



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
LTE Band 12
LTE Band 17

RESULTS

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2										
Mode	RB/ RB SIZE	Frequency	Result						Polarizati on Of Max. ERP	Conclusio n
			SG Level (dBm)	Cable Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Avera ge (dBm)	Max. EIRP			
							Average (mW)			
1.4MHz Band QPSK	6/0	1850.7	-2.23	3.76	28.24	22.25	167.880	Vertical	Pass	
		1880	-1.97	3.91	28.22	22.34	171.396	Vertical	Pass	
		1909.3	-2.20	3.93	28.20	22.07	161.065	Vertical	Pass	
1.4MHz Band 16 QAM	6/0	1850.7	-3.33	3.76	28.24	21.15	130.317	Vertical	Pass	
		1880	-3.42	3.91	28.22	20.89	122.744	Vertical	Pass	
		1909.3	-3.30	3.93	28.20	20.97	125.026	Vertical	Pass	
3.0MHz Band QPSK	15/0	1851.5	-2.21	3.77	28.23	22.25	167.880	Vertical	Pass	
		1880	-2.04	3.91	28.24	22.29	169.434	Vertical	Pass	
		1908.5	-2.16	3.94	28.25	22.15	164.059	Vertical	Pass	
3.0MHz Band 16 QAM	15/0	1851.5	-2.92	3.77	28.23	21.54	142.561	Vertical	Pass	
		1880	-3.05	3.91	28.24	21.28	134.276	Vertical	Pass	
		1908.5	-2.94	3.94	28.25	21.37	137.088	Vertical	Pass	
5.0MHz Band QPSK	25/0	1852.5	-2.39	3.77	28.31	22.15	164.059	Vertical	Pass	
		1880	-2.23	3.91	28.22	22.08	161.436	Vertical	Pass	
		1907.5	-2.15	3.94	28.20	22.11	162.555	Vertical	Pass	
5.0MHz Band 16 QAM	25/0	1852.5	-3.28	3.77	28.31	21.26	133.660	Vertical	Pass	
		1880	-2.80	3.91	28.22	21.51	141.579	Vertical	Pass	
		1907.5	-2.99	3.94	28.20	21.27	133.968	Vertical	Pass	
10.0MH z Band QPSK	50/0	1855	-2.30	3.79	28.33	22.24	167.494	Vertical	Pass	
		1880	-2.09	3.95	28.22	22.18	165.196	Vertical	Pass	
		1905	-1.86	3.97	28.19	22.36	172.187	Vertical	Pass	
10.0MH z Band 16 QAM	50/0	1855	-3.55	3.79	28.33	20.99	125.603	Vertical	Pass	
		1880	-3.20	3.95	28.22	21.07	127.938	Vertical	Pass	
		1905	-3.06	3.97	28.19	21.16	130.617	Vertical	Pass	
15.0MH z Band QPSK	75/0	1857.5	-2.59	3.79	28.34	21.96	157.036	Vertical	Pass	
		1880	-2.09	3.95	28.22	22.18	165.196	Vertical	Pass	
		1902.5	-1.87	3.97	28.18	22.34	171.396	Vertical	Pass	
15.0MH z Band 16 QAM	75/0	1857.5	-3.51	3.79	28.34	21.04	127.057	Vertical	Pass	
		1880	-3.12	3.95	28.22	21.15	130.317	Vertical	Pass	
		1902.5	-3.13	3.97	28.18	21.08	128.233	Vertical	Pass	



20.0MH z Band QPSK	100/ 0	1860	-3.65	3.81	28.35	20.89	122.744	Vertical	Pass
		1880	-2.13	3.96	28.22	22.13	163.305	Vertical	Pass
		1900	-2.02	4.00	28.16	22.14	163.682	Vertical	Pass
20.0MH z Band 16 QAM	100/ 0	1860	-3.13	3.81	28.35	21.41	138.357	Vertical	Pass
		1880	-3.01	3.96	28.22	21.25	133.352	Vertical	Pass
		1900	-2.97	4.00	28.16	21.19	131.522	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)	Anten na Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
1.4MHz Band QPSK	6/0	1850.7	-2.44	3.76	28.24	22.04	159.956	Horizontal	Pass
		1880	-2.24	3.91	28.22	22.07	161.065	Horizontal	Pass
		1909.3	-2.38	3.93	28.20	21.89	154.525	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-3.47	3.76	28.24	21.01	126.183	Horizontal	Pass
		1880	-3.44	3.91	28.22	20.87	122.180	Horizontal	Pass
		1909.3	-3.53	3.93	28.20	20.74	118.577	Horizontal	Pass
3.0MHz Band QPSK	15/0	1851.5	-2.43	3.77	28.23	22.03	159.588	Horizontal	Pass
		1880	-2.36	3.91	28.24	21.97	157.398	Horizontal	Pass
		1908.5	-2.26	3.94	28.25	22.05	160.325	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-3.29	3.77	28.23	21.17	130.918	Horizontal	Pass
		1880	-3.48	3.91	28.24	20.85	121.619	Horizontal	Pass
		1908.5	-3.62	3.94	28.25	20.69	117.220	Horizontal	Pass
5.0MHz Band QPSK	25/0	1852.5	-2.51	3.77	28.31	22.03	159.588	Horizontal	Pass
		1880	-2.43	3.91	28.22	21.88	154.170	Horizontal	Pass
		1907.5	-2.34	3.94	28.20	21.92	155.597	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-3.63	3.77	28.31	20.91	123.310	Horizontal	Pass
		1880	-3.16	3.91	28.22	21.15	130.317	Horizontal	Pass
		1907.5	-3.21	3.94	28.20	21.05	127.350	Horizontal	Pass
10.0MH z Band QPSK	50/0	1855	-2.57	3.79	28.33	21.97	157.398	Horizontal	Pass
		1880	-2.26	3.95	28.22	22.01	158.855	Horizontal	Pass
		1905	-2.09	3.97	28.19	22.13	163.305	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	1855	-3.69	3.79	28.33	20.85	121.619	Horizontal	Pass
		1880	-3.48	3.95	28.22	20.79	119.950	Horizontal	Pass
		1905	-3.39	3.97	28.19	20.83	121.060	Horizontal	Pass
15.0MH z Band QPSK	75/0	1857.5	-2.81	3.79	28.34	21.74	149.279	Horizontal	Pass
		1880	-2.73	3.95	28.22	21.54	142.561	Horizontal	Pass
		1902.5	-2.35	3.97	28.18	21.86	153.462	Horizontal	Pass
15.0MH z Band 16 QAM	75/0	1857.5	-3.47	3.79	28.34	21.08	128.233	Horizontal	Pass
		1880	-3.69	3.95	28.22	20.58	114.288	Horizontal	Pass
		1902.5	-3.44	3.97	28.18	20.77	119.399	Horizontal	Pass
20.0MH z Band	100/ 0	1860	-3.96	3.81	28.35	20.58	114.288	Horizontal	Pass
		1880	-2.62	3.96	28.22	21.64	145.881	Horizontal	Pass



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QPSK		1900	-3.02	4.00	28.16	21.14	130.017	Horizontal	Pass
20.0MHz z 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	-3.79	3.12	27.58	20.67	116.681	Vertical	Pass
		1732.5	-3.79	3.27	27.61	20.55	113.501	Vertical	Pass
		1754.3	-3.63	3.29	27.63	20.71	117.761	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-4.61	3.12	27.58	19.85	96.605	Vertical	Pass
		1732.5	-4.87	3.27	27.61	19.47	88.512	Vertical	Pass
		1754.3	-4.68	3.29	27.63	19.66	92.470	Vertical	Pass
3.0MHz Band QPSK	15/0	1711.5	-3.90	3.13	27.61	20.58	114.288	Vertical	Pass
		1732.5	-3.80	3.27	27.61	20.54	113.240	Vertical	Pass
		1753.5	-3.66	3.30	27.62	20.66	116.413	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-4.70	3.13	27.61	19.78	95.060	Vertical	Pass
		1732.5	-4.50	3.27	27.61	19.84	96.383	Vertical	Pass
		1753.5	-4.49	3.30	27.62	19.83	96.161	Vertical	Pass
5.0MHz Band QPSK	25/0	1712.5	-3.46	3.13	27.63	21.04	127.057	Vertical	Pass
		1732.5	-3.43	3.27	27.61	20.91	123.310	Vertical	Pass
		1752.5	-3.42	3.30	27.60	20.88	122.462	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-4.46	3.13	27.63	20.04	100.925	Vertical	Pass
		1732.5	-4.42	3.27	27.61	19.92	98.175	Vertical	Pass
		1752.5	-4.42	3.30	27.60	19.88	97.275	Vertical	Pass
10.0MHz Band QPSK	50/0	1715	-3.78	3.15	27.64	20.71	117.761	Vertical	Pass
		1732.5	-3.35	3.31	27.61	20.95	124.451	Vertical	Pass
		1750	-3.21	3.33	27.59	21.05	127.350	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1715	-4.82	3.15	27.64	19.67	92.683	Vertical	Pass
		1732.5	-4.49	3.31	27.61	19.81	95.719	Vertical	Pass
		1750	-4.69	3.33	27.59	19.57	90.573	Vertical	Pass
15.0MHz Band QPSK	75/0	1717.5	-3.95	3.15	27.65	20.55	113.501	Vertical	Pass
		1732.5	-3.63	3.31	27.61	20.67	116.681	Vertical	Pass
		1747.5	-3.76	3.33	27.57	20.48	111.686	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-4.76	3.15	27.65	19.74	94.189	Vertical	Pass
		1732.5	-4.77	3.31	27.61	19.53	89.743	Vertical	Pass
		1747.5	-4.63	3.33	27.57	19.61	91.411	Vertical	Pass



20.0MH z Band QPSK	100/0	1720	-4.06	3.17	27.66	20.43	110.408	Vertical	Pass
		1732.5	-3.71	3.32	27.61	20.58	114.288	Vertical	Pass
		1745	-3.54	3.36	27.56	20.66	116.413	Vertical	Pass
20.0MH z Band 16 QAM	100/0	1720	-5.03	3.17	27.66	19.46	88.308	Vertical	Pass
		1732.5	-4.74	3.32	27.61	19.55	90.157	Vertical	Pass
		1745	-4.63	3.36	27.56	19.57	90.573	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	-4.09	3.12	27.58	20.37	108.893	Horizontal	Pass
		1732.5	-3.80	3.27	27.61	20.54	113.240	Horizontal	Pass
		1754.3	-3.90	3.29	27.63	20.44	110.662	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-4.82	3.12	27.58	19.64	92.045	Horizontal	Pass
		1732.5	-5.01	3.27	27.61	19.33	85.704	Horizontal	Pass
		1754.3	-4.92	3.29	27.63	19.42	87.498	Horizontal	Pass
3.0MHz Band QPSK	15/0	1711.5	-3.97	3.13	27.61	20.51	112.460	Horizontal	Pass
		1732.5	-4.01	3.27	27.61	20.33	107.895	Horizontal	Pass
		1753.5	-3.91	3.30	27.62	20.41	109.901	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-5.21	3.13	27.61	19.27	84.528	Horizontal	Pass
		1732.5	-4.87	3.27	27.61	19.47	88.512	Horizontal	Pass
		1753.5	-4.69	3.30	27.62	19.63	91.833	Horizontal	Pass
5.0MHz Band QPSK	25/0	1712.5	-3.61	3.13	27.63	20.89	122.744	Horizontal	Pass
		1732.5	-3.87	3.27	27.61	20.47	111.429	Horizontal	Pass
		1752.5	-3.67	3.30	27.60	20.63	115.611	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-4.73	3.13	27.63	19.77	94.842	Horizontal	Pass
		1732.5	-4.82	3.27	27.61	19.52	89.536	Horizontal	Pass
		1752.5	-4.96	3.30	27.60	19.34	85.901	Horizontal	Pass
10.0MHz Band QPSK	50/0	1715	-4.03	3.15	27.64	20.46	111.173	Horizontal	Pass
		1732.5	-3.72	3.31	27.61	20.58	114.288	Horizontal	Pass
		1750	-3.53	3.33	27.59	20.73	118.304	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1715	-4.97	3.15	27.64	19.52	89.536	Horizontal	Pass
		1732.5	-5.07	3.31	27.61	19.23	83.753	Horizontal	Pass
		1750	-4.84	3.33	27.59	19.42	87.498	Horizontal	Pass
15.0MHz Band QPSK	75/0	1717.5	-4.09	3.15	27.65	20.41	109.901	Horizontal	Pass
		1732.5	-3.95	3.31	27.61	20.35	108.393	Horizontal	Pass
		1747.5	-4.02	3.33	27.57	20.22	105.196	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-4.77	3.15	27.65	19.73	93.972	Horizontal	Pass
		1732.5	-4.98	3.31	27.61	19.32	85.507	Horizontal	Pass
		1747.5	-5.00	3.33	27.57	19.24	83.946	Horizontal	Pass
20.0MHz Band	100/0	1720	-4.31	3.17	27.66	20.18	104.232	Horizontal	Pass
		1732.5	-4.03	3.32	27.61	20.26	106.170	Horizontal	Pass



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QPSK		1745	-3.87	3.36	27.56	20.33	107.895	Horizontal	Pass
20.0MHz	100/0	1720	-5.37	3.17	27.66	19.12	81.658	Horizontal	Pass
z Band		1732.5	-4.87	3.32	27.61	19.42	87.498	Horizontal	Pass
16 QAM		1745	-4.83	3.36	27.56	19.37	86.497	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	Frequ ncy	Result							Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	3.23	2.01	19.68	2.15	18.75	74.989	Vertical	Pass
		836.5	2.83	2.01	19.77	2.15	18.44	69.823	Vertical	Pass
		848.3	2.98	2.02	19.82	2.15	18.63	72.946	Vertical	Pass
1.4MHz Band 16 QAM	6/0	824.7	2.15	2.01	19.68	2.15	17.67	58.479	Vertical	Pass
		836.5	2.13	2.01	19.77	2.15	17.74	59.429	Vertical	Pass
		848.3	2.04	2.02	19.82	2.15	17.69	58.749	Vertical	Pass
3.0MHz Band QPSK	15/0	825.5	3.03	2.01	19.70	2.15	18.57	71.945	Vertical	Pass
		836.5	2.85	2.01	19.77	2.15	18.46	70.146	Vertical	Pass
		847.5	3.03	2.02	19.81	2.15	18.67	73.621	Vertical	Pass
3.0MHz Band 16 QAM	15/0	825.5	1.88	2.01	19.70	2.15	17.42	55.208	Vertical	Pass
		836.5	1.75	2.01	19.77	2.15	17.36	54.450	Vertical	Pass
		847.5	2.20	2.02	19.81	2.15	17.84	60.814	Vertical	Pass
5.0MHz Band QPSK	25/0	826.5	3.02	2.01	19.71	2.15	18.57	71.945	Vertical	Pass
		836.5	3.26	2.01	19.77	2.15	18.87	77.090	Vertical	Pass
		846.5	3.04	2.02	19.79	2.15	18.66	73.451	Vertical	Pass
5.0MHz Band 16 QAM	25/0	826.5	1.87	2.01	19.71	2.15	17.42	55.208	Vertical	Pass
		836.5	1.82	2.01	19.77	2.15	17.43	55.335	Vertical	Pass
		846.5	1.74	2.02	19.79	2.15	17.36	54.450	Vertical	Pass
10.0MH z Band QPSK	50/0	829	2.85	2.01	19.73	2.15	18.42	69.502	Vertical	Pass
		836.5	2.94	2.01	19.77	2.15	18.55	71.614	Vertical	Pass
		844	3.06	2.02	19.78	2.15	18.67	73.621	Vertical	Pass
10.0MH z Band 16 QAM	50/0	829	2.14	2.01	19.73	2.15	17.71	59.020	Vertical	Pass
		836.5	2.03	2.01	19.77	2.15	17.64	58.076	Vertical	Pass
		844	1.92	2.02	19.78	2.15	17.53	56.624	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	Freque ncy	Result							Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	2.95	2.01	19.68	2.15	18.47	70.307	Horizontal	Pass
		836.5	2.51	2.01	19.77	2.15	18.12	64.863	Horizontal	Pass
		848.3	2.70	2.02	19.82	2.15	18.35	68.391	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	824.7	1.90	2.01	19.68	2.15	17.42	55.208	Horizontal	Pass
		836.5	1.63	2.01	19.77	2.15	17.24	52.966	Horizontal	Pass
		848.3	1.69	2.02	19.82	2.15	17.34	54.200	Horizontal	Pass
3.0MHz Band QPSK	15/0	825.5	2.68	2.01	19.70	2.15	18.22	66.374	Horizontal	Pass
		836.5	2.71	2.01	19.77	2.15	18.32	67.920	Horizontal	Pass
		847.5	2.53	2.02	19.81	2.15	18.17	65.615	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	825.5	1.58	2.01	19.70	2.15	17.12	51.523	Horizontal	Pass
		836.5	1.67	2.01	19.77	2.15	17.28	53.456	Horizontal	Pass
		847.5	1.78	2.02	19.81	2.15	17.42	55.208	Horizontal	Pass
5.0MHz Band QPSK	25/0	826.5	2.70	2.01	19.71	2.15	18.25	66.834	Horizontal	Pass
		836.5	1.82	2.01	19.77	2.15	17.43	55.335	Horizontal	Pass
		846.5	2.44	2.02	19.79	2.15	18.06	63.973	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	826.5	1.67	2.01	19.71	2.15	17.22	52.723	Horizontal	Pass
		836.5	1.51	2.01	19.77	2.15	17.12	51.523	Horizontal	Pass
		846.5	1.56	2.02	19.79	2.15	17.18	52.240	Horizontal	Pass
10.0MH z Band QPSK	50/0	829	2.70	2.01	19.73	2.15	18.27	67.143	Horizontal	Pass
		836.5	2.75	2.01	19.77	2.15	18.36	68.549	Horizontal	Pass
		844	2.68	2.02	19.78	2.15	18.29	67.453	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	829	1.85	2.01	19.73	2.15	17.42	55.208	Horizontal	Pass
		836.5	1.53	2.01	19.77	2.15	17.14	51.761	Horizontal	Pass
		844	1.64	2.02	19.78	2.15	17.25	53.088	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)	Cabl e Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
5.0MHz Band QPSK	25/0	2502.5	-3.36	4.54	27.75	19.85	96.605	Vertical	Pass
		2535	-2.99	4.69	27.72	20.04	100.925	Vertical	Pass
		2567.5	-3.23	4.71	27.71	19.77	94.842	Vertical	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-4.46	4.54	27.75	18.75	74.989	Vertical	Pass
		2535	-4.34	4.69	27.72	18.69	73.961	Vertical	Pass
		2567.5	-4.24	4.71	27.71	18.76	75.162	Vertical	Pass
10.0MH z Band QPSK	50/0	2505	-3.25	4.55	27.76	19.96	99.083	Vertical	Pass
		2535	-3.16	4.69	27.72	19.87	97.051	Vertical	Pass
		2565	-2.97	4.72	27.70	20.01	100.231	Vertical	Pass
10.0MH z Band 16 QAM	50/0	2505	-4.45	4.55	27.76	18.76	75.162	Vertical	Pass
		2535	-4.18	4.69	27.72	18.85	76.736	Vertical	Pass
		2565	-4.34	4.72	27.70	18.64	73.114	Vertical	Pass
15.0MH z Band QPSK	75/0	2507.5	-3.19	4.55	27.77	20.03	100.693	Vertical	Pass
		2535	-3.06	4.69	27.72	19.97	99.312	Vertical	Pass
		2562.5	-2.92	4.72	27.69	20.05	101.158	Vertical	Pass
15.0MH z Band 16 QAM	75/0	2507.5	-4.11	4.55	27.77	19.11	81.470	Vertical	Pass
		2535	-3.98	4.69	27.72	19.05	80.353	Vertical	Pass
		2562.5	-4.04	4.72	27.69	18.93	78.163	Vertical	Pass
20.0MH z Band QPSK	100/ 0	2510	-3.08	4.57	27.78	20.13	103.039	Vertical	Pass
		2535	-2.91	4.73	27.72	20.08	101.859	Vertical	Pass
		2560	-2.79	4.75	27.68	20.14	103.276	Vertical	Pass
20.0MH z Band 16 QAM	100/ 0	2510	-4.06	4.57	27.78	19.15	82.224	Vertical	Pass
		2535	-4.02	4.73	27.72	18.97	78.886	Vertical	Pass
		2560	-3.90	4.75	27.68	19.03	79.983	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)	Cabl e Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
5.0MHz Band QPSK	25/0	2502.5	-3.65	4.54	27.75	19.56	90.365	Horizontal	Pass
		2535	-3.56	4.69	27.72	19.47	88.512	Horizontal	Pass
		2567.5	-3.54	4.71	27.71	19.46	88.308	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-4.79	4.54	27.75	18.42	69.502	Horizontal	Pass
		2535	-4.40	4.69	27.72	18.63	72.946	Horizontal	Pass
		2567.5	-4.48	4.71	27.71	18.52	71.121	Horizontal	Pass
10.0MH z Band QPSK	50/0	2505	-3.47	4.55	27.76	19.74	94.189	Horizontal	Pass
		2535	-3.42	4.69	27.72	19.61	91.411	Horizontal	Pass
		2565	-3.32	4.72	27.70	19.66	92.470	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	2505	-4.87	4.55	27.76	18.34	68.234	Horizontal	Pass
		2535	-3.61	4.69	27.72	19.42	87.498	Horizontal	Pass
		2565	-3.70	4.72	27.70	19.28	84.723	Horizontal	Pass
15.0MH z Band QPSK	75/0	2507.5	-3.35	4.55	27.77	19.87	97.051	Horizontal	Pass
		2535	-3.27	4.69	27.72	19.76	94.624	Horizontal	Pass
		2562.5	-3.54	4.72	27.69	19.43	87.700	Horizontal	Pass
15.0MH z Band 16 QAM	75/0	2507.5	-4.20	4.55	27.77	19.02	79.799	Horizontal	Pass
		2535	-4.16	4.69	27.72	18.87	77.090	Horizontal	Pass
		2562.5	-4.12	4.72	27.69	18.85	76.736	Horizontal	Pass
20.0MH z Band QPSK	100/ 0	2510	-3.44	4.57	27.78	19.77	94.842	Horizontal	Pass
		2535	-3.18	4.73	27.72	19.81	95.719	Horizontal	Pass
		2560	-3.07	4.75	27.68	19.86	96.828	Horizontal	Pass
20.0MH z Band 16 QAM	100/ 0	2510	-4.19	4.57	27.78	19.02	79.799	Horizontal	Pass
		2535	-4.43	4.73	27.72	18.56	71.779	Horizontal	Pass
		2560	-4.06	4.75	27.68	18.87	77.090	Horizontal	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)



8.6 LTE BAND 12

Radiated Power (ERP) for Band 12											
Mode	RB/ RB SIZE	Freque ncy	Result							Polarizati on Of Max. ERP	Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)			
1.4MHz Band QPSK	6/0	699.7	3.42	1.91	19.21	2.15	18.57	71.945	Vertical	Pass	
		707.5	3.51	1.91	19.26	2.15	18.71	74.302	Vertical	Pass	
		715.3	3.36	1.93	19.34	2.15	18.62	72.778	Vertical	Pass	
1.4MHz Band 16 QAM	6/0	699.7	2.19	1.91	19.21	2.15	17.34	54.200	Vertical	Pass	
		707.5	2.04	1.91	19.26	2.15	17.24	52.966	Vertical	Pass	
		715.3	2.02	1.93	19.34	2.15	17.28	53.456	Vertical	Pass	
3.0MHz Band QPSK	15/0	700.5	3.27	1.91	19.21	2.15	18.42	69.502	Vertical	Pass	
		707.5	3.27	1.91	19.26	2.15	18.47	70.307	Vertical	Pass	
		714.5	3.37	1.93	19.34	2.15	18.63	72.946	Vertical	Pass	
3.0MHz Band 16 QAM	15/0	700.5	2.04	1.91	19.21	2.15	17.19	52.360	Vertical	Pass	
		707.5	2.22	1.91	19.26	2.15	17.42	55.208	Vertical	Pass	
		714.5	2.05	1.93	19.34	2.15	17.31	53.827	Vertical	Pass	
5.0MHz Band QPSK	25/0	701.5	3.58	1.91	19.23	2.15	18.75	74.989	Vertical	Pass	
		707.5	3.44	1.91	19.26	2.15	18.64	73.114	Vertical	Pass	
		713.5	3.23	1.92	19.33	2.15	18.49	70.632	Vertical	Pass	
5.0MHz Band 16 QAM	25/0	701.5	2.38	1.91	19.23	2.15	17.55	56.885	Vertical	Pass	
		707.5	2.22	1.91	19.26	2.15	17.42	55.208	Vertical	Pass	
		713.5	2.12	1.92	19.33	2.15	17.38	54.702	Vertical	Pass	
10.0MH z Band QPSK	50/0	704	3.33	1.91	19.25	2.15	18.52	71.121	Vertical	Pass	
		707.5	3.27	1.91	19.26	2.15	18.47	70.307	Vertical	Pass	
		711	3.37	1.92	19.32	2.15	18.62	72.778	Vertical	Pass	
10.0MH z Band 16 QAM	50/0	704	2.03	1.91	19.25	2.15	17.22	52.723	Vertical	Pass	
		707.5	2.08	1.91	19.26	2.15	17.28	53.456	Vertical	Pass	
		711	2.06	1.92	19.32	2.15	17.31	53.827	Vertical	Pass	



Radiated Power (EIRP) for Band 12										
Mode	RB/ RB SIZE	Freque ncy	Result							Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
1.4MHz Band QPSK	6/0	699.7	3.09	1.91	19.21	2.15	18.24	66.681	Horizontal	Pass
		707.5	3.27	1.91	19.26	2.15	18.47	70.307	Horizontal	Pass
		715.3	2.96	1.93	19.34	2.15	18.22	66.374	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	699.7	1.89	1.91	19.21	2.15	17.04	50.582	Horizontal	Pass
		707.5	1.92	1.91	19.26	2.15	17.12	51.523	Horizontal	Pass
		715.3	1.72	1.93	19.34	2.15	16.98	49.888	Horizontal	Pass
3.0MHz Band QPSK	15/0	700.5	3.37	1.91	19.21	2.15	18.52	71.121	Horizontal	Pass
		707.5	3.04	1.91	19.26	2.15	18.24	66.681	Horizontal	Pass
		714.5	3.10	1.93	19.34	2.15	18.36	68.549	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	700.5	1.83	1.91	19.21	2.15	16.98	49.888	Horizontal	Pass
		707.5	1.91	1.91	19.26	2.15	17.11	51.404	Horizontal	Pass
		714.5	1.71	1.93	19.34	2.15	16.97	49.774	Horizontal	Pass
5.0MHz Band QPSK	25/0	701.5	3.37	1.91	19.23	2.15	18.54	71.450	Horizontal	Pass
		707.5	3.02	1.91	19.26	2.15	18.22	66.374	Horizontal	Pass
		713.5	3.06	1.92	19.33	2.15	18.32	67.920	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	701.5	1.95	1.91	19.23	2.15	17.12	51.523	Horizontal	Pass
		707.5	1.88	1.91	19.26	2.15	17.08	51.050	Horizontal	Pass
		713.5	1.76	1.92	19.33	2.15	17.02	50.350	Horizontal	Pass
10.0MH z Band QPSK	50/0	704	3.05	1.91	19.25	2.15	18.24	66.681	Horizontal	Pass
		707.5	3.11	1.91	19.26	2.15	18.31	67.764	Horizontal	Pass
		711	2.94	1.92	19.32	2.15	18.19	65.917	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	704	1.88	1.91	19.25	2.15	17.07	50.933	Horizontal	Pass
		707.5	1.81	1.91	19.26	2.15	17.01	50.234	Horizontal	Pass
		711	1.87	1.92	19.32	2.15	17.12	51.523	Horizontal	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)



8.7 LTE BAND 17

Radiated Power (ERP) for Band 17										
Mode	RB/ RB SIZE	Freque ncy	Result							Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
5.0MHz Band QPSK	25/0	706.5	3.70	1.91	19.23	2.15	18.87	77.090	Vertical	Pass
		710	3.75	1.91	19.26	2.15	18.95	78.524	Vertical	Pass
		713.5	3.77	1.92	19.33	2.15	19.03	79.983	Vertical	Pass
5.0MHz Band 16 QAM	25/0	706.5	2.68	1.91	19.23	2.15	17.85	60.954	Vertical	Pass
		710	2.54	1.91	19.26	2.15	17.74	59.429	Vertical	Pass
		713.5	2.70	1.92	19.33	2.15	17.96	62.517	Vertical	Pass
10.0MH z Band QPSK	50/0	709	3.85	1.91	19.25	2.15	19.04	80.168	Vertical	Pass
		710	3.91	1.91	19.26	2.15	19.11	81.470	Vertical	Pass
		711	3.71	1.92	19.32	2.15	18.96	78.705	Vertical	Pass
10.0MH z Band 16 QAM	50/0	709	2.66	1.91	19.25	2.15	17.85	60.954	Vertical	Pass
		710	2.82	1.91	19.26	2.15	18.02	63.387	Vertical	Pass
		711	2.80	1.92	19.32	2.15	18.05	63.826	Vertical	Pass



Radiated Power (ERP) for Band 17										
Mode	RB/ RB SIZE	Freque ncy	Result							Conclu sion
			SG Level (dBm)	Cable Loss (dBm)	Anten na Gain (dB)	Corre ction (dB)	Max. EIRP Averag e (dBm)	Max. EIRP Averag e (mW)	Polarizati on Of Max. ERP	
5.0MHz Band QPSK	25/0	706.5	3.37	1.91	19.23	2.15	18.54	71.450	Horizontal	Pass
		710	3.45	1.91	19.26	2.15	18.65	73.282	Horizontal	Pass
		713.5	3.40	1.92	19.33	2.15	18.66	73.451	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	706.5	2.30	1.91	19.23	2.15	17.47	55.847	Horizontal	Pass
		710	2.04	1.91	19.26	2.15	17.24	52.966	Horizontal	Pass
		713.5	2.06	1.92	19.33	2.15	17.32	53.951	Horizontal	Pass
10.0MH z Band QPSK	50/0	709	3.37	1.91	19.25	2.15	18.56	71.779	Horizontal	Pass
		710	3.52	1.91	19.26	2.15	18.72	74.473	Horizontal	Pass
		711	3.37	1.92	19.32	2.15	18.62	72.778	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	709	2.23	1.91	19.25	2.15	17.42	55.208	Horizontal	Pass
		710	2.43	1.91	19.26	2.15	17.63	57.943	Horizontal	Pass
		711	2.36	1.92	19.32	2.15	17.61	57.677	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 $43 + 10 \log_{10}(P)$ 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 $43 + 10 \text{ Log}_{10} (p)$, dB; and
- b. for mobile subscriber equipment, the attenuation shall not be less than $43 + 10 \text{ Log}_{10} (p)$, dB at the channel edges and $55 + 10 \text{ Log}_{10} (p)$ 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
LTE Band 12
LTE Band 17

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	-52.65	4.04	33.51	-23.18	-13	-10.18	Horizontal
3701.4	-54.48	4.04	33.51	-25.01	-13	-12.01	Vertical
5552.1	-56.96	5.24	35.84	-26.36	-13	-13.36	Vertical
5552.1	-67.48	5.24	35.84	-36.88	-13	-23.88	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760.0	-53.62	4.04	33.56	-24.10	-13	-11.10	Horizontal
3760.0	-54.12	4.04	33.56	-24.60	-13	-11.60	Vertical
5640.0	-54.98	5.24	35.91	-24.31	-13	-11.31	Vertical
5640.0	-56.69	5.24	35.91	-26.02	-13	-13.02	Horizontal
Test Results for High Channel 1754.3MHz							
3818.6	-53.29	4.04	34	-23.33	-13	-10.33	Horizontal
3818.6	-55.58	4.04	34	-25.62	-13	-12.62	Vertical
5727.9	-57.64	5.24	36.04	-26.84	-13	-13.84	Vertical
5727.9	-56.96	5.24	36.04	-26.16	-13	-13.16	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	-57.41	4.07	33.54	-27.94	-13	-14.94	Horizontal
3720	-52.28	4.07	33.54	-22.81	-13	-9.81	Vertical
5580	-58.98	5.28	35.86	-28.40	-13	-15.40	Vertical
5580	-60.32	5.28	35.86	-29.74	-13	-16.74	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760	-56.96	4.04	33.56	-27.44	-13	-14.44	Horizontal
3760	-53.62	4.04	33.56	-24.10	-13	-11.10	Vertical
5640	-57.74	5.24	35.91	-27.07	-13	-14.07	Vertical
5640	-58.98	5.24	35.91	-28.31	-13	-15.31	Horizontal
Test Results for High Channel 1754.3MHz							
3800	-55.52	4.04	34.00	-25.56	-13	-12.56	Horizontal
3800	-56.96	4.04	34.00	-27.00	-13	-14.00	Vertical
5700	-58.41	5.24	36.04	-27.61	-13	-14.61	Vertical
5700	-56.62	5.24	36.04	-25.82	-13	-12.82	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

. Over Limit= : P_{Mea}(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	-59.95	4.02	29.80	-34.17	-13	-21.17	Horizontal
3421.4	-57.41	4.02	29.80	-31.63	-13	-18.63	Vertical
5132.1	-61.23	5.24	35.84	-30.63	-13	-17.63	Vertical
5132.1	-62.82	5.24	35.84	-32.22	-13	-19.22	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-51.23	4.03	30.00	-25.26	-13	-12.26	Horizontal
3465.0	-54.94	4.03	30.00	-28.97	-13	-15.97	Vertical
5197.5	-58.69	5.25	35.86	-28.08	-13	-15.08	Vertical
5197.5	-56.63	5.25	35.86	-26.02	-13	-13.02	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-51.17	4.05	30.01	-25.21	-13	-12.21	Horizontal
3508.6	-57.84	4.05	30.01	-31.88	-13	-18.88	Vertical
5262.9	-57.53	5.26	35.86	-26.93	-13	-13.93	Vertical
5262.9	-55.58	5.26	35.86	-24.98	-13	-11.98	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	-56.64	4.02	29.80	-30.86	-13	-17.86	Horizontal
3440	-57.41	4.02	29.80	-31.63	-13	-18.63	Vertical
5160	-60.11	5.24	35.84	-29.51	-13	-16.51	Vertical
5160	-62.28	5.24	35.84	-31.68	-13	-18.68	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-51.18	4.03	30.00	-25.21	-13	-12.21	Horizontal
3465	-54.23	4.03	30.00	-28.26	-13	-15.26	Vertical
5198	-60.52	5.25	35.86	-29.91	-13	-16.91	Vertical
5198	-58.98	5.25	35.86	-28.37	-13	-15.37	Horizontal
Test Results for High Channel 1754.3MHz							
2490	-53.62	2.91	27.68	-28.85	-13	-15.85	Horizontal
3490	-55.58	2.91	27.68	-30.81	-13	-17.81	Vertical
5235	-58.98	5.26	35.86	-28.38	-13	-15.38	Vertical
5235	-57.94	5.26	35.86	-27.34	-13	-14.34	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ ARpl (dBm)

Over Limit= : P_{Mea}(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	-51.23	2.78	27.50	-26.51	-13	-13.51	Horizontal
1649.4	-56.63	2.78	27.50	-31.91	-13	-18.91	Vertical
2474.1	-55.28	2.90	27.80	-30.38	-13	-17.38	Vertical
2474.1	-54.13	2.90	27.80	-29.23	-13	-16.23	Horizontal
Test Results For Mid Channel 836.5MHz							
1673.0	-51.62	2.78	27.48	-26.92	-13	-13.92	Horizontal
1673.0	-50.14	2.78	27.48	-25.44	-13	-12.44	Vertical
2509.5	-52.47	2.91	27.70	-27.68	-13	-14.68	Vertical
2509.5	-52.33	2.91	27.70	-27.54	-13	-14.54	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-52.89	2.78	27.43	-28.24	-13	-15.24	Horizontal
1696.6	-54.64	2.78	27.43	-29.99	-13	-16.99	Vertical
2544.9	-51.12	2.92	27.74	-26.30	-13	-13.30	Vertical
2544.9	-52.32	2.92	27.74	-27.50	-13	-14.50	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	-53.62	2.78	27.50	-28.90	-13	-15.90	Horizontal
1658	-51.14	2.78	27.50	-26.42	-13	-13.42	Vertical
2487	-55.28	2.90	27.80	-30.38	-13	-17.38	Vertical
2487	-52.97	2.90	27.80	-28.07	-13	-15.07	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-51.64	2.78	27.48	-26.94	-13	-13.94	Horizontal
1673	-52.34	2.78	27.48	-27.64	-13	-14.64	Vertical
2510	-55.56	2.91	27.70	-30.77	-13	-17.77	Vertical
2510	-52.98	2.91	27.70	-28.19	-13	-15.19	Horizontal
Test Results for High Channel 848.3MHz							
1688	-55.58	2.78	27.43	-30.93	-13	-17.93	Horizontal
1688	-50.12	2.78	27.43	-25.47	-13	-12.47	Vertical
2532	-51.09	2.92	27.74	-26.27	-13	-13.27	Vertical
2532	-52.32	2.92	27.74	-27.50	-13	-14.50	Horizontal

Note: $P_{Mea}(dBm) = Power(dBm) + ARpl(dBm)$

. Over Limit = $P_{Mea}(dBm) - Limit(dBm)$

. 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	-56.92	5.23	35.81	-26.34	-13	-13.34	Horizontal
5005	-54.41	5.23	35.81	-23.83	-13	-10.83	Vertical
7507.5	-58.95	5.67	36.85	-27.77	-13	-14.77	Vertical
7507.5	-54.62	5.67	36.85	-23.44	-13	-10.44	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-53.26	5.23	35.82	-22.67	-13	-9.67	Horizontal
5070	-55.54	5.23	35.82	-24.95	-13	-11.95	Vertical
7605	-56.95	5.67	36.85	-25.77	-13	-12.77	Vertical
7605	-57.84	5.67	36.85	-26.66	-13	-13.66	Horizontal
Test Results for High Channel 1754.3MHz							
5135	-57.84	5.24	35.83	-27.25	-13	-14.25	Horizontal
5135	-54.41	5.24	35.83	-23.82	-13	-10.82	Vertical
7702.5	-56.68	5.68	36.87	-25.49	-13	-12.49	Vertical
7702.5	-57.82	5.68	36.87	-26.63	-13	-13.63	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	-56.69	5.23	35.82	-26.10	-13	-13.10	Horizontal
5020	-54.41	5.23	35.82	-23.82	-13	-10.82	Vertical
7530	-57.58	5.67	36.86	-26.39	-13	-13.39	Vertical
7530	-53.26	5.67	36.86	-22.07	-13	-9.07	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-54.12	5.23	35.82	-23.53	-13	-10.53	Horizontal
5070	-53.69	5.23	35.82	-23.10	-13	-10.10	Vertical
7605	-56.68	5.67	36.85	-25.50	-13	-12.50	Vertical
7605	-57.81	5.67	36.85	-26.63	-13	-13.63	Horizontal
Test Results for High Channel 1754.3MHz							
5120	-53.22	5.24	35.83	-22.63	-13	-9.63	Horizontal
5120	-56.69	5.24	35.83	-26.10	-13	-13.10	Vertical
7680	-57.84	5.70	36.88	-26.66	-13	-13.66	Vertical
7680	-57.51	5.70	36.88	-26.33	-13	-13.33	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

Over Limit= : P_{Mea}(dBm)-Limit(dBm)

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



9.5 LTE BAND 12

QPSK EIRP POWER FOR LTE BAND 12 (1.4MHZ BANDWIDTH)

Test Results for Low Channel 699.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1399.4	-49.98	2.60	27.20	-25.38	-13	-12.38	Horizontal
1399.4	-50.65	2.60	27.20	-26.05	-13	-13.05	Vertical
2099.1	-51.17	2.85	27.54	-26.48	-13	-13.48	Vertical
2099.1	-50.63	2.85	27.54	-25.94	-13	-12.94	Horizontal
Test Results For Mid Channel 707.5MHz							
1415	-52.58	2.61	27.28	-27.91	-13	-14.91	Horizontal
1415	-50.58	2.61	27.28	-25.91	-13	-12.91	Vertical
2122.5	-49.22	2.87	27.59	-24.50	-13	-11.50	Vertical
2122.5	-53.62	2.87	27.59	-28.90	-13	-15.90	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-52.47	2.63	27.28	-27.82	-13	-14.82	Horizontal
1430.6	-56.62	2.63	27.28	-31.97	-13	-18.97	Vertical
2145.9	-53.62	2.88	27.60	-28.90	-13	-15.90	Vertical
2145.9	-51.89	2.88	27.60	-27.17	-13	-14.17	Horizontal

QPSK EIRP POWER FOR LTE BAND 12 (10MHZ BANDWIDTH)

Test Results for Low Channel 704MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1408	-49.41	2.61	27.26	-24.76	-13	-11.76	Horizontal
1408	-53.21	2.61	27.26	-28.56	-13	-15.56	Vertical
2112	-52.68	2.87	27.58	-27.97	-13	-14.97	Vertical
2112	-52.97	2.87	27.58	-28.26	-13	-15.26	Horizontal
Test Results for Mid Channel 707.5MHz							
1415	-51.64	2.61	27.28	-26.97	-13	-13.97	Horizontal
1415	-55.57	2.61	27.28	-30.90	-13	-17.90	Vertical
2122.5	-53.62	2.87	27.59	-28.90	-13	-15.90	Vertical
2122.5	-52.67	2.87	27.59	-27.95	-13	-14.95	Horizontal
Test Results for High Channel 711MHz							
1422	-54.49	2.62	27.28	-29.83	-13	-16.83	Horizontal
1422	-50.41	2.62	27.28	-25.75	-13	-12.75	Vertical
2133	-53.28	2.87	27.60	-28.55	-13	-15.55	Vertical
2133	-52.98	2.87	27.60	-28.25	-13	-15.25	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : P_{Mea}(dBm)-Limit(dBm)

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



9.6 LTE BAND 17

QPSK EIRP POWER FOR LTE BAND 17 (5MHZ BANDWIDTH)

Test Results for Low Channel 706.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1413	-50.52	2.61	27.28	-25.85	-13	-12.85	Horizontal
1413	-49.33	2.61	27.28	-24.66	-13	-11.66	Vertical
2119.5	-51.24	2.87	27.59	-26.52	-13	-13.52	Vertical
2119.5	-50.46	2.87	27.59	-25.74	-13	-12.74	Horizontal
Test Results For Mid Channel 710MHz							
1420	-49.98	2.62	27.30	-25.30	-13	-12.30	Horizontal
1420	-52.26	2.62	27.30	-27.58	-13	-14.58	Vertical
2130	-53.46	2.87	27.62	-28.71	-13	-15.71	Vertical
2130	-55.51	2.87	27.62	-30.76	-13	-17.76	Horizontal
Test Results for High Channel 713.5MHz							
1427	-53.24	2.66	27.28	-28.62	-13	-15.62	Horizontal
1427	-53.62	2.66	27.28	-29.00	-13	-16.00	Vertical
2140.5	-51.18	2.88	27.60	-26.46	-13	-13.46	Vertical
2140.5	-50.07	2.88	27.60	-25.35	-13	-12.35	Horizontal

QPSK EIRP POWER FOR LTE BAND 17 (10MHZ BANDWIDTH)

Test Results for Low Channel 709MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1418	-53.24	2.62	27.30	-28.56	-13	-15.56	Horizontal
1418	-50.98	2.62	27.30	-26.30	-13	-13.30	Vertical
2127	-52.12	2.87	27.62	-27.37	-13	-14.37	Vertical
2127	-55.56	2.87	27.62	-30.81	-13	-17.81	Horizontal
Test Results for Mid Channel 710MHz							
1420	-53.24	2.62	27.30	-28.56	-13	-15.56	Horizontal
1420	-50.67	2.62	27.30	-25.99	-13	-12.99	Vertical
2130	-55.49	2.87	27.62	-30.74	-13	-17.74	Vertical
2130	-51.12	2.87	27.62	-26.37	-13	-13.37	Horizontal
Test Results for High Channel 711MHz							
1422	-19.98	2.62	27.30	4.70	-13	17.70	Horizontal
1422	-52.24	2.62	27.30	-27.56	-13	-14.56	Vertical
2133	-50.65	2.87	27.62	-25.90	-13	-12.90	Vertical
2133	-53.64	2.87	27.62	-28.89	-13	-15.89	Horizontal

Note: $P_{Mea}(dBm) = Power(dBm) + ARpl(dBm)$

. Over Limit = $P_{Mea}(dBm) - Limit(dBm)$

. 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 $+50^{\circ}\text{C}$
- Voltage = low voltage, DC 3.66V, Normal, DC 3.85V and High voltage, DC 4.43V.

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to -30°C 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 $+50^{\circ}\text{C}$ is reached.

Frequency Stability vs Voltage:

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

MODES TESTED

- LTE Band 2
LTE Band 4
- LTE Band 5
LTE Band 7
LTE Band 12
LTE Band 17

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)				
3.66	1880	4.7	0.002500	2.5
3.85	1880	-7.2	-0.003830	2.5
4.43	1880	4.5	0.002394	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	5.7	0.003032	2.5
Extreme (50C)	1880	-6.6	-0.003511	2.5
Extreme (40C)	1880	-7.1	-0.003777	2.5
Extreme (30C)	1880	8.6	0.004574	2.5
Extreme (10C)	1880	7.3	0.003883	2.5
Extreme (0C)	1880	6.1	0.003245	2.5
Extreme (-10C)	1880	-7.4	-0.003936	2.5
Extreme (-20C)	1880	6.9	0.003670	2.5
Extreme (-30C)	1880	5.3	0.002819	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)				
3.66	1880	6.4	0.003404	2.5
3.85	1880	4.2	0.002234	2.5
4.43	1880	5.6	0.002979	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	-5.4	-0.002872	2.5
Extreme (40C)	1880	3.9	0.002074	2.5
Extreme (30C)	1880	-4.7	-0.002500	2.5
Extreme (10C)	1880	5.6	0.002979	2.5
Extreme (0C)	1880	4.7	0.002500	2.5
Extreme (-10C)	1880	7.8	0.004149	2.5
Extreme (-20C)	1880	9.3	0.004947	2.5
Extreme (-30C)	1880	5.2	0.002766	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)				
3.66	1732.5	4.6	0.002655	2.5
3.85	1732.5	8.9	0.005137	2.5
4.43	1732.5	10.2	0.005887	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	6.9	0.003983	2.5
Extreme (50C)	1732.5	4.7	0.002713	2.5
Extreme (40C)	1732.5	5.1	0.002944	2.5
Extreme (30C)	1732.5	8.2	0.004733	2.5
Extreme (10C)	1732.5	-6.3	-0.003636	2.5
Extreme (0C)	1732.5	-4.8	-0.002771	2.5
Extreme (-10C)	1732.5	7.8	0.004502	2.5
Extreme (-20C)	1732.5	8.4	0.004848	2.5
Extreme (-30C)	1732.5	8.9	0.005137	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)				
3.66	1732.5	6.9	0.003983	2.5
3.85	1732.5	7.8	0.004502	2.5
4.43	1732.5	5.4	0.003117	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	4.6	0.002655	2.5
Extreme (50C)	1732.5	5.4	0.003117	2.5
Extreme (40C)	1732.5	3.9	0.002251	2.5
Extreme (30C)	1732.5	-7.7	-0.004444	2.5
Extreme (10C)	1732.5	-4.1	-0.002367	2.5
Extreme (0C)	1732.5	3.5	0.002020	2.5
Extreme (-10C)	1732.5	5.9	0.003405	2.5
Extreme (-20C)	1732.5	5.5	0.003175	2.5
Extreme (-30C)	1732.5	6.2	0.003579	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)				
3.66	836.5	-2.6	-0.003108	2.5
3.85	836.5	-6.0	-0.007173	2.5
4.43	836.5	3.9	0.004662	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	-2.3	-0.002750	2.5
Extreme (50C)	836.5	-4.7	-0.005619	2.5
Extreme (40C)	836.5	-4.4	-0.005260	2.5
Extreme (30C)	836.5	-3.6	-0.004304	2.5
Extreme (10C)	836.5	1.9	0.002271	2.5
Extreme (0C)	836.5	2.5	0.002989	2.5
Extreme (-10C)	836.5	3.7	0.004423	2.5
Extreme (-20C)	836.5	-4.8	-0.005738	2.5
Extreme (-30C)	836.5	-6.5	-0.007770	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)				
3.66	836.5	-3.3	-0.003945	2.5
3.85	836.5	-5.4	-0.006455	2.5
4.43	836.5	-6.8	-0.008129	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	-4.6	-0.005499	2.5
Extreme (50C)	836.5	-5.7	-0.006814	2.5
Extreme (40C)	836.5	-3.4	-0.004065	2.5
Extreme (30C)	836.5	6.5	0.007770	2.5
Extreme (10C)	836.5	3.2	0.003825	2.5
Extreme (0C)	836.5	3.3	0.003945	2.5
Extreme (-10C)	836.5	-4.8	-0.005738	2.5
Extreme (-20C)	836.5	-5.1	-0.006097	2.5
Extreme (-30C)	836.5	-4.2	-0.005021	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)				
3.66	2535	-6.1	-0.002406	2.5
3.85	2535	-12.6	-0.004970	2.5
4.43	2535	-9.6	-0.003787	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	-8.1	-0.003195	2.5
Extreme (50C)	2535	-6.9	-0.002722	2.5
Extreme (40C)	2535	5.3	0.002091	2.5
Extreme (30C)	2535	4.6	0.001815	2.5
Extreme (10C)	2535	4.7	0.001854	2.5
Extreme (0C)	2535	-7.6	-0.002998	2.5
Extreme (-10C)	2535	-6.5	-0.002564	2.5
Extreme (-20C)	2535	-10.2	-0.004024	2.5
Extreme (-30C)	2535	-12.5	-0.004931	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)				
3.66	2535	-8.6	-0.003393	2.5
3.85	2535	-7.0	-0.002761	2.5
4.43	2535	-9.6	-0.003787	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	-6.7	-0.002643	2.5
Extreme (50C)	2535	-8.4	-0.003314	2.5
Extreme (40C)	2535	-9.5	-0.003748	2.5
Extreme (30C)	2535	-11.2	-0.004418	2.5
Extreme (10C)	2535	2.4	0.000947	2.5
Extreme (0C)	2535	3.7	0.001460	2.5
Extreme (-10C)	2535	5.6	0.002209	2.5
Extreme (-20C)	2535	-8.2	-0.003235	2.5
Extreme (-30C)	2535	-8.9	-0.003511	2.5

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



10.5 LTE BAND 12

QPSK, (10MHz BANDWIDTH)**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.66	707.5	-4.2	-0.005936	2.5
3.85	707.5	-4.8	-0.006784	2.5
4.43	707.5	-5.7	-0.008057	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	707.5	-4.2	-0.005936	2.5
Extreme (50C)	707.5	-4.8	-0.006784	2.5
Extreme (40C)	707.5	-5.3	-0.007491	2.5
Extreme (30C)	707.5	-5.6	-0.007915	2.5
Extreme (10C)	707.5	-5.2	-0.007350	2.5
Extreme (0C)	707.5	-3.9	-0.005512	2.5
Extreme (-10C)	707.5	-4.1	-0.005795	2.5
Extreme (-20C)	707.5	-4.7	-0.006643	2.5
Extreme (-30C)	707.5	-5.6	-0.007915	2.5

**16QAM, (10MHz BANDWIDTH)****Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 16QAM, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.66	707.5	-3.3	-0.004664	2.5
3.85	707.5	-3.8	-0.005371	2.5
4.43	707.5	-3.4	-0.004806	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	707.5	-6.4	-0.009046	2.5
Extreme (50C)	707.5	-6.1	-0.008622	2.5
Extreme (40C)	707.5	-6.8	-0.009611	2.5
Extreme (30C)	707.5	-7.8	-0.011025	2.5
Extreme (10C)	707.5	-8.1	-0.011449	2.5
Extreme (0C)	707.5	2.3	0.003251	2.5
Extreme (-10C)	707.5	-5.6	-0.007915	2.5
Extreme (-20C)	707.5	-9.8	-0.013852	2.5
Extreme (-30C)	707.5	-10.2	-0.014417	2.5

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



10.6 LTE BAND 17

QPSK, (10MHz BANDWIDTH)**Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.66	710.0	-2.6	-0.003662	2.5
3.85	710.0	6.4	0.009014	2.5
4.43	710.0	5.2	0.007324	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	710.0	3.9	0.005493	2.5
Extreme (50C)	710.0	6.1	0.008592	2.5
Extreme (40C)	710.0	5.7	0.008028	2.5
Extreme (30C)	710.0	5.2	0.007324	2.5
Extreme (10C)	710.0	6.8	0.009577	2.5
Extreme (0C)	710.0	-7.0	-0.009859	2.5
Extreme (-10C)	710.0	-7.1	-0.010000	2.5
Extreme (-20C)	710.0	6.9	0.009718	2.5
Extreme (-30C)	710.0	7.2	0.010141	2.5

**16QAM, (10MHz BANDWIDTH)****Frequency error vs. Voltage**

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 16QAM, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.66	710.0	3.8	0.005352	2.5
3.85	710.0	6.2	0.008732	2.5
4.43	710.0	-5.8	-0.008169	2.5

Frequency error vs. Temperature

Temperature [° C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	710.0	4.1	0.005775	2.5
Extreme (50C)	710.0	-3.6	-0.005070	2.5
Extreme (40C)	710.0	-4.8	-0.006761	2.5
Extreme (30C)	710.0	-6.7	-0.009437	2.5
Extreme (10C)	710.0	5.8	0.008169	2.5
Extreme (0C)	710.0	6.9	0.009718	2.5
Extreme (-10C)	710.0	7.2	0.010141	2.5
Extreme (-20C)	710.0	6.4	0.009014	2.5
Extreme (-30C)	710.0	5.9	0.008310	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.

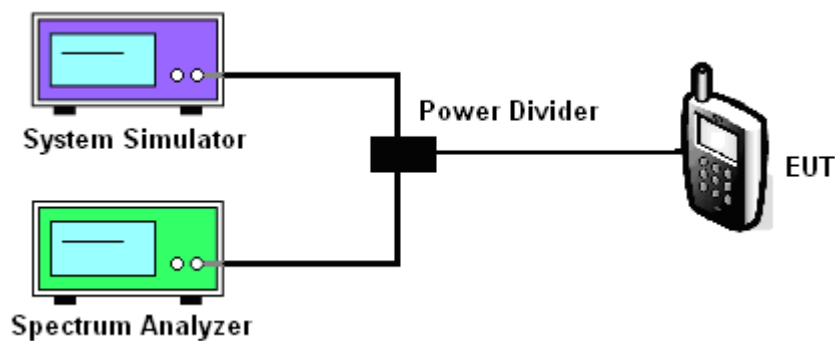
11.2 Measuring Instruments

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
- LTE Band 12
- LTE Band 17



BAND	CHANNEL	Frequency [MHz]	BANDWIDTH	NO. RB	RB POS.	MODULATION	PAR [dB]
2	18900	1880.0	1.4	1	Low	QPSK	1.35
2	18900	1880.0	1.4	1	Low	16-QAM	2.73
2	18900	1880.0	3.0	1	Low	QPSK	1.15
2	18900	1880.0	3.0	1	Low	16-QAM	1.56
2	18900	1880.0	5.0	1	Low	QPSK	1.31
2	18900	1880.0	5.0	1	Low	16-QAM	1.42
2	18900	1880.0	10.0	1	Low	QPSK	2.32
2	18900	1880.0	10.0	1	Low	16-QAM	2.59
2	18900	1880.0	15.0	1	Low	QPSK	2.21
2	18900	1880.0	15.0	1	Low	16-QAM	2.27
2	18900	1880.0	20.0	1	Low	QPSK	1.52
2	18900	1880.0	20.0	1	Low	16-QAM	1.39
4	20175	1732.5	1.4	1	Low	QPSK	1.21
4	20175	1732.5	1.4	1	Low	16-QAM	2.70
4	20175	1732.5	3.0	1	Low	QPSK	1.11
4	20175	1732.5	3.0	1	Low	16-QAM	1.73
4	20175	1732.5	5.0	1	Low	QPSK	1.30
4	20175	1732.5	5.0	1	Low	16-QAM	1.73
4	20175	1732.5	10.0	1	Low	QPSK	1.59
4	20175	1732.5	10.0	1	Low	16-QAM	1.41



4	20175	1732.5	15.0	1	Low	QPSK	2.61
4	20175	1732.5	15.0	1	Low	16-QAM	3.34
4	20175	1732.5	20.0	1	Low	QPSK	2.35
4	20175	1732.5	20.0	1	Low	16-QAM	2.00
5	20525	836.5	1.4	1	Low	QPSK	2.32
5	20525	836.5	1.4	1	Low	16-QAM	2.20
5	20525	836.5	3.0	1	Low	QPSK	0.81
5	20525	836.5	3.0	1	Low	16-QAM	1.75
5	20525	836.5	5.0	1	Low	QPSK	0.81
5	20525	836.5	5.0	1	Low	16-QAM	1.64
5	20525	836.5	10.0	1	Low	QPSK	1.19
5	20525	836.5	10.0	1	Low	16-QAM	1.69
7	21100	2535.0	5.0	1	Low	QPSK	7.34
7	21100	2535.0	5.0	1	Low	16-QAM	8.00
7	21100	2535.0	10.0	1	Low	QPSK	7.34
7	21100	2535.0	10.0	1	Low	16-QAM	1.24
7	21100	2535.0	15.0	1	Low	QPSK	1.21
7	21100	2535.0	15.0	1	Low	16-QAM	1.19
7	21100	2535.0	20.0	1	Low	QPSK	1.14
7	21100	2535.0	20.0	1	Low	16-QAM	1.29
12	23095	707.5	1.4	1	Low	QPSK	4.14
12	23095	707.5	1.4	1	Low	16-QAM	2.79



12	23095	707.5	3.0	1	Low	QPSK	1.22
12	23095	707.5	3.0	1	Low	16-QAM	1.16
12	23095	707.5	5.0	1	Low	QPSK	0.83
12	23095	707.5	5.0	1	Low	16-QAM	1.09
12	23095	707.5	10.0	1	Low	QPSK	0.90
12	23095	707.5	10.0	1	Low	16-QAM	1.12
17	23790	710.0	5.0	1	Low	QPSK	0.84
17	23790	710.0	5.0	1	Low	16-QAM	0.97
17	23790	710.0	10.0	1	Low	QPSK	1.02
17	23790	710.0	10.0	1	Low	16-QAM	1.00

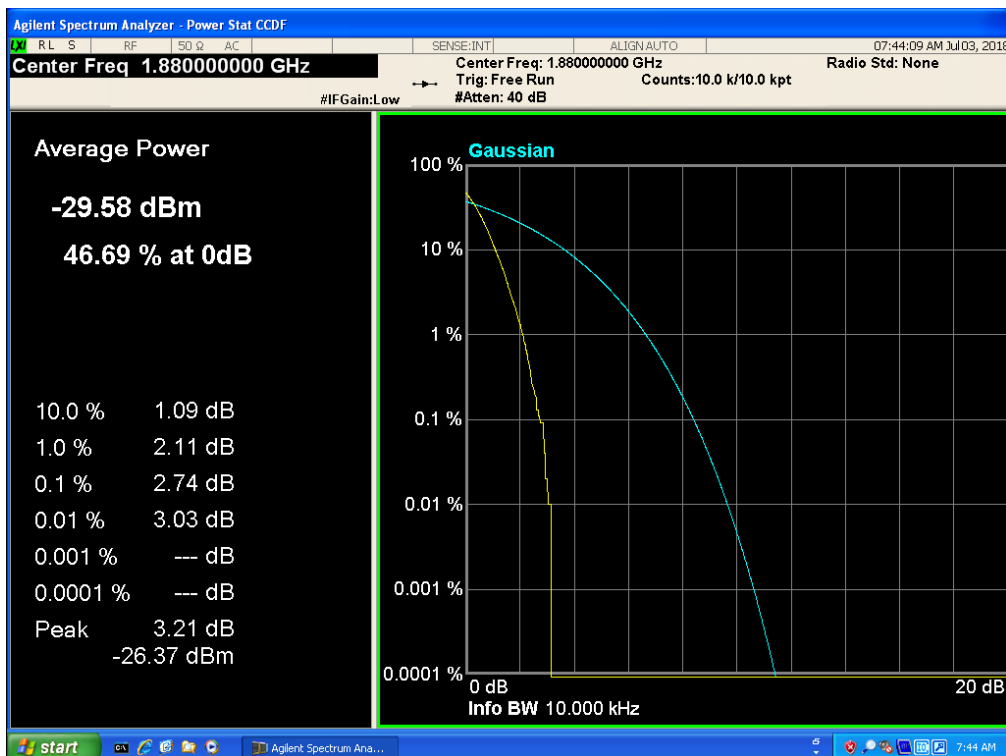


11.5 LTE BAND 2

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

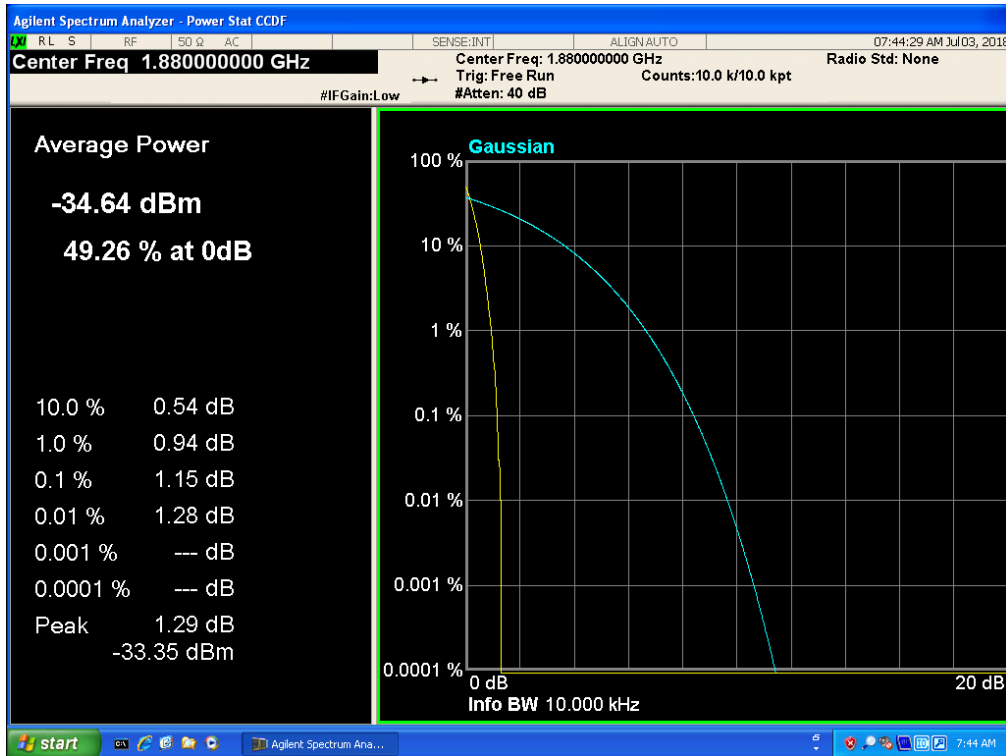


Band 2, UL Channel 18900, UL Frequency 1880.0, BW 1.4, NO. RB 1, RB POS. Low, 16-QAM

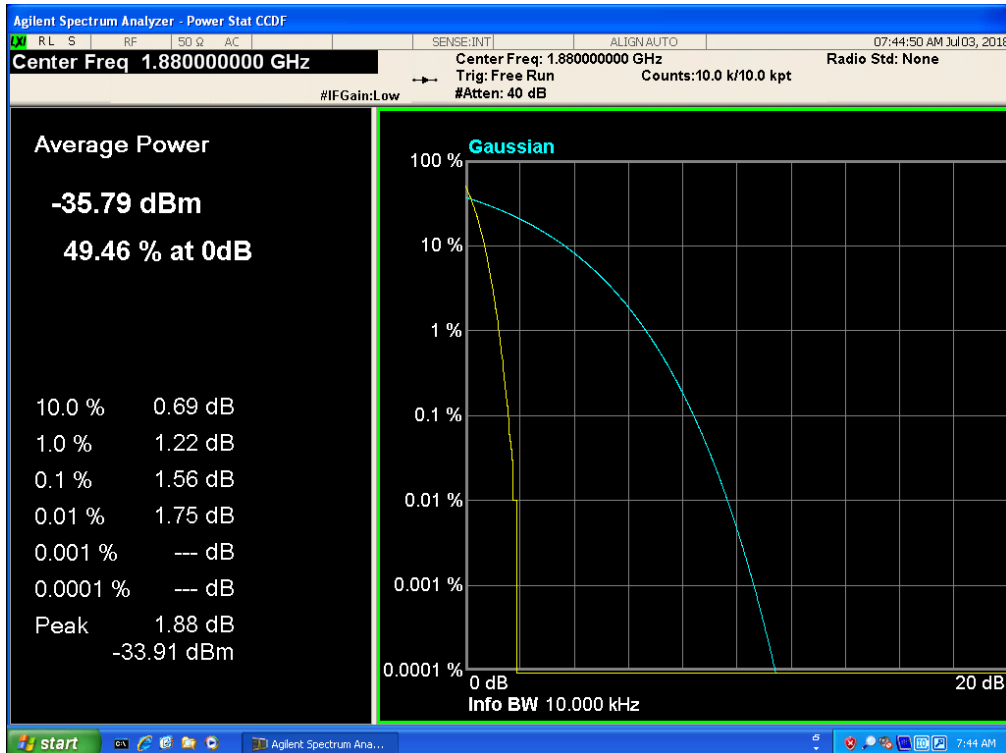




Band 2, UL Channel 18900, UL Frequency 1880.0, BW 3.0, NO. RB 1, RB POS. Low, QPSK

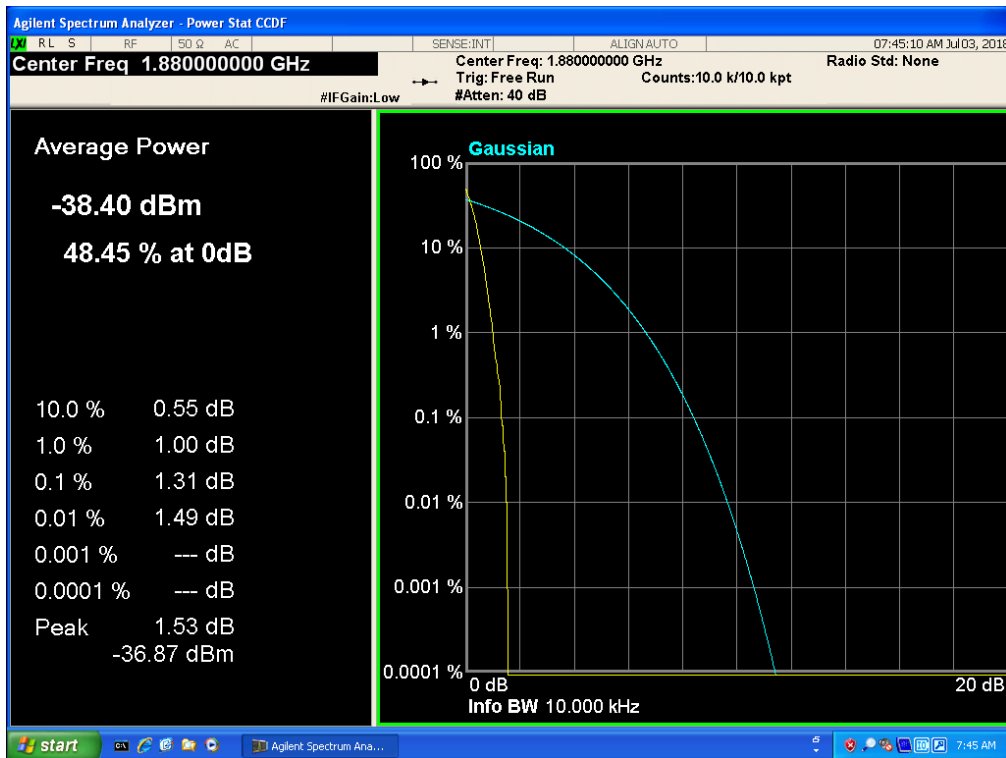


Band 2, UL Channel 18900, UL Frequency 1880.0, BW 3.0, NO. RB 1, RB POS. Low, 16-QAM

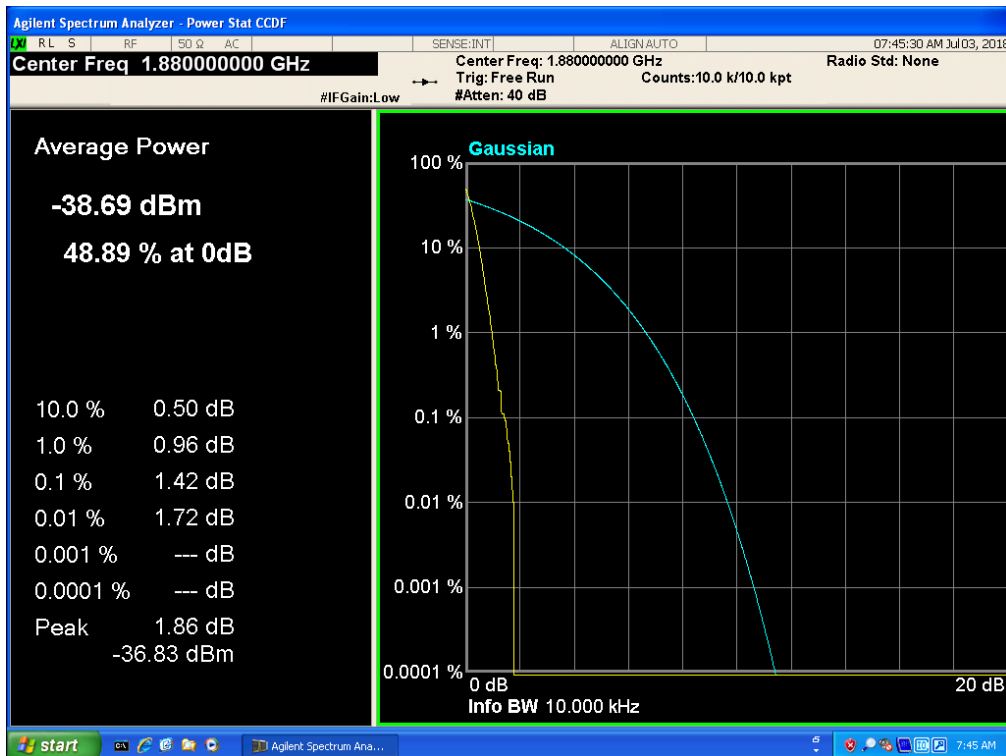




Band 2,UL Channel 18900,UL Frequency 1880.0,BW 5.0,NO. RB 1,RB POS. Low,QPSK

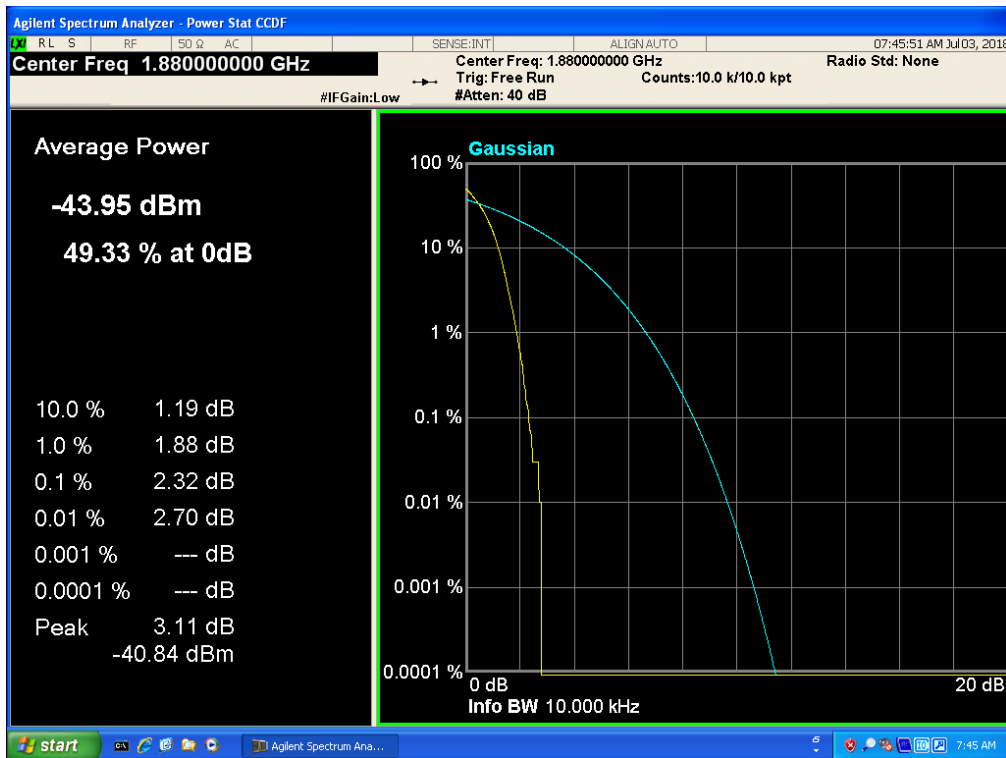


Band 2,UL Channel 18900,UL Frequency 1880.0,BW 5.0,NO. RB 1,RB POS. Low,16-QAM

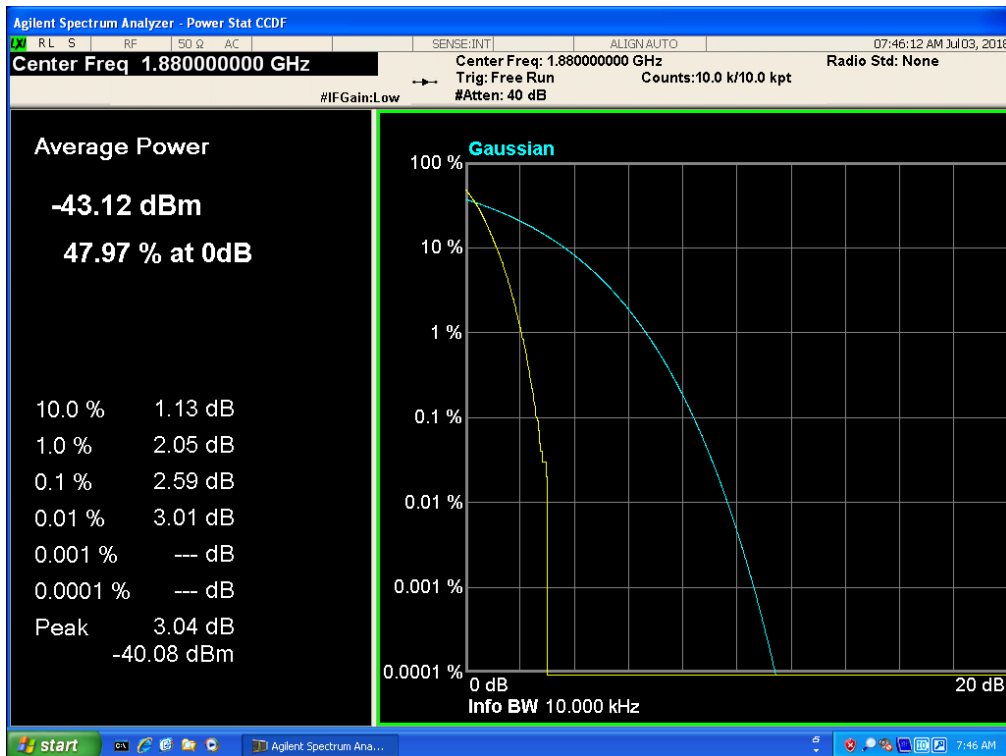




Band 2,UL Channel 18900,UL Frequency 1880.0,BW 10.0,NO. RB 1,RB POS. Low,QPSK

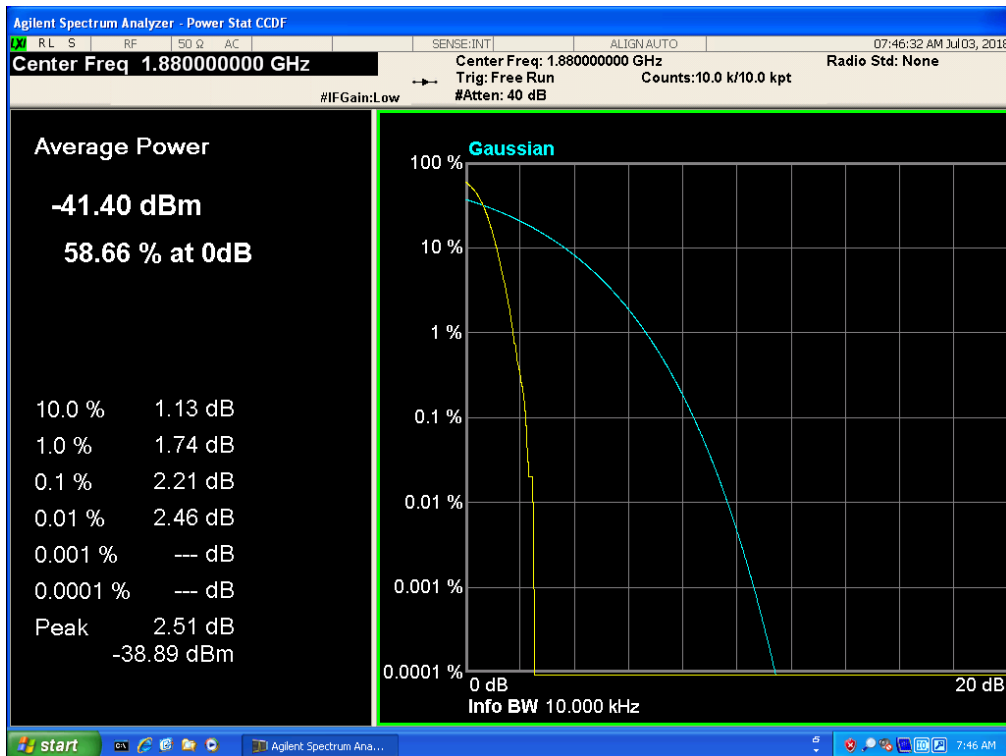


Band 2,UL Channel 18900,UL Frequency 1880.0,BW 10.0,NO. RB 1,RB POS. Low,16-QAM

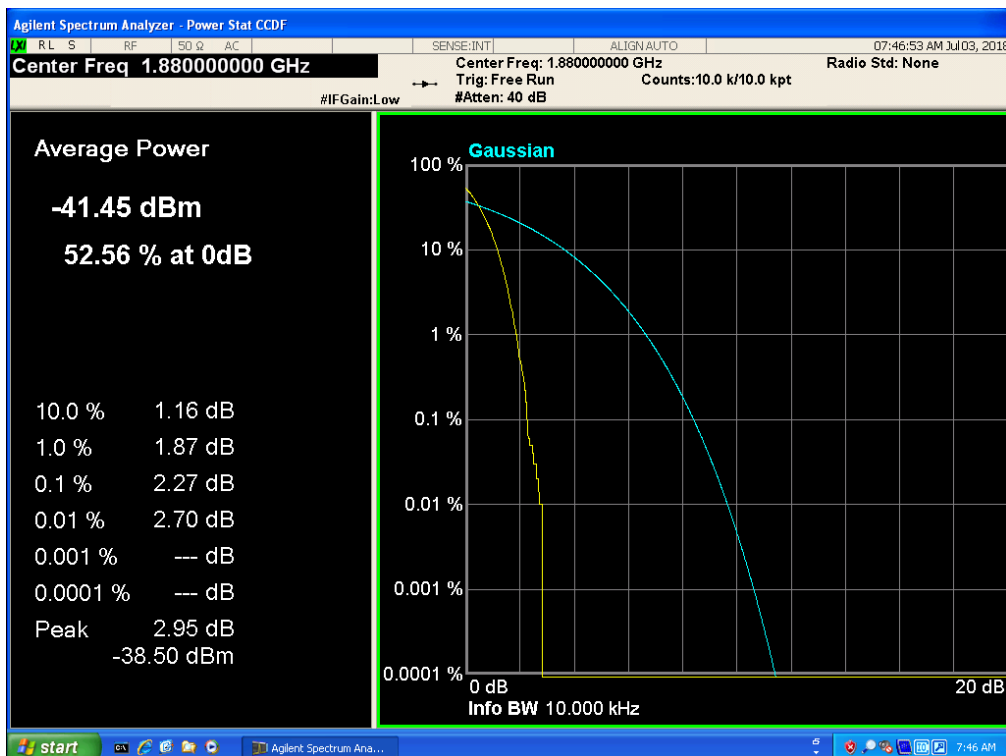




Band 2,UL Channel 18900,UL Frequency 1880.0,BW 15.0,NO. RB 1,RB POS. Low,QPSK



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

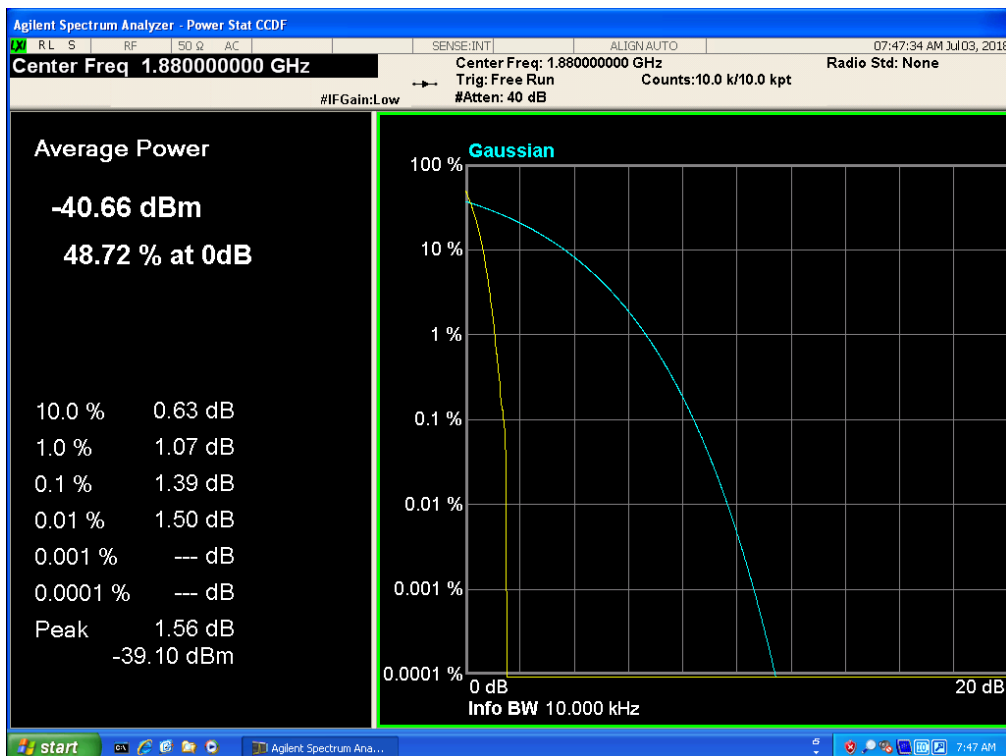




Band 2,UL Channel 18900,UL Frequency 1880.0,BW 20.0,NO. RB 1,RB POS. Low,QPSK



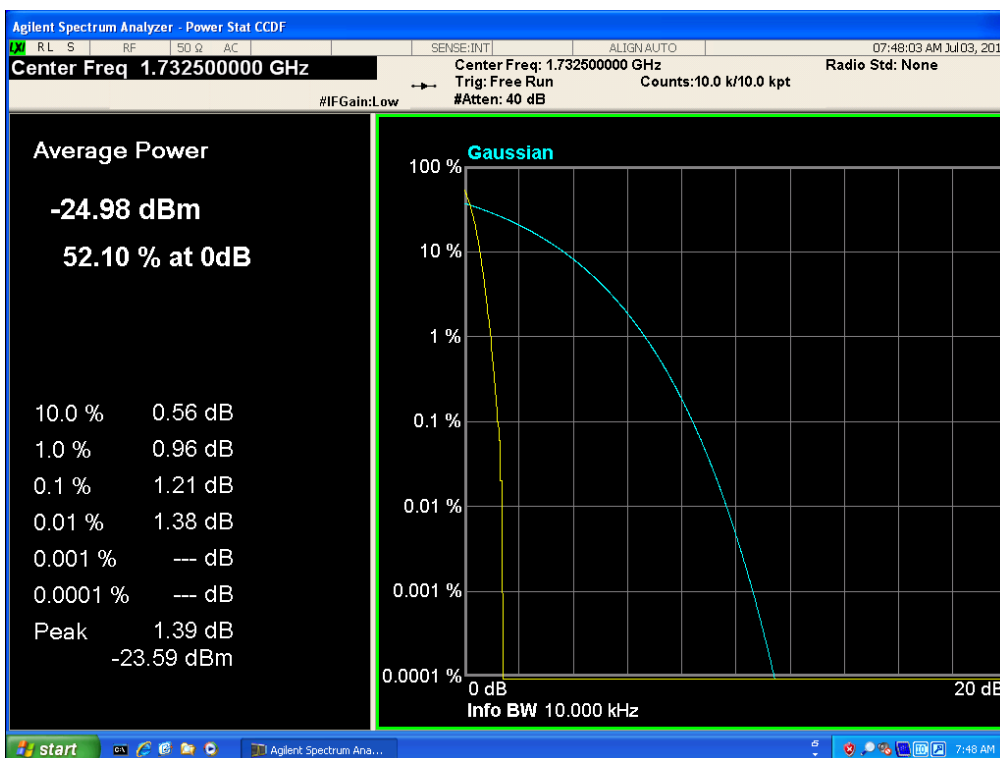
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 20.0,NO. RB 1,RB POS. Low,16-QAM



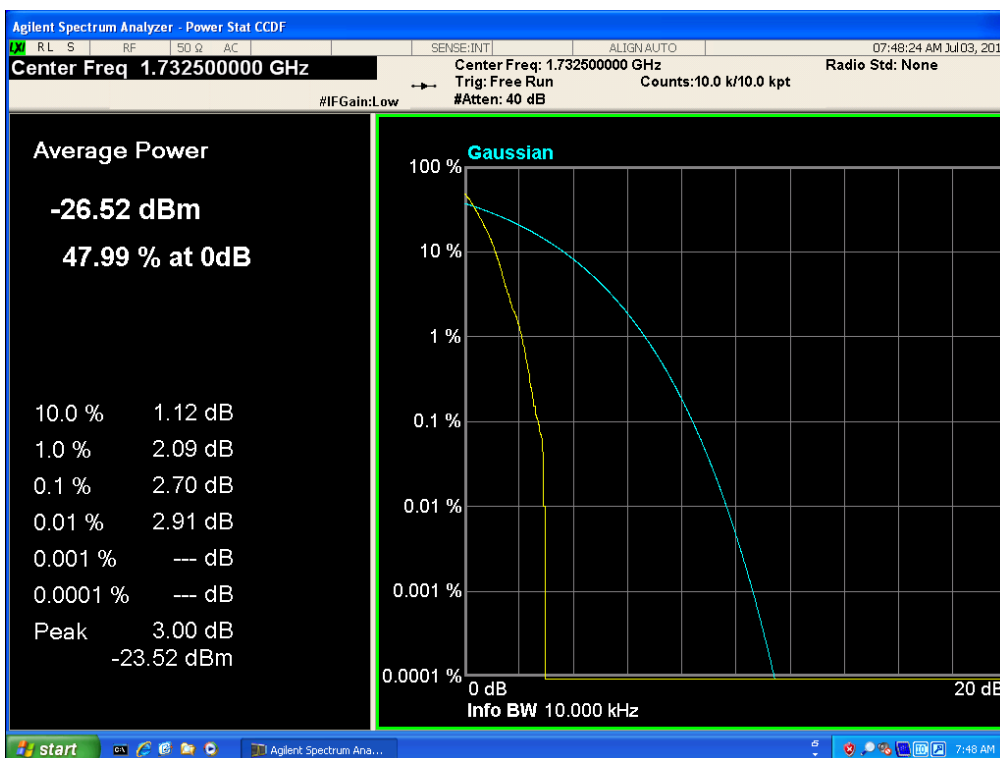


11.6 LTE BAND 4

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

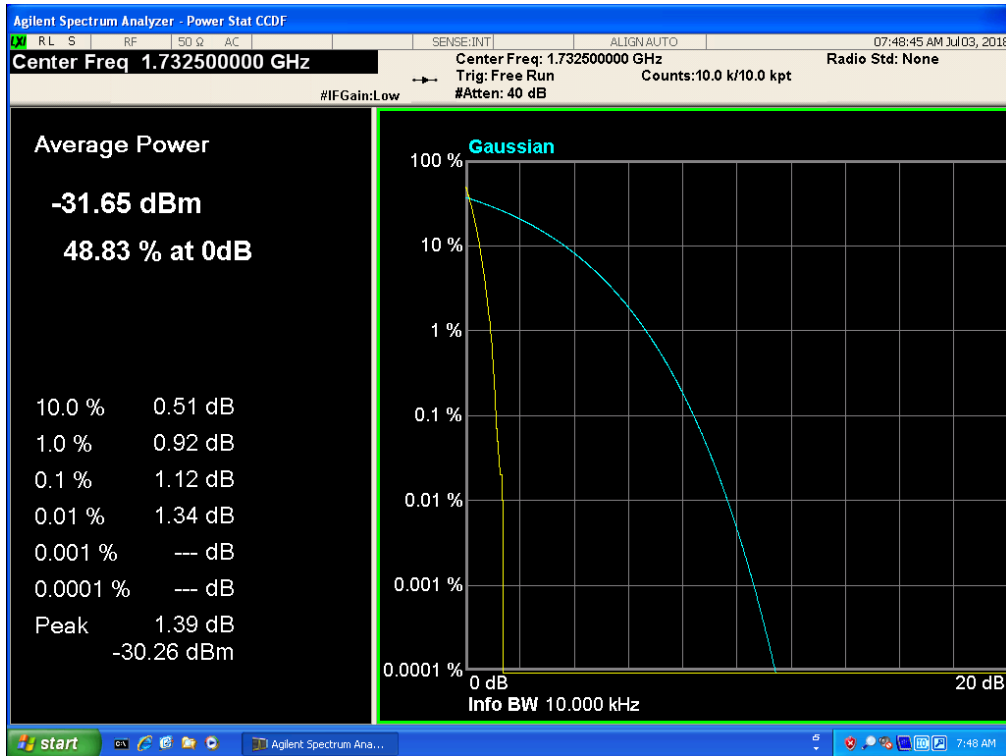


Band 4,UL Channel 20175,UL Frequency 1732.5,BW 1.4,NO. RB 1,RB POS. Low,16-QAM

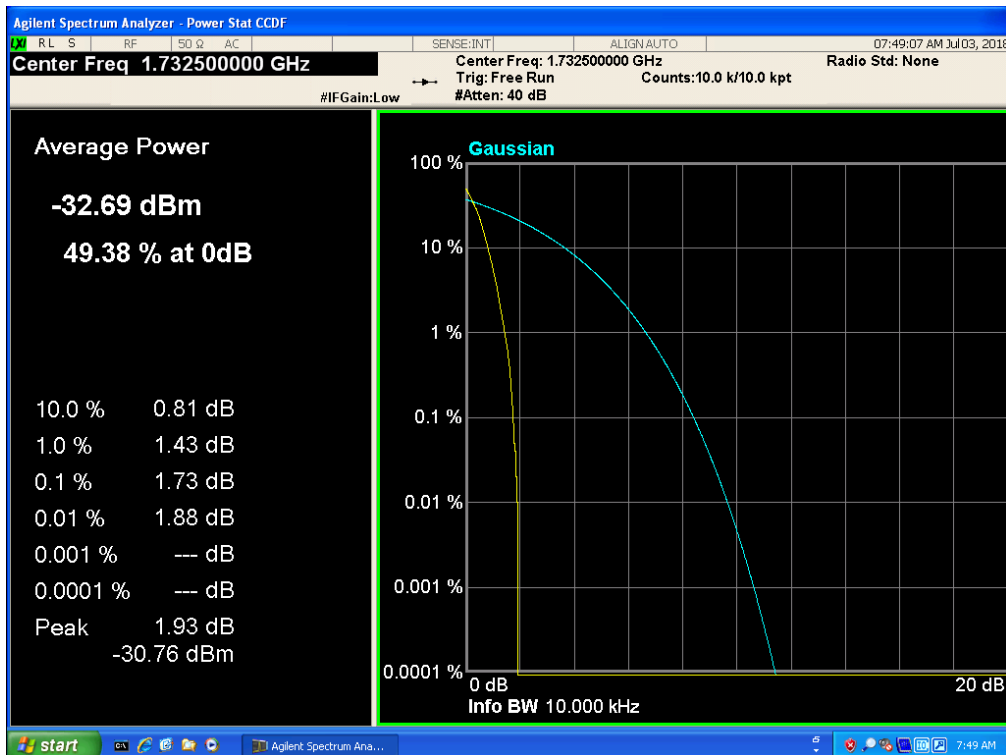




Band 4, UL Channel 20175, UL Frequency 1732.5, BW 3.0, NO. RB 1, RB POS. Low, QPSK

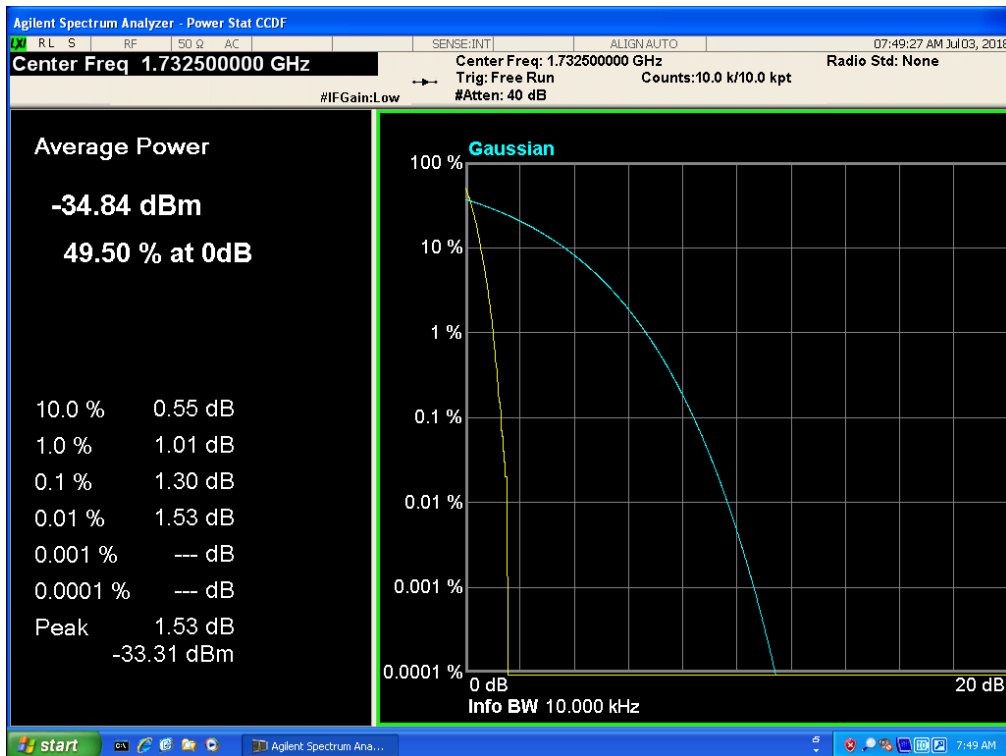


Band 4, UL Channel 20175, UL Frequency 1732.5, BW 3.0, NO. RB 1, RB POS. Low, 16-QAM

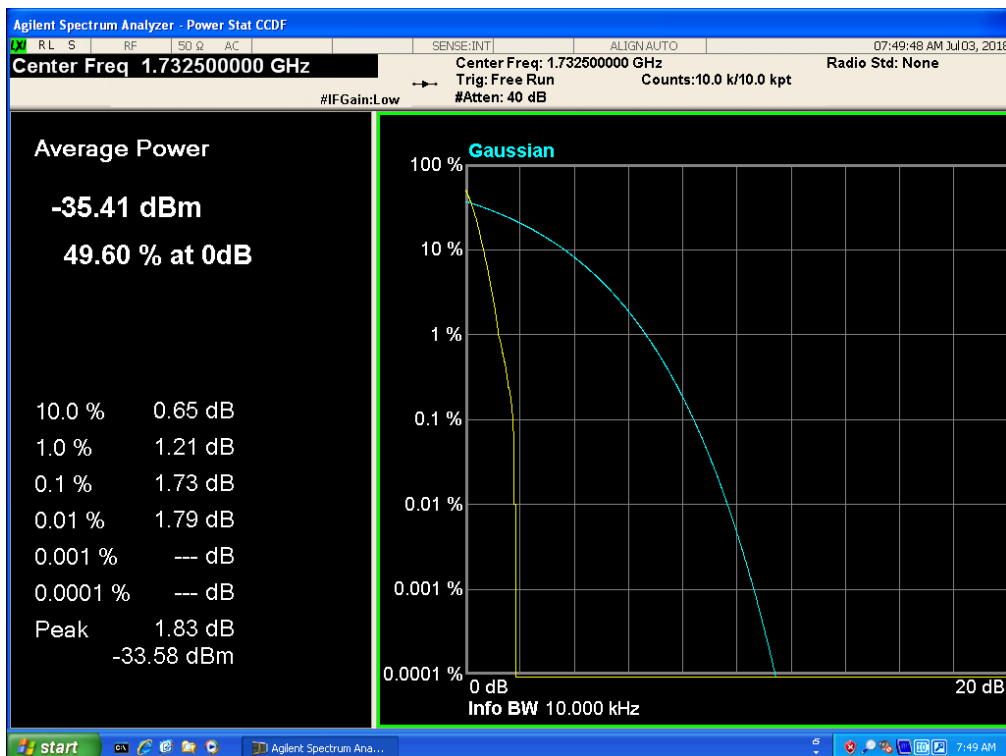




Band 4,UL Channel 20175,UL Frequency 1732.5,BW 5.0,NO. RB 1,RB POS. Low,QPSK

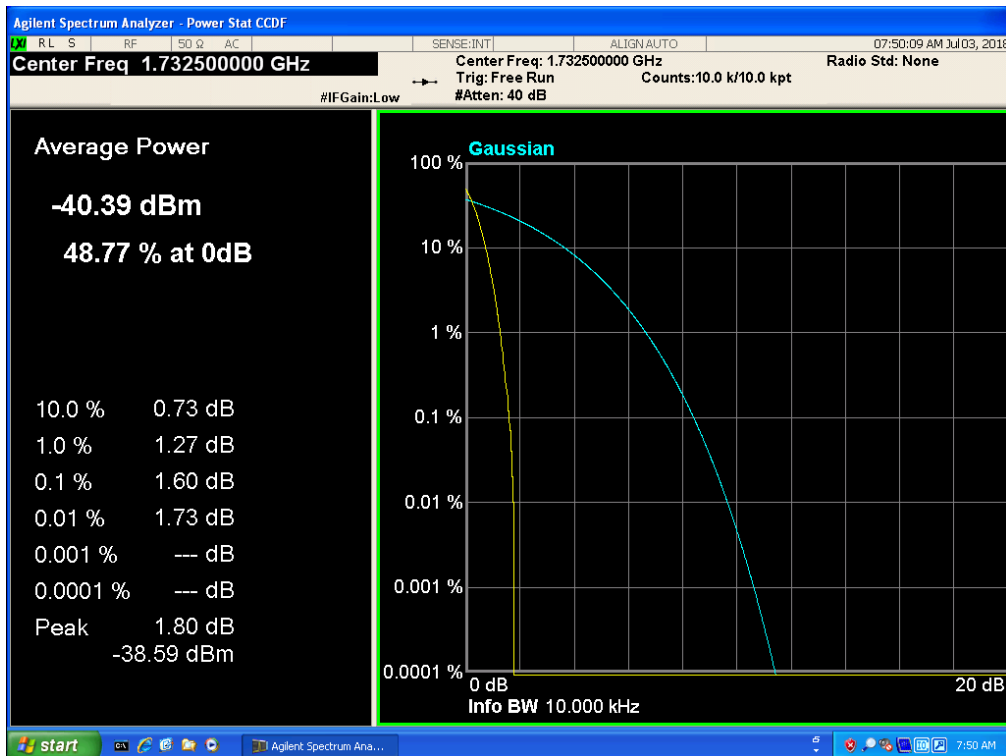


Band 4,UL Channel 20175,UL Frequency 1732.5,BW 5.0,NO. RB 1,RB POS. Low,16-QAM

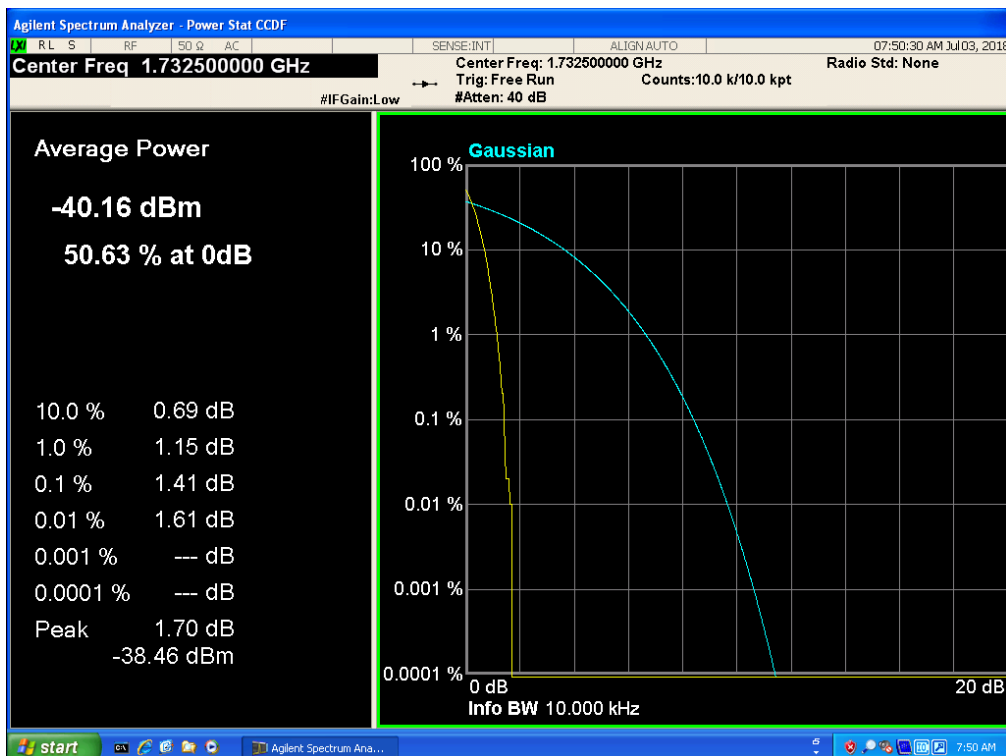




Band 4,UL Channel 20175,UL Frequency 1732.5,BW 10.0,NO. RB 1,RB POS. Low,QPSK

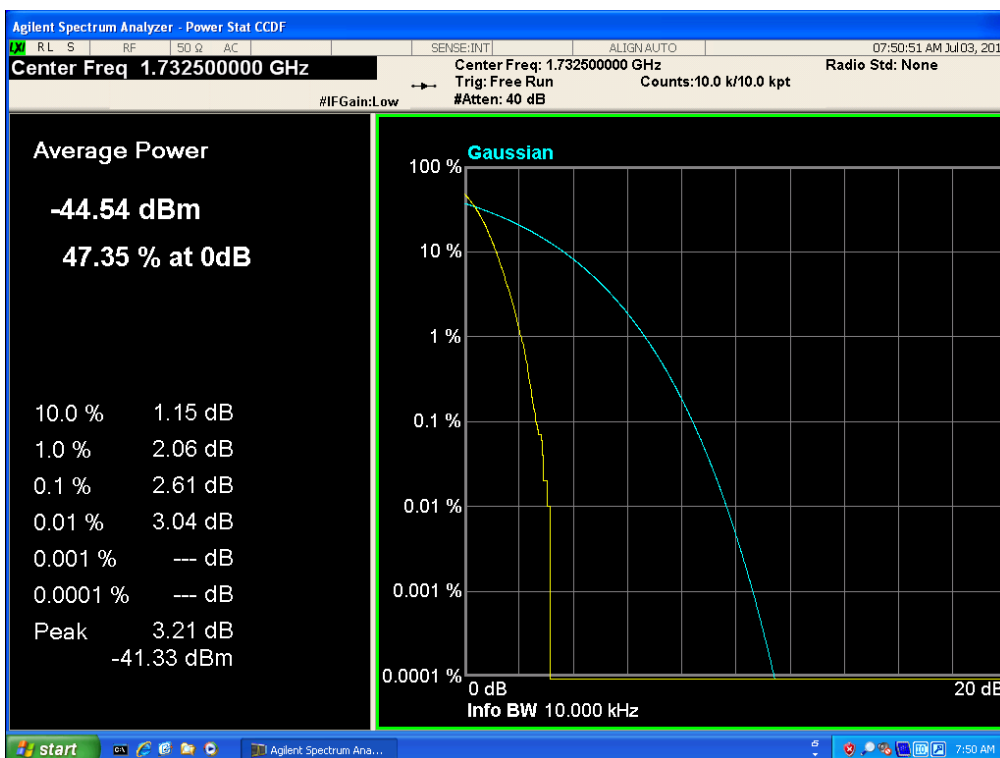


Band 4,UL Channel 20175,UL Frequency 1732.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM

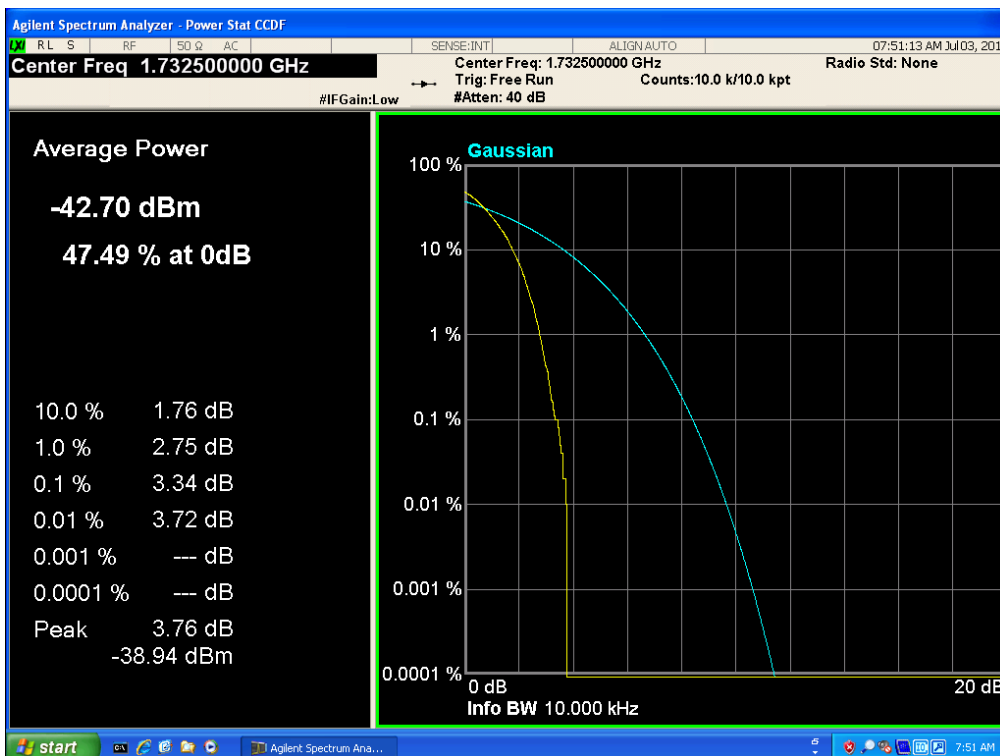




Band 4,UL Channel 20175,UL Frequency 1732.5,BW 15.0,NO. RB 1,RB POS. Low,QPSK

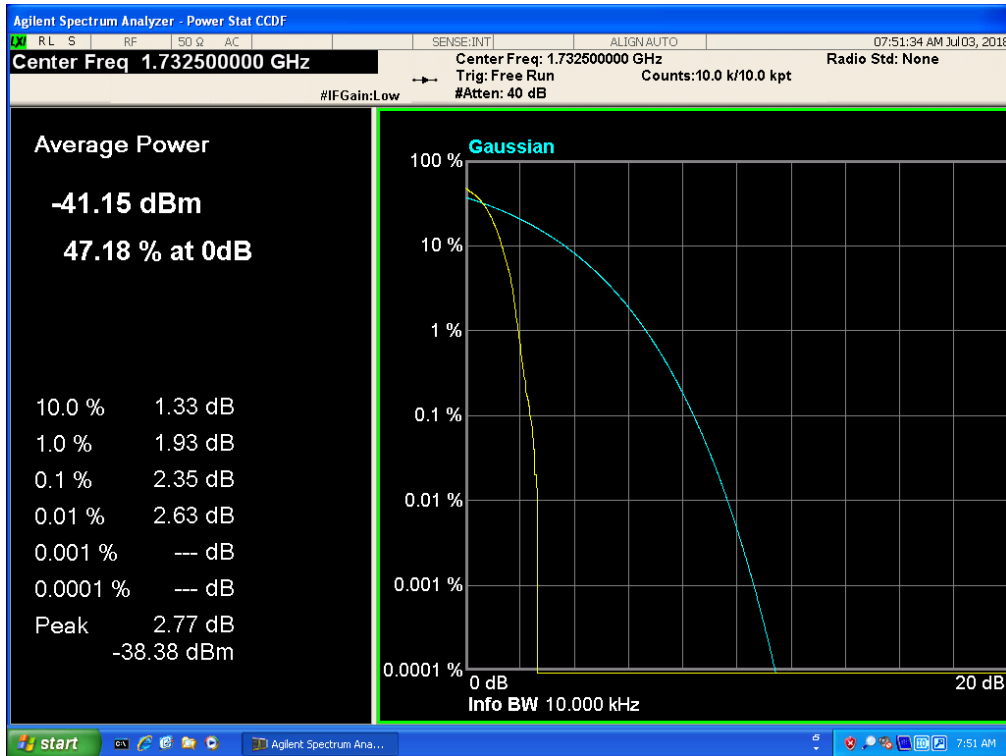


Band 4,UL Channel 20175,UL Frequency 1732.5,BW 15.0,NO. RB 1,RB POS. Low,16-QAM

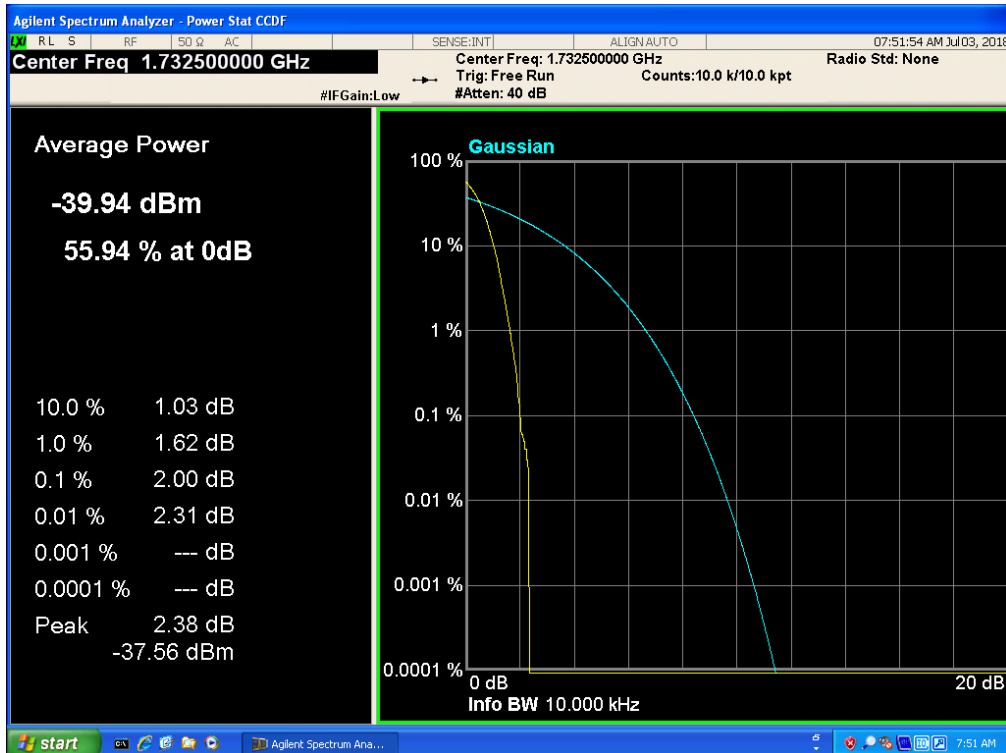




Band 4, UL Channel 20175, UL Frequency 1732.5, BW 20.0, NO. RB 1, RB POS. Low, QPSK



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



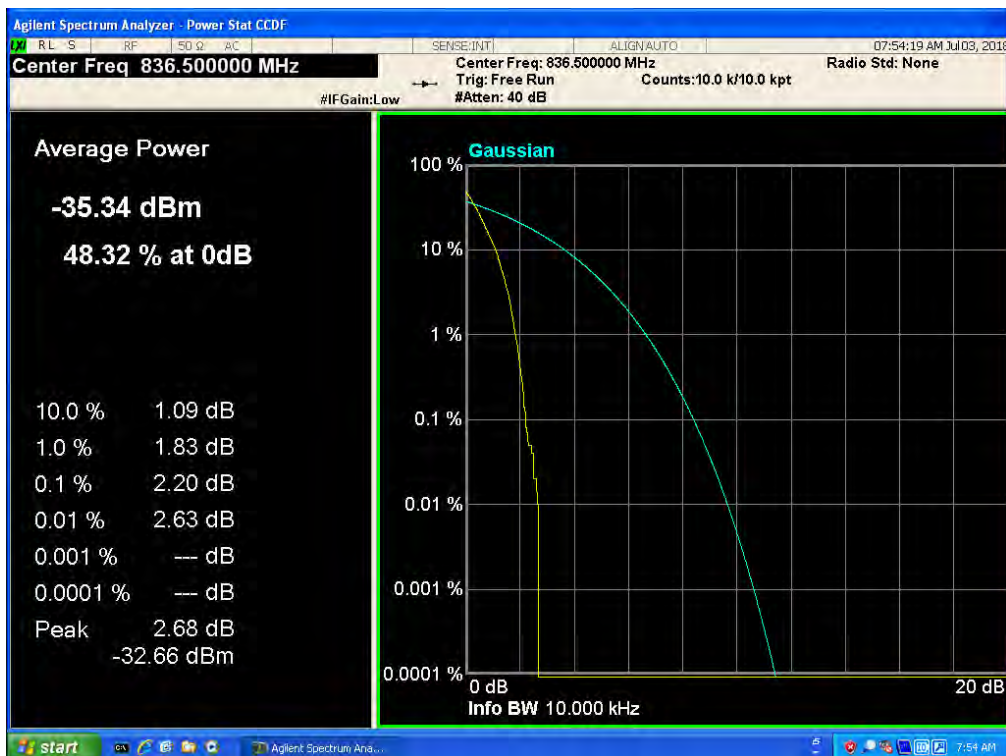


11.7 LTE BAND 5

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

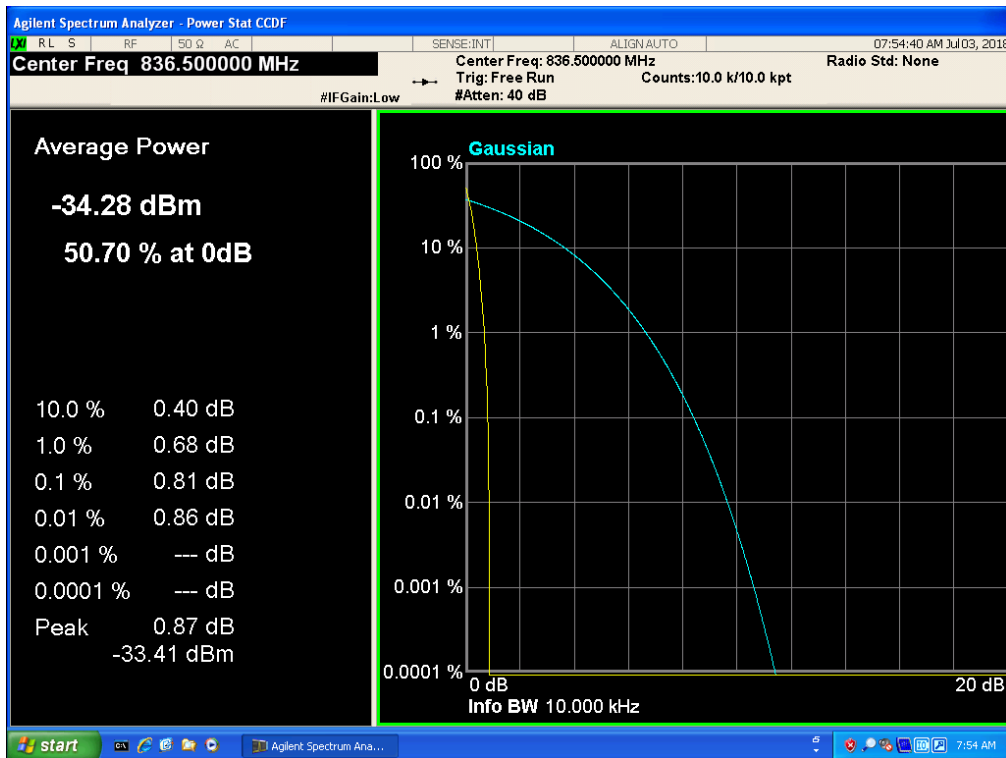


Band 5, UL Channel 20525, UL Frequency 836.5, BW 1.4, NO. RB 1, RB POS. Low, 16-QAM





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

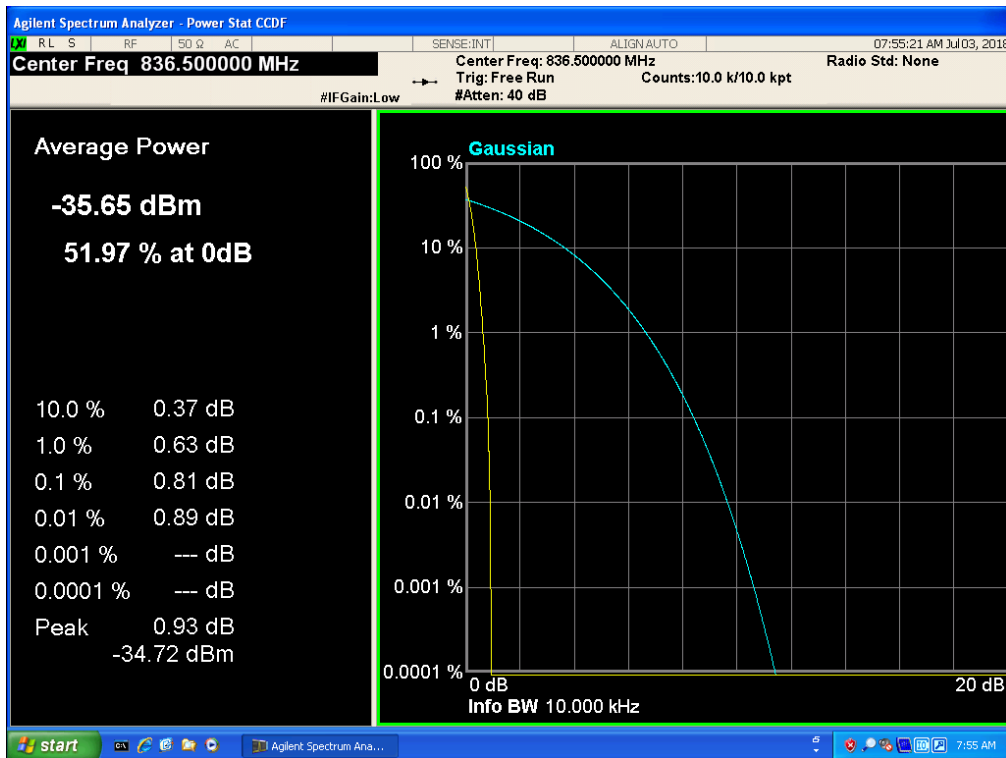


Band 5, UL Channel 20525, UL Frequency 836.5, BW 3.0, NO. RB 1, RB POS. Low, 16-QAM





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

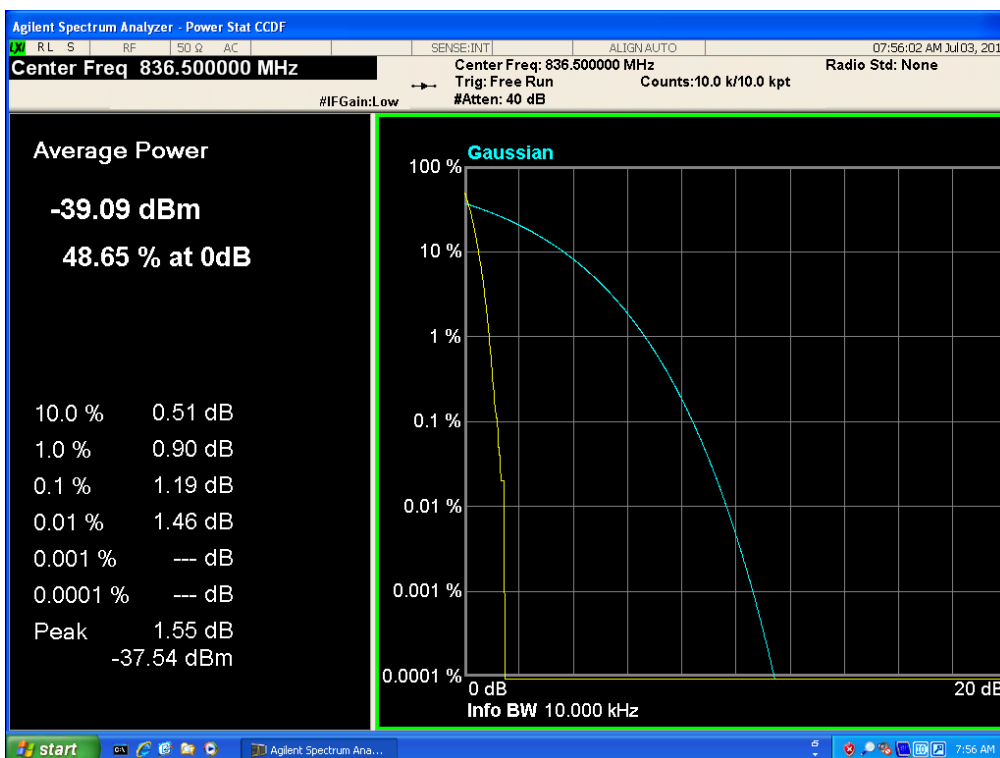


Band 5, UL Channel 20525, UL Frequency 836.5, BW 5.0, NO. RB 1, RB POS. Low, 16-QAM

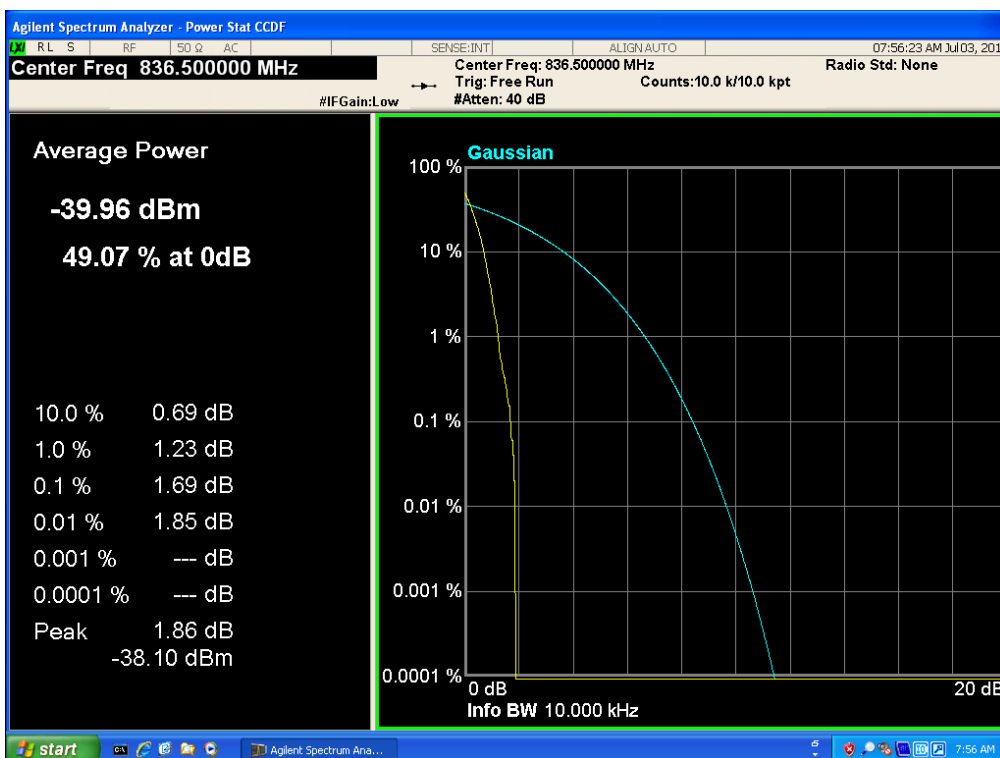




Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 1,RB POS. Low,QPSK



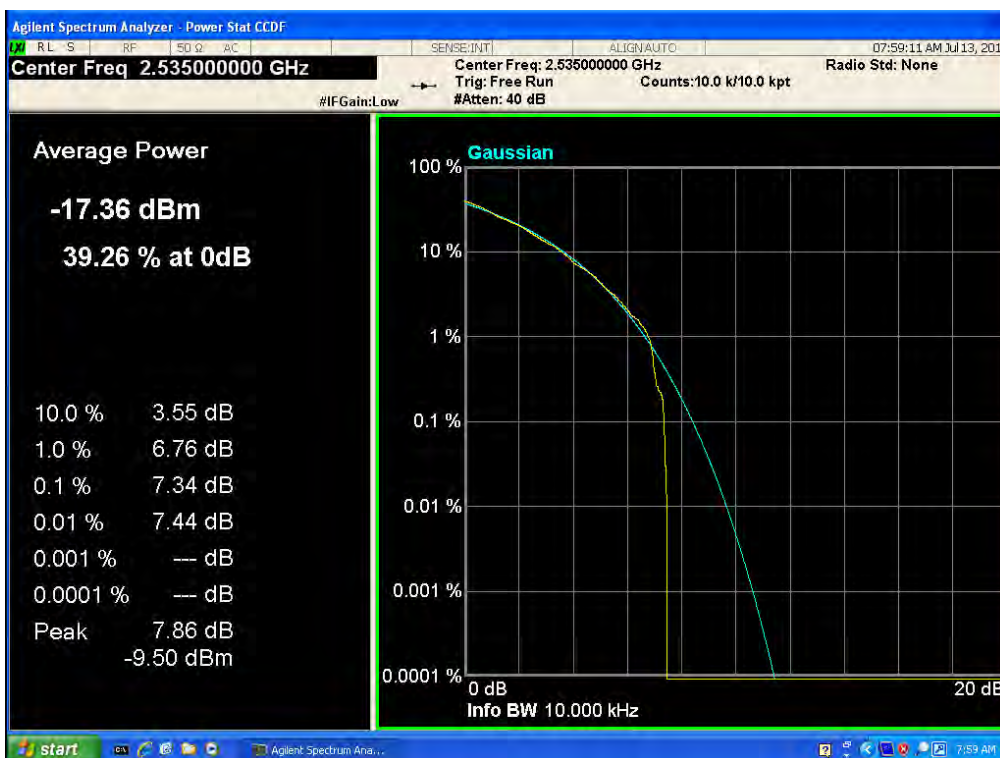
Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM





11.8 LTE BAND 7

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

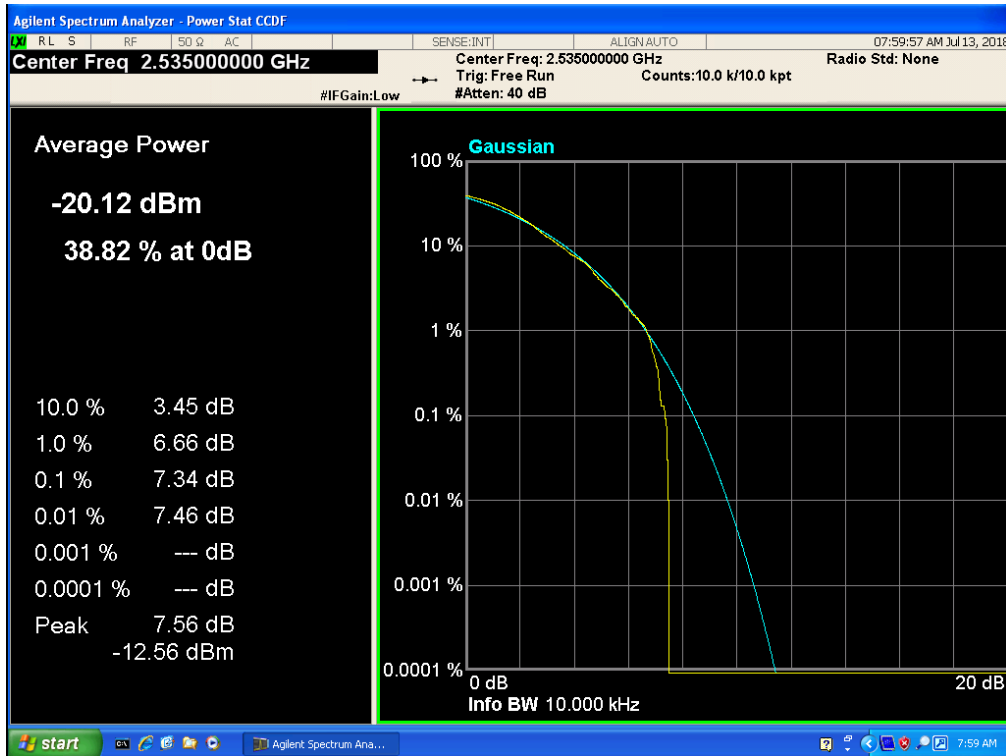


Band 7,UL Channel 21100,UL Frequency 2535.0,BW 5.0,NO. RB 25,RB POS. Low,16-QAM

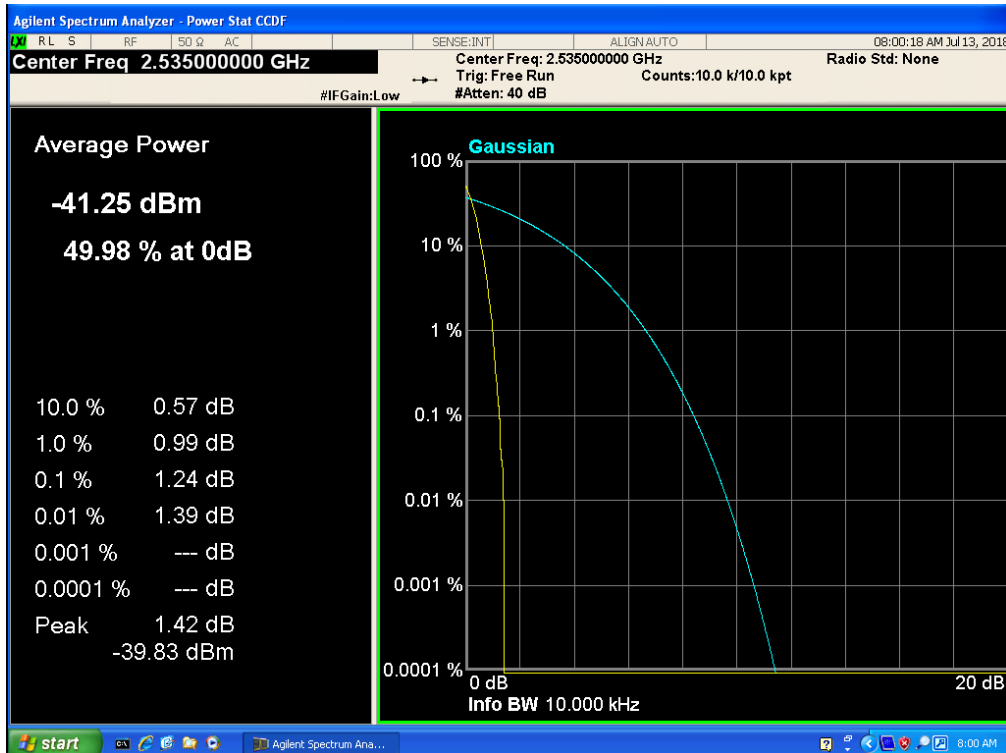




Band 7, UL Channel 21100, UL Frequency 2535.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK

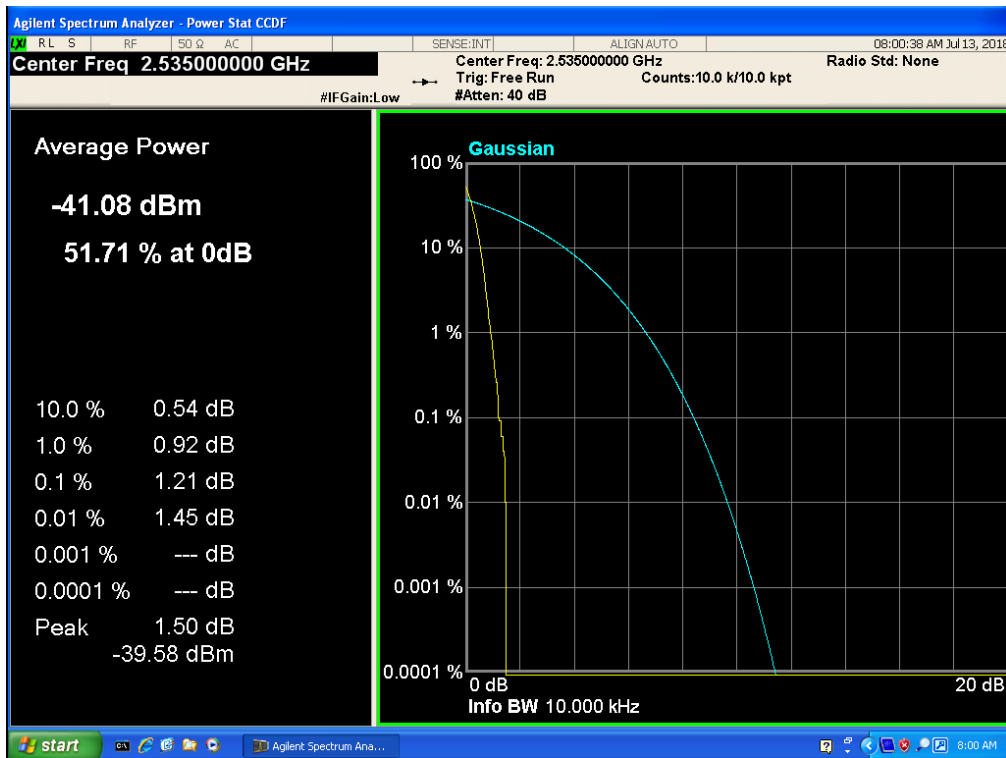


Band 7, UL Channel 21100, UL Frequency 2535.0, BW 10.0, NO. RB 1, RB POS. Low, 16-QAM

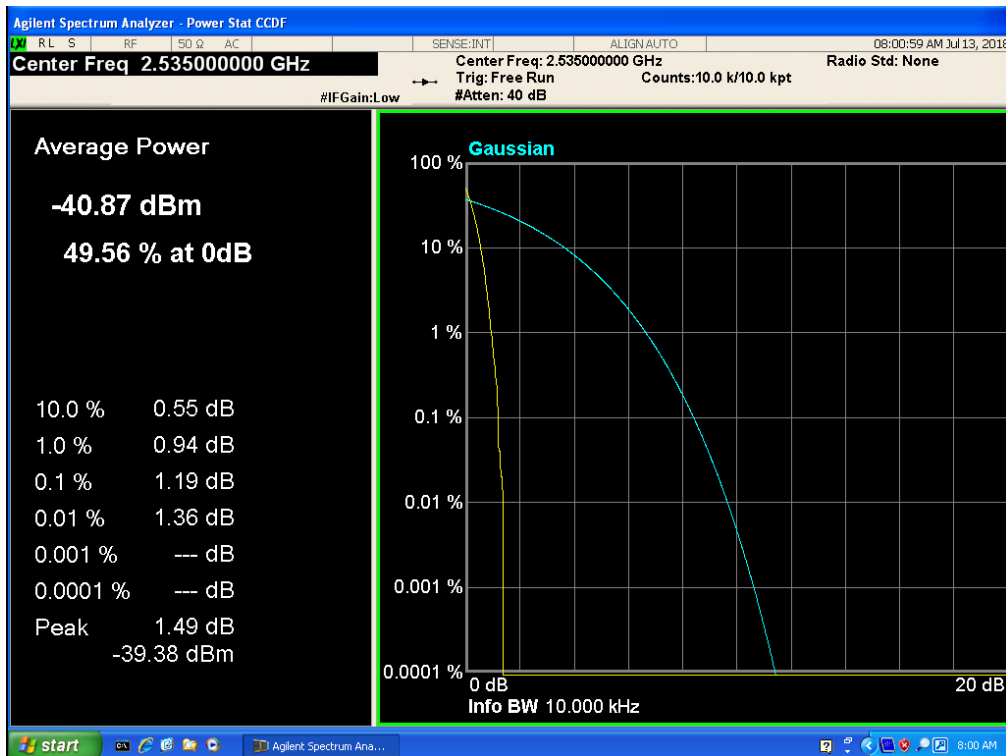




Band 7,UL Channel 21100,UL Frequency 2535.0,BW 15.0,NO. RB 1,RB POS. Low,QPSK

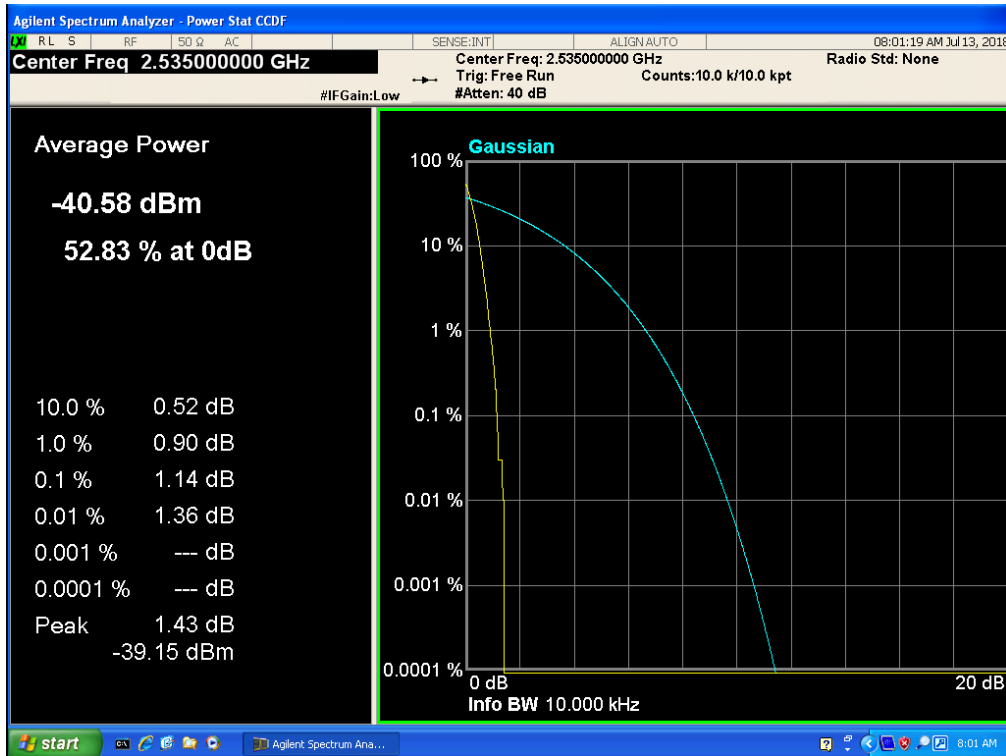


Band 7,UL Channel 21100,UL Frequency 2535.0,BW 15.0,NO. RB 1,RB POS. Low,16-QAM

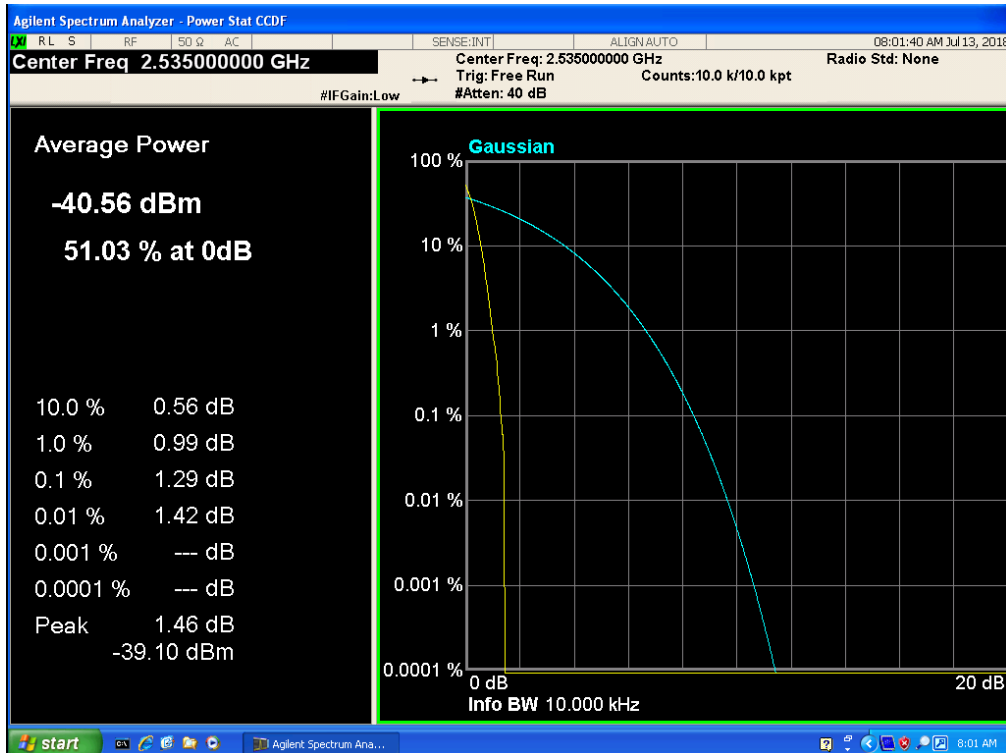




Band 7, UL Channel 21100, UL Frequency 2535.0, BW 20.0, NO. RB 1, RB POS. Low, QPSK



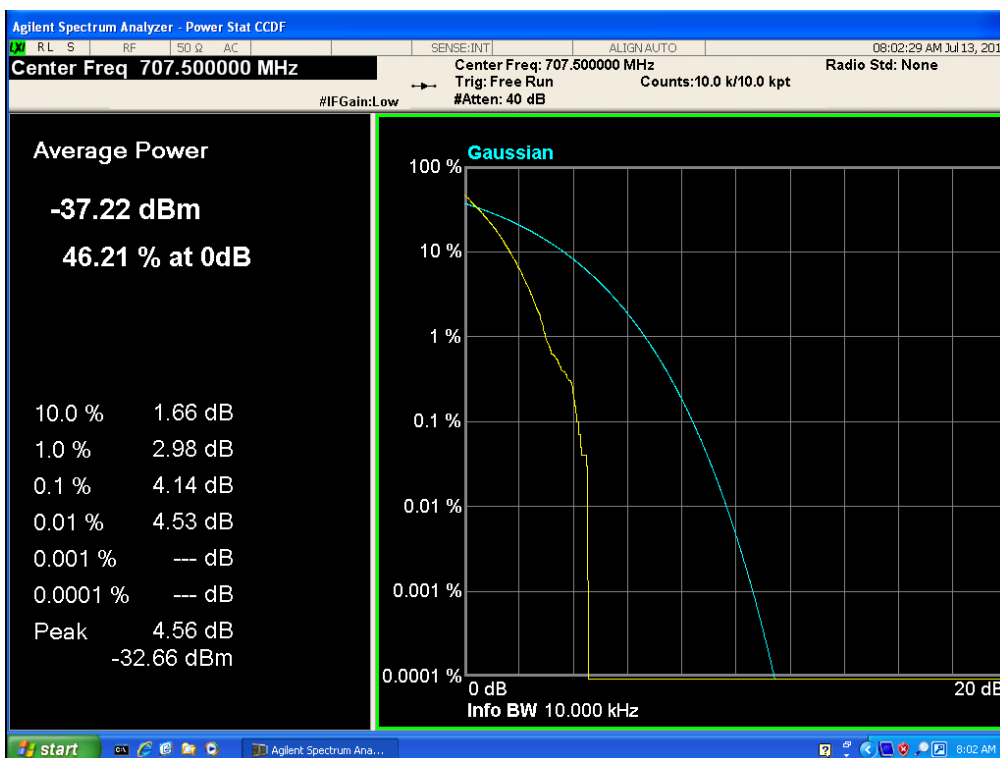
Band 7, UL Channel 21100, UL Frequency 2535.0, BW 20.0, NO. RB 1, RB POS. Low, 16-QAM



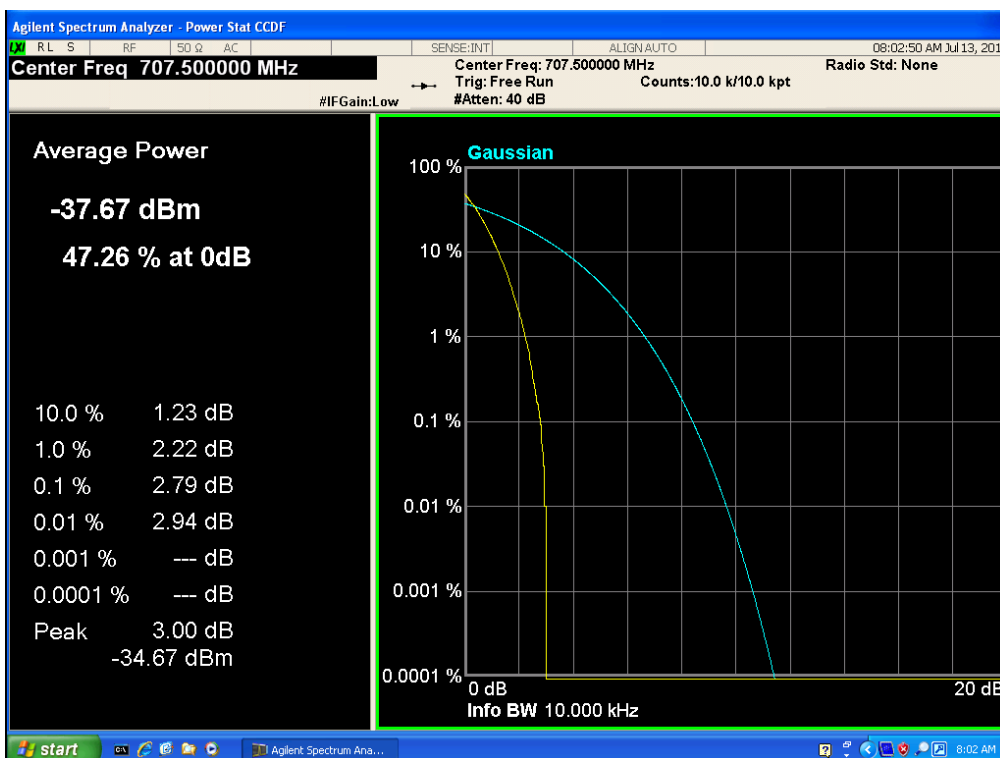


11.9 LTE BAND 12

Band 12,UL Channel 23095,UL Frequency 707.5,BW 1.4,NO. RB 1,RB POS. Low,QPSK

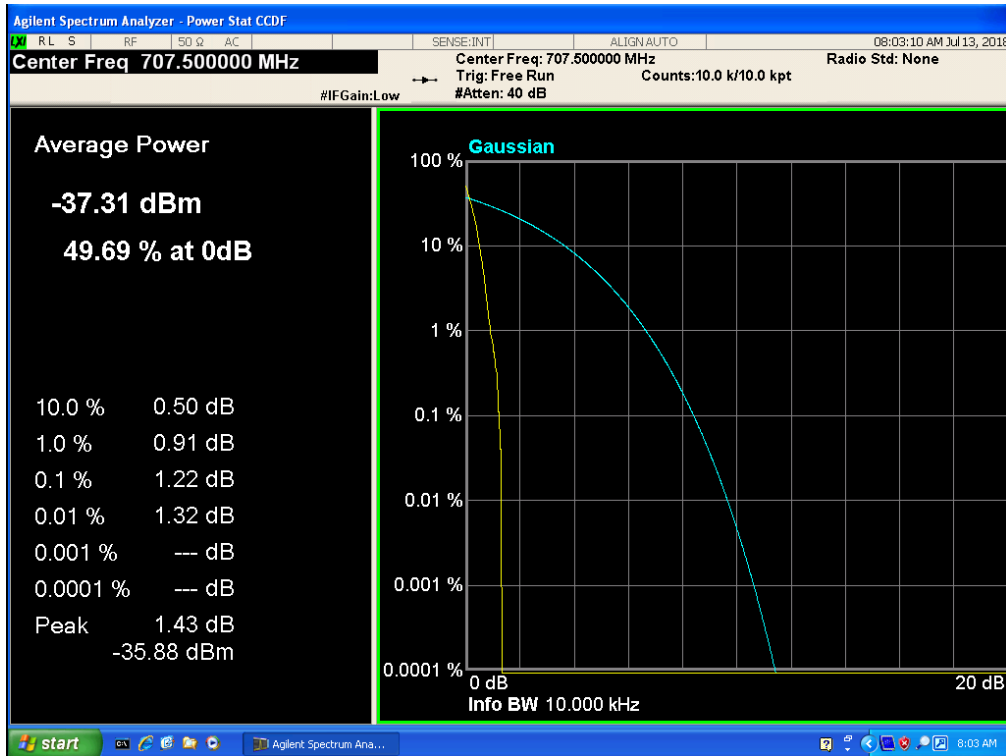


Band 12,UL Channel 23095,UL Frequency 707.5,BW 1.4,NO. RB 1,RB POS. Low,16-QAM

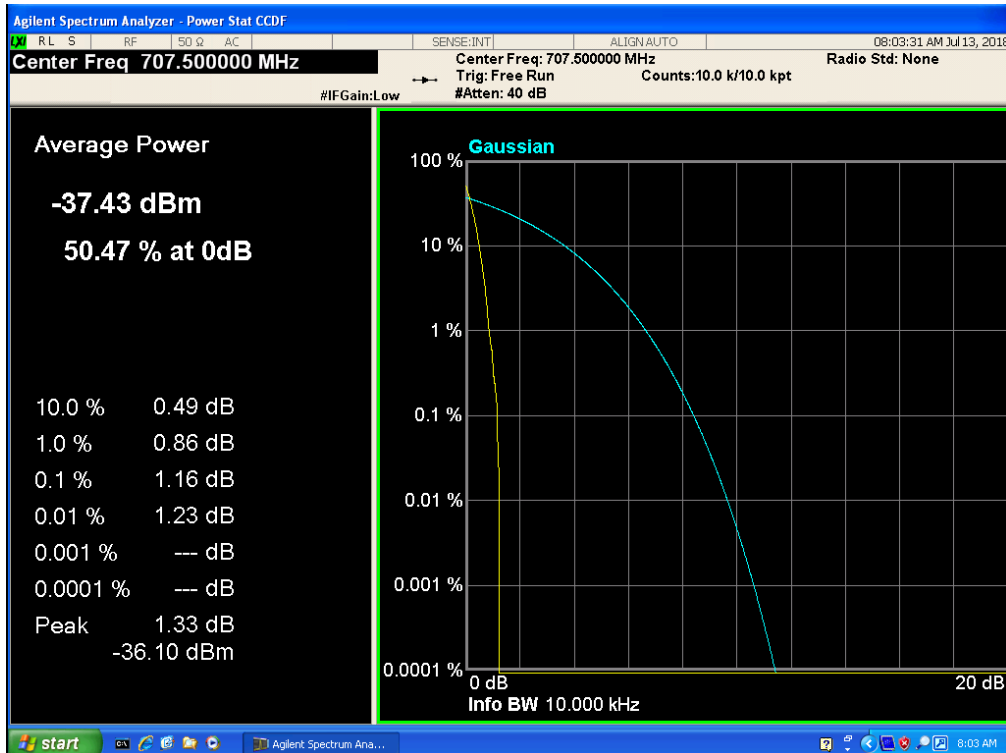




Band 12, UL Channel 23095, UL Frequency 707.5, BW 3.0, NO. RB 1, RB POS. Low, QPSK

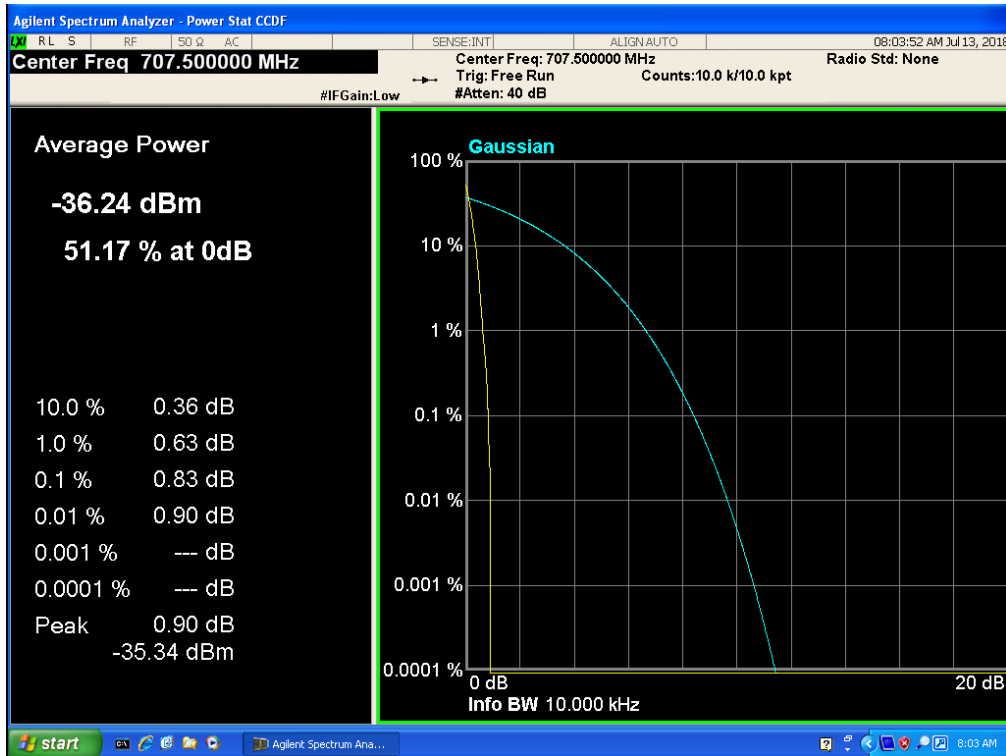


Band 12, UL Channel 23095, UL Frequency 707.5, BW 3.0, NO. RB 1, RB POS. Low, 16-QAM

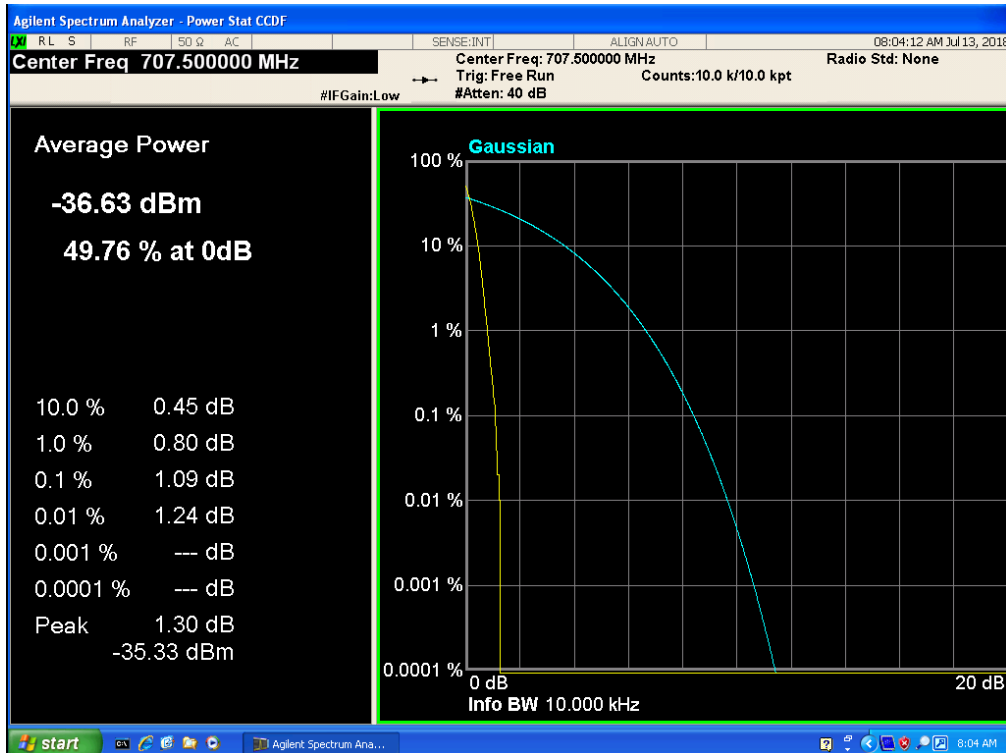




Band 12, UL Channel 23095, UL Frequency 707.5, BW 5.0, NO. RB 1, RB POS. Low, QPSK

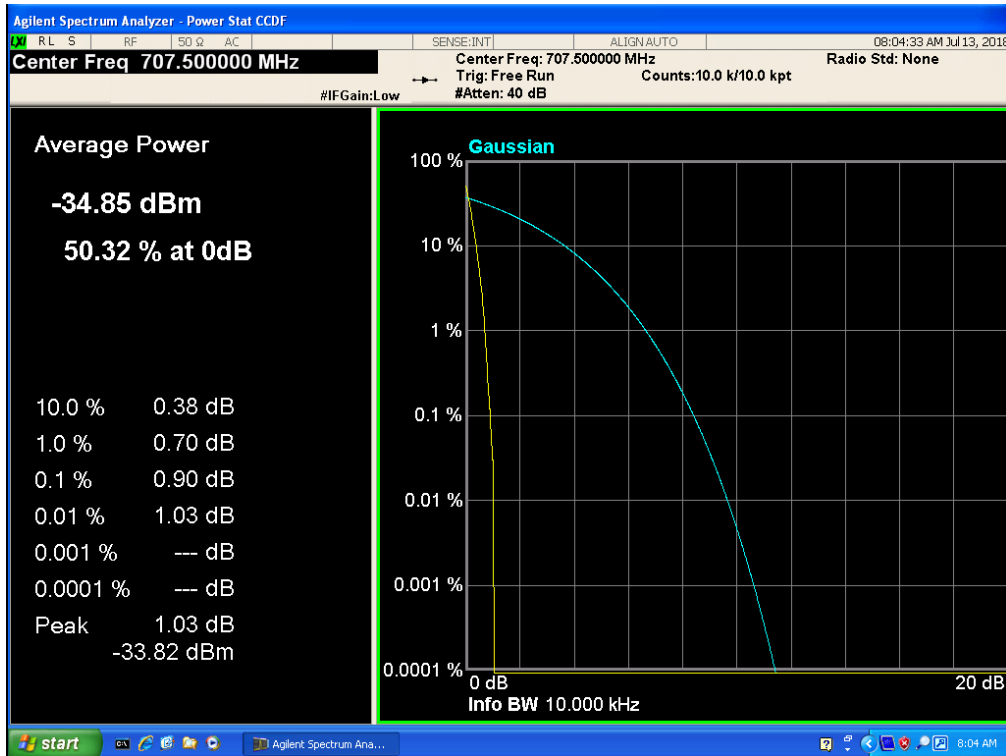


Band 12, UL Channel 23095, UL Frequency 707.5, BW 5.0, NO. RB 1, RB POS. Low, 16-QAM

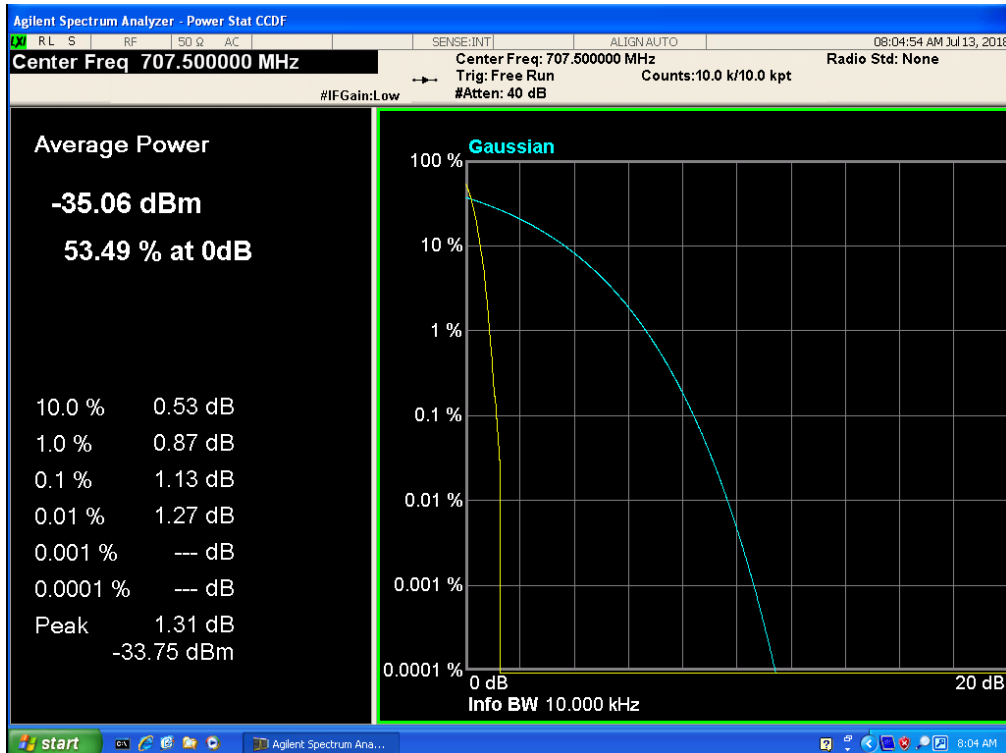




Band 12,UL Channel 23095,UL Frequency 707.5,BW 10.0,NO. RB 1,RB POS. Low,QPSK



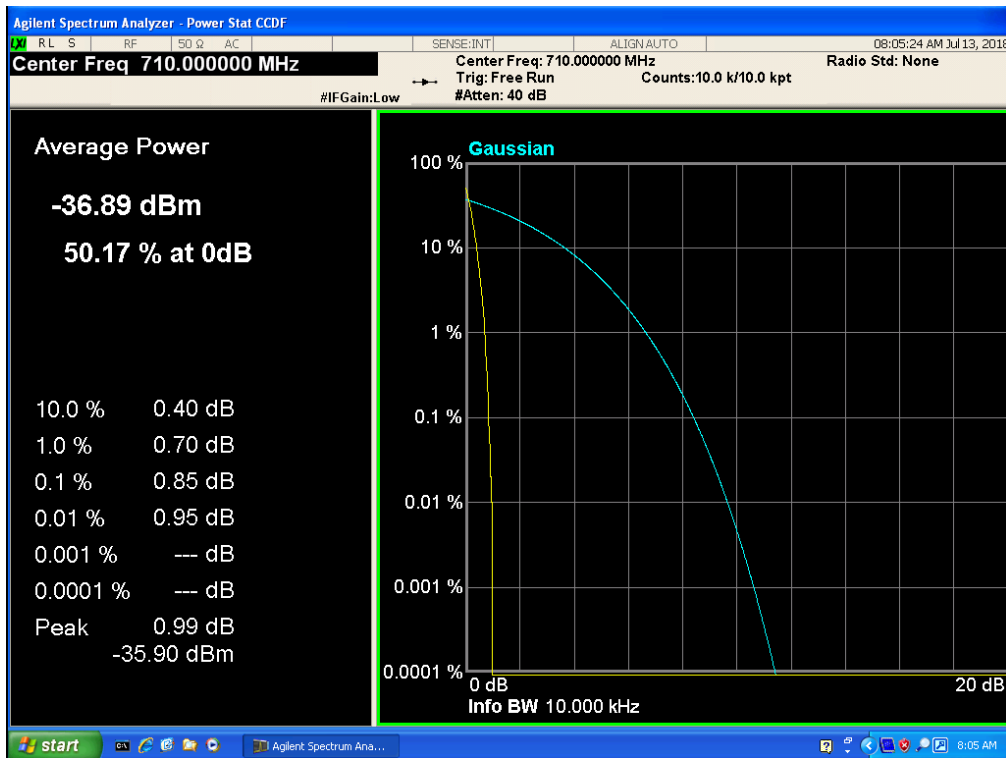
Band 12,UL Channel 23095,UL Frequency 707.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



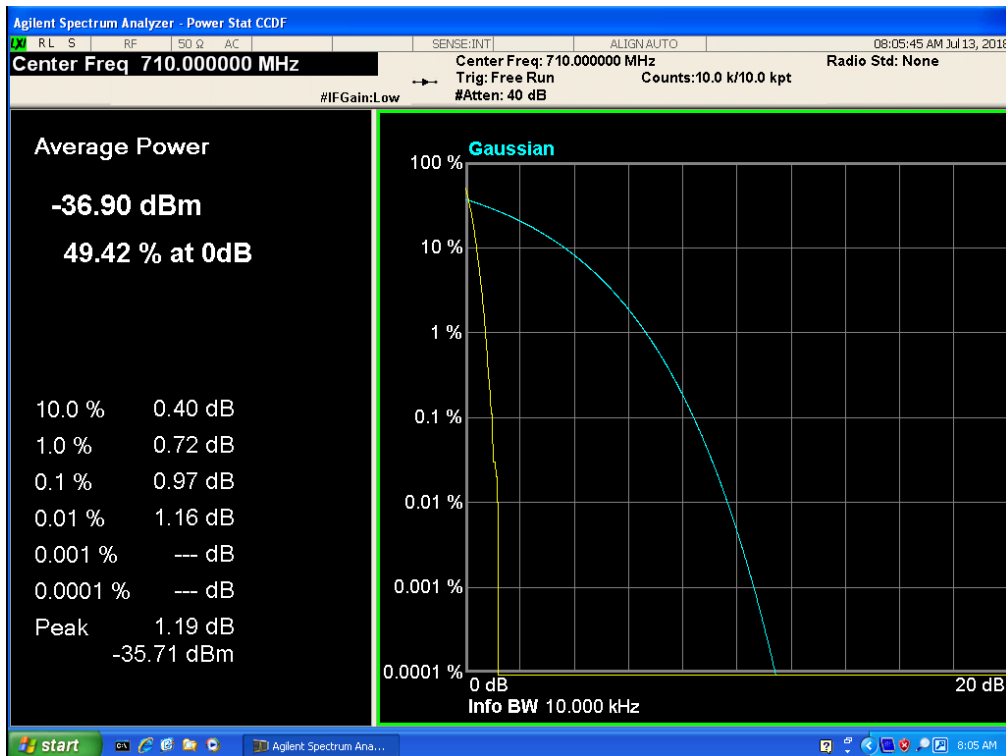


11.10 LTE BAND 17

Band 17,UL Channel 23790,UL Frequency 710.0,BW 5.0,NO. RB 1,RB POS. Low,QPSK

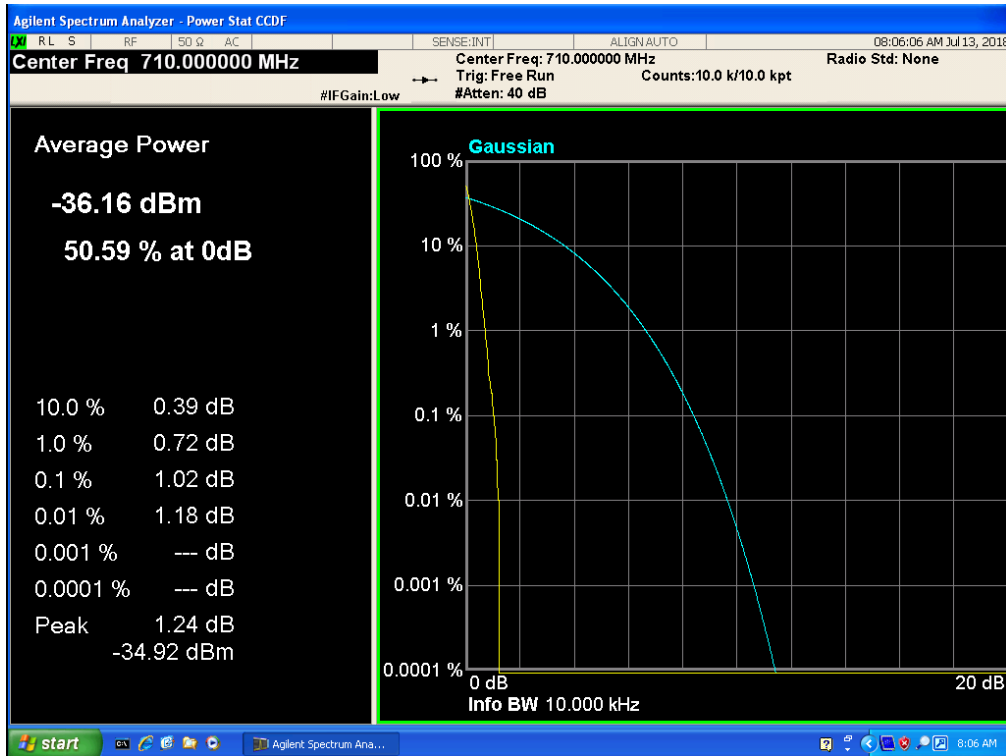


Band 17,UL Channel 23790,UL Frequency 710.0,BW 5.0,NO. RB 1,RB POS. Low,16-QAM

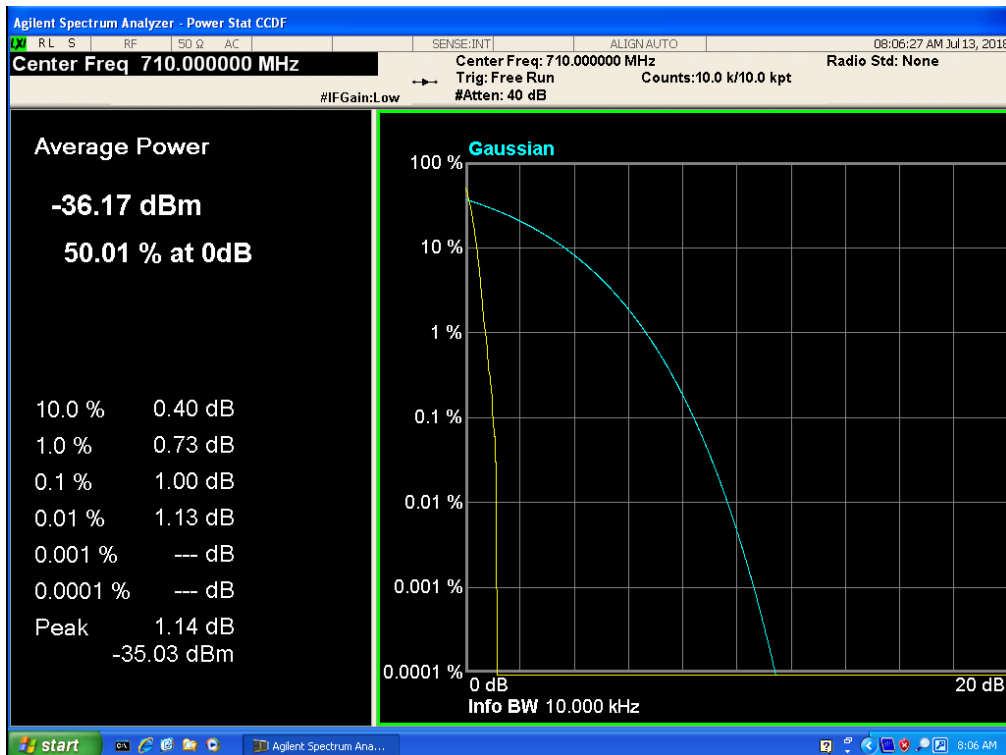




Band 17,UL Channel 23790,UL Frequency 710.0,BW 10.0,NO. RB 1,RB POS. Low,QPSK



Band 17,UL Channel 23790,UL Frequency 710.0,BW 10.0,NO. RB 1,RB POS. Low,16-QAM





Report No.: SER180628601007E

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