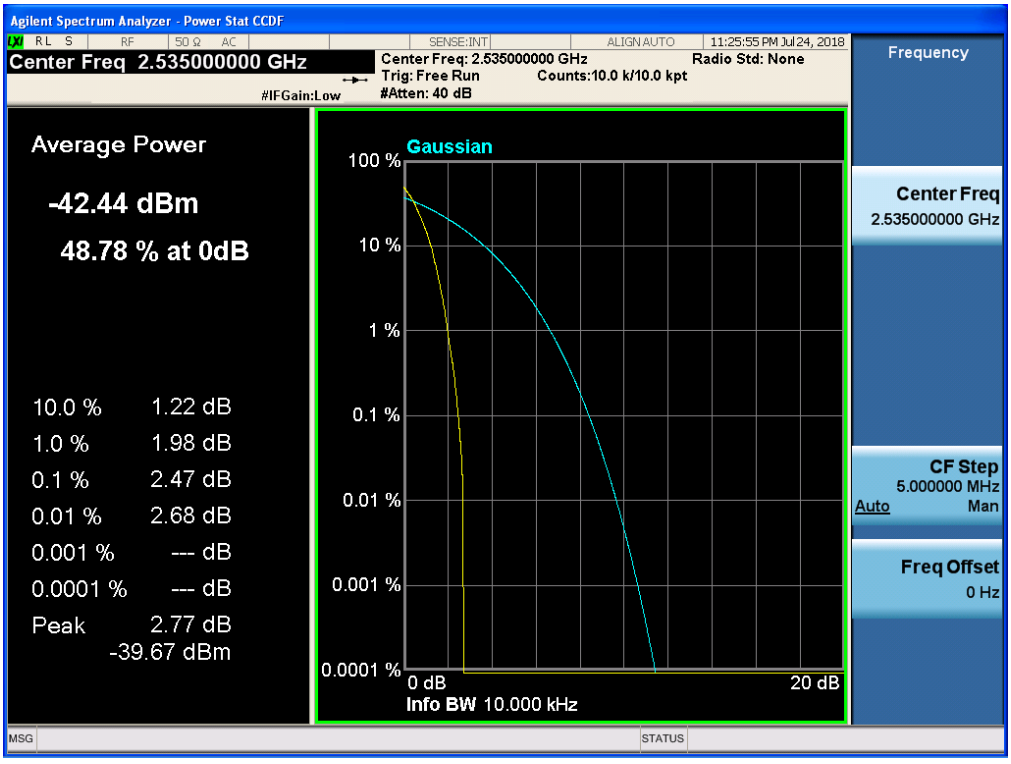
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



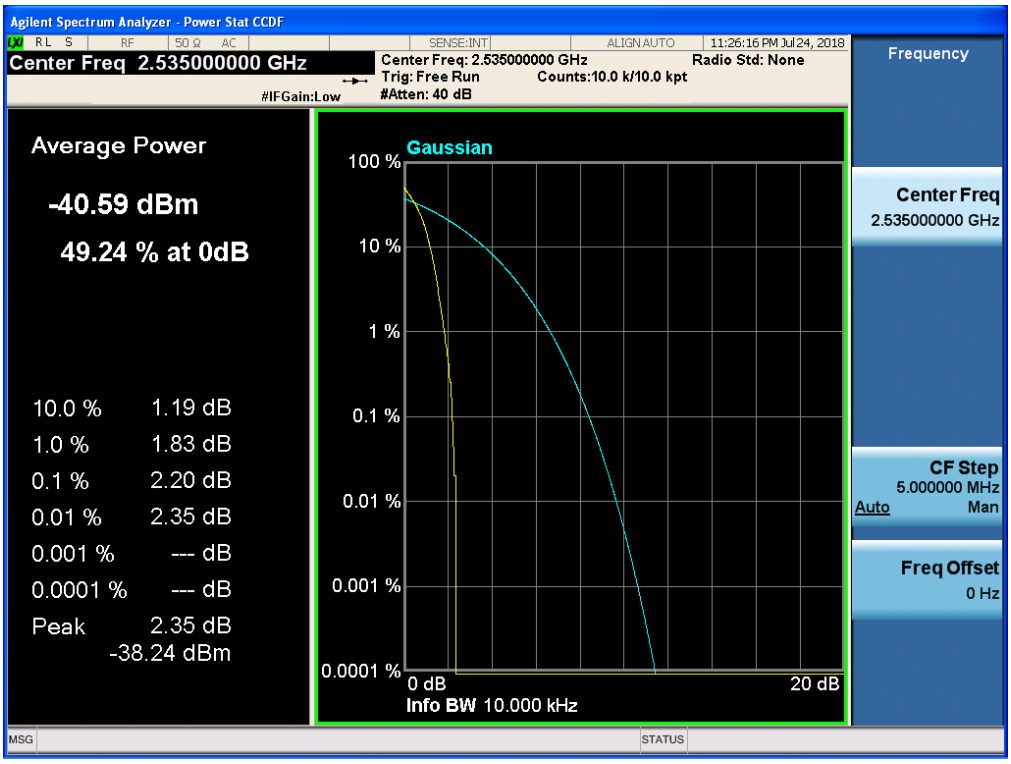
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 15.0,NO. RB 1,RB POS. Low,QPSK



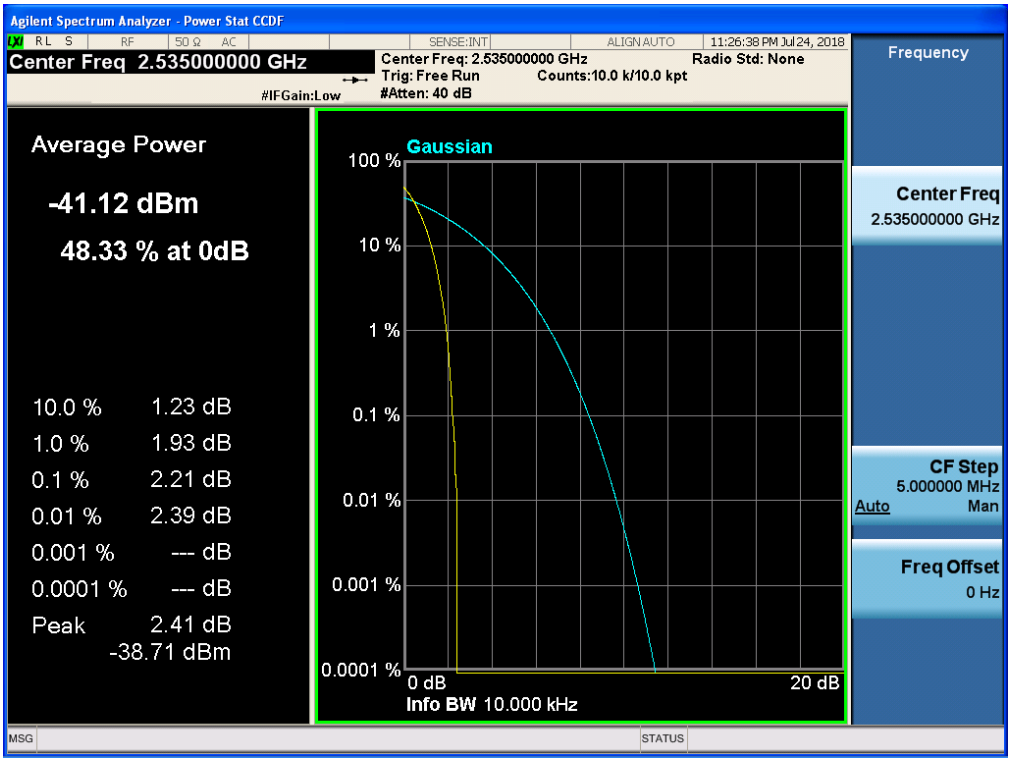
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 15.0,NO. RB 1,RB POS. Low,16-QAM



Band 7,UL Channel 21100,UL Frequency 2535.0,BW 20.0,NO. RB 1,RB POS. Low,QPSK



Band 7,UL Channel 21100,UL Frequency 2535.0,BW 20.0,NO. RB 1,RB POS. Low,16-QAM



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