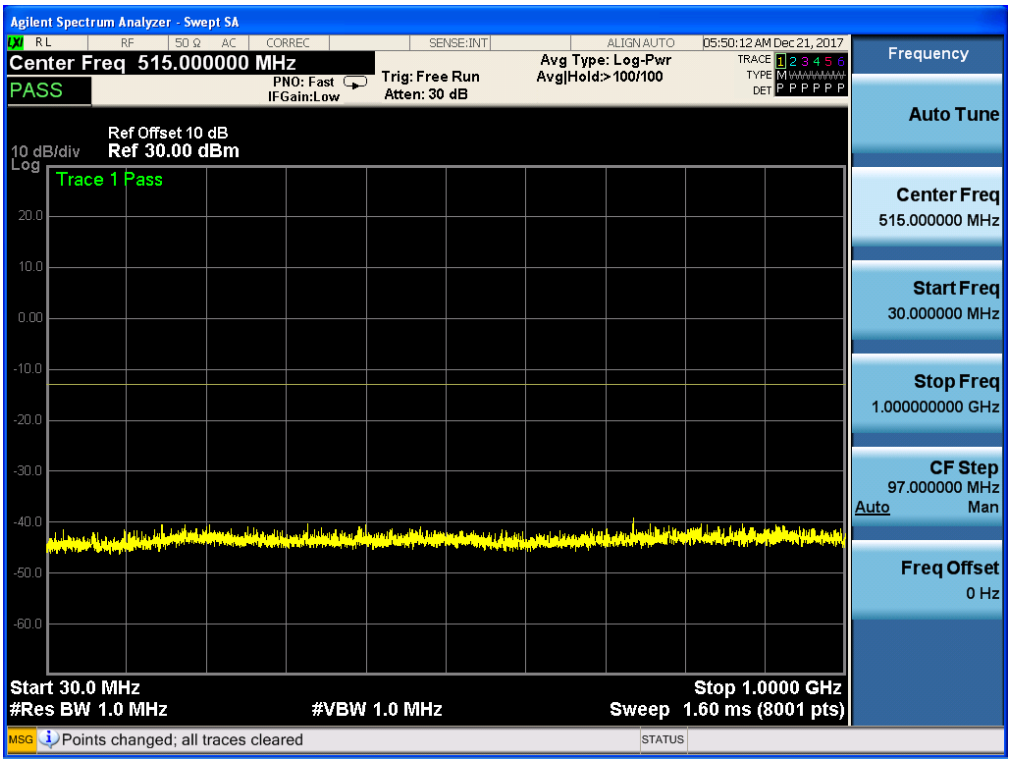
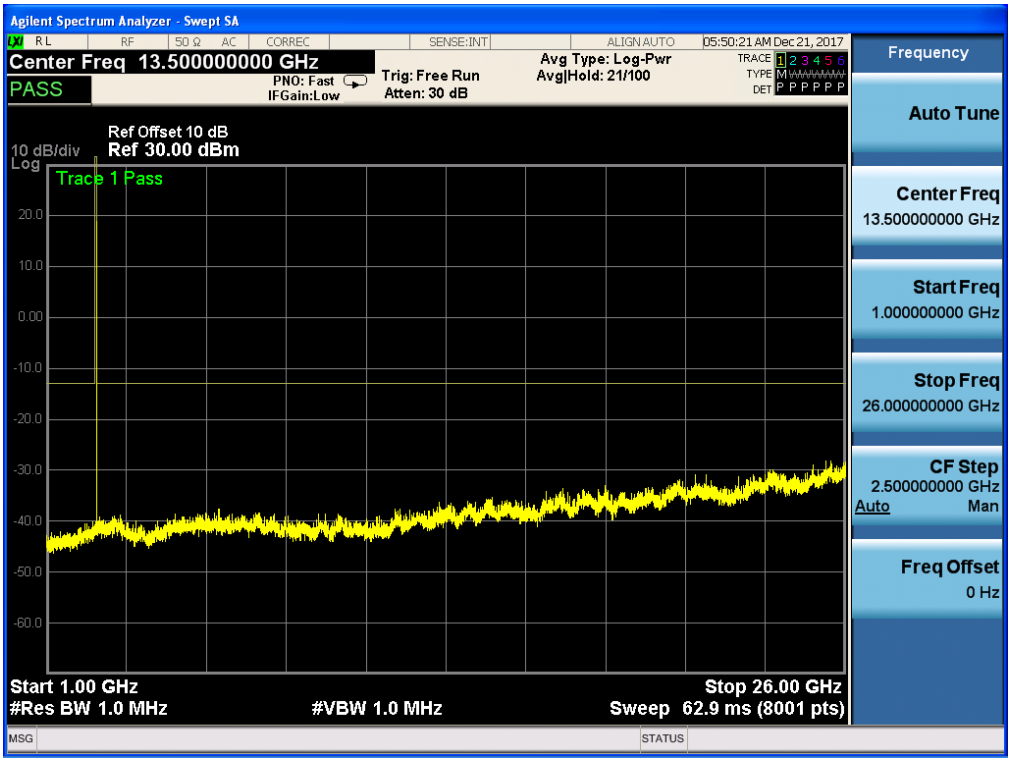
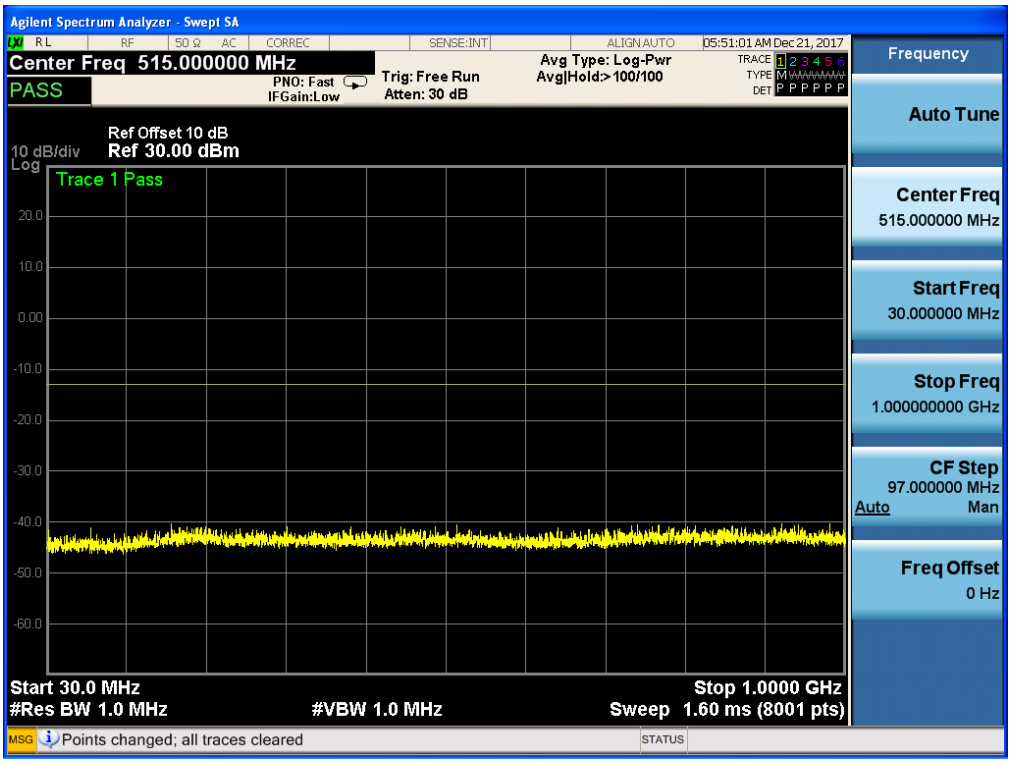
Band 7,UL Channel 21425,UL Frequency 2567.5,BW 5.0,NO. RB 25,RB POS. Low,16QAM



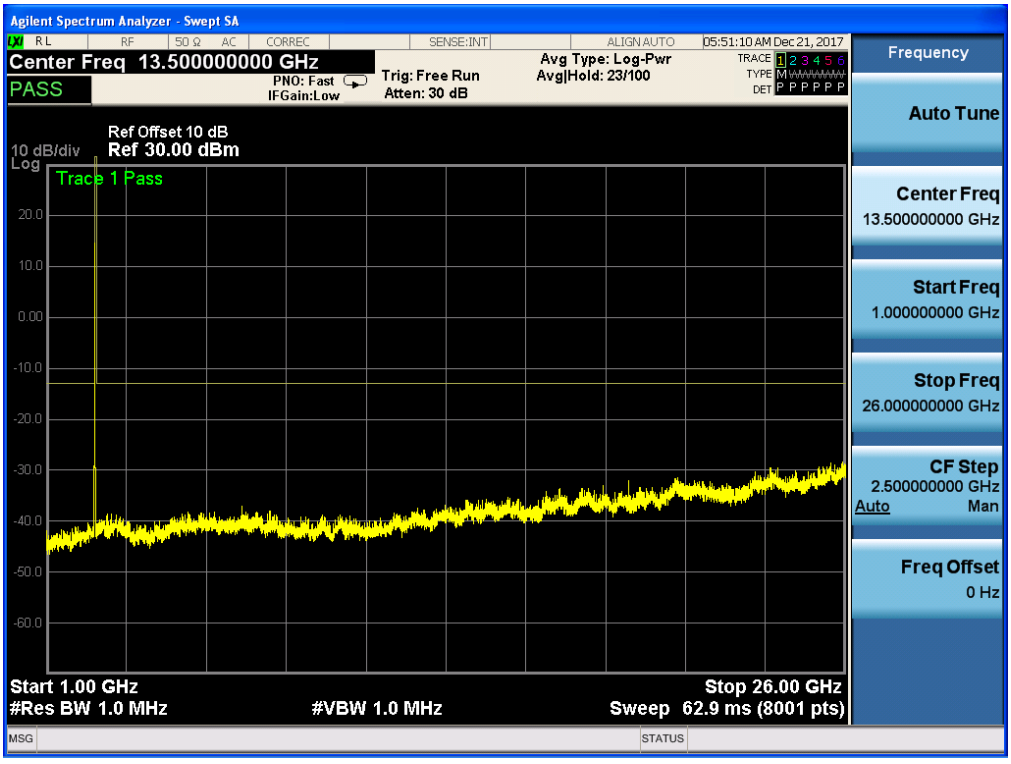
Band 7,UL Channel 21425,UL Frequency 2567.5,BW 5.0,NO. RB 25,RB POS. Low,16QAM



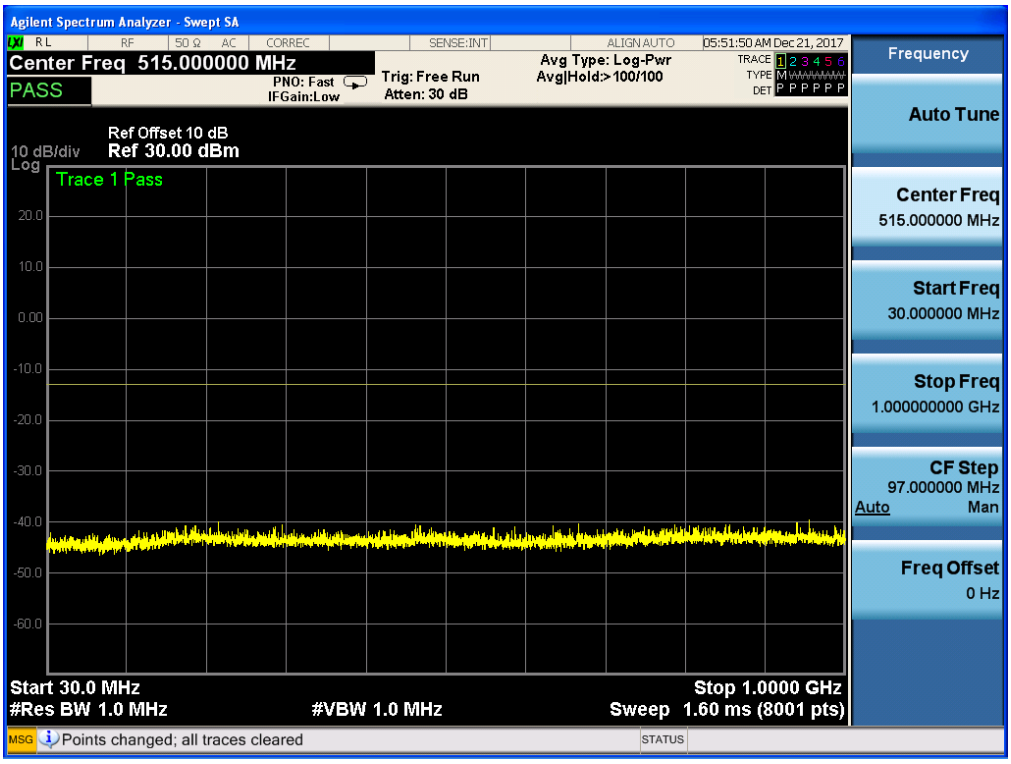
Band 7,UL Channel 20800,UL Frequency 2505.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK



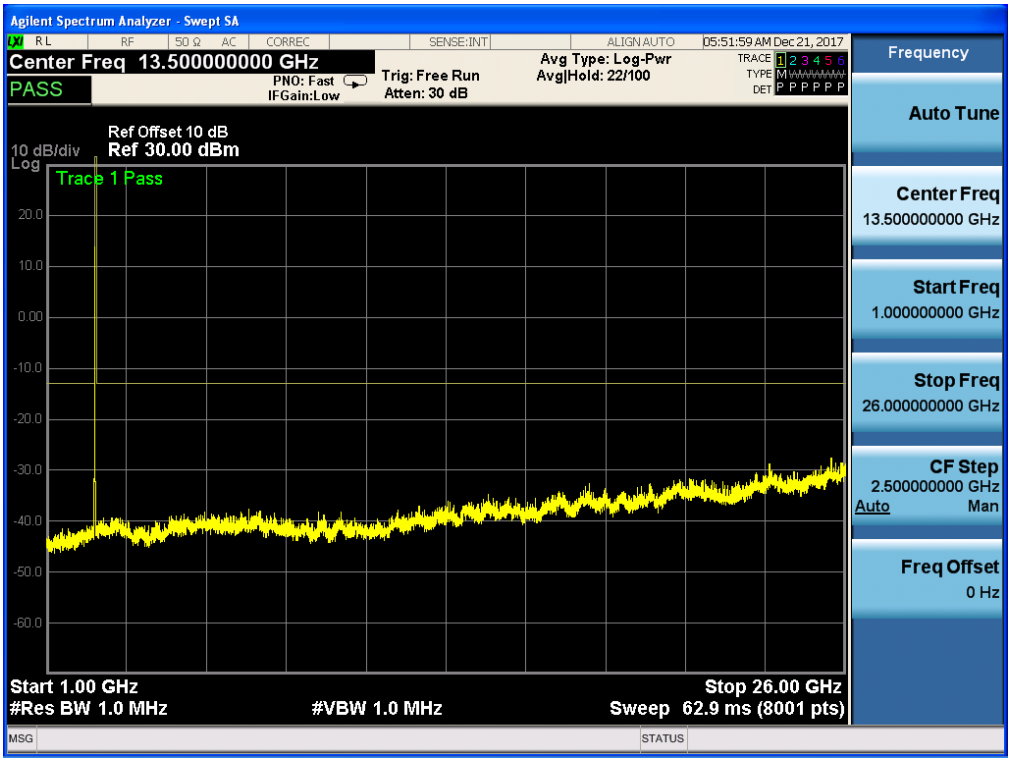
Band 7,UL Channel 20800,UL Frequency 2505.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK



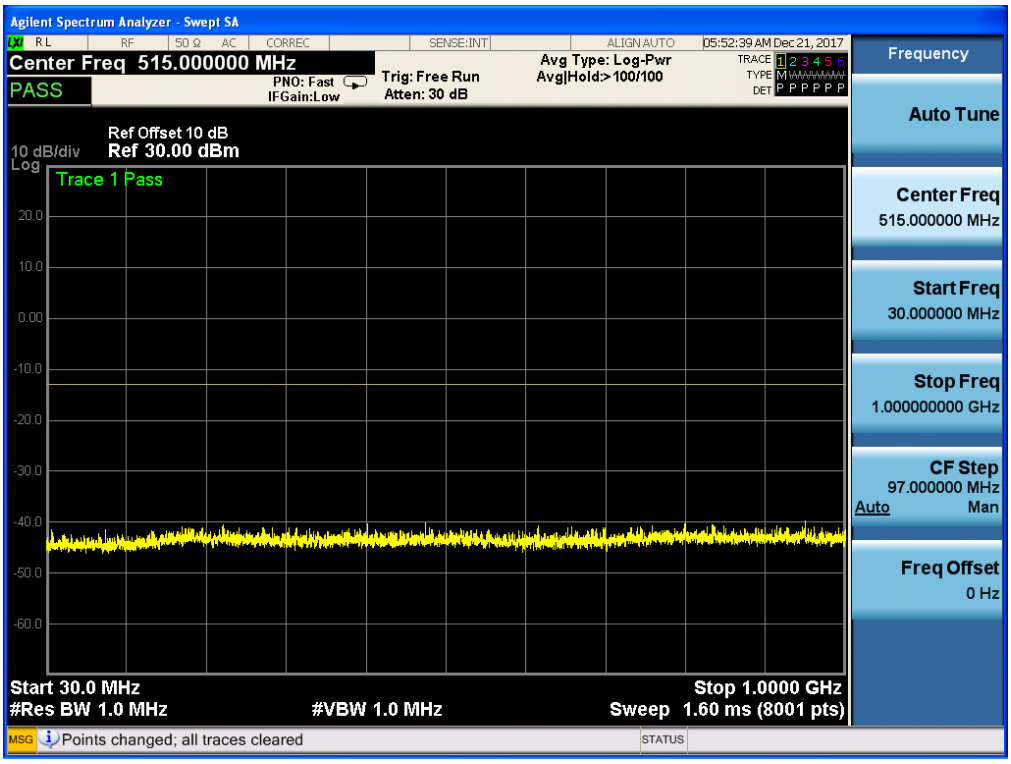
Band 7,UL Channel 20800,UL Frequency 2505.0,BW 10.0,NO. RB 25,RB POS. Low,16QAM



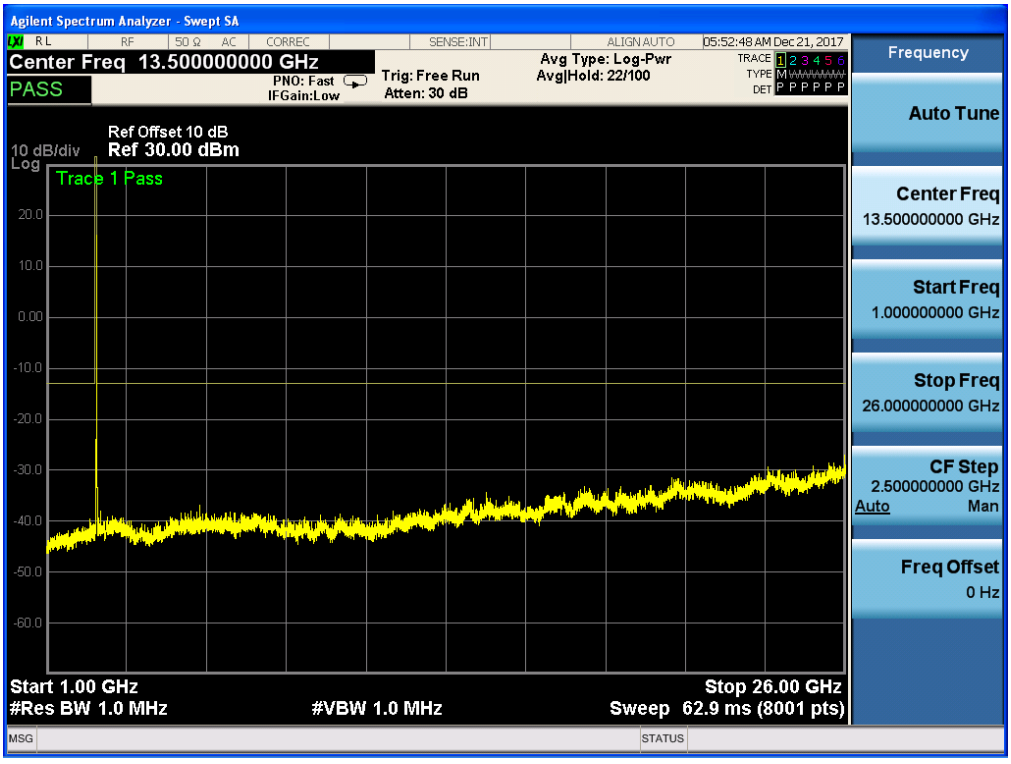
Band 7,UL Channel 20800,UL Frequency 2505.0,BW 10.0,NO. RB 25,RB POS. Low,16QAM



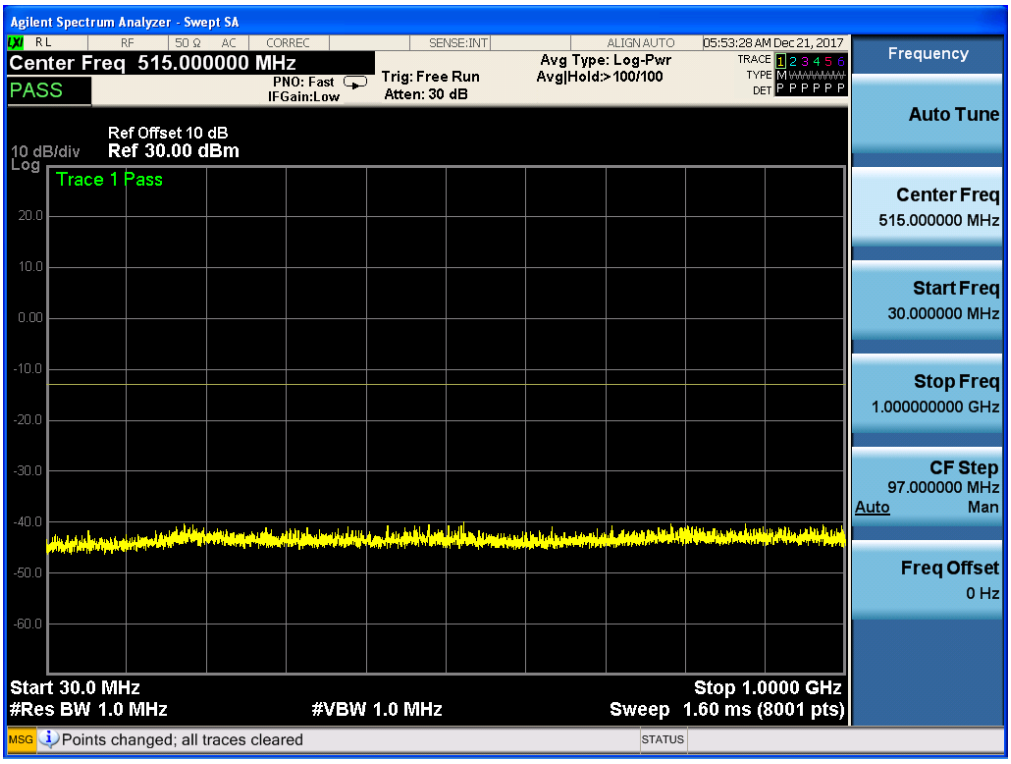
Band 7,UL Channel 21400,UL Frequency 2565.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK



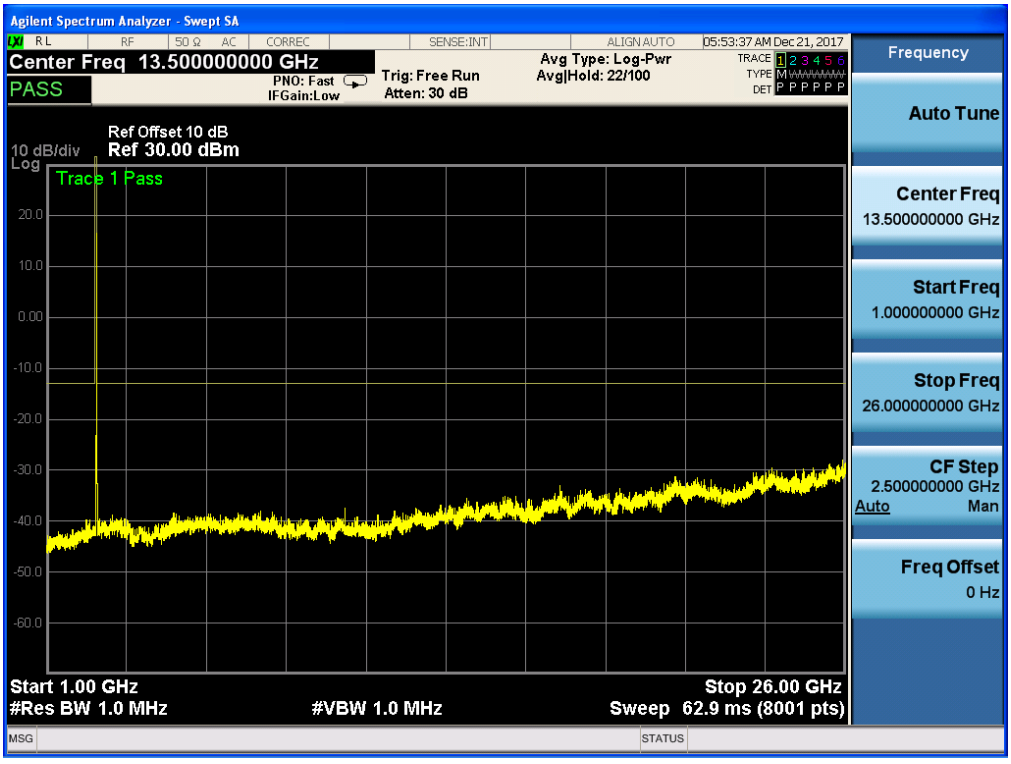
Band 7,UL Channel 21400,UL Frequency 2565.0,BW 10.0,NO. RB 50,RB POS. Low,QPSK



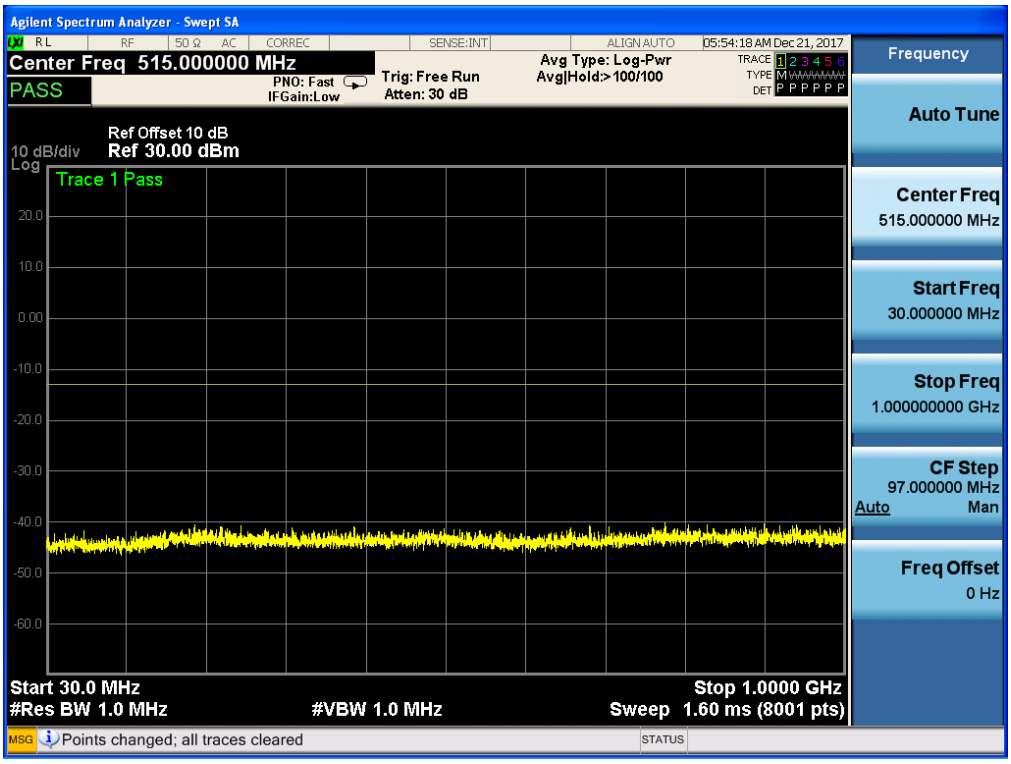
Band 7,UL Channel 21400,UL Frequency 2565.0,BW 10.0,NO. RB 50,RB POS. Low,16QAM



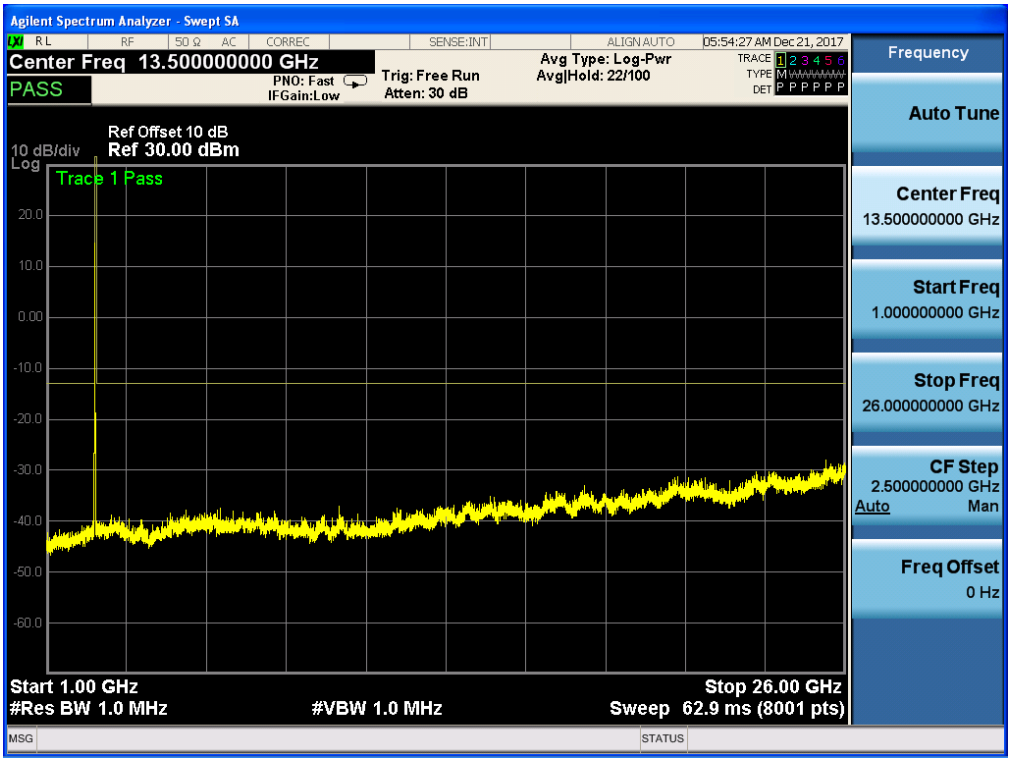
Band 7,UL Channel 21400,UL Frequency 2565.0,BW 10.0,NO. RB 50,RB POS. Low,16QAM



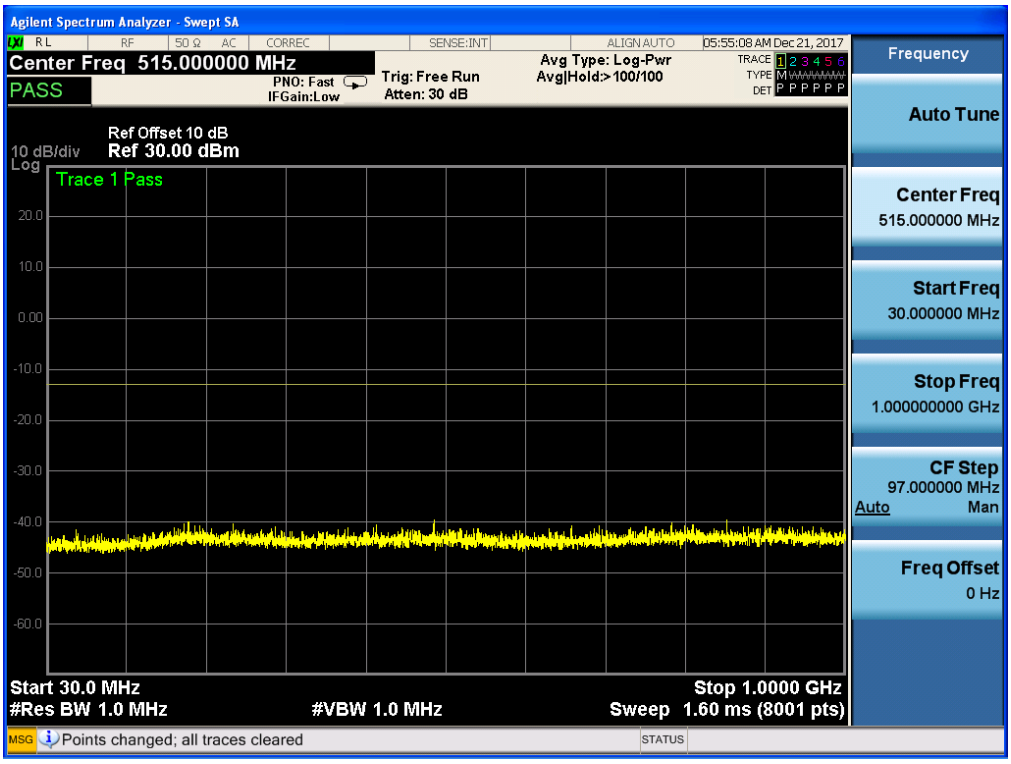
Band 7,UL Channel 20825,UL Frequency 2507.5,BW 15.0,NO. RB 75,RB POS. Low,QPSK



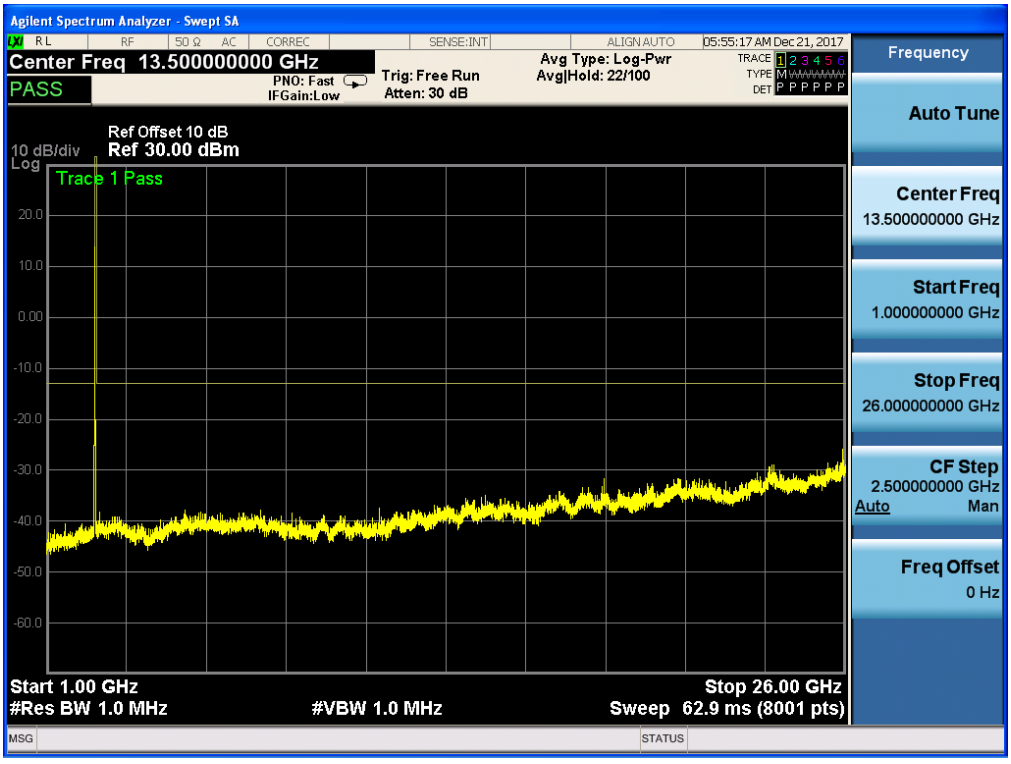
Band 7,UL Channel 20825,UL Frequency 2507.5,BW 15.0,NO. RB 75,RB POS. Low,QPSK



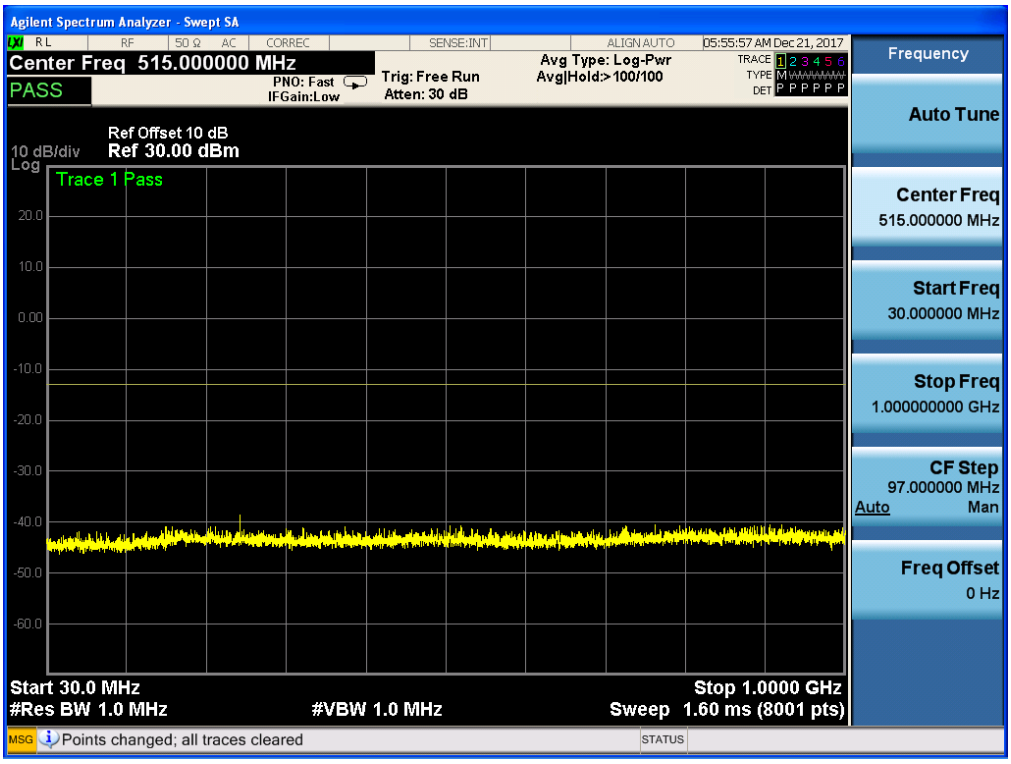
Band 7,UL Channel 20825,UL Frequency 2507.5,BW 15.0,NO. RB 75,RB POS. Low,16QAM



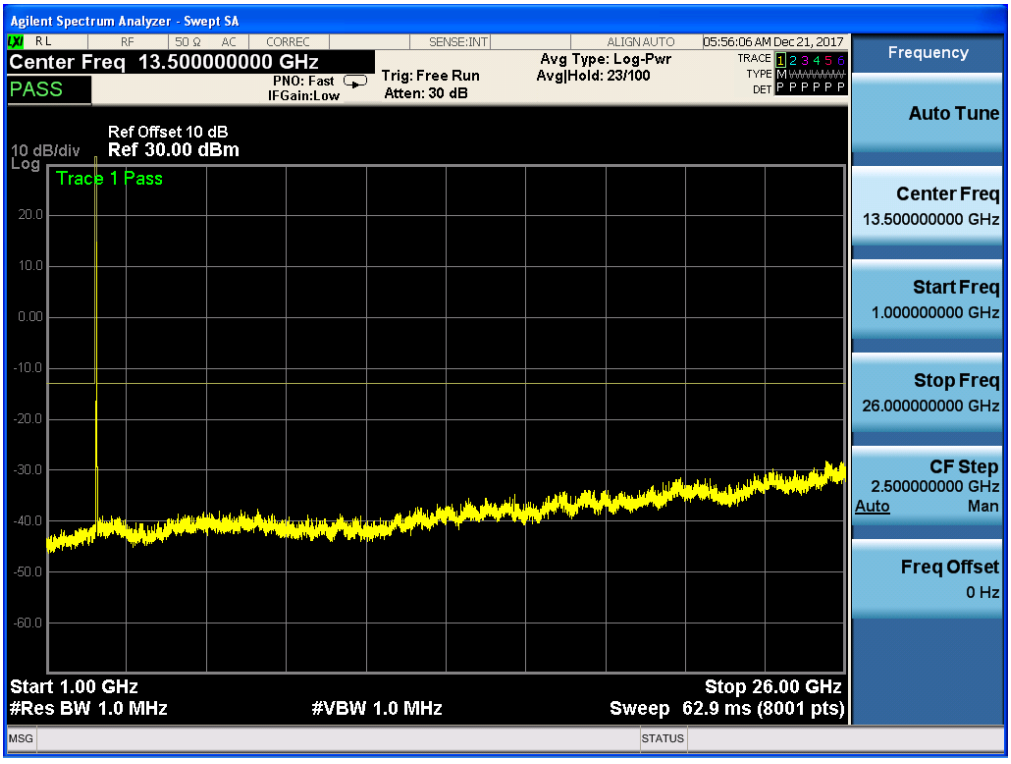
Band 7,UL Channel 20825,UL Frequency 2507.5,BW 15.0,NO. RB 75,RB POS. Low,16QAM



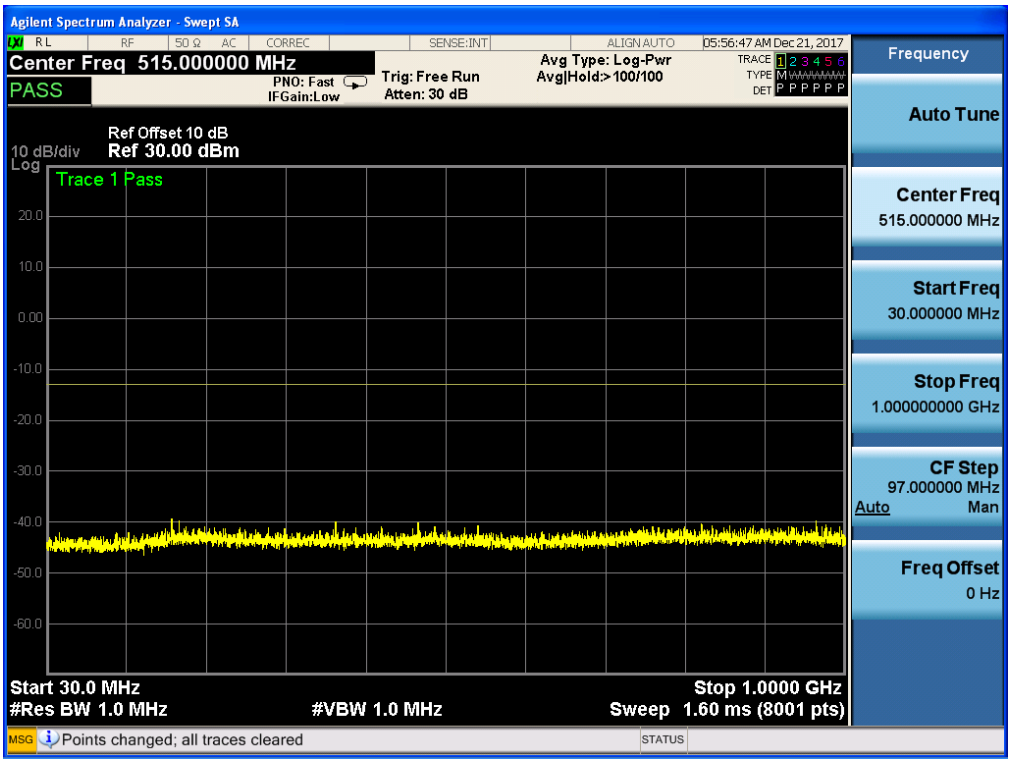
Band 7,UL Channel 21375,UL Frequency 2562.5,BW 15.0,NO. RB 75,RB POS. Low,QPSK



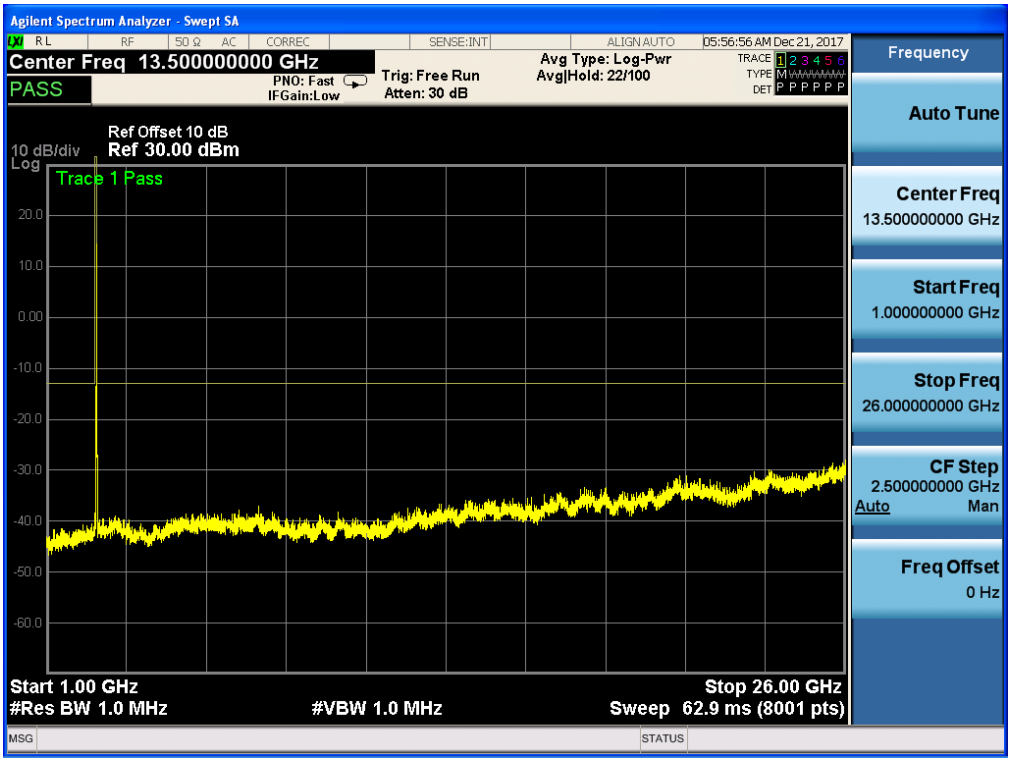
Band 7,UL Channel 21375,UL Frequency 2562.5,BW 15.0,NO. RB 75,RB POS. Low,QPSK



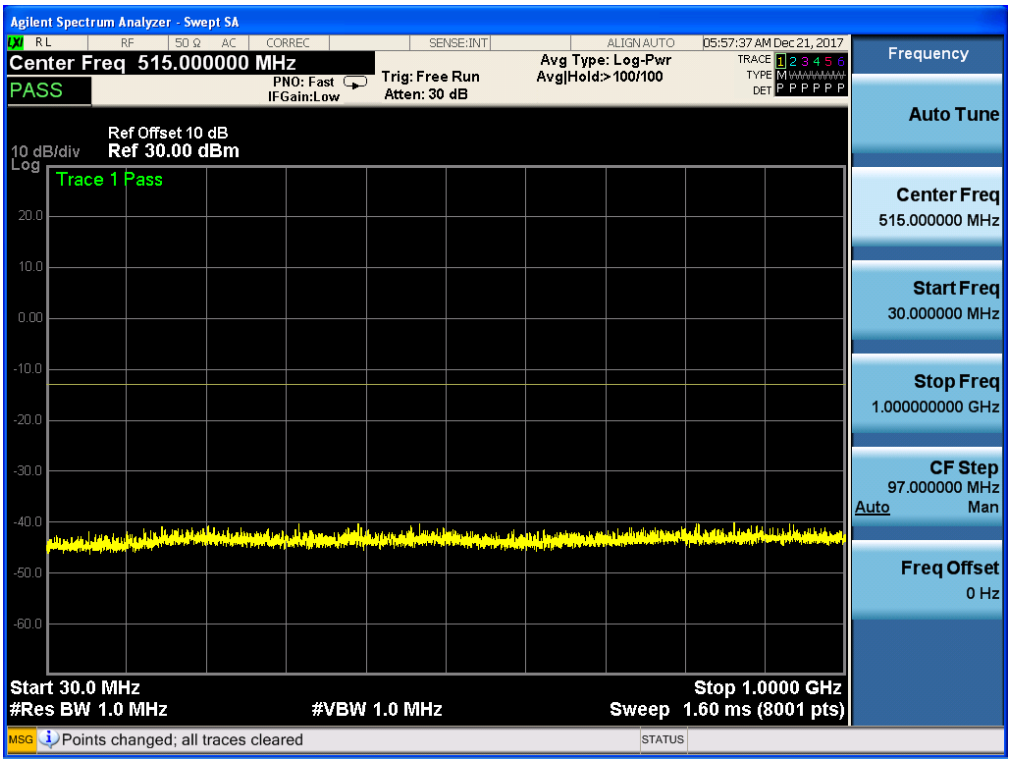
Band 7,UL Channel 21375,UL Frequency 2562.5,BW 15.0,NO. RB 75,RB POS. Low,16QAM



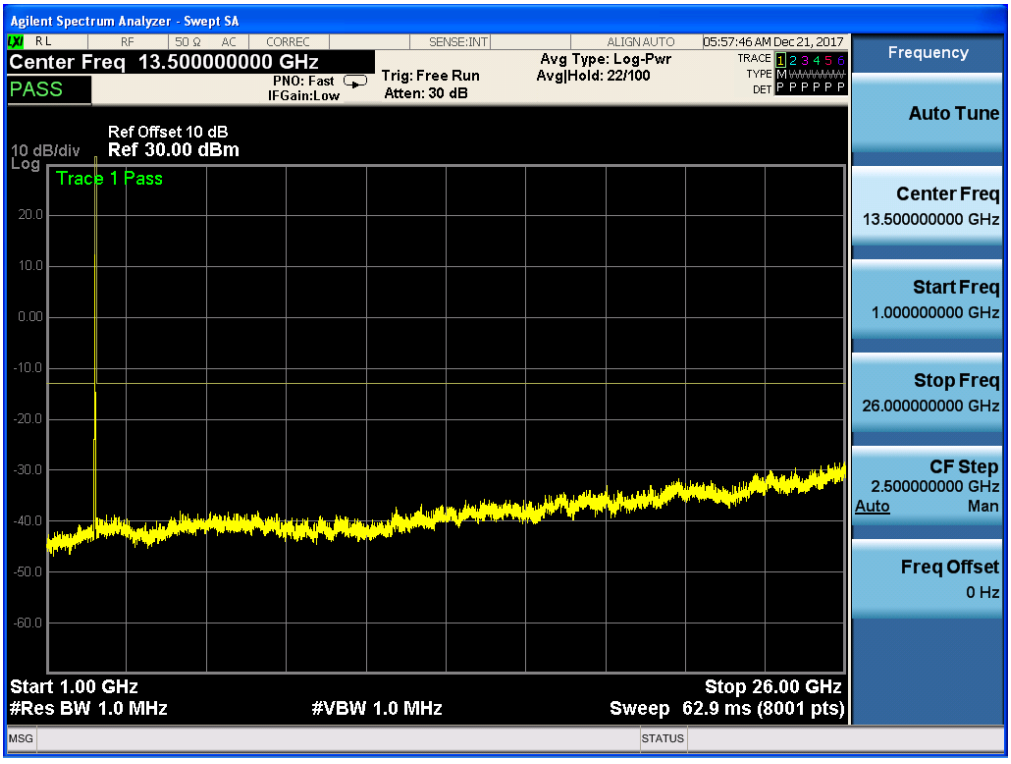
Band 7,UL Channel 21375,UL Frequency 2562.5,BW 15.0,NO. RB 75,RB POS. Low,16QAM



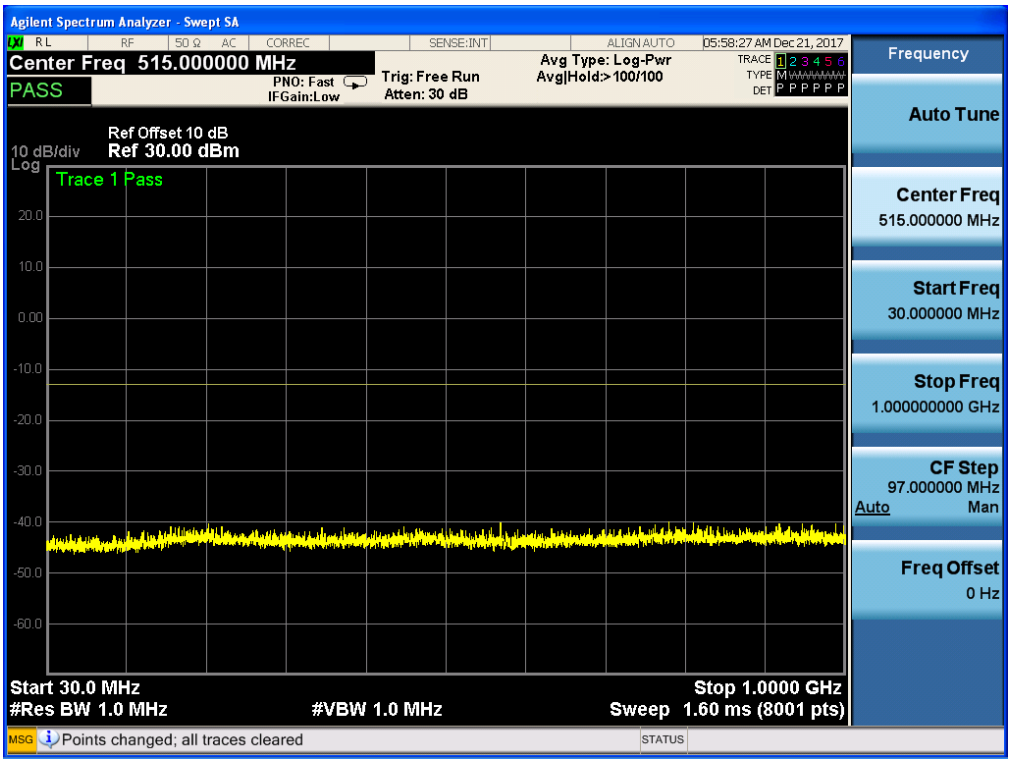
Band 7,UL Channel 20850,UL Frequency 2510.0,BW 20.0,NO. RB 100,RB POS. Low,QPSK



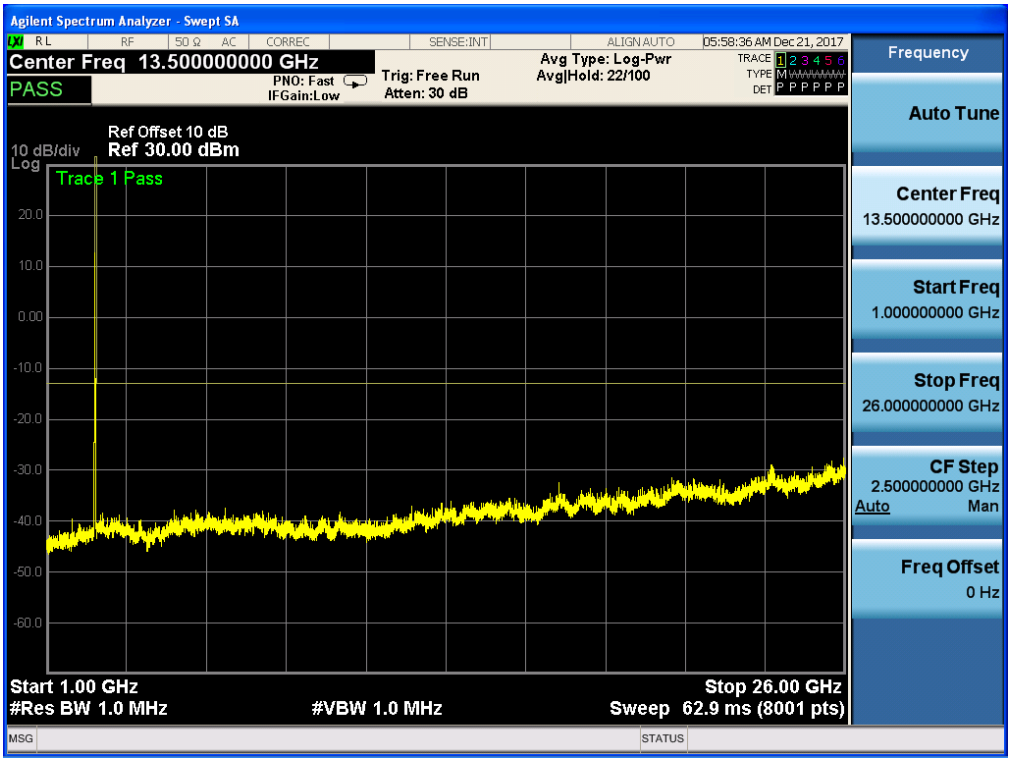
Band 7,UL Channel 20850,UL Frequency 2510.0,BW 20.0,NO. RB 100,RB POS. Low,QPSK



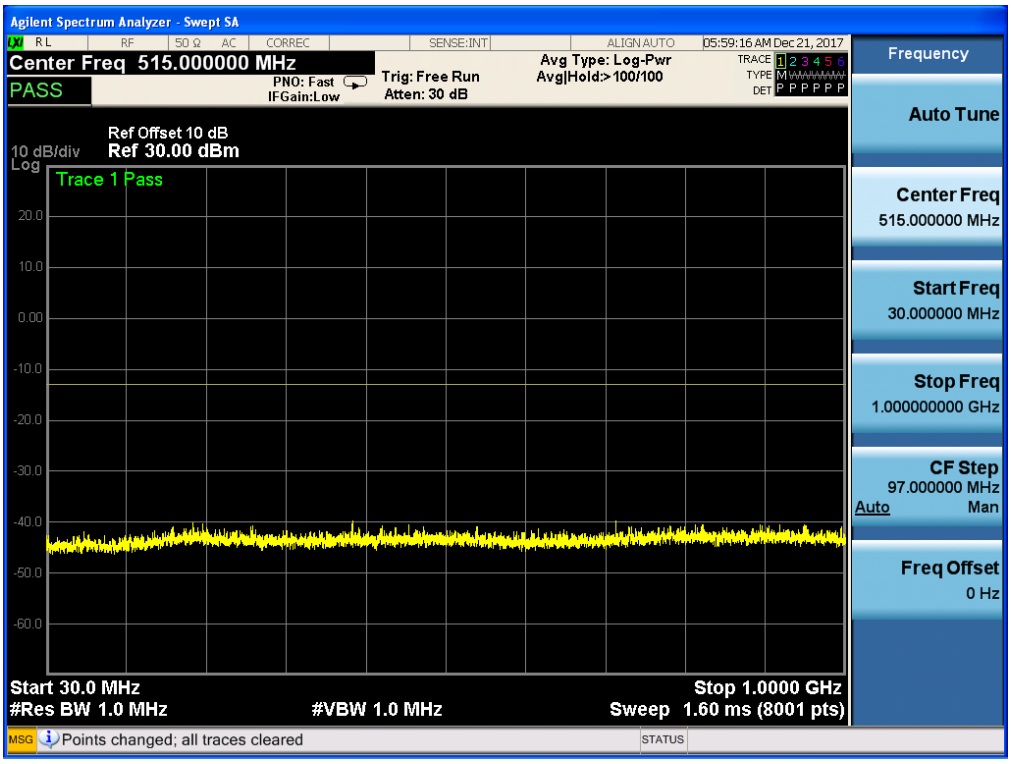
Band 7,UL Channel 20850,UL Frequency 2510.0,BW 20.0,NO. RB 100,RB POS. Low,16QAM



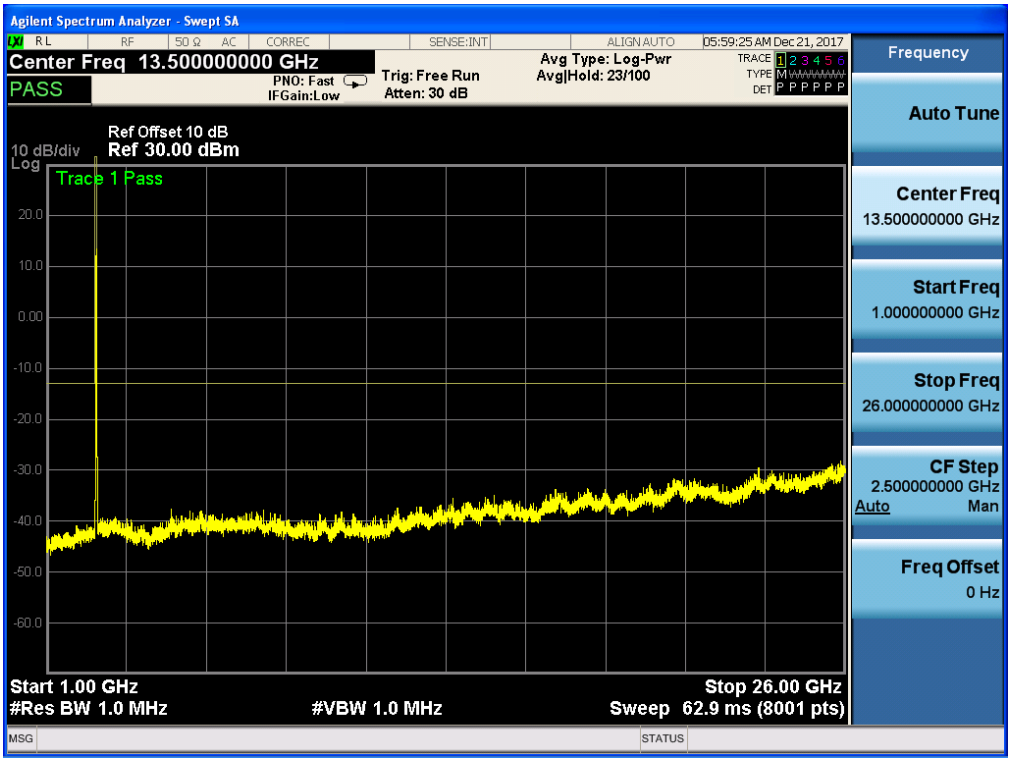
Band 7,UL Channel 20850,UL Frequency 2510.0,BW 20.0,NO. RB 100,RB POS. Low,16QAM



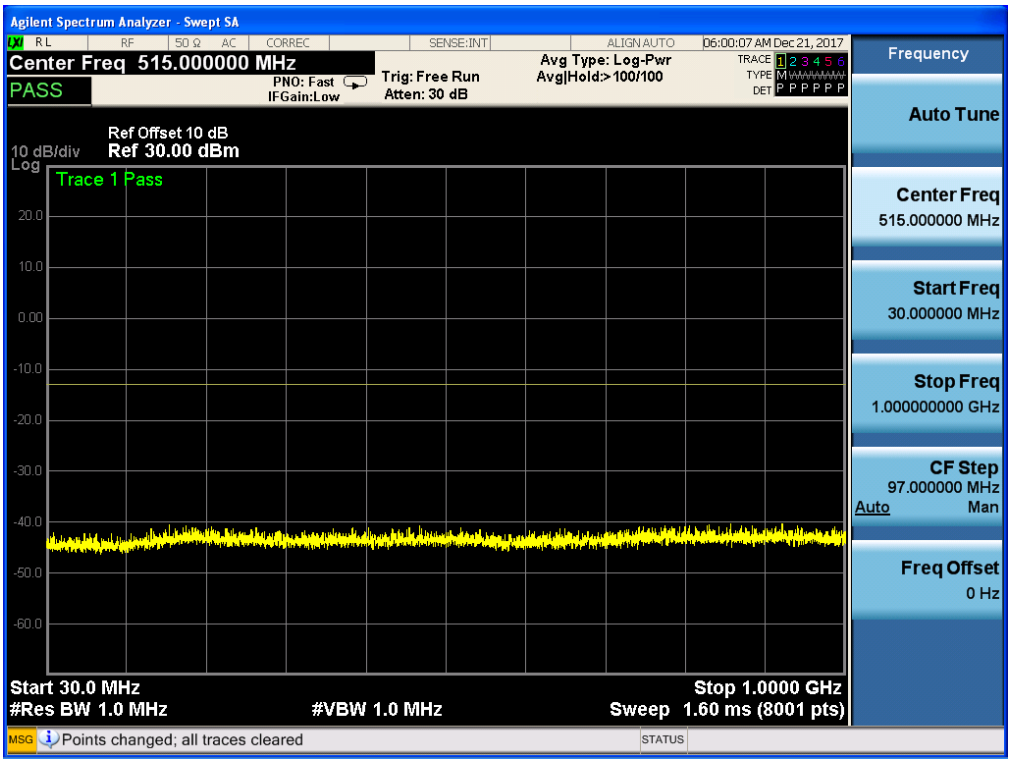
Band 7,UL Channel 21350,UL Frequency 2560.0,BW 20.0,NO. RB 100,RB POS. Low,QPSK



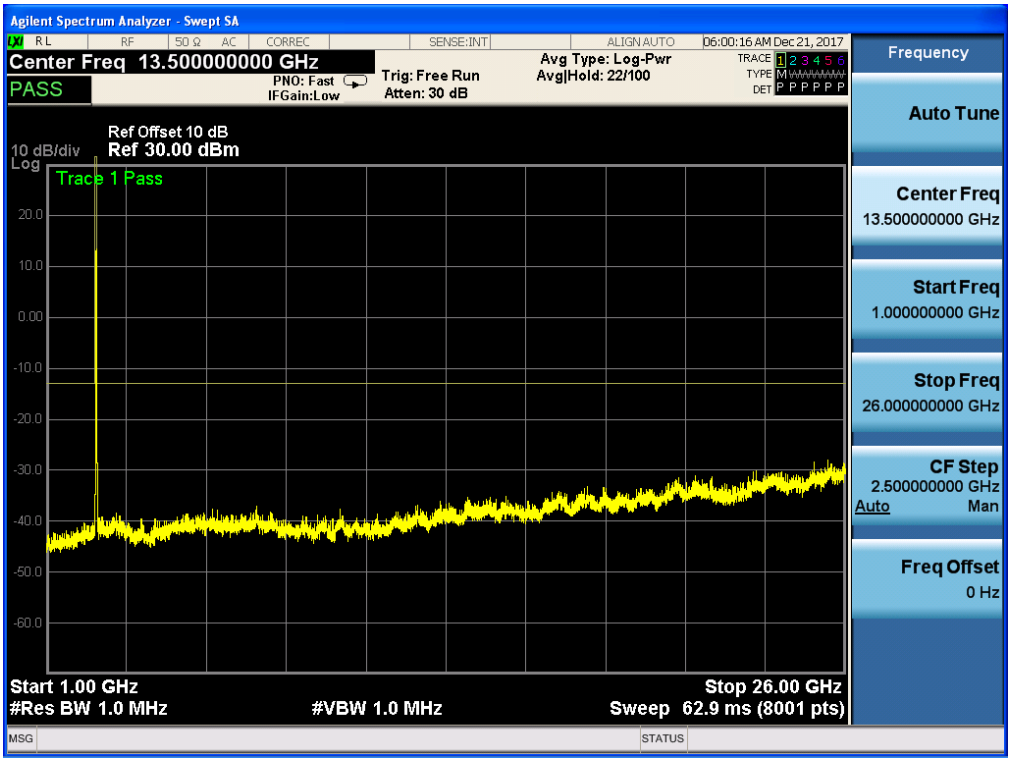
Band 7,UL Channel 21350,UL Frequency 2560.0,BW 20.0,NO. RB 100,RB POS. Low,QPSK



Band 7,UL Channel 21350,UL Frequency 2560.0,BW 20.0,NO. RB 100,RB POS. Low,16QAM



Band 7,UL Channel 21350,UL Frequency 2560.0,BW 20.0,NO. RB 100,RB POS. Low,16QAM



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 / EIA 603C 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 Band 5
- □ LTE Band7

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	-0.71	3.76	28.24	23.77	238.232	Horizontal	Pass
		1880	0.16	3.91	28.22	24.47	279.898	Horizontal	Pass
		1909.3	-0.16	3.93	28.2	24.11	257.632	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-0.68	3.76	28.24	23.8	239.883	Horizontal	Pass
		1880	0.11	3.91	28.22	24.42	276.694	Horizontal	Pass
		1909.3	-0.49	3.93	28.2	23.78	238.781	Horizontal	Pass
3.0MHz Band QPSK	15/0	1851.5	-0.77	3.77	28.23	23.69	233.884	Horizontal	Pass
		1880	-0.07	3.91	28.24	24.26	266.686	Horizontal	Pass
		1908.5	0.08	3.94	28.25	24.39	274.789	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-0.80	3.77	28.23	23.66	232.274	Horizontal	Pass
		1880	-0.42	3.91	28.24	23.91	246.037	Horizontal	Pass
		1908.5	-0.86	3.94	28.25	23.45	221.309	Horizontal	Pass
5.0MHz Band QPSK	25/0	1852.5	-0.44	3.77	28.31	24.1	257.040	Horizontal	Pass
		1880	-0.56	3.91	28.22	23.75	237.137	Horizontal	Pass
		1907.5	-0.07	3.94	28.2	24.19	262.422	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-0.54	3.77	28.31	24	251.189	Horizontal	Pass
		1880	0.29	3.91	28.22	24.6	288.403	Horizontal	Pass
		1907.5	0.08	3.94	28.2	24.34	271.644	Horizontal	Pass
10.0MHz Band QPSK	50/0	1855	-0.77	3.79	28.33	23.77	238.232	Horizontal	Pass
		1880	-0.12	3.95	28.22	24.15	260.016	Horizontal	Pass
		1905	-0.10	3.97	28.19	24.12	258.226	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1855	-0.77	3.79	28.33	23.77	238.232	Horizontal	Pass
		1880	0.27	3.95	28.22	24.54	284.446	Horizontal	Pass
		1905	-0.57	3.97	28.19	23.65	231.739	Horizontal	Pass
15.0MHz Band QPSK	75/0	1857.5	-1.00	3.79	28.34	23.55	226.464	Horizontal	Pass
		1880	0.28	3.95	28.22	24.55	285.102	Horizontal	Pass
		1902.5	-0.06	3.97	28.18	24.15	260.016	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1857.5	-0.65	3.79	28.34	23.9	245.471	Horizontal	Pass
		1880	0.06	3.95	28.22	24.33	271.019	Horizontal	Pass
		1902.5	-0.74	3.97	28.18	23.47	222.331	Horizontal	Pass

20.0MHz Band QPSK	100/0	1860	-0.93	3.81	28.35	23.61	229.615	Horizontal	Pass
		1880	-0.20	3.96	28.22	24.06	254.683	Horizontal	Pass
		1900	0.01	4	28.16	24.17	261.216	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1860	-0.55	3.81	28.35	23.99	250.611	Horizontal	Pass
		1880	-0.14	3.96	28.22	24.12	258.226	Horizontal	Pass
		1900	-0.10	4	28.16	24.06	254.683	Horizontal	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	-0.25	3.76	28.24	24.23	264.850	Vertical	Pass
		1880	-0.50	3.91	28.22	23.81	240.436	Vertical	Pass
		1909.3	-0.31	3.93	28.2	23.96	248.886	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-0.35	3.76	28.24	24.13	258.821	Vertical	Pass
		1880	-1.08	3.91	28.22	23.23	210.378	Vertical	Pass
		1909.3	-1.07	3.93	28.2	23.2	208.930	Vertical	Pass
3.0MHz Band QPSK	15/0	1851.5	-0.16	3.77	28.23	24.3	269.153	Vertical	Pass
		1880	-0.25	3.91	28.24	24.08	255.859	Vertical	Pass
		1908.5	-0.74	3.94	28.25	23.57	227.510	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-0.94	3.77	28.23	23.52	224.905	Vertical	Pass
		1880	-0.63	3.91	28.24	23.7	234.423	Vertical	Pass
		1908.5	-0.57	3.94	28.25	23.74	236.592	Vertical	Pass
5.0MHz Band QPSK	25/0	1852.5	-0.23	3.77	28.31	24.31	269.774	Vertical	Pass
		1880	-0.27	3.91	28.22	24.04	253.513	Vertical	Pass
		1907.5	-0.53	3.94	28.2	23.73	236.048	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-0.10	3.77	28.31	24.44	277.971	Vertical	Pass
		1880	-0.50	3.91	28.22	23.81	240.436	Vertical	Pass
		1907.5	-0.86	3.94	28.2	23.4	218.776	Vertical	Pass
10.0MHz Band QPSK	50/0	1855	-0.93	3.79	28.33	23.61	229.615	Vertical	Pass
		1880	-0.26	3.95	28.22	24.01	251.768	Vertical	Pass
		1905	-0.57	3.97	28.19	23.65	231.739	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1855	-0.41	3.79	28.33	24.13	258.821	Vertical	Pass
		1880	-0.80	3.95	28.22	23.47	222.331	Vertical	Pass
		1905	-0.54	3.97	28.19	23.68	233.346	Vertical	Pass
15.0MHz Band QPSK	75/0	1857.5	-0.12	3.79	28.34	24.43	277.332	Vertical	Pass
		1880	-0.18	3.95	28.22	24.09	256.448	Vertical	Pass
		1902.5	-0.23	3.97	28.18	23.98	250.035	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1857.5	-0.41	3.79	28.34	24.14	259.418	Vertical	Pass
		1880	-0.96	3.95	28.22	23.31	214.289	Vertical	Pass
		1902.5	-0.25	3.97	28.18	23.96	248.886	Vertical	Pass
20.0MHz Band	100/ 0	1860	-0.71	3.81	28.35	23.83	241.546	Vertical	Pass
		1880	-0.51	3.96	28.22	23.75	237.137	Vertical	Pass

QPSK		1900	-0.40	4	28.16	23.76	237.684	Vertical	Pass
20.0MHz Band 16 QAM	100/0	1860	-0.33	3.81	28.35	24.21	263.633	Vertical	Pass
		1880	-0.21	3.96	28.22	24.05	254.097	Vertical	Pass
		1900	-0.91	4	28.16	23.25	211.349	Vertical	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	-1.21	3.12	27.58	23.25	211.349	Horizontal	Pass
		1732.5	-1.26	3.27	27.61	23.08	203.236	Horizontal	Pass
		1754.3	-0.55	3.29	27.63	23.79	239.332	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-0.76	3.12	27.58	23.7	234.423	Horizontal	Pass
		1732.5	-1.24	3.27	27.61	23.1	204.174	Horizontal	Pass
		1754.3	-1.00	3.29	27.63	23.34	215.774	Horizontal	Pass
3.0MHz Band QPSK	15/0	1711.5	-0.94	3.13	27.61	23.54	225.944	Horizontal	Pass
		1732.5	-1.06	3.27	27.61	23.28	212.814	Horizontal	Pass
		1753.5	-1.08	3.3	27.62	23.24	210.863	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-0.41	3.13	27.61	24.07	255.270	Horizontal	Pass
		1732.5	-0.39	3.27	27.61	23.95	248.313	Horizontal	Pass
		1753.5	-0.56	3.3	27.62	23.76	237.684	Horizontal	Pass
5.0MHz Band QPSK	25/0	1712.5	-0.89	3.13	27.63	23.61	229.615	Horizontal	Pass
		1732.5	-0.74	3.27	27.61	23.6	229.087	Horizontal	Pass
		1752.5	-1.27	3.3	27.6	23.03	200.909	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-0.59	3.13	27.63	23.91	246.037	Horizontal	Pass
		1732.5	-0.41	3.27	27.61	23.93	247.172	Horizontal	Pass
		1752.5	-1.36	3.3	27.6	22.94	196.789	Horizontal	Pass
10.0MHz Band QPSK	50/0	1715	-1.05	3.15	27.64	23.44	220.800	Horizontal	Pass
		1732.5	-0.75	3.31	27.61	23.55	226.464	Horizontal	Pass
		1750	-1.13	3.33	27.59	23.13	205.589	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1715	-1.16	3.15	27.64	23.33	215.278	Horizontal	Pass
		1732.5	-1.34	3.31	27.61	22.96	197.697	Horizontal	Pass
		1750	-1.04	3.33	27.59	23.22	209.894	Horizontal	Pass
15.0MHz Band QPSK	75/0	1717.5	-1.32	3.15	27.65	23.18	207.970	Horizontal	Pass
		1732.5	-0.50	3.31	27.61	23.8	239.883	Horizontal	Pass
		1747.5	-1.24	3.33	27.57	23	199.526	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-0.39	3.15	27.65	24.11	257.632	Horizontal	Pass
		1732.5	-0.80	3.31	27.61	23.5	223.872	Horizontal	Pass
		1747.5	-0.91	3.33	27.57	23.33	215.278	Horizontal	Pass

20.0MHz Band QPSK	100/0	1720	-0.60	3.17	27.66	23.89	244.906	Horizontal	Pass
		1732.5	-0.96	3.32	27.61	23.33	215.278	Horizontal	Pass
		1745	-1.01	3.36	27.56	23.19	208.449	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1720	-1.22	3.17	27.66	23.27	212.324	Horizontal	Pass
		1732.5	-1.04	3.32	27.61	23.25	211.349	Horizontal	Pass
		1745	-0.44	3.36	27.56	23.76	237.684	Horizontal	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	-1.34	3.12	27.58	23.12	205.116	Vertical	Pass
		1732.5	-0.61	3.27	27.61	23.73	236.048	Vertical	Pass
		1754.3	-0.96	3.29	27.63	23.38	217.771	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-1.03	3.12	27.58	23.43	220.293	Vertical	Pass
		1732.5	-1.05	3.27	27.61	23.29	213.304	Vertical	Pass
		1754.3	-1.05	3.29	27.63	23.29	213.304	Vertical	Pass
3.0MHz Band QPSK	15/0	1711.5	-0.92	3.13	27.61	23.56	226.986	Vertical	Pass
		1732.5	-0.69	3.27	27.61	23.65	231.739	Vertical	Pass
		1753.5	-0.63	3.3	27.62	23.69	233.884	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-1.31	3.13	27.61	23.17	207.491	Vertical	Pass
		1732.5	-0.91	3.27	27.61	23.43	220.293	Vertical	Pass
		1753.5	-1.12	3.3	27.62	23.2	208.930	Vertical	Pass
5.0MHz Band QPSK	25/0	1712.5	-1.15	3.13	27.63	23.35	216.272	Vertical	Pass
		1732.5	-1.16	3.27	27.61	23.18	207.970	Vertical	Pass
		1752.5	-1.04	3.3	27.6	23.26	211.836	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-0.66	3.13	27.63	23.84	242.103	Vertical	Pass
		1732.5	-0.81	3.27	27.61	23.53	225.424	Vertical	Pass
		1752.5	-0.88	3.3	27.6	23.42	219.786	Vertical	Pass
10.0MHz Band QPSK	50/0	1715	-0.65	3.15	27.64	23.84	242.103	Vertical	Pass
		1732.5	-1.04	3.31	27.61	23.26	211.836	Vertical	Pass
		1750	-1.24	3.33	27.59	23.02	200.447	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1715	-0.67	3.15	27.64	23.82	240.991	Vertical	Pass
		1732.5	-0.69	3.31	27.61	23.61	229.615	Vertical	Pass
		1750	-1.31	3.33	27.59	22.95	197.242	Vertical	Pass
15.0MHz Band QPSK	75/0	1717.5	-0.50	3.15	27.65	24	251.189	Vertical	Pass
		1732.5	-0.59	3.31	27.61	23.71	234.963	Vertical	Pass
		1747.5	-1.31	3.33	27.57	22.93	196.336	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-0.83	3.15	27.65	23.67	232.809	Vertical	Pass
		1732.5	-1.16	3.31	27.61	23.14	206.063	Vertical	Pass
		1747.5	-0.54	3.33	27.57	23.7	234.423	Vertical	Pass
20.0MHz Band	100/0	1720	-1.14	3.17	27.66	23.35	216.272	Vertical	Pass
		1732.5	-1.38	3.32	27.61	22.91	195.434	Vertical	Pass

QPSK		1745	-0.85	3.36	27.56	23.35	216.272	Vertical	Pass
20.0MHz Band 16 QAM	100/0	1720	-0.80	3.17	27.66	23.69	233.884	Vertical	Pass
		1732.5	-0.71	3.32	27.61	23.58	228.034	Vertical	Pass
		1745	-0.96	3.36	27.56	23.24	210.863	Vertical	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. ERP Average (dBm)	Max. ERP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	8.73	2.01	19.68	2.15	24.25	266.073	Horizontal	Pass
		836.5	9.06	2.01	19.77	2.15	24.67	293.089	Horizontal	Pass
		848.3	8.47	2.02	19.82	2.15	24.12	258.226	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	824.7	8.90	2.01	19.68	2.15	24.42	276.694	Horizontal	Pass
		836.5	8.44	2.01	19.77	2.15	24.05	254.097	Horizontal	Pass
		848.3	9.00	2.02	19.82	2.15	24.65	291.743	Horizontal	Pass
3.0MHz Band QPSK	15/0	825.5	8.42	2.01	19.7	2.15	23.96	248.886	Horizontal	Pass
		836.5	9.27	2.01	19.77	2.15	24.88	307.610	Horizontal	Pass
		847.5	8.87	2.02	19.81	2.15	24.51	282.488	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	825.5	9.12	2.01	19.7	2.15	24.66	292.415	Horizontal	Pass
		836.5	8.51	2.01	19.77	2.15	24.12	258.226	Horizontal	Pass
		847.5	8.82	2.02	19.81	2.15	24.46	279.254	Horizontal	Pass
5.0MHz Band QPSK	25/0	826.5	9.18	2.01	19.71	2.15	24.73	297.167	Horizontal	Pass
		836.5	9.03	2.01	19.77	2.15	24.64	291.072	Horizontal	Pass
		846.5	8.78	2.02	19.79	2.15	24.4	275.423	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	826.5	9.22	2.01	19.71	2.15	24.77	299.916	Horizontal	Pass
		836.5	9.03	2.01	19.77	2.15	24.64	291.072	Horizontal	Pass
		846.5	8.34	2.02	19.79	2.15	23.96	248.886	Horizontal	Pass
10.0MHz Band QPSK	50/0	829	8.89	2.01	19.73	2.15	24.46	279.254	Horizontal	Pass
		836.5	9.14	2.01	19.77	2.15	24.75	298.538	Horizontal	Pass
		844	8.85	2.02	19.78	2.15	24.46	279.254	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	829	8.64	2.01	19.73	2.15	24.21	263.633	Horizontal	Pass
		836.5	8.34	2.01	19.77	2.15	23.95	248.313	Horizontal	Pass
		844	8.78	2.02	19.78	2.15	24.39	274.789	Horizontal	Pass

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. ERP Average (dBm)	Max. ERP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	8.99	2.01	19.68	2.15	24.51	282.488	Vertical	Pass
		836.5	8.59	2.01	19.77	2.15	24.2	263.027	Vertical	Pass
		848.3	8.47	2.02	19.82	2.15	24.12	258.226	Vertical	Pass
1.4MHz Band 16 QAM	6/0	824.7	9.08	2.01	19.68	2.15	24.6	288.403	Vertical	Pass
		836.5	9.14	2.01	19.77	2.15	24.75	298.538	Vertical	Pass
		848.3	8.99	2.02	19.82	2.15	24.64	291.072	Vertical	Pass
3.0MHz Band QPSK	15/0	825.5	8.63	2.01	19.7	2.15	24.17	261.216	Vertical	Pass
		836.5	9.27	2.01	19.77	2.15	24.88	307.610	Vertical	Pass
		847.5	9.32	2.02	19.81	2.15	24.96	313.329	Vertical	Pass
3.0MHz Band 16 QAM	15/0	825.5	8.98	2.01	19.7	2.15	24.52	283.139	Vertical	Pass
		836.5	8.56	2.01	19.77	2.15	24.17	261.216	Vertical	Pass
		847.5	8.98	2.02	19.81	2.15	24.62	289.734	Vertical	Pass
5.0MHz Band QPSK	25/0	826.5	8.56	2.01	19.71	2.15	24.11	257.632	Vertical	Pass
		836.5	8.43	2.01	19.77	2.15	24.04	253.513	Vertical	Pass
		846.5	8.94	2.02	19.79	2.15	24.56	285.759	Vertical	Pass
5.0MHz Band 16 QAM	25/0	826.5	9.25	2.01	19.71	2.15	24.8	301.995	Vertical	Pass
		836.5	8.85	2.01	19.77	2.15	24.46	279.254	Vertical	Pass
		846.5	8.81	2.02	19.79	2.15	24.43	277.332	Vertical	Pass
10.0MHz Band QPSK	50/0	829	8.75	2.01	19.73	2.15	24.32	270.396	Vertical	Pass
		836.5	8.68	2.01	19.77	2.15	24.29	268.534	Vertical	Pass
		844	8.52	2.02	19.78	2.15	24.13	258.821	Vertical	Pass
10.0MHz Band 16 QAM	50/0	829	8.67	2.01	19.73	2.15	24.24	265.461	Vertical	Pass
		836.5	8.41	2.01	19.77	2.15	24.02	252.348	Vertical	Pass
		844	8.66	2.02	19.78	2.15	24.27	267.301	Vertical	Pass

Note:
SG Level= Signal generator output
Max. ERP 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	0.65	4.54	27.75	23.86	243.220	Horizontal	Pass
		2535	0.37	4.69	27.72	23.4	218.776	Horizontal	Pass
		2567.5	0.58	4.71	27.71	23.58	228.034	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-0.19	4.54	27.75	23.02	200.447	Horizontal	Pass
		2535	0.68	4.69	27.72	23.71	234.963	Horizontal	Pass
		2567.5	-0.19	4.71	27.71	22.81	190.985	Horizontal	Pass
10.0MHz Band QPSK	50/0	2505	0.56	4.55	27.76	23.77	238.232	Horizontal	Pass
		2535	0.37	4.69	27.72	23.4	218.776	Horizontal	Pass
		2565	-0.06	4.72	27.7	22.92	195.884	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	2505	0.13	4.55	27.76	23.34	215.774	Horizontal	Pass
		2535	-0.05	4.69	27.72	22.98	198.609	Horizontal	Pass
		2565	0.06	4.72	27.7	23.04	201.372	Horizontal	Pass
15.0MHz Band QPSK	75/0	2507.5	0.23	4.55	27.77	23.45	221.309	Horizontal	Pass
		2535	0.54	4.69	27.72	23.57	227.510	Horizontal	Pass
		2562.5	0.16	4.72	27.69	23.13	205.589	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	2507.5	0.42	4.55	27.77	23.64	231.206	Horizontal	Pass
		2535	0.65	4.69	27.72	23.68	233.346	Horizontal	Pass
		2562.5	0.51	4.72	27.69	23.48	222.844	Horizontal	Pass
20.0MHz Band QPSK	100/ 0	2510	-0.21	4.57	27.78	23	199.526	Horizontal	Pass
		2535	0.42	4.73	27.72	23.41	219.280	Horizontal	Pass
		2560	0.12	4.75	27.68	23.05	201.837	Horizontal	Pass
20.0MHz Band 16 QAM	100/ 0	2510	0.12	4.57	27.78	23.33	215.278	Horizontal	Pass
		2535	0.68	4.73	27.72	23.67	232.809	Horizontal	Pass
		2560	-0.04	4.75	27.68	22.89	194.536	Horizontal	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	0.42	4.54	27.75	23.63	230.675	Vertical	Pass
		2535	0.56	4.69	27.72	23.59	228.560	Vertical	Pass
		2567.5	0.21	4.71	27.71	23.21	209.411	Vertical	Pass
5.0MHz Band 16 QAM	25/0	2502.5	0.42	4.54	27.75	23.63	230.675	Vertical	Pass
		2535	0.02	4.69	27.72	23.05	201.837	Vertical	Pass
		2567.5	0.61	4.71	27.71	23.61	229.615	Vertical	Pass
10.0MHz Band QPSK	50/0	2505	-0.05	4.55	27.76	23.16	207.014	Vertical	Pass
		2535	0.25	4.69	27.72	23.28	212.814	Vertical	Pass
		2565	0.26	4.72	27.7	23.24	210.863	Vertical	Pass
10.0MHz Band 16 QAM	50/0	2505	0.34	4.55	27.76	23.55	226.464	Vertical	Pass
		2535	-0.19	4.69	27.72	22.84	192.309	Vertical	Pass
		2565	0.63	4.72	27.7	23.61	229.615	Vertical	Pass
15.0MHz Band QPSK	75/0	2507.5	0.39	4.55	27.77	23.61	229.615	Vertical	Pass
		2535	-0.18	4.69	27.72	22.85	192.752	Vertical	Pass
		2562.5	0.50	4.72	27.69	23.47	222.331	Vertical	Pass
15.0MHz Band 16 QAM	75/0	2507.5	0.64	4.55	27.77	23.86	243.220	Vertical	Pass
		2535	0.03	4.69	27.72	23.06	202.302	Vertical	Pass
		2562.5	0.37	4.72	27.69	23.34	215.774	Vertical	Pass
20.0MHz Band QPSK	100/ 0	2510	0.15	4.57	27.78	23.36	216.770	Vertical	Pass
		2535	0.15	4.73	27.72	23.14	206.063	Vertical	Pass
		2560	0.64	4.75	27.68	23.57	227.510	Vertical	Pass
20.0MHz Band 16 QAM	100/ 0	2510	0.52	4.57	27.78	23.73	236.048	Vertical	Pass
		2535	0.63	4.73	27.72	23.62	230.144	Vertical	Pass
		2560	-0.15	4.75	27.68	22.78	189.671	Vertical	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 Band 5
- ☐ LTE Band7

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	-52.13	4.04	33.51	-22.66	-13	-9.66	Horizontal
3701.4	-54.47	4.04	33.51	-25.00	-13	-12.00	Vertical
5552.1	-56.59	5.24	35.84	-25.99	-13	-12.99	Vertical
5552.1	-55.58	5.24	35.84	-24.98	-13	-11.98	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760	-56.95	4.04	33.56	-27.43	-13	-14.43	Horizontal
3760	-57.74	4.04	33.56	-28.22	-13	-15.22	Vertical
5640	-58.85	5.24	35.91	-28.18	-13	-15.18	Vertical
5640	-57.94	5.24	35.91	-27.27	-13	-14.27	Horizontal
Test Results for High Channel 1754.3MHz							
3818.6	-54.41	4.04	34	-24.45	-13	-11.45	Horizontal
3818.6	-56.59	4.04	34	-26.63	-13	-13.63	Vertical
5727.9	-57.74	5.24	36.04	-26.94	-13	-13.94	Vertical
5727.9	-57.89	5.24	36.04	-27.09	-13	-14.09	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	-56.98	4.07	33.54	-27.51	-13	-14.51	Horizontal
3720	-57.74	4.07	33.54	-28.27	-13	-15.27	Vertical
5580	-54.41	5.28	35.86	-23.83	-13	-10.83	Vertical
5580	-58.59	5.28	35.86	-28.01	-13	-15.01	Horizontal
Test Results for Mid Channel 1732.5MHz							
3760	-58.92	4.04	33.56	-29.40	-13	-16.40	Horizontal
3760	-56.63	4.04	33.56	-27.11	-13	-14.11	Vertical
5640	-57.74	5.24	35.91	-27.07	-13	-14.07	Vertical
5640	-58.96	5.24	35.91	-28.29	-13	-15.29	Horizontal
Test Results for High Channel 1754.3MHz							
3800	-57.74	4.04	34	-27.78	-13	-14.78	Horizontal
3800	-58.84	4.04	34	-28.88	-13	-15.88	Vertical
5700	-56.95	5.24	36.04	-26.15	-13	-13.15	Vertical
5700	-54.41	5.24	36.04	-23.61	-13	-10.61	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	-54.41	4.02	29.8	-28.63	-13	-15.63	Horizontal
3421.4	-55.52	4.02	29.8	-29.74	-13	-16.74	Vertical
5132.1	-53.95	5.24	35.84	-23.35	-13	-10.35	Vertical
5132.1	-53.29	5.24	35.84	-22.69	-13	-9.69	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-54.47	4.03	30	-28.50	-13	-15.50	Horizontal
3465	-56.58	4.03	30	-30.61	-13	-17.61	Vertical
5197.5	-56.61	5.25	35.86	-26.00	-13	-13.00	Vertical
5197.5	-55.59	5.25	35.86	-24.98	-13	-11.98	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-53.62	4.05	30.01	-27.66	-13	-14.66	Horizontal
3508.6	-54.48	4.05	30.01	-28.52	-13	-15.52	Vertical
5262.9	-56.59	5.26	35.86	-25.99	-13	-12.99	Vertical
5262.9	-56.98	5.26	35.86	-26.38	-13	-13.38	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	-56.85	4.02	29.8	-31.07	-13	-18.07	Horizontal
3440	-54.41	4.02	29.8	-28.63	-13	-15.63	Vertical
5160	-55.58	5.24	35.84	-24.98	-13	-11.98	Vertical
5160	-56.85	5.24	35.84	-26.25	-13	-13.25	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-56.96	4.03	30	-30.99	-13	-17.99	Horizontal
3465	-51.15	4.03	30	-25.18	-13	-12.18	Vertical
5197.5	-55.28	5.25	35.86	-24.67	-13	-11.67	Vertical
5197.5	-56.96	5.25	35.86	-26.35	-13	-13.35	Horizontal
Test Results for High Channel 1754.3MHz							
2490	-56.67	2.91	27.68	-31.90	-13	-18.90	Horizontal
3490	-54.74	2.91	27.68	-29.97	-13	-16.97	Vertical
5235	-59.98	5.26	35.86	-29.38	-13	-16.38	Vertical
5235	-55.56	5.26	35.86	-24.96	-13	-11.96	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 (1.4.0MHZ 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	-55.54	2.78	27.5	-30.82	-13	-17.82	Horizontal
1649.4	-50.12	2.78	27.5	-25.40	-13	-12.40	Vertical
2474.1	-53.26	2.9	27.8	-28.36	-13	-15.36	Vertical
2474.1	-54.47	2.9	27.8	-29.57	-13	-16.57	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-56.52	2.8	27.48	-31.84	-13	-18.84	Horizontal
1673	-54.48	2.8	27.48	-29.80	-13	-16.80	Vertical
2509.5	-56.92	2.91	27.7	-32.13	-13	-19.13	Vertical
2509.5	-52.85	2.91	27.7	-28.06	-13	-15.06	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-54.41	2.82	27.43	-29.80	-13	-16.80	Horizontal
1696.6	-54.48	2.82	27.43	-29.87	-13	-16.87	Vertical
2544.9	-49.98	2.92	27.74	-25.16	-13	-12.16	Vertical
2544.9	-56.53	2.92	27.74	-31.71	-13	-18.71	Horizontal

QPSK EIRP POWER FOR LTE BAND 5 (10.0MHZ 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	-54.47	2.78	27.5	-29.75	-13	-16.75	Horizontal
1658	-56.59	2.78	27.5	-31.87	-13	-18.87	Vertical
2487	-56.86	2.9	27.8	-31.96	-13	-18.96	Vertical
2487	-49.97	2.9	27.8	-25.07	-13	-12.07	Horizontal
Test Results for Mid Channel 836.5MHz							
1673	-53.65	2.8	27.48	-28.97	-13	-15.97	Horizontal
1673	-56.65	2.8	27.48	-31.97	-13	-18.97	Vertical
2509.5	-57.74	2.91	27.7	-32.95	-13	-19.95	Vertical
2509.5	-56.58	2.91	27.7	-31.79	-13	-18.79	Horizontal
Test Results for High Channel 848.3MHz							
1688	-55.58	2.82	27.43	-30.97	-13	-17.97	Horizontal
1688	-56.59	2.82	27.43	-31.98	-13	-18.98	Vertical
2532	-55.58	2.92	27.74	-30.76	-13	-17.76	Vertical
2532	-56.63	2.92	27.74	-31.81	-13	-18.81	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	-56.67	5.23	35.81	-26.09	-13	-13.09	Horizontal
5005	-55.84	5.23	35.81	-25.26	-13	-12.26	Vertical
7507.5	-56.96	5.67	36.85	-25.78	-13	-12.78	Vertical
7507.5	-54.41	5.67	36.85	-23.23	-13	-10.23	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-56.98	5.23	35.82	-26.39	-13	-13.39	Horizontal
5070	-54.43	5.23	35.82	-23.84	-13	-10.84	Vertical
7605	-56.78	5.67	36.85	-25.60	-13	-12.60	Vertical
7605	-58.94	5.67	36.85	-27.76	-13	-14.76	Horizontal
Test Results for High Channel 1754.3MHz							
5135	-56.41	5.24	35.83	-25.82	-13	-12.82	Horizontal
5135	-56.59	5.24	35.83	-26.00	-13	-13.00	Vertical
7702.5	-56.95	5.68	36.87	-25.76	-13	-12.76	Vertical
7702.5	-58.74	5.68	36.87	-27.55	-13	-14.55	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	-56.96	5.23	35.82	-26.37	-13	-13.37	Horizontal
5020	-56.41	5.23	35.82	-25.82	-13	-12.82	Vertical
7530	-57.81	5.67	36.86	-26.62	-13	-13.62	Vertical
7530	-55.53	5.67	36.86	-24.34	-13	-11.34	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-56.94	5.23	35.82	-26.35	-13	-13.35	Horizontal
5070	-56.85	5.23	35.82	-26.26	-13	-13.26	Vertical
7605	-52.23	5.67	36.85	-21.05	-13	-8.05	Vertical
7605	-59.41	5.67	36.85	-28.23	-13	-15.23	Horizontal
Test Results for High Channel 1754.3MHz							
5120	-54.41	5.24	35.83	-23.82	-13	-10.82	Horizontal
5120	-56.69	5.24	35.83	-26.10	-13	-13.10	Vertical
7680	-57.85	5.7	36.88	-26.67	-13	-13.67	Vertical
7680	-58.95	5.7	36.88	-27.77	-13	-14.77	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 Band 5

- LTE Band7

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	0.002128	2.5
3.85	1880	-11.5	-0.006117	2.5
4.43	1880	5	0.002660	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 (25° C)	1880	11	0.005851	2.5
Extreme (50° C)	1880	6	0.003191	2.5
Extreme (40° C)	1880	-13	-0.006915	2.5
Extreme (30° C)	1880	-9	-0.004787	2.5
Extreme (10° C)	1880	11	0.005851	2.5
Extreme (0° C)	1880	5	0.002660	2.5
Extreme (-10° C)	1880	4.2	0.002234	2.5
Extreme (-20° C)	1880	6.5	0.003457	2.5
Extreme (-30° C)	1880	7	0.003723	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	14	0.007447	2.5
3.85	1880	5	0.002660	2.5
4.43	1880	7	0.003723	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 (25° C)	1880	-16	-0.008511	2.5
Extreme (50° C)	1880	-11.2	-0.005957	2.5
Extreme (40° C)	1880	-10	-0.005319	2.5
Extreme (30° C)	1880	-7	-0.003723	2.5
Extreme (10° C)	1880	-6	-0.003191	2.5
Extreme (0° C)	1880	-5.8	-0.003085	2.5
Extreme (-10° C)	1880	12	0.006383	2.5
Extreme (-20° C)	1880	6	0.003191	2.5
Extreme (-30° C)	1880	8	0.004255	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	3.2	0.001847	2.5
3.85	1732.5	-5.0	-0.002886	2.5
4.43	1732.5	5.0	0.002886	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 (25° C)	1732.5	6.9	0.003983	2.5
Extreme (50° C)	1732.5	5.8	0.003348	2.5
Extreme (40° C)	1732.5	-6.3	-0.003636	2.5
Extreme (30° C)	1732.5	-5.5	-0.003175	2.5
Extreme (10° C)	1732.5	-11.0	-0.006349	2.5
Extreme (0° C)	1732.5	6.0	0.003463	2.5
Extreme (-10° C)	1732.5	7.4	0.004271	2.5
Extreme (-20° C)	1732.5	8.0	0.004618	2.5
Extreme (-30° C)	1732.5	5.0	0.002886	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	11	0.006349	2.5
3.85	1732.5	9	0.005195	2.5
4.43	1732.5	8	0.004618	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 (25° C)	1732.5	-6.0	-0.003463	2.5
Extreme (50° C)	1732.5	-5.7	-0.003290	2.5
Extreme (40° C)	1732.5	-9.0	-0.005195	2.5
Extreme (30° C)	1732.5	11.0	0.006349	2.5
Extreme (10° C)	1732.5	10.0	0.005772	2.5
Extreme (0° C)	1732.5	7.4	0.004271	2.5
Extreme (-10° C)	1732.5	-6.2	-0.003579	2.5
Extreme (-20° C)	1732.5	-5.5	-0.003175	2.5
Extreme (-30° C)	1732.5	7.3	0.004214	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 4 QPSK, (CH 20175 RB size 100 RB Offset 0 10MHz BANDWIDTH)				
3.66	836.5	7.0	0.008368	2.5
3.85	836.5	-6.7	-0.008010	2.5
4.43	836.5	11.0	0.013150	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 QPSK, (CH 20175 RB size 100 RB Offset 0 10MHz BANDWIDTH)				
Normal (25° C)	836.5	6.8	0.008129	2.5
Extreme (50° C)	836.5	11.0	0.013150	2.5
Extreme (40° C)	836.5	15.0	0.017932	2.5
Extreme (30° C)	836.5	7.0	0.008368	2.5
Extreme (10° C)	836.5	-5.0	-0.005977	2.5
Extreme (0° C)	836.5	-9.0	-0.010759	2.5
Extreme (-10° C)	836.5	-12.0	-0.014345	2.5
Extreme (-20° C)	836.5	8.9	0.010640	2.5
Extreme (-30° C)	836.5	8.7	0.010400	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 20175 RB size 100 RB Offset 0 10MHz BANDWIDTH)				
3.66	836.5	11	0.013150	2.5
3.85	836.5	6	0.007173	2.5
4.43	836.5	10	0.011955	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 5 16QAM, (CH 20175 RB size 100 RB Offset 0 10MHz BANDWIDTH)				
Normal (25° C)	836.5	6	0.007173	2.5
Extreme (50° C)	836.5	-3	-0.003586	2.5
Extreme (40° C)	836.5	-10	-0.011955	2.5
Extreme (30° C)	836.5	-12	-0.014345	2.5
Extreme (10° C)	836.5	-9	-0.010759	2.5
Extreme (0° C)	836.5	11	0.013150	2.5
Extreme (-10° C)	836.5	12	0.014345	2.5
Extreme (-20° C)	836.5	13	0.015541	2.5
Extreme (-30° C)	836.5	-5	-0.005977	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	3.3	0.001302	2.5
3.85	2535	6.7	0.002643	2.5
4.43	2535	8.0	0.003156	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 (25° C)	2535	5.1	0.002012	2.5
Extreme (50° C)	2535	-6.0	-0.002367	2.5
Extreme (40° C)	2535	-9.5	-0.003748	2.5
Extreme (30° C)	2535	-11.0	-0.004339	2.5
Extreme (10° C)	2535	8.0	0.003156	2.5
Extreme (0° C)	2535	6.3	0.002485	2.5
Extreme (-10° C)	2535	4.3	0.001696	2.5
Extreme (-20° C)	2535	5.5	0.002170	2.5
Extreme (-30° C)	2535	2.8	0.001105	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	9.0	0.003550	2.5
3.85	2535	11.0	0.004339	2.5
4.43	2535	5.4	0.002130	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 (25° C)	2535	6.3	0.002485	2.5
Extreme (50° C)	2535	5.2	0.002051	2.5
Extreme (40° C)	2535	-4.2	-0.001657	2.5
Extreme (30° C)	2535	-11.0	-0.004339	2.5
Extreme (10° C)	2535	-9.8	-0.003866	2.5
Extreme (0° C)	2535	-4.6	-0.001815	2.5
Extreme (-10° C)	2535	8.0	0.003156	2.5
Extreme (-20° C)	2535	5.0	0.001972	2.5
Extreme (-30° C)	2535	12.0	0.004734	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.

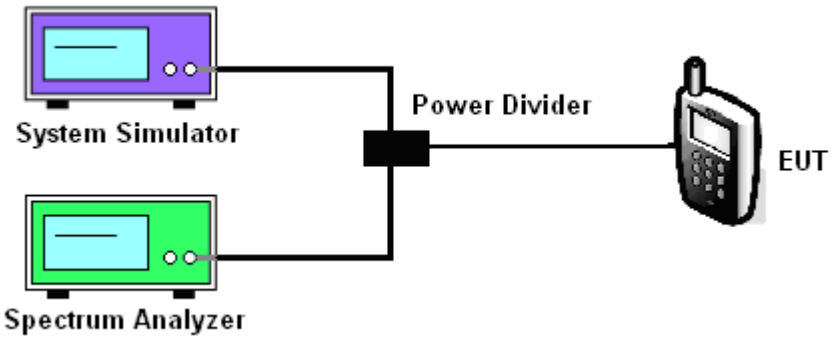
11.2 Measuring Instruments

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

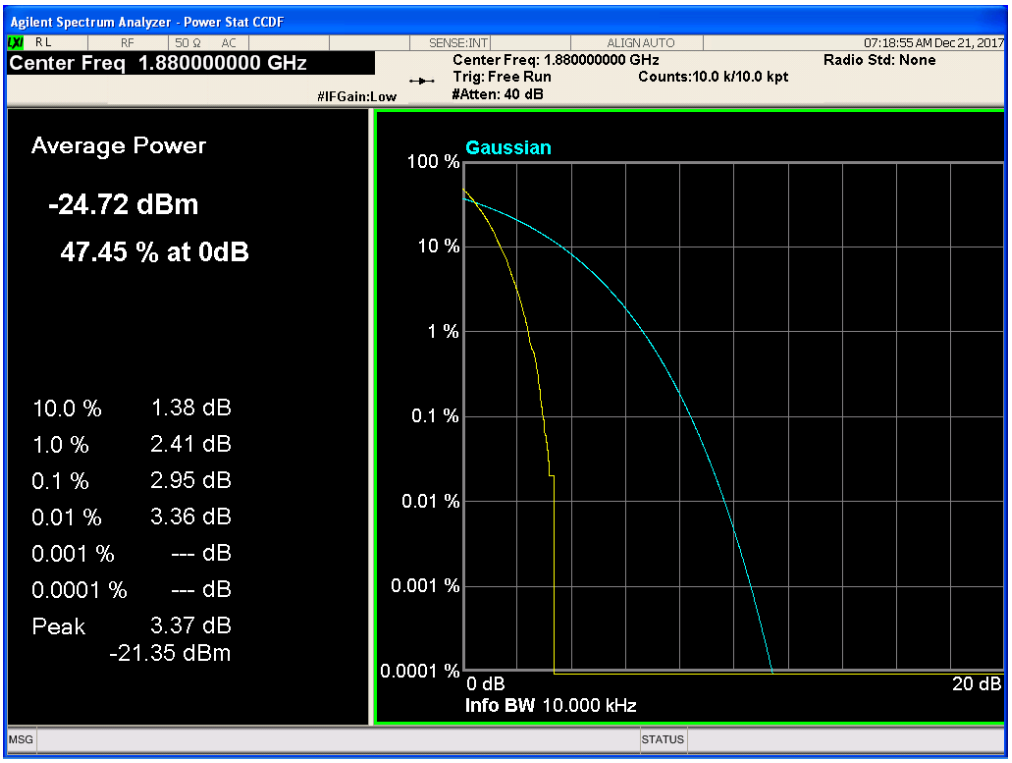
- ☐ LTE Band2
- LTE Band 4
- LTE Band 5
- ☐ LTE Band7

BAND	CHANNEL	Frequency [MHz]	BANDWIDTH	NO. RB	RB POS.	MODULATION	PAR [dB]
2	18900	1880.0	1.4	1	Low	QPSK	2.95
2	18900	1880.0	1.4	1	Low	16-QAM	3.15
2	18900	1880.0	3.0	1	Low	QPSK	1.26
2	18900	1880.0	3.0	1	Low	16-QAM	1.26
2	18900	1880.0	5.0	1	Low	QPSK	0.92
2	18900	1880.0	5.0	1	Low	16-QAM	0.97
2	18900	1880.0	10.0	1	Low	QPSK	0.99
2	18900	1880.0	10.0	1	Low	16-QAM	0.84
2	18900	1880.0	15.0	1	Low	QPSK	1.08
2	18900	1880.0	15.0	1	Low	16-QAM	0.77
2	18900	1880.0	20.0	1	Low	QPSK	1.02
2	18900	1880.0	20.0	1	Low	16-QAM	0.99
4	20175	1732.5	1.4	1	Low	QPSK	3.58
4	20175	1732.5	1.4	1	Low	16-QAM	2.96
4	20175	1732.5	3.0	1	Low	QPSK	1.20
4	20175	1732.5	3.0	1	Low	16-QAM	1.27
4	20175	1732.5	5.0	1	Low	QPSK	0.98
4	20175	1732.5	5.0	1	Low	16-QAM	1.08
4	20175	1732.5	10.0	1	Low	QPSK	0.88
4	20175	1732.5	10.0	1	Low	16-QAM	1.25

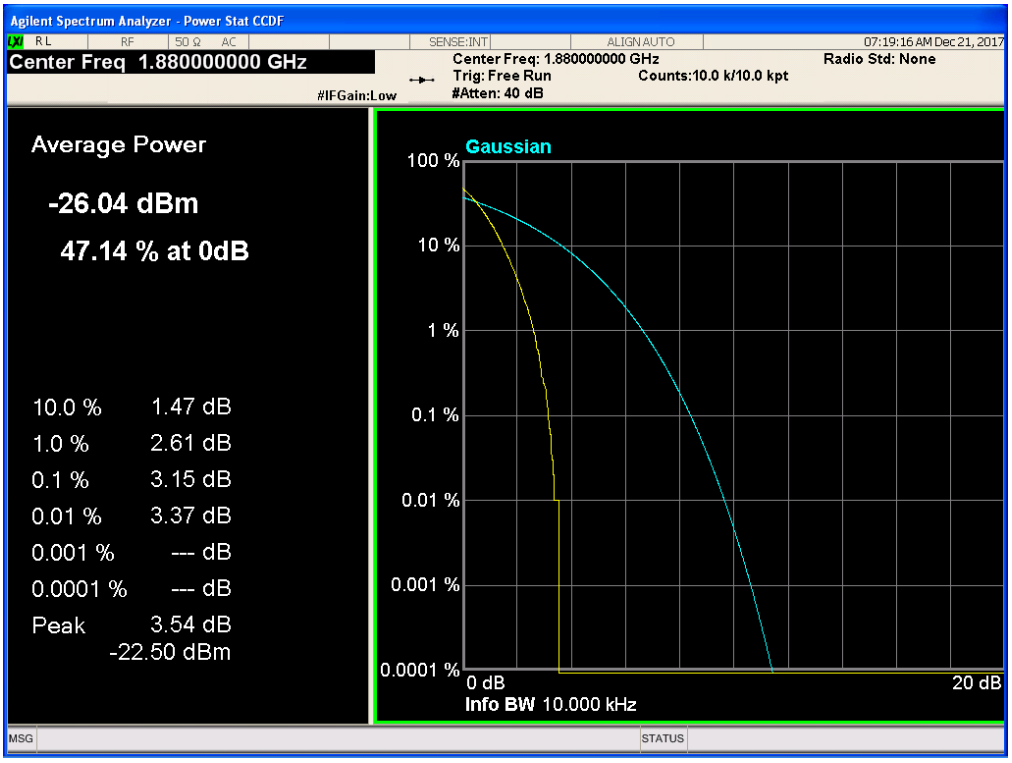
4	20175	1732.5	15.0	1	Low	QPSK	0.96
4	20175	1732.5	15.0	1	Low	16-QAM	0.93
4	20175	1732.5	20.0	1	Low	QPSK	0.80
4	20175	1732.5	20.0	1	Low	16-QAM	0.83
5	20525	836.5	1.4	1	Low	QPSK	4.72
5	20525	836.5	1.4	1	Low	16-QAM	5.08
5	20525	836.5	3.0	1	Low	QPSK	2.06
5	20525	836.5	3.0	1	Low	16-QAM	2.33
5	20525	836.5	5.0	1	Low	QPSK	1.69
5	20525	836.5	5.0	1	Low	16-QAM	3.17
5	20525	836.5	10.0	1	Low	QPSK	1.58
5	20525	836.5	10.0	1	Low	16-QAM	1.31
7	21100	2535.0	5.0	1	Low	QPSK	1.10
7	21100	2535.0	5.0	1	Low	16-QAM	1.24
7	21100	2535.0	10.0	1	Low	QPSK	1.08
7	21100	2535.0	10.0	1	Low	16-QAM	1.11
7	21100	2535.0	15.0	1	Low	QPSK	1.11
7	21100	2535.0	15.0	1	Low	16-QAM	1.20
7	21100	2535.0	20.0	1	Low	QPSK	0.99
7	21100	2535.0	20.0	1	Low	16-QAM	1.15

11.5 LTE BAND 2

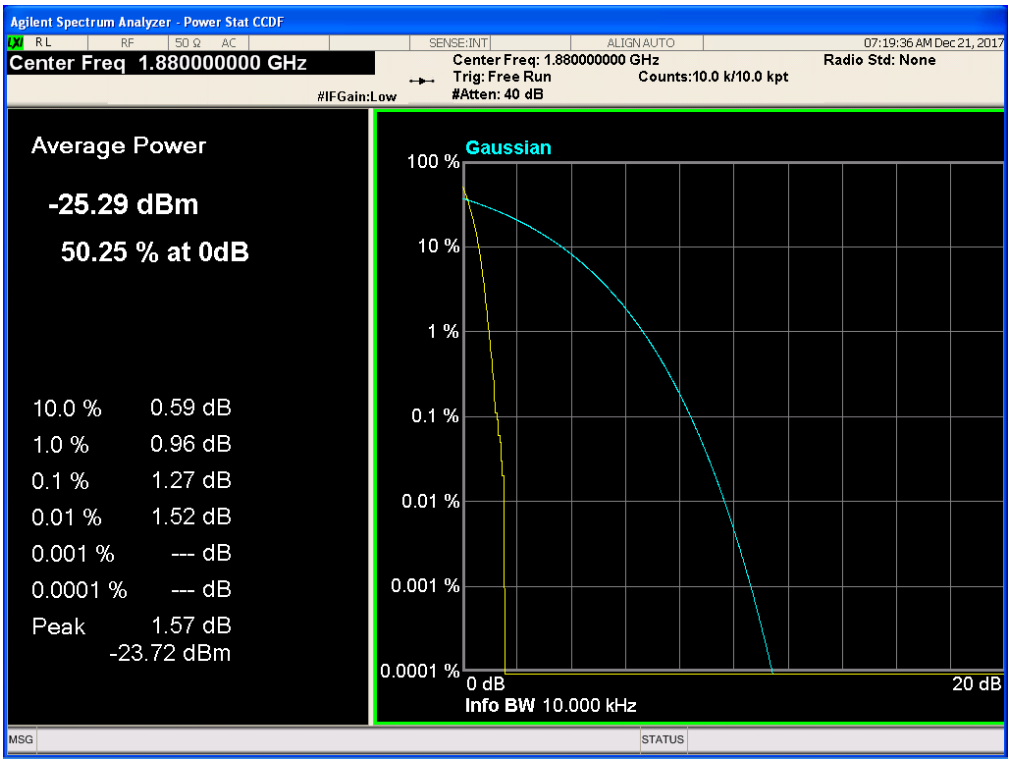
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 1.4,NO. RB 1,RB POS. Low,QPSK



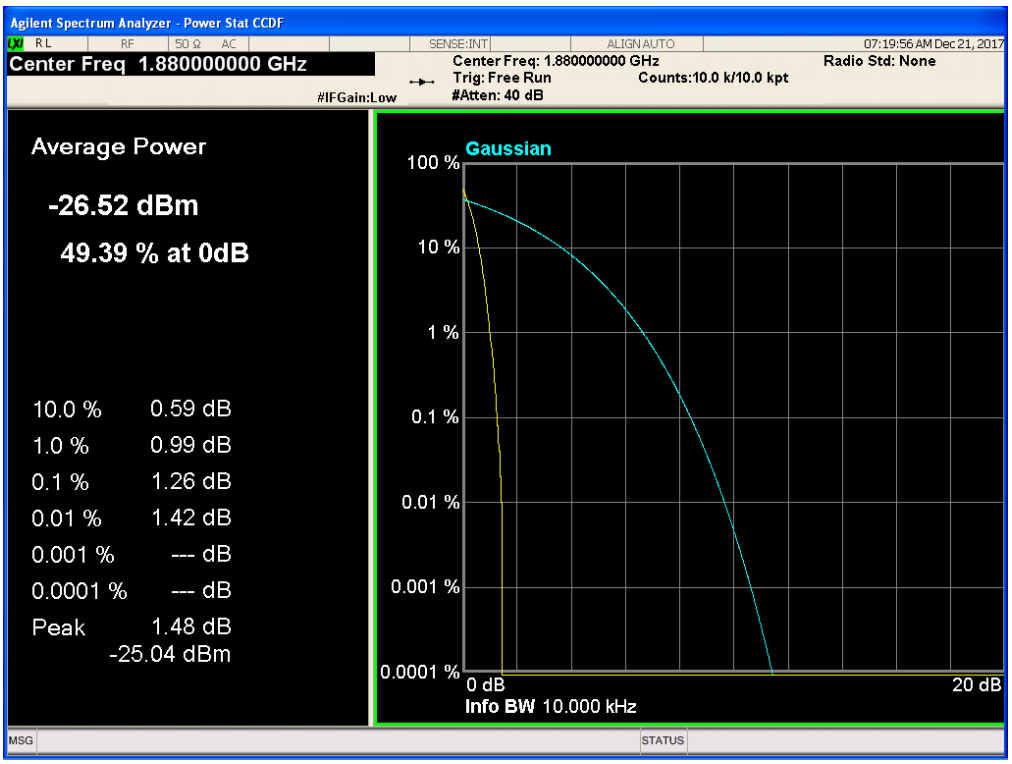
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 1.4,NO. RB 1,RB POS. Low,16-QAM



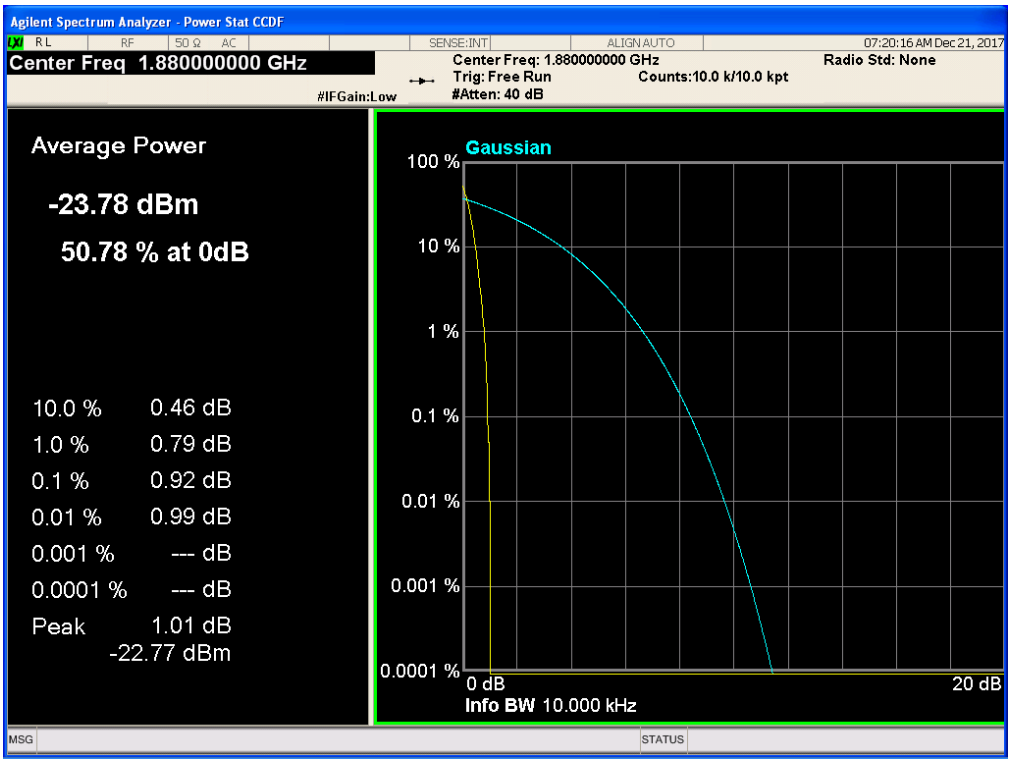
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 3.0,NO. RB 1,RB POS. Low,QPSK



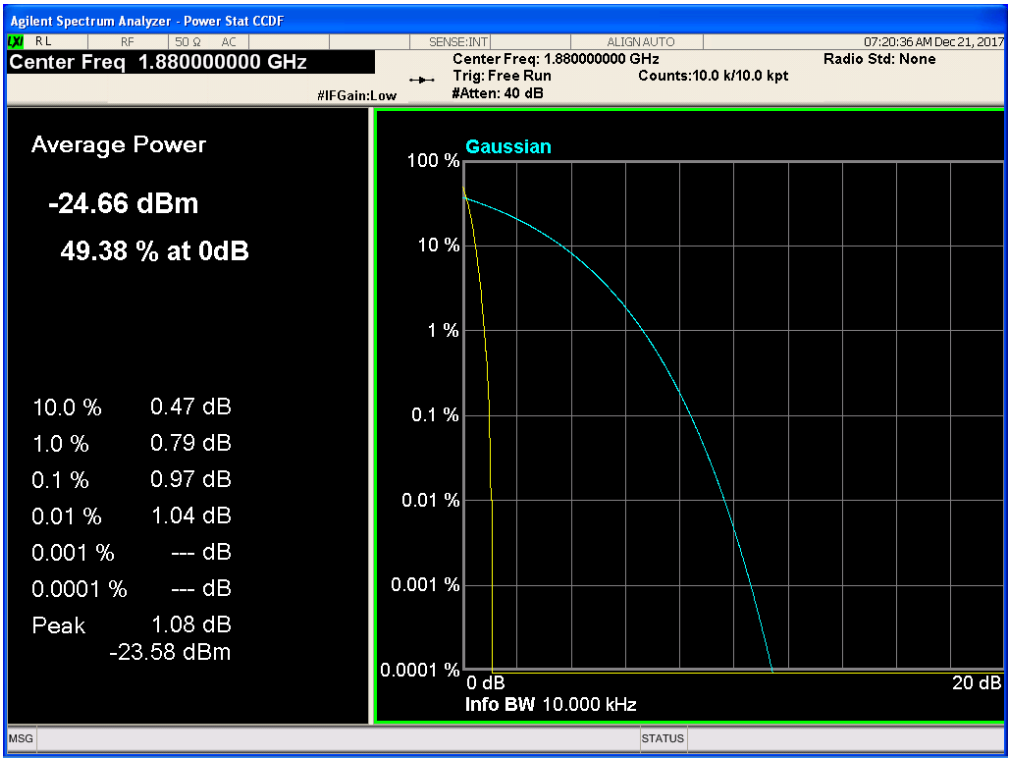
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 3.0,NO. RB 1,RB POS. Low,16-QAM



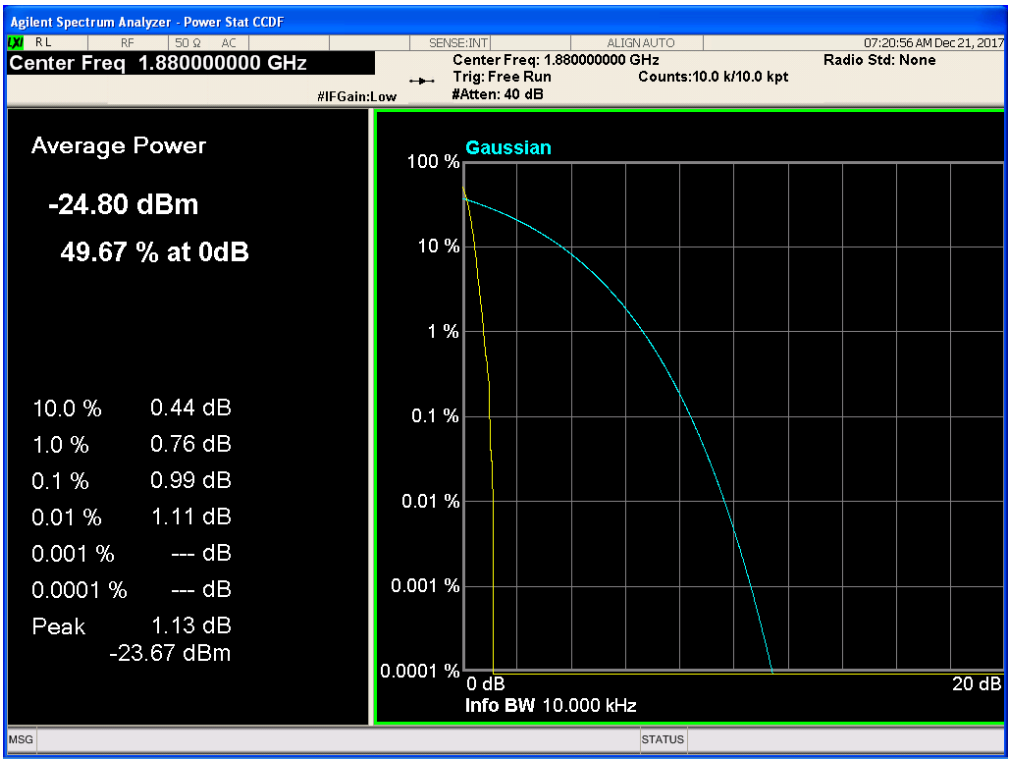
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 5.0,NO. RB 1,RB POS. Low,QPSK



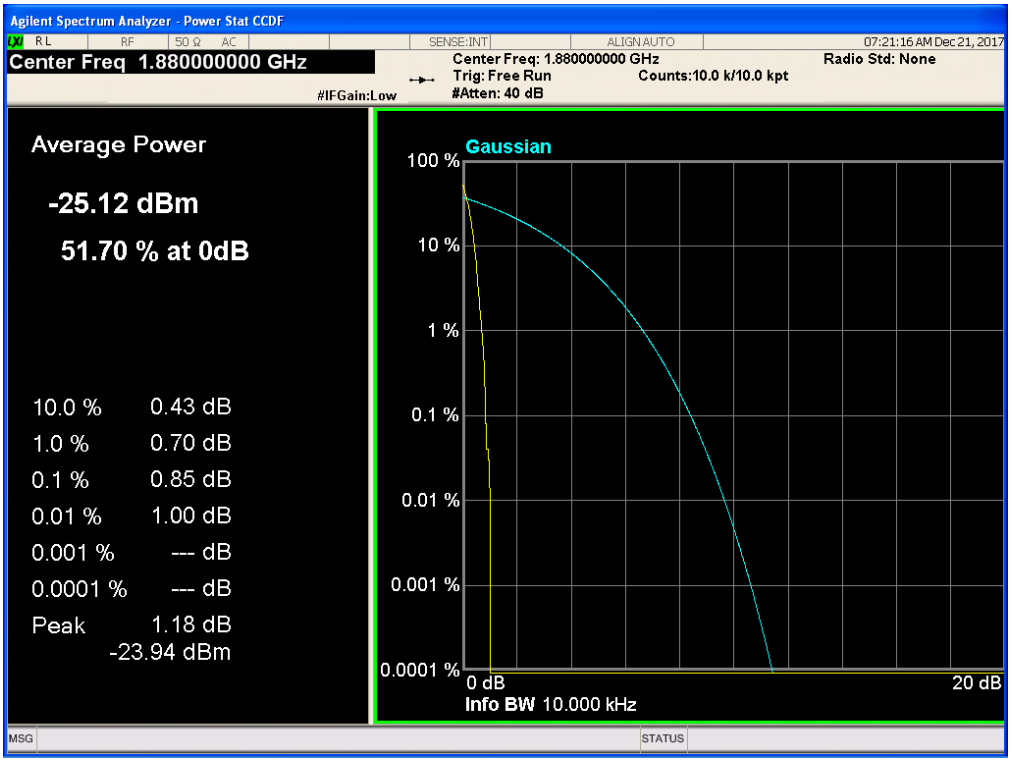
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



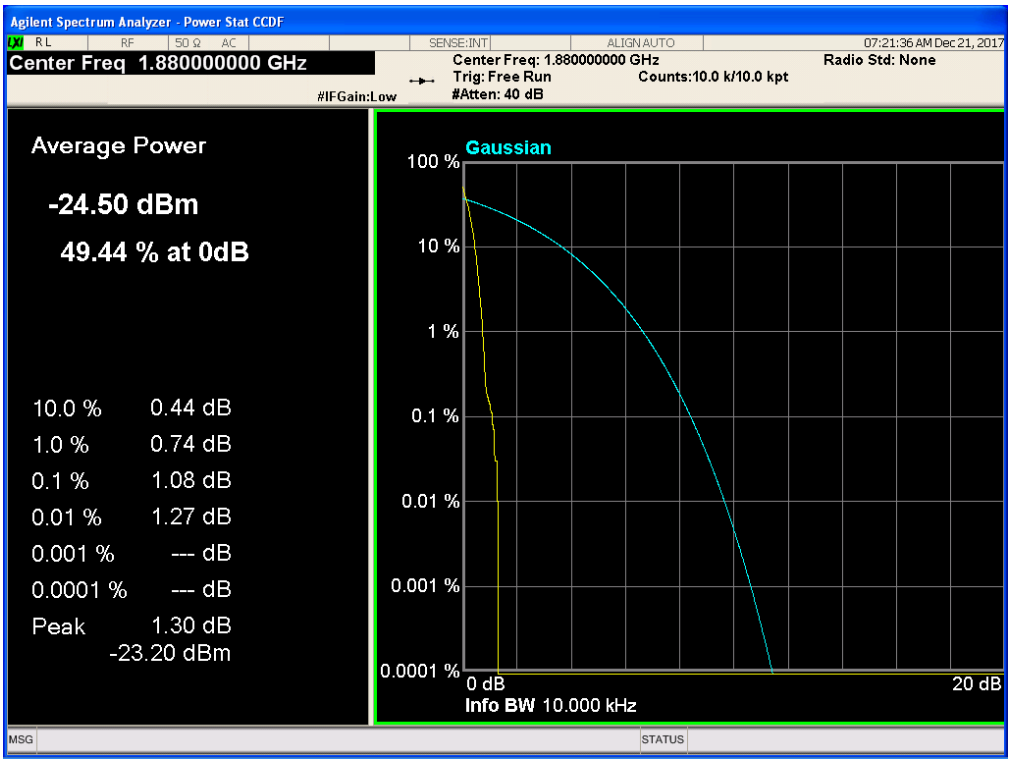
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 10.0,NO. RB 1,RB POS. Low,QPSK



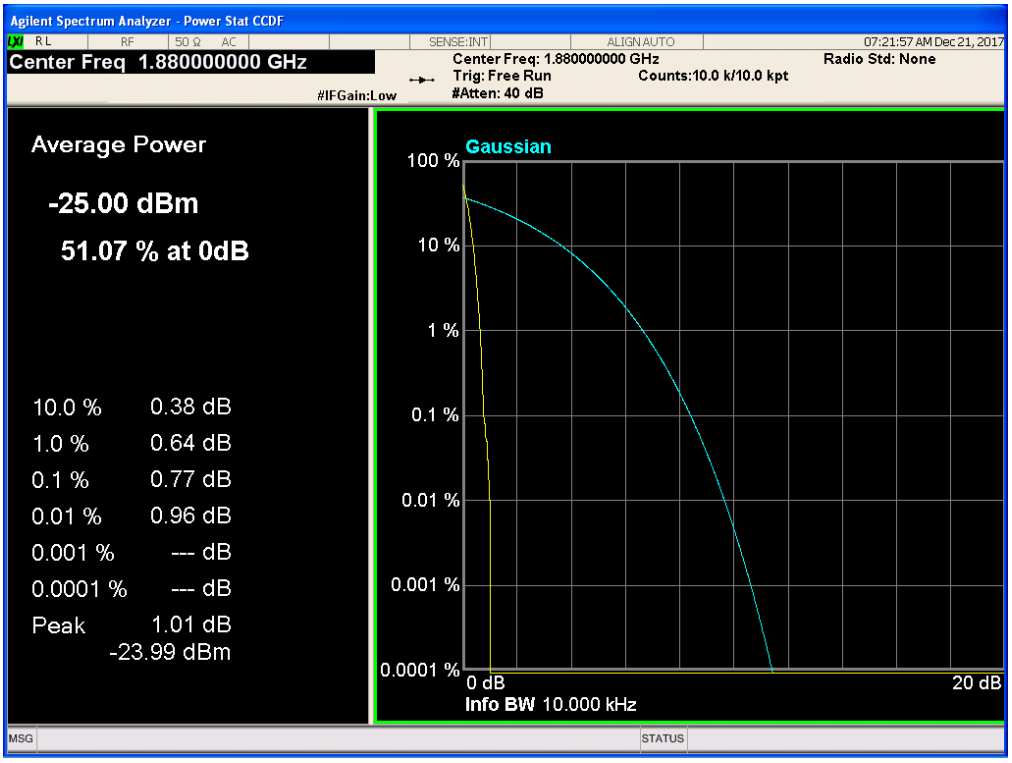
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



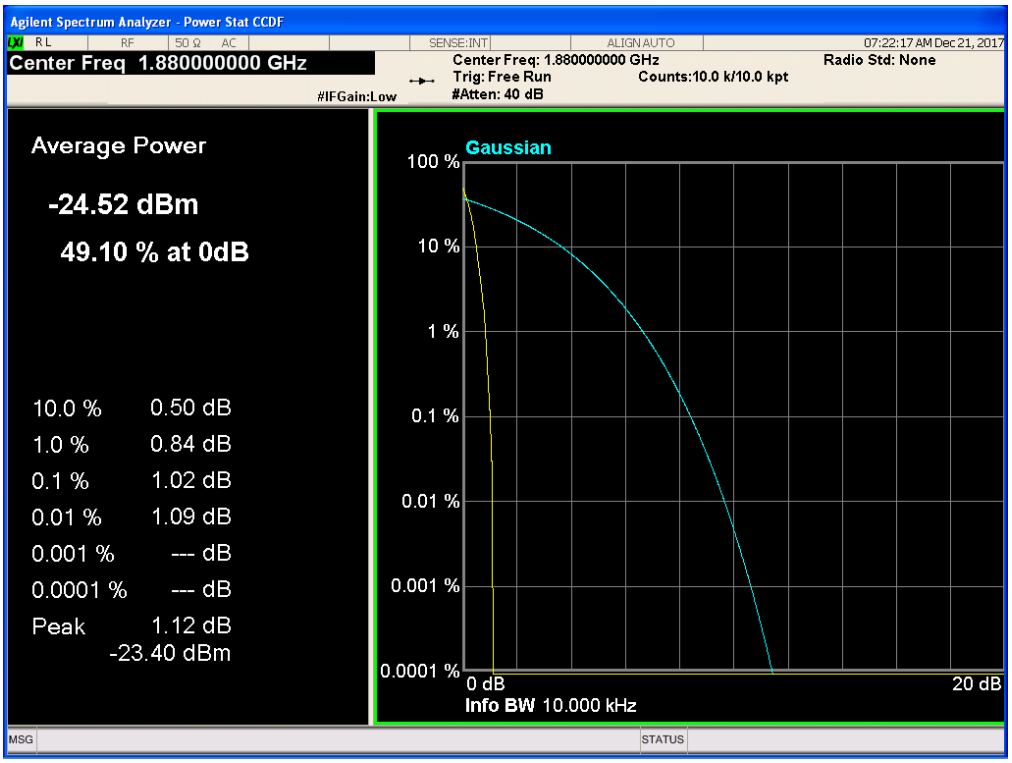
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 15.0,NO. RB 1,RB POS. Low,QPSK



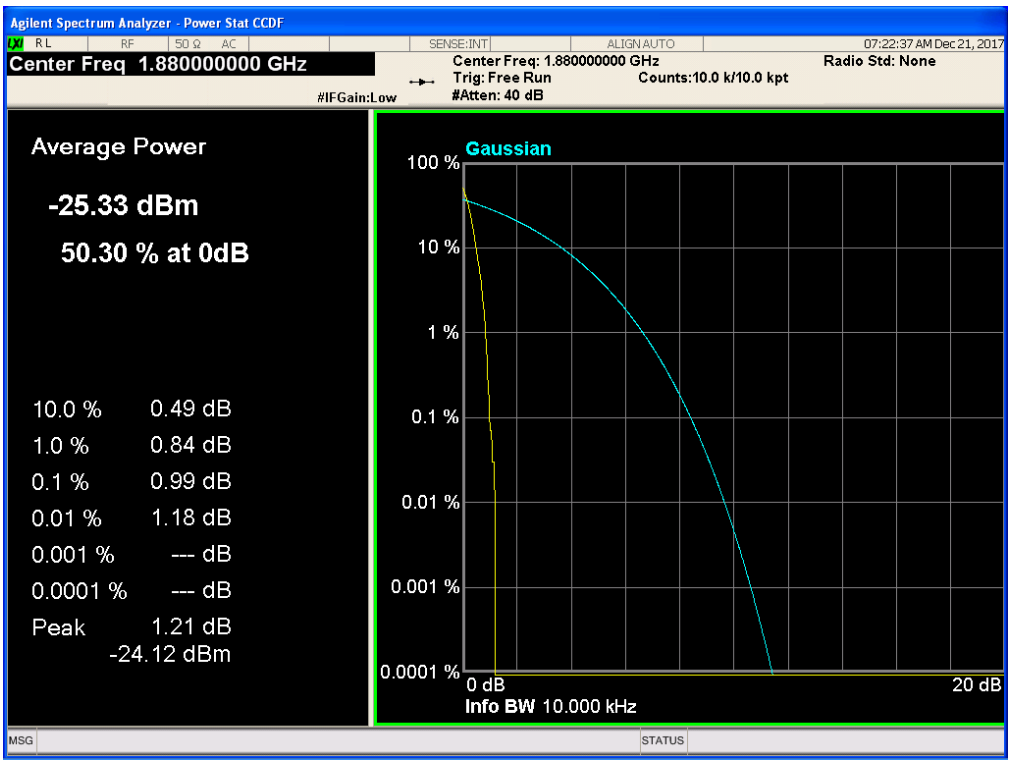
Band 2,UL Channel 18900,UL Frequency 1880.0,BW 15.0,NO. RB 1,RB POS. Low,16-QAM



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

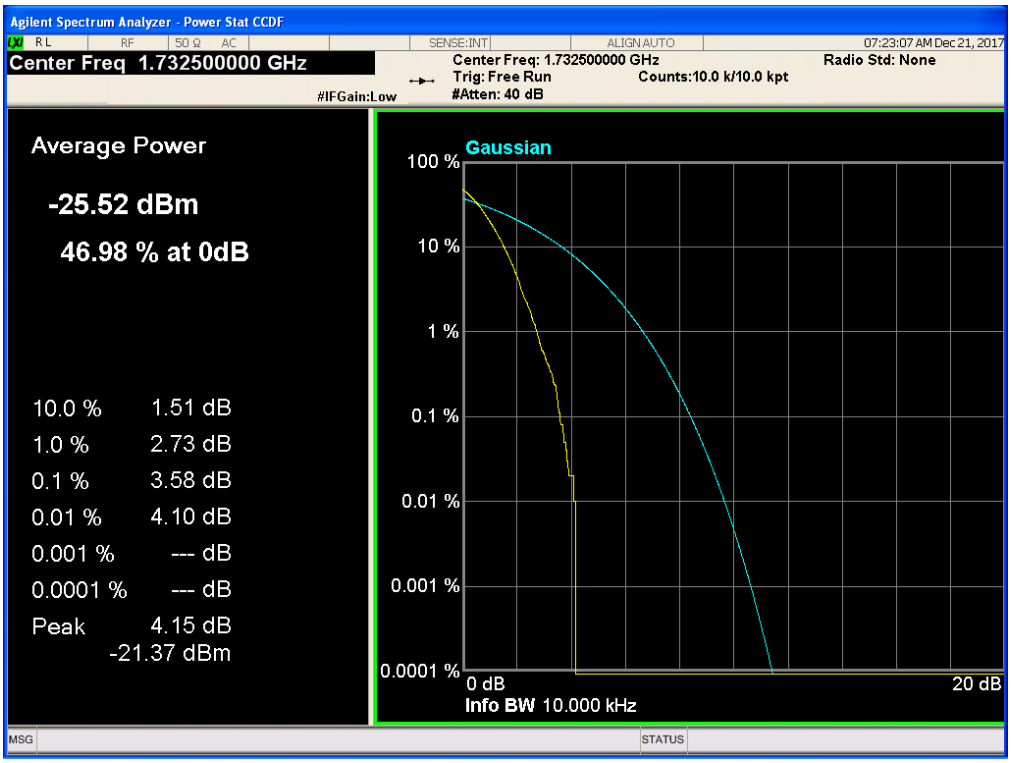


Band 2,UL Channel 18900,UL Frequency 1880.0,BW 20.0,NO. RB 1,RB POS. Low,16-QAM

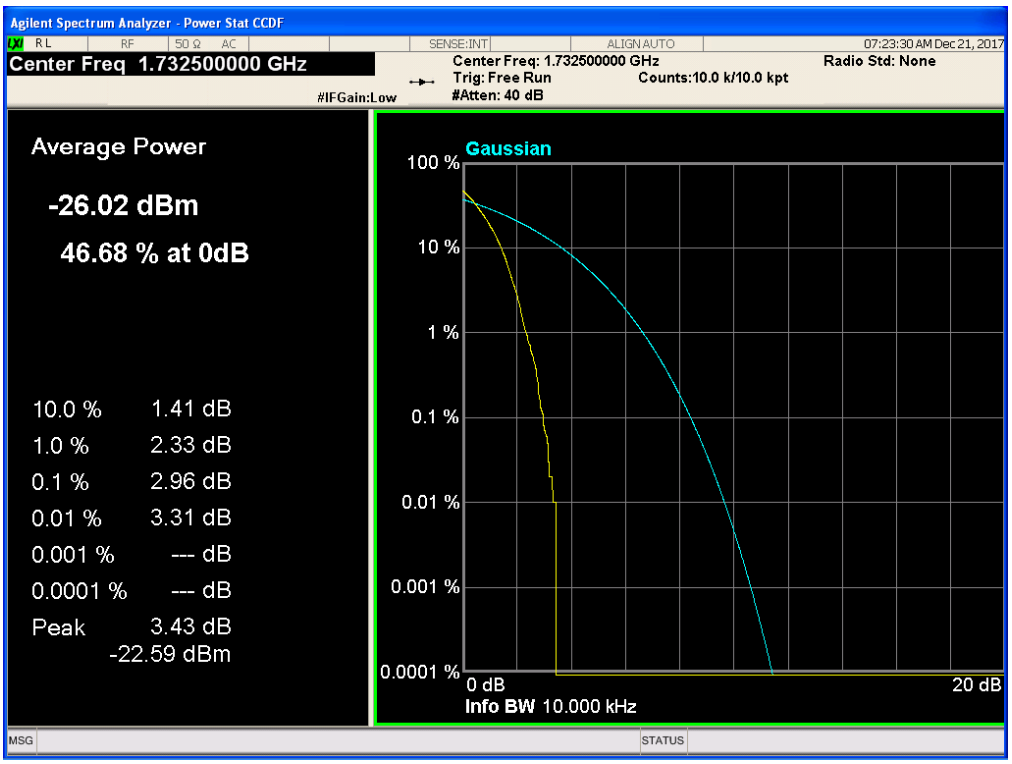


11.6 LTE BAND 4

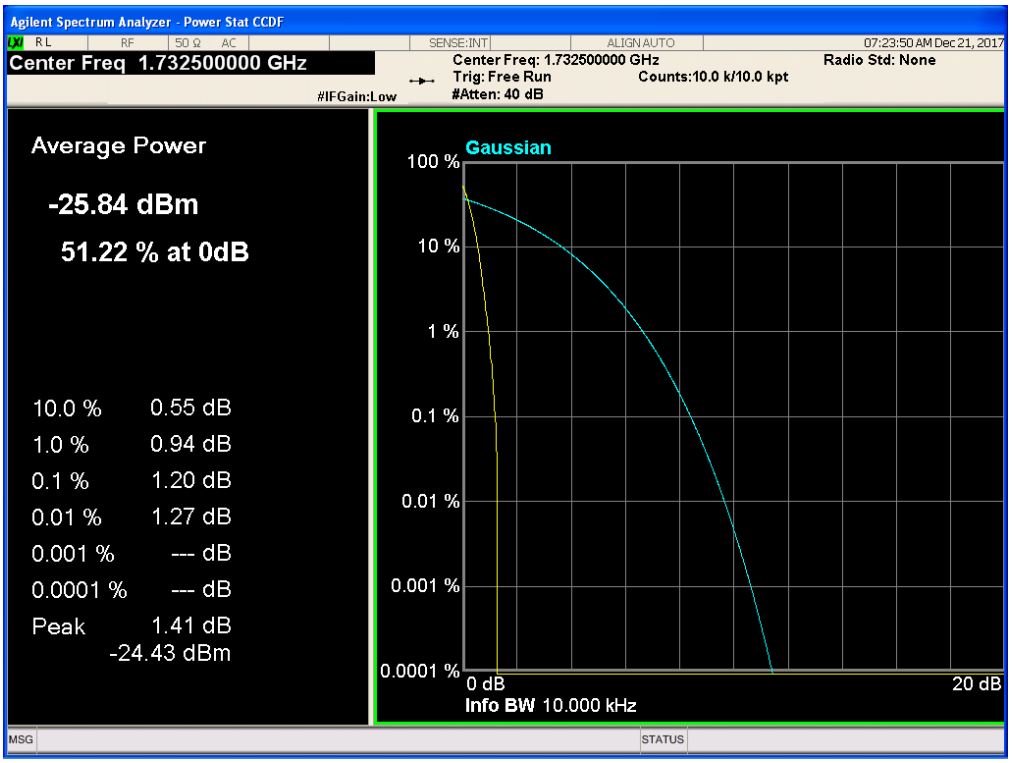
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 1.4,NO. RB 1,RB POS. Low,QPSK



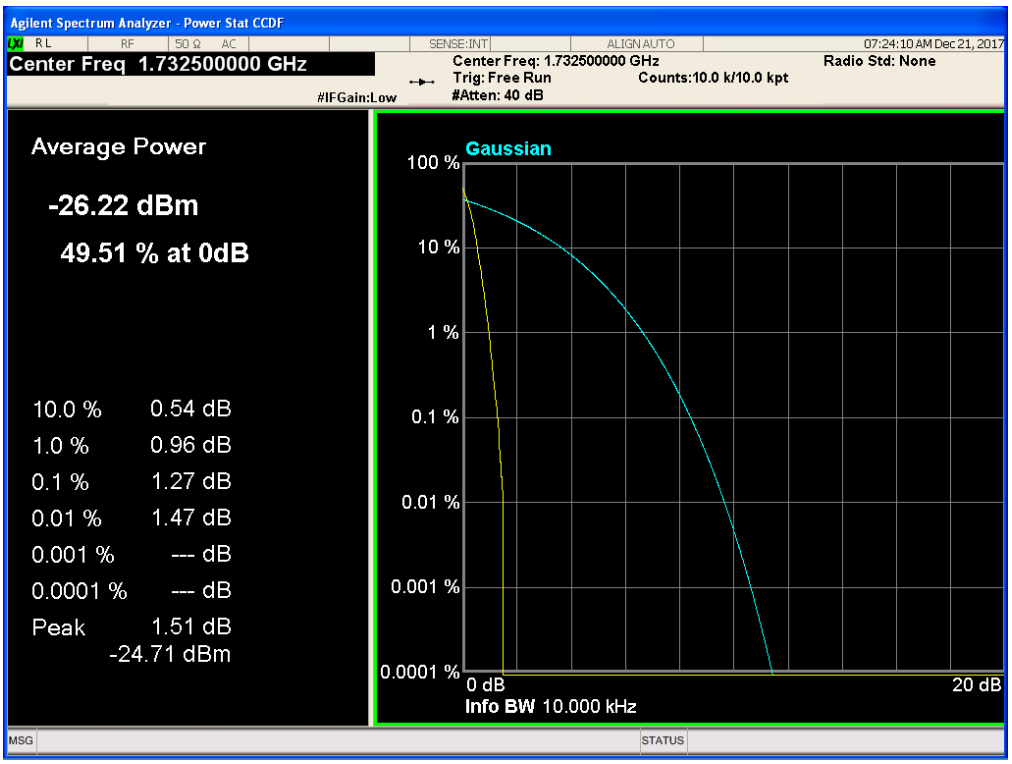
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 1.4,NO. RB 1,RB POS. Low,16-QAM



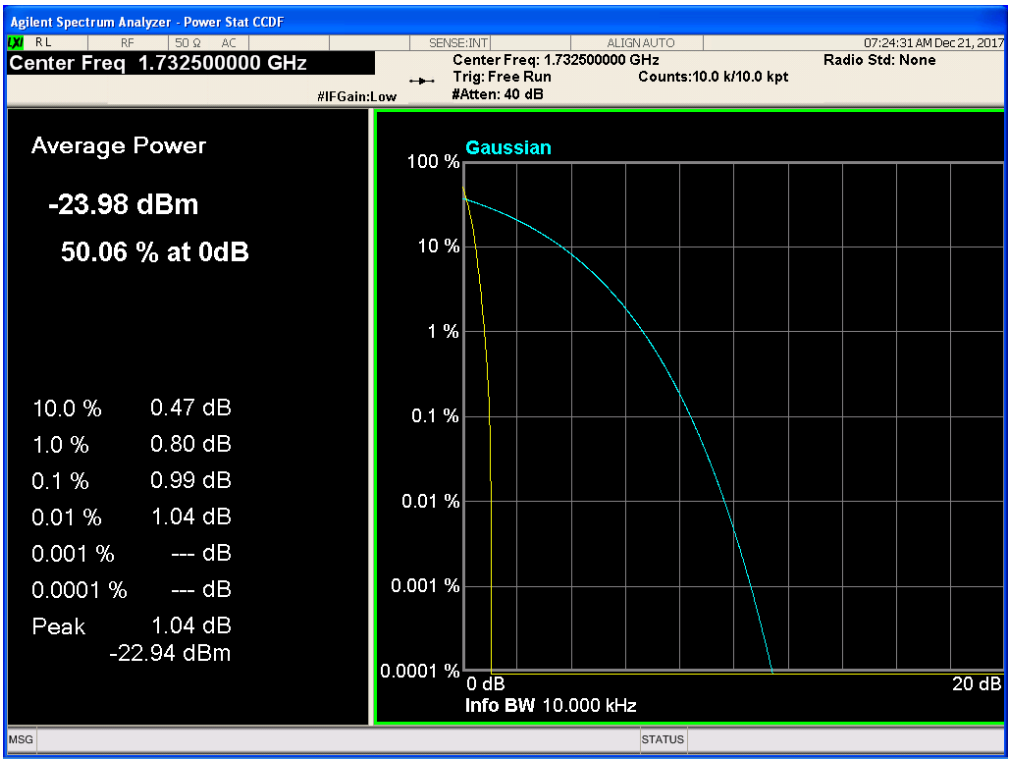
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 3.0,NO. RB 1,RB POS. Low,QPSK



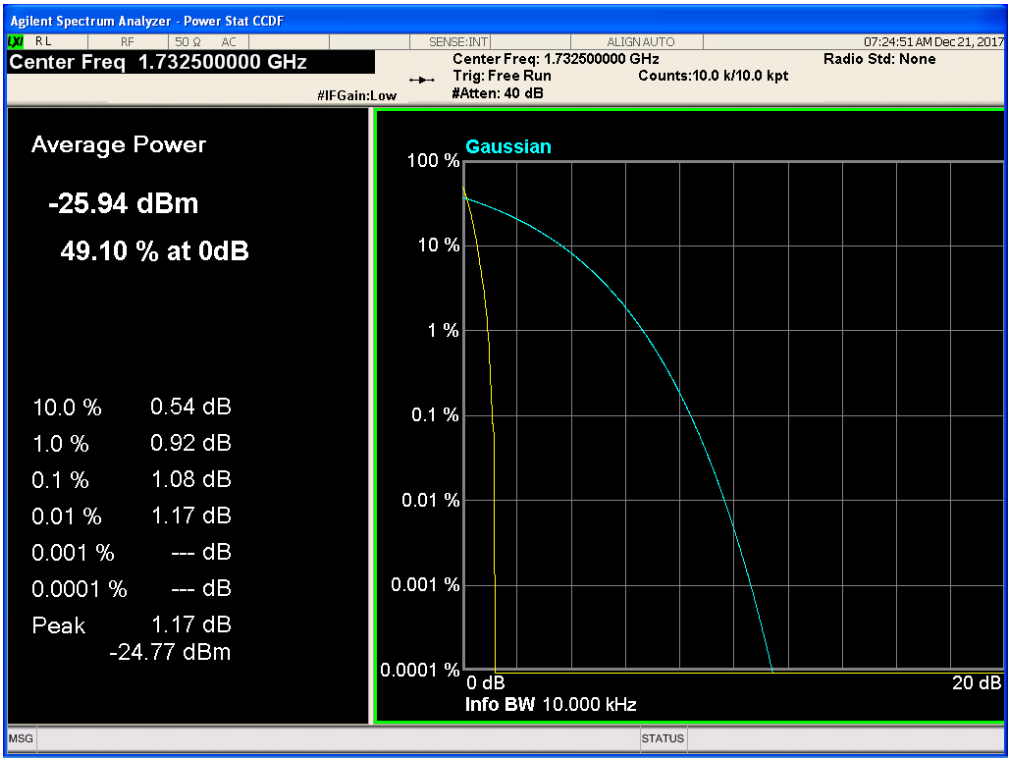
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 3.0,NO. RB 1,RB POS. Low,16-QAM



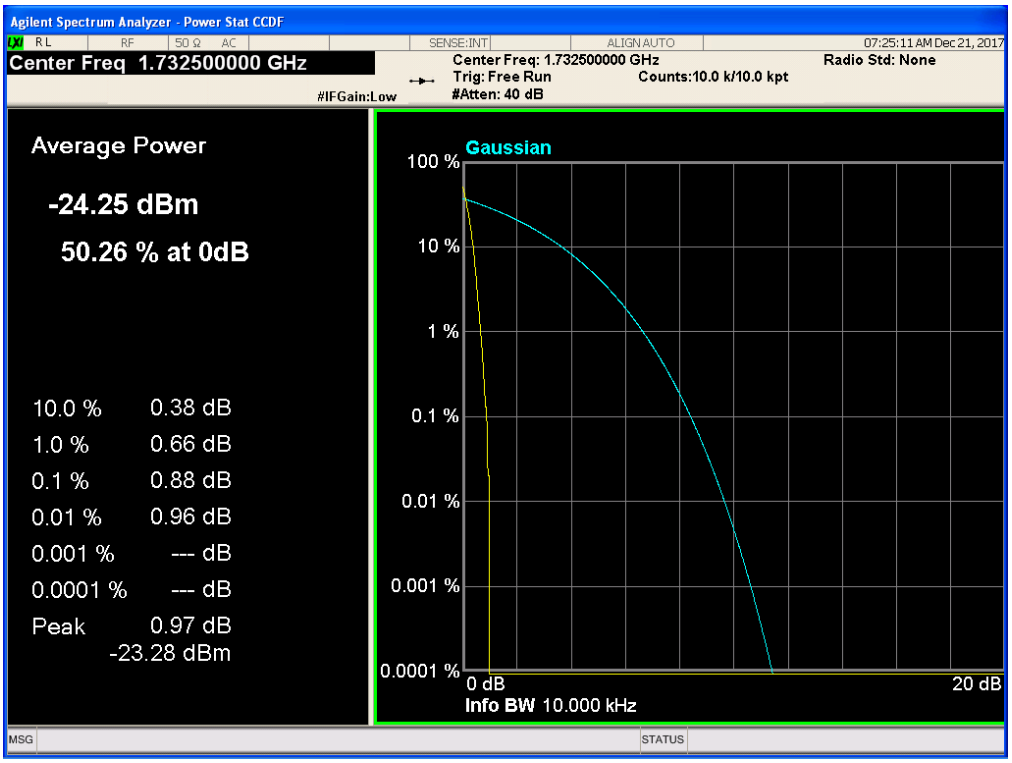
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 5.0,NO. RB 1,RB POS. Low,QPSK



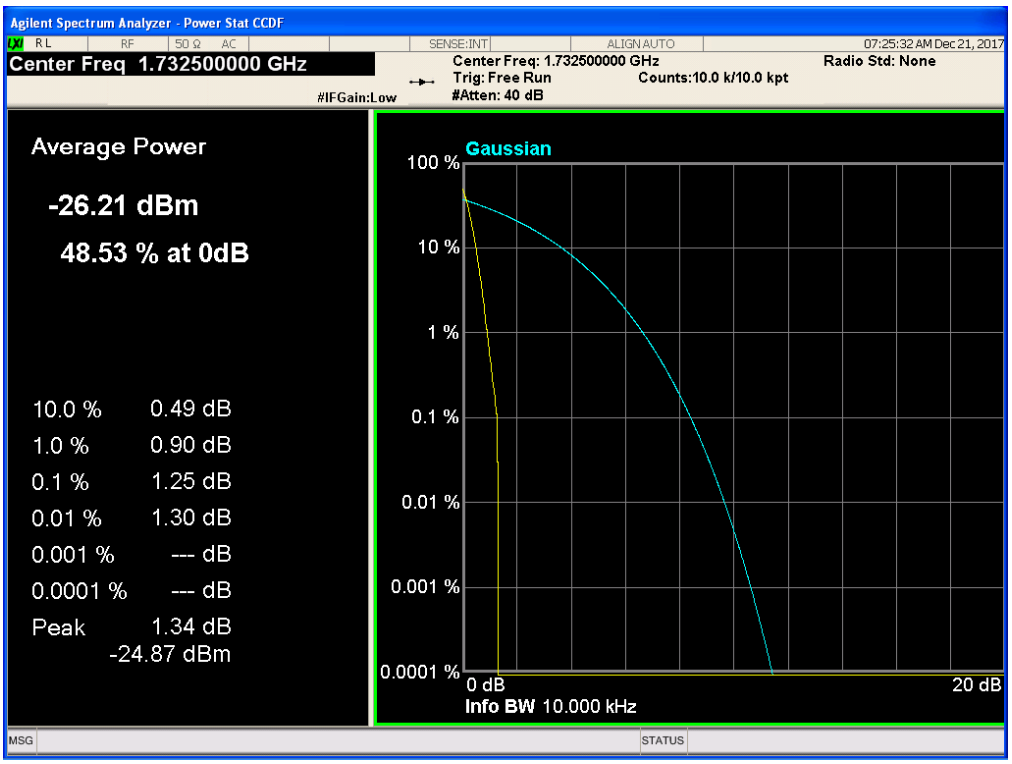
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



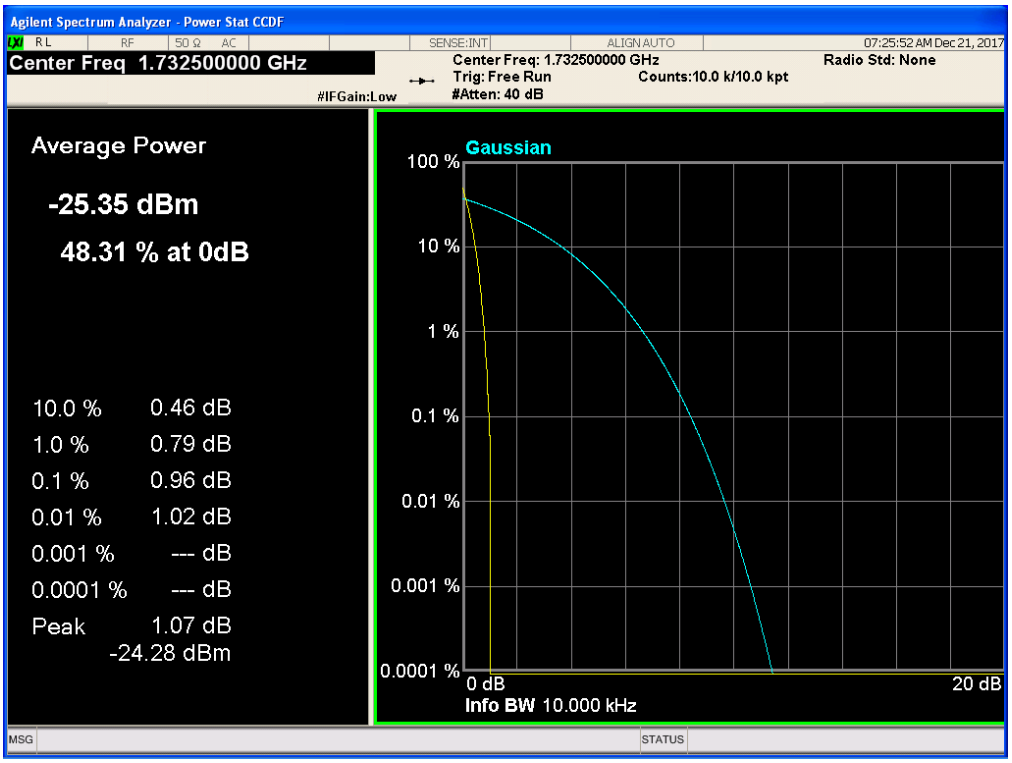
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 10.0,NO. RB 1,RB POS. Low,QPSK



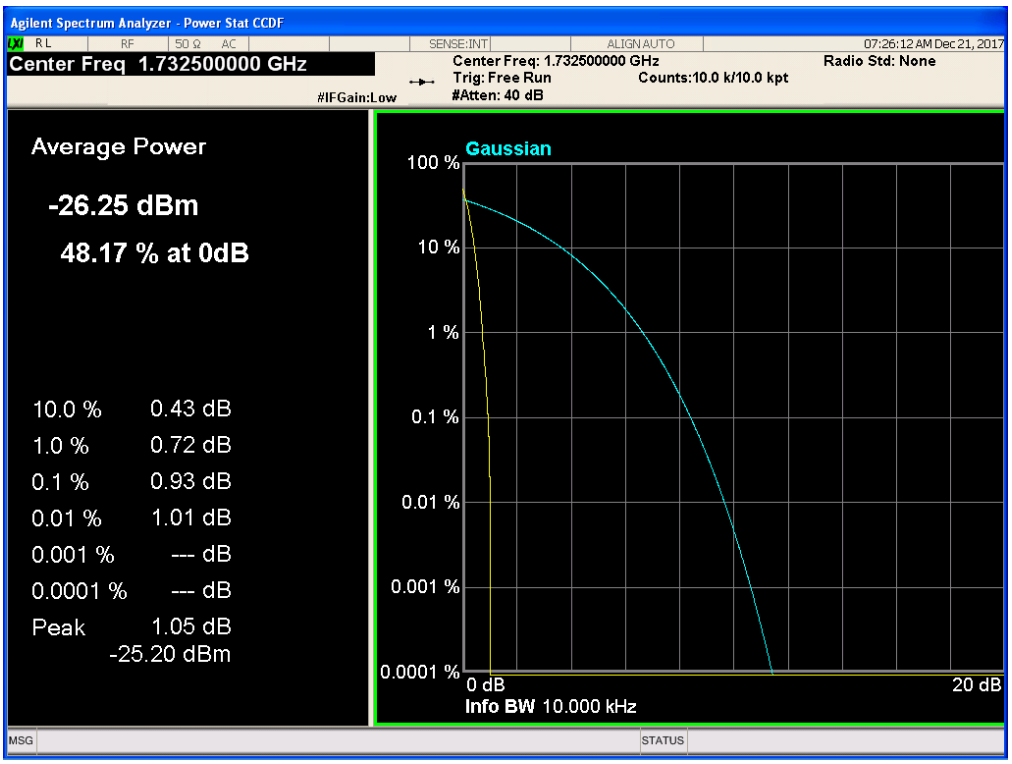
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



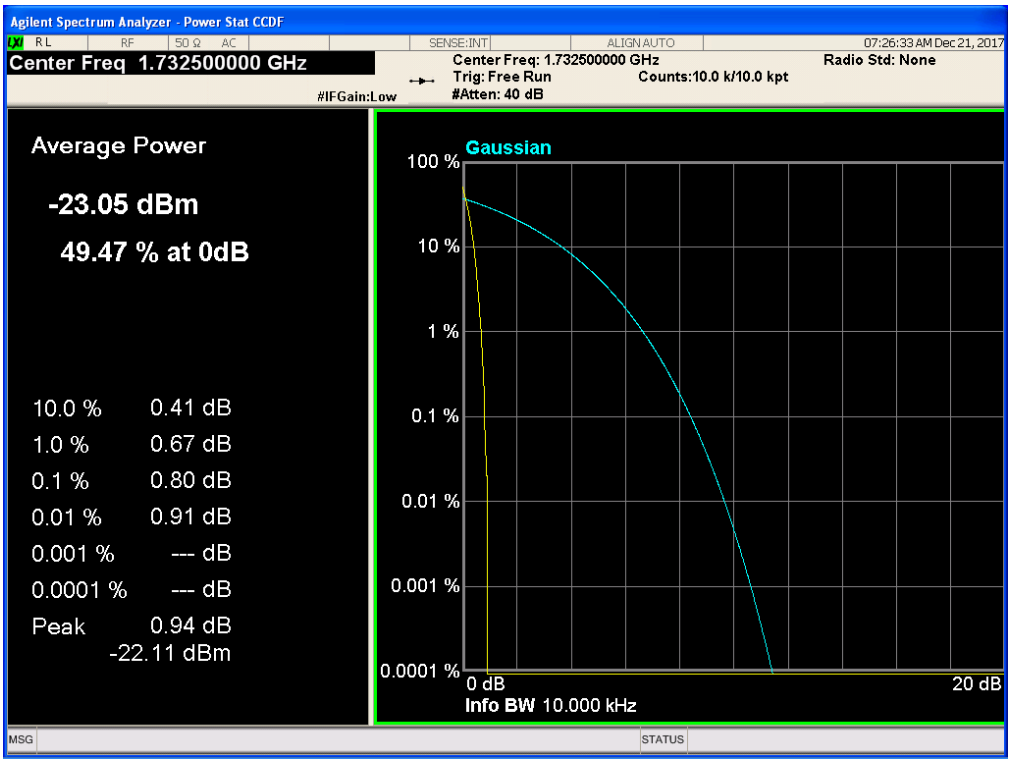
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 15.0,NO. RB 1,RB POS. Low,QPSK



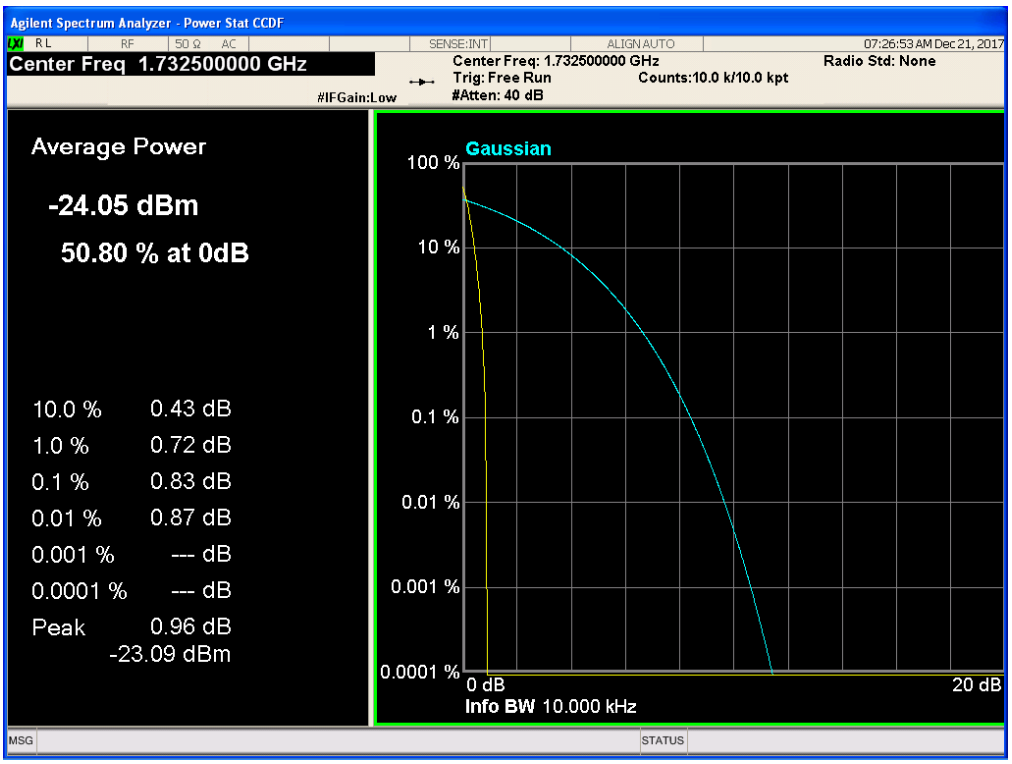
Band 4,UL Channel 20175,UL Frequency 1732.5,BW 15.0,NO. RB 1,RB POS. Low,16-QAM



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

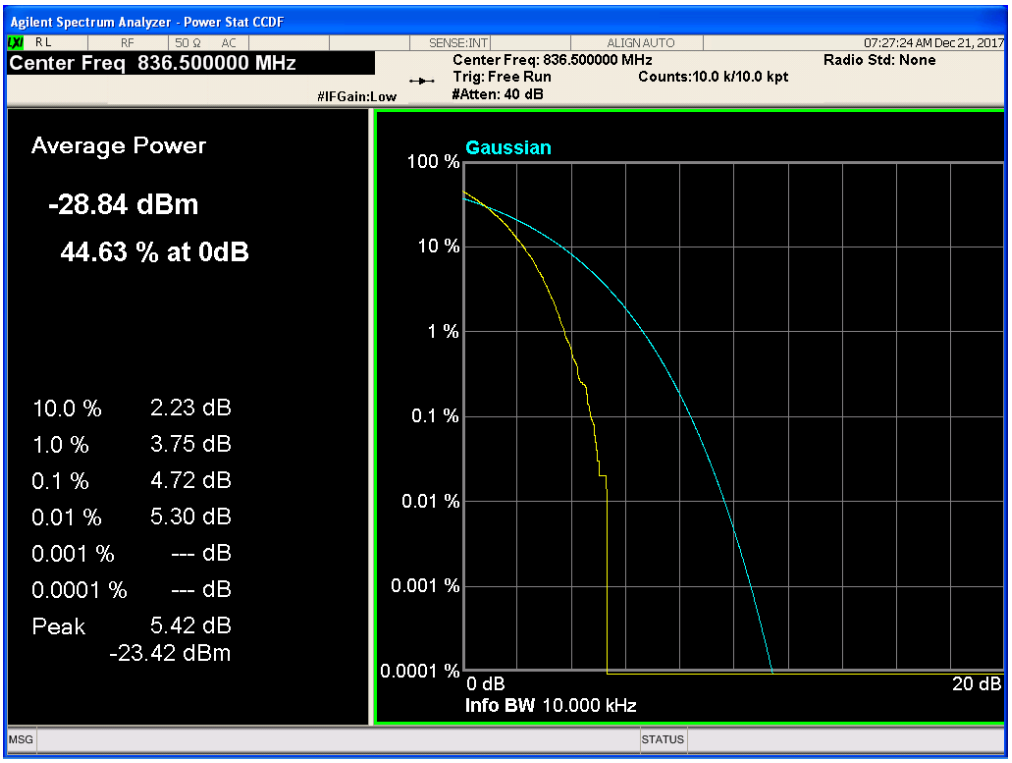


Band 4,UL Channel 20175,UL Frequency 1732.5,BW 20.0,NO. RB 1,RB POS. Low,16-QAM

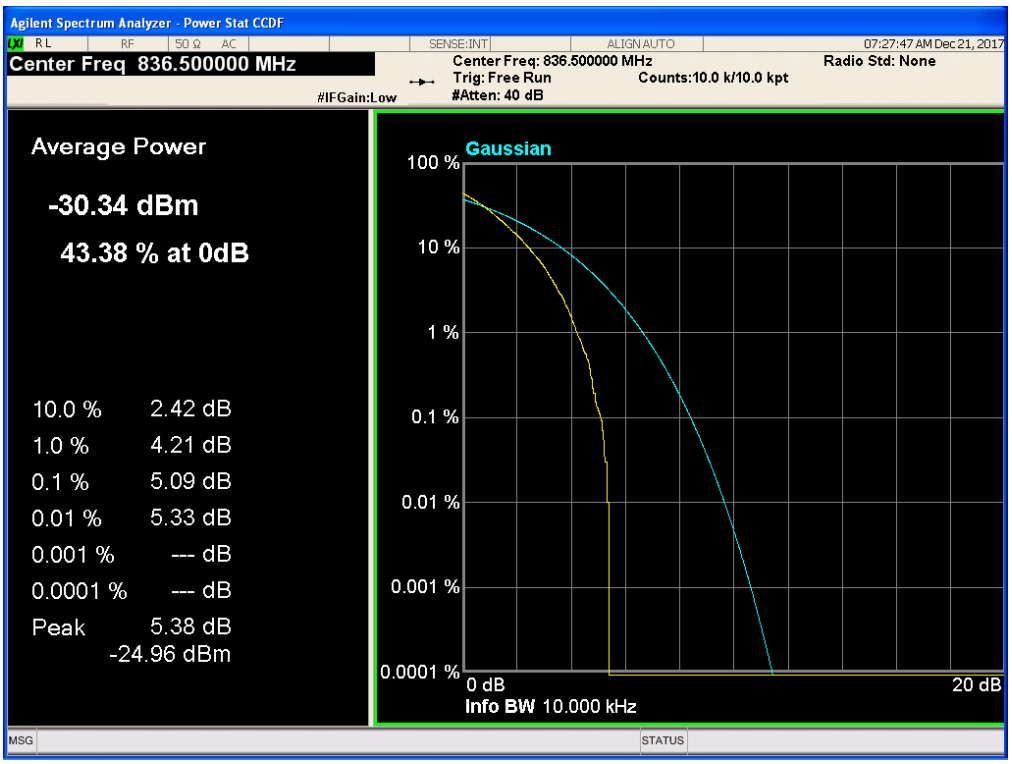


11.7 LTE BAND 5

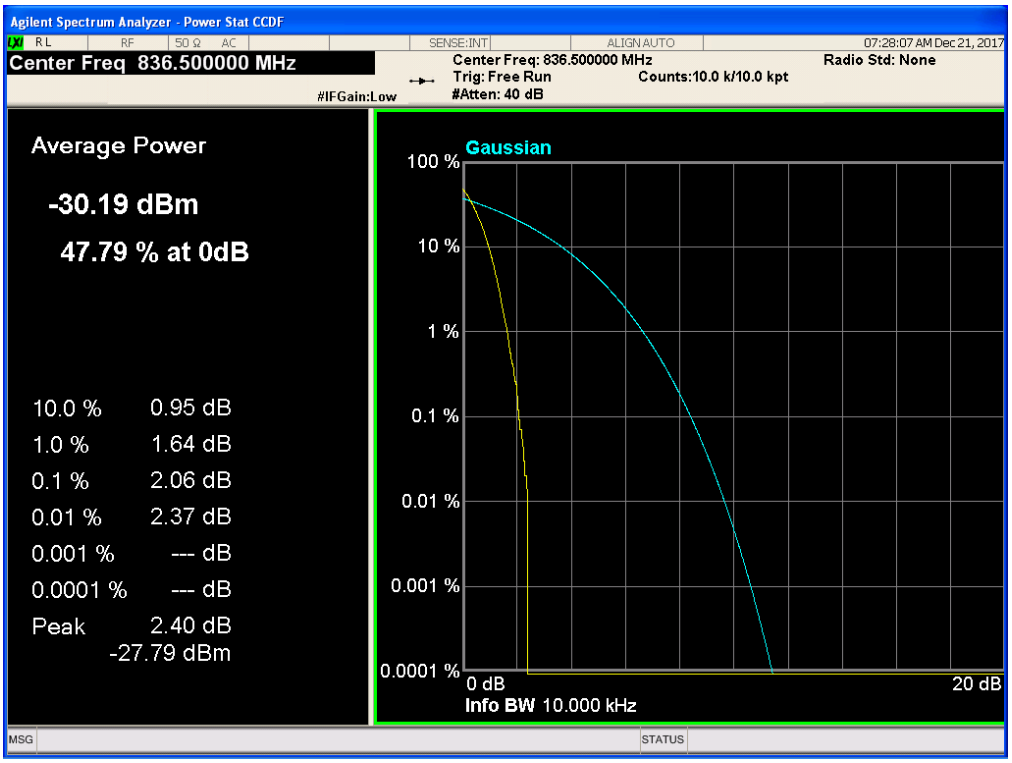
Band 5,UL Channel 20525,UL Frequency 836.5,BW 1.4,NO. RB 1,RB POS. Low,QPSK



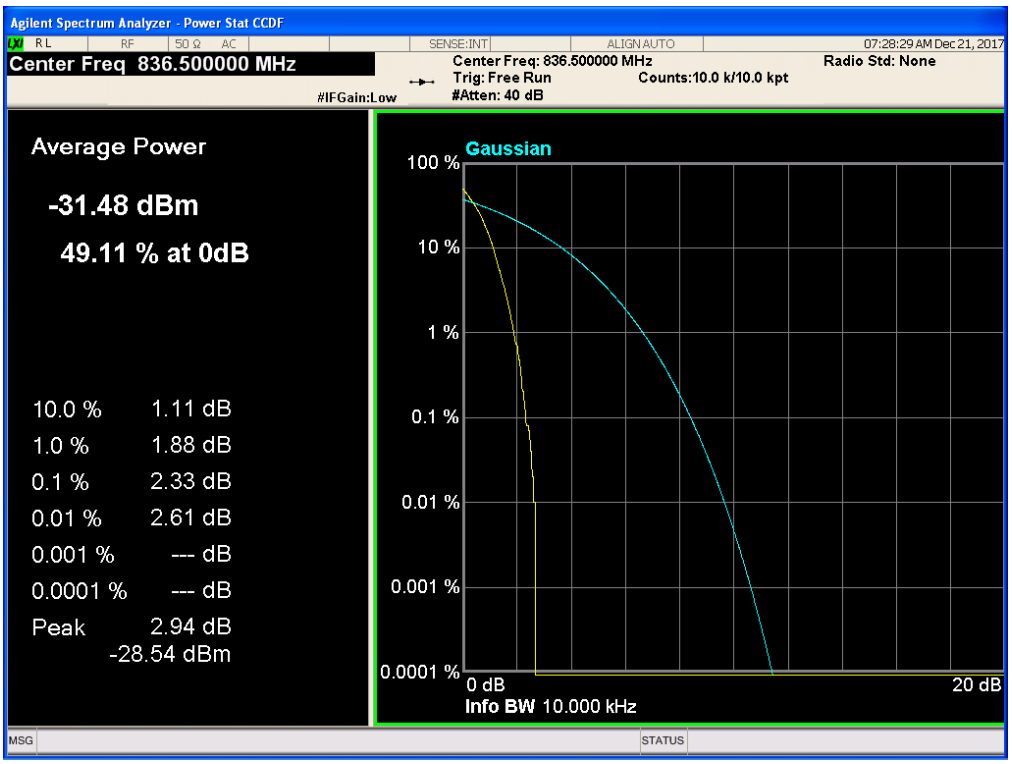
Band 5,UL Channel 20525,UL Frequency 836.5,BW 1.4,NO. RB 1,RB POS. Low,16-QAM



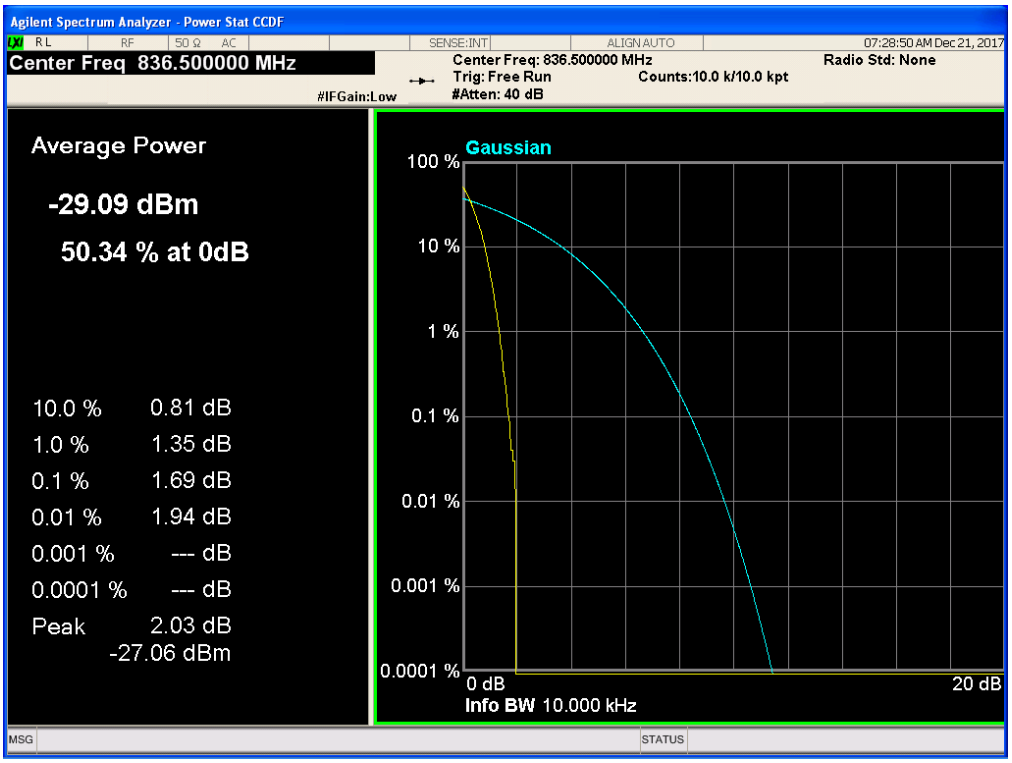
Band 5,UL Channel 20525,UL Frequency 836.5,BW 3.0,NO. RB 1,RB POS. Low,QPSK



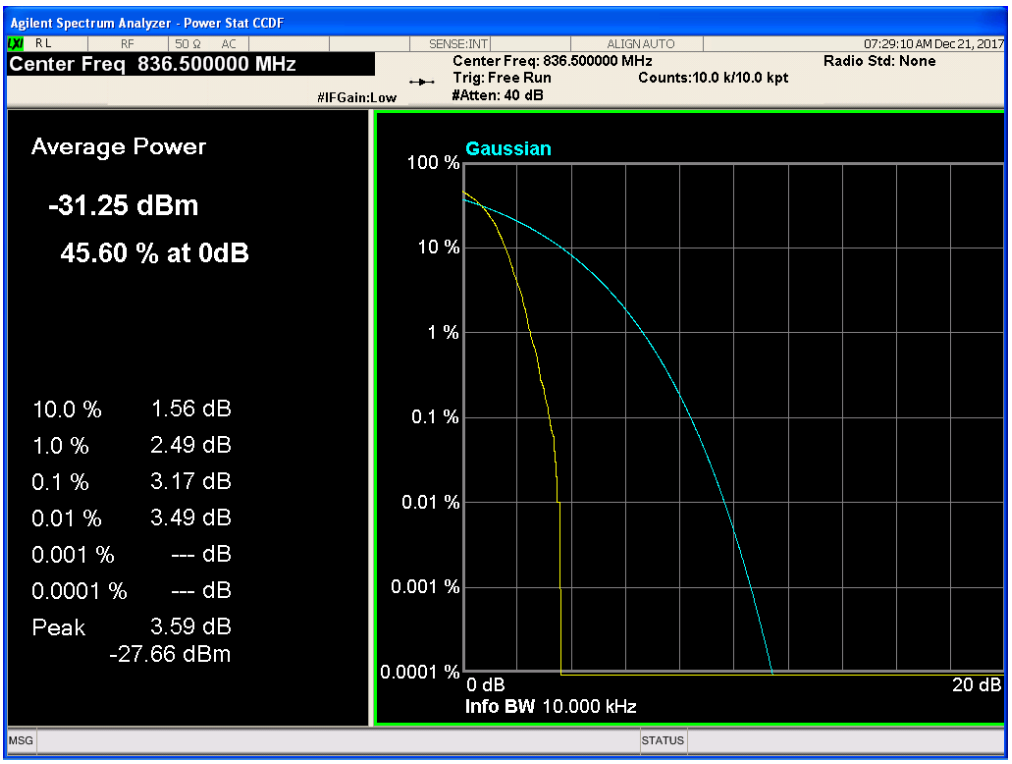
Band 5,UL Channel 20525,UL Frequency 836.5,BW 3.0,NO. RB 1,RB POS. Low,16-QAM



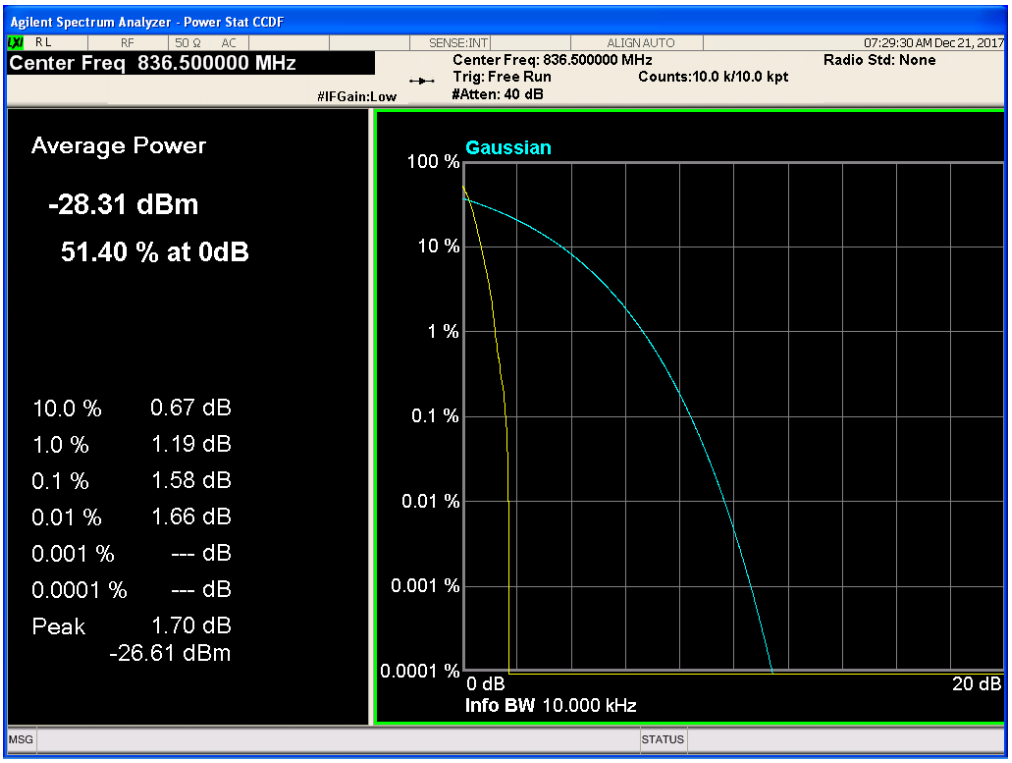
Band 5,UL Channel 20525,UL Frequency 836.5,BW 5.0,NO. RB 1,RB POS. Low,QPSK



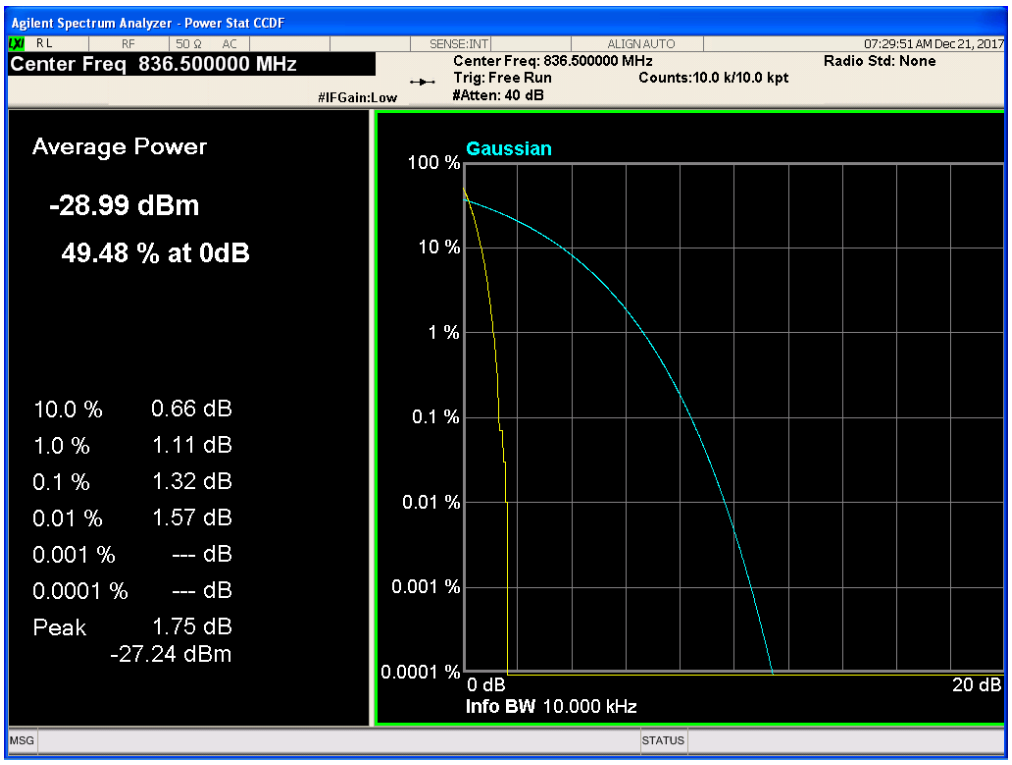
Band 5,UL Channel 20525,UL Frequency 836.5,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



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

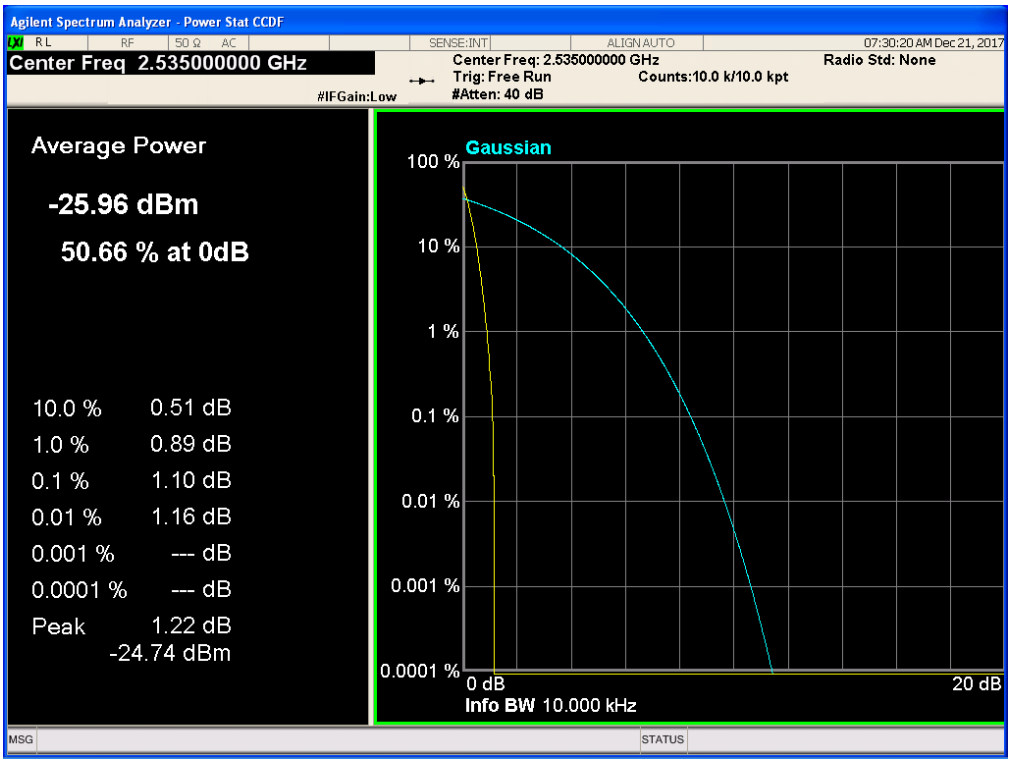


Band 5,UL Channel 20525,UL Frequency 836.5,BW 10.0,NO. RB 1,RB POS. Low,16-QAM

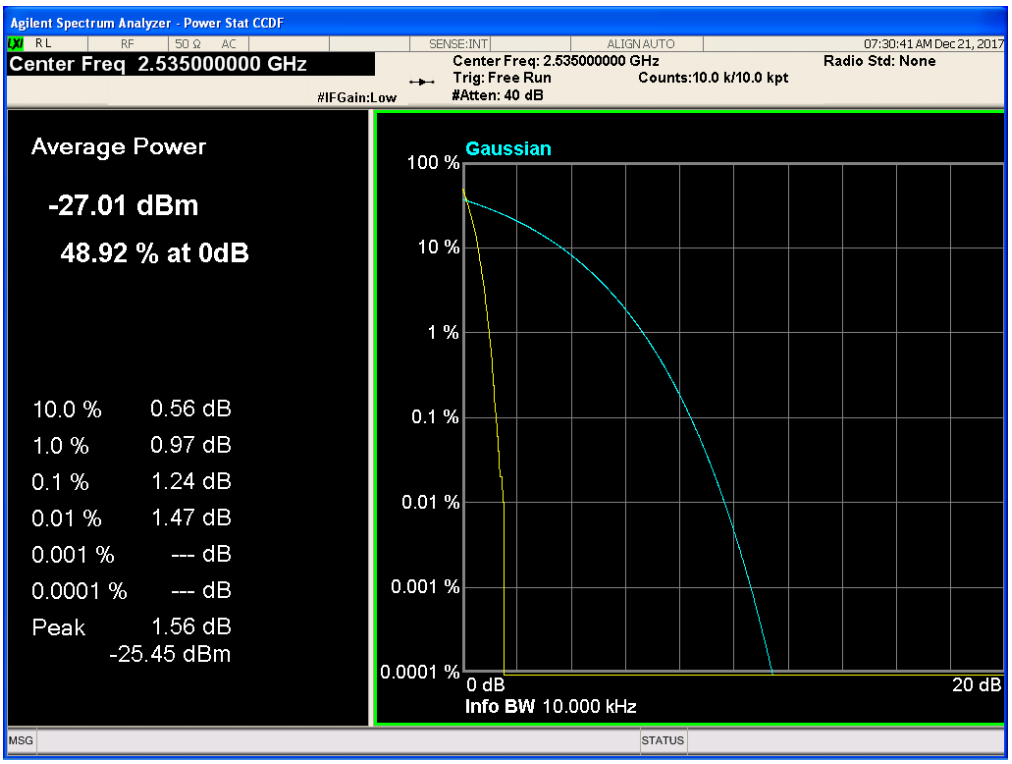


11.8 LTE BAND 7

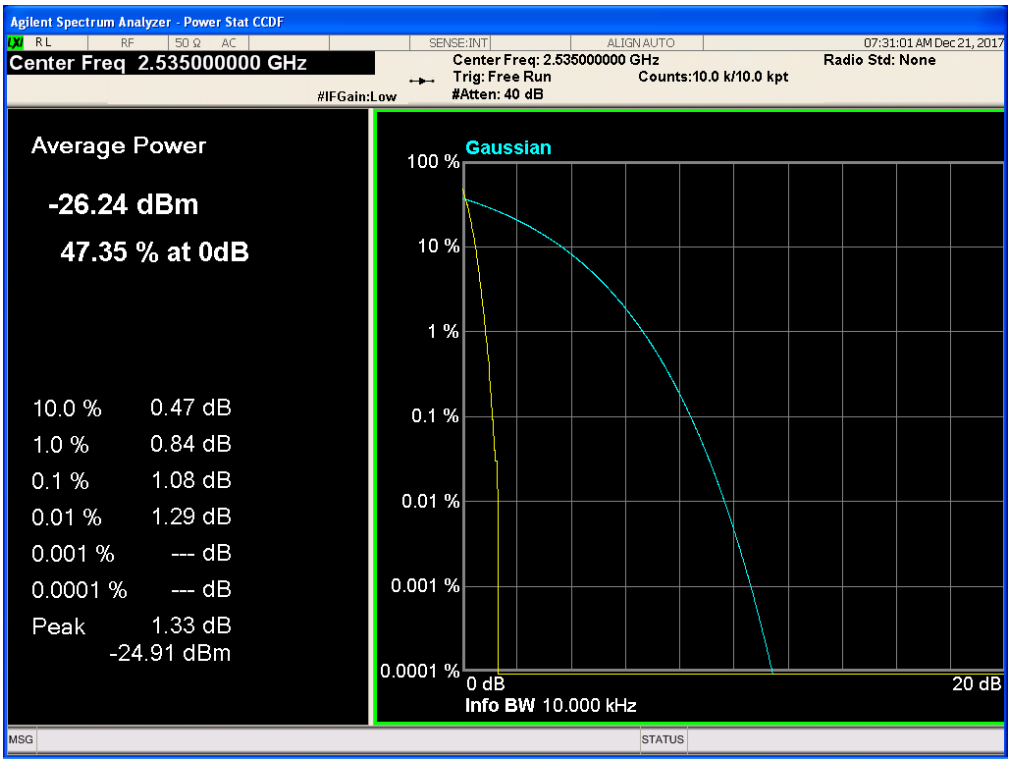
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 5.0,NO. RB 1,RB POS. Low,QPSK



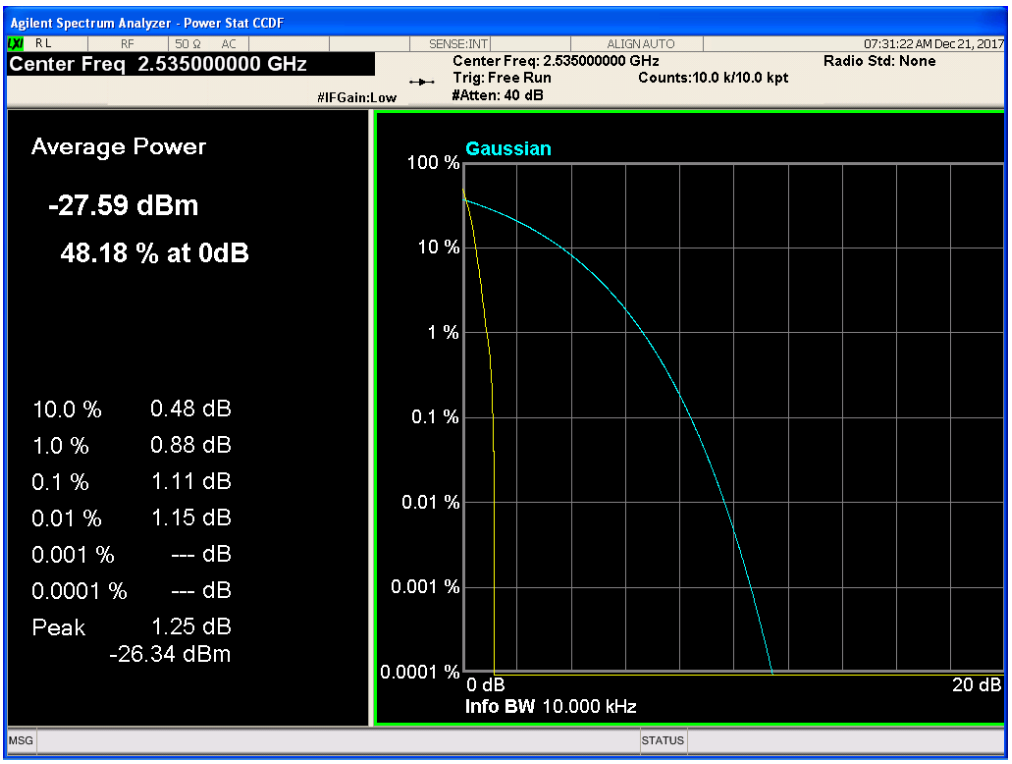
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 5.0,NO. RB 1,RB POS. Low,16-QAM



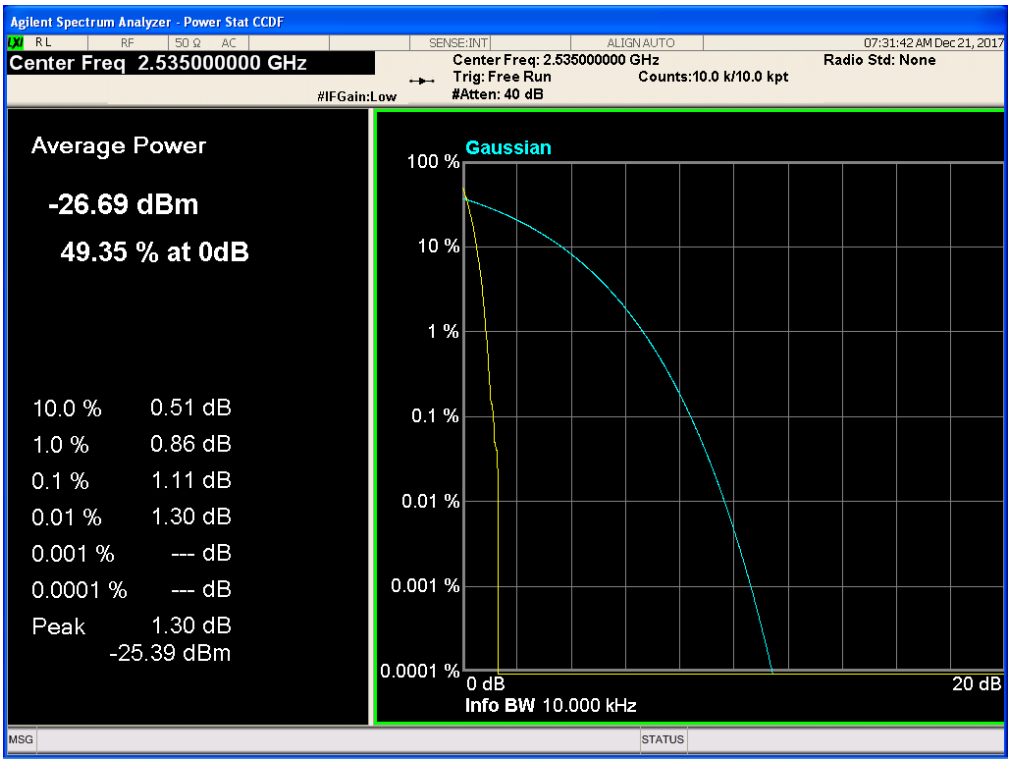
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 10.0,NO. RB 1,RB POS. Low,QPSK



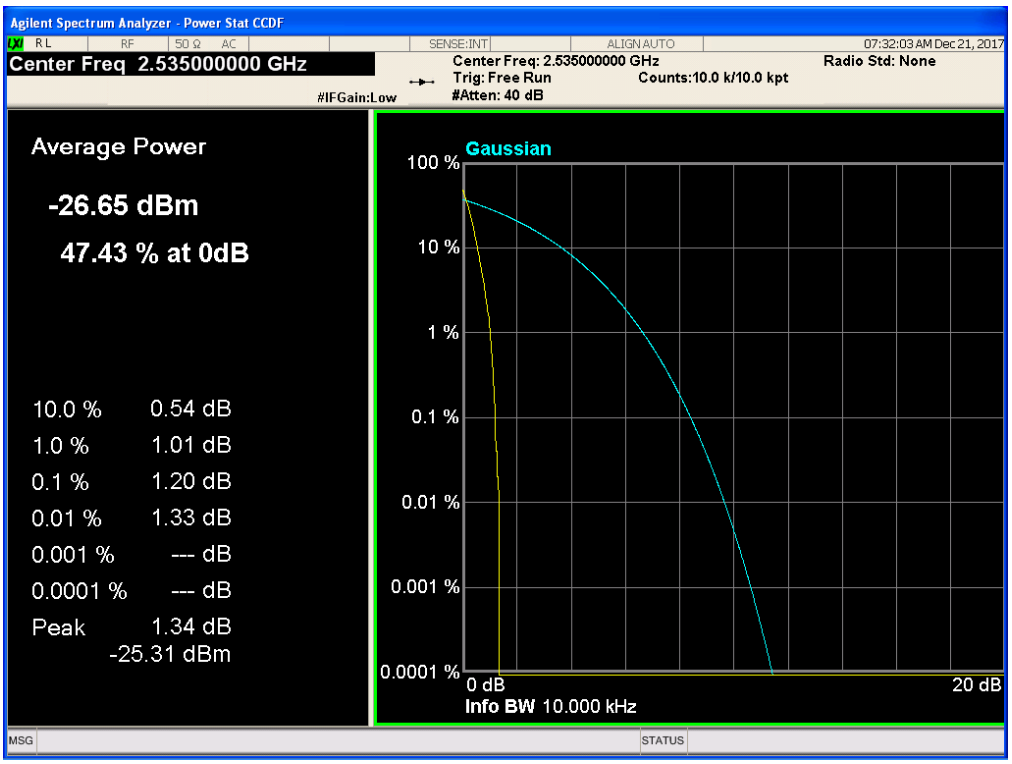
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 10.0,NO. RB 1,RB POS. Low,16-QAM



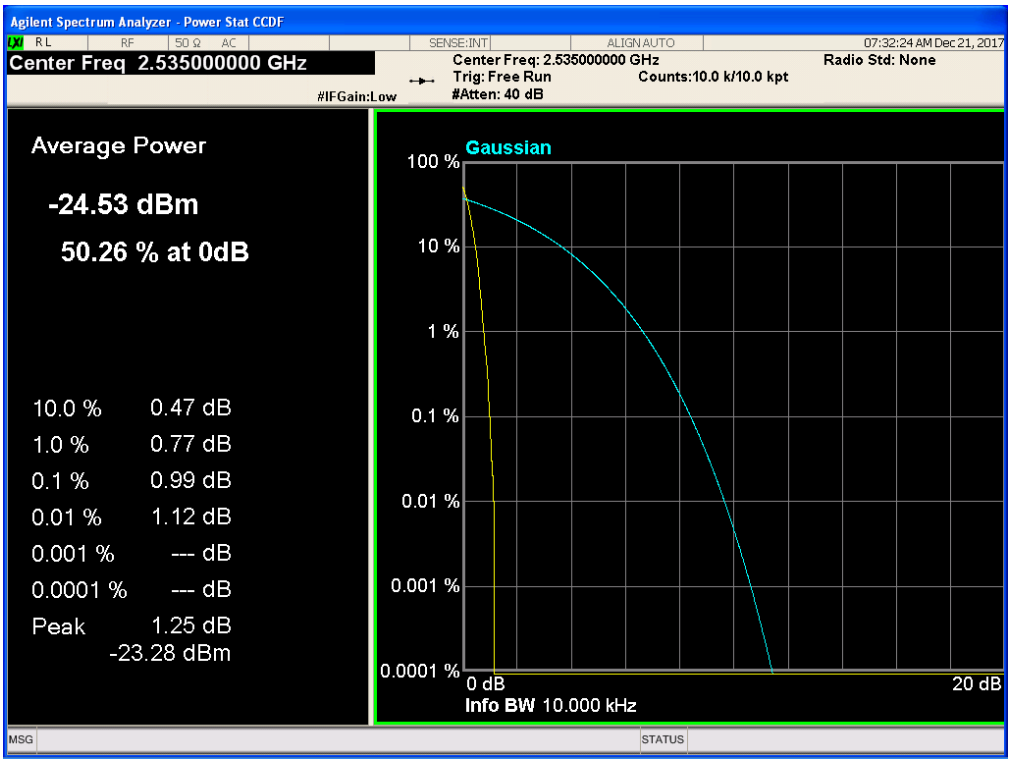
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 15.0,NO. RB 1,RB POS. Low,QPSK



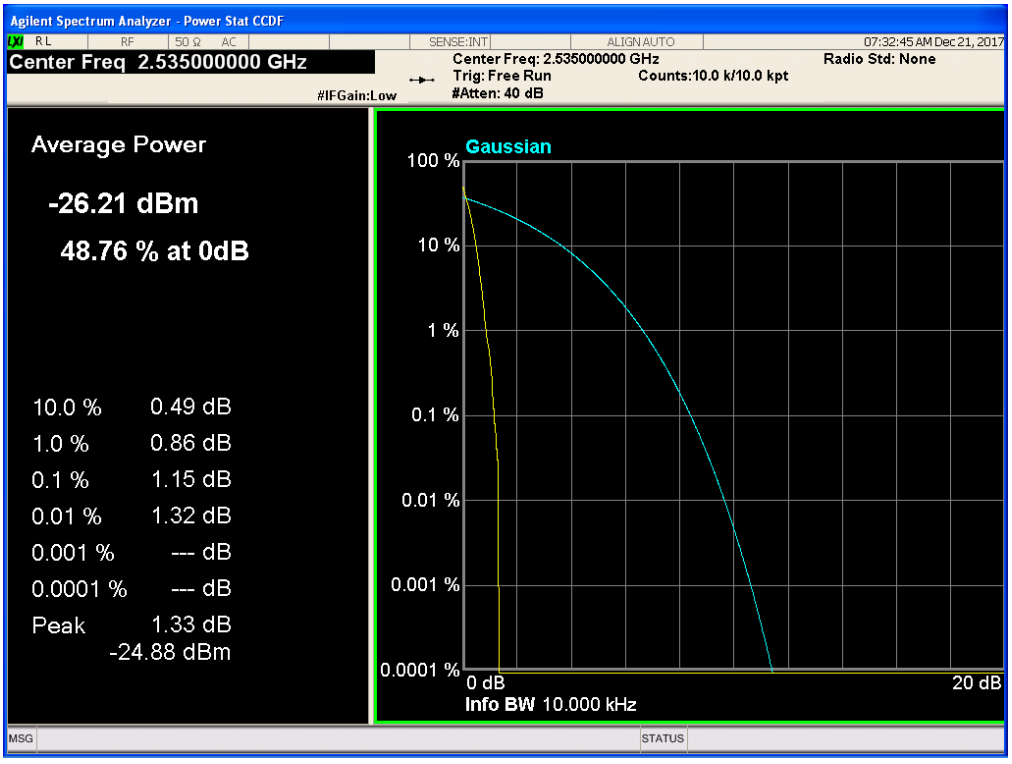
Band 7,UL Channel 21100,UL Frequency 2535.0,BW 15.0,NO. RB 1,RB POS. Low,16-QAM



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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