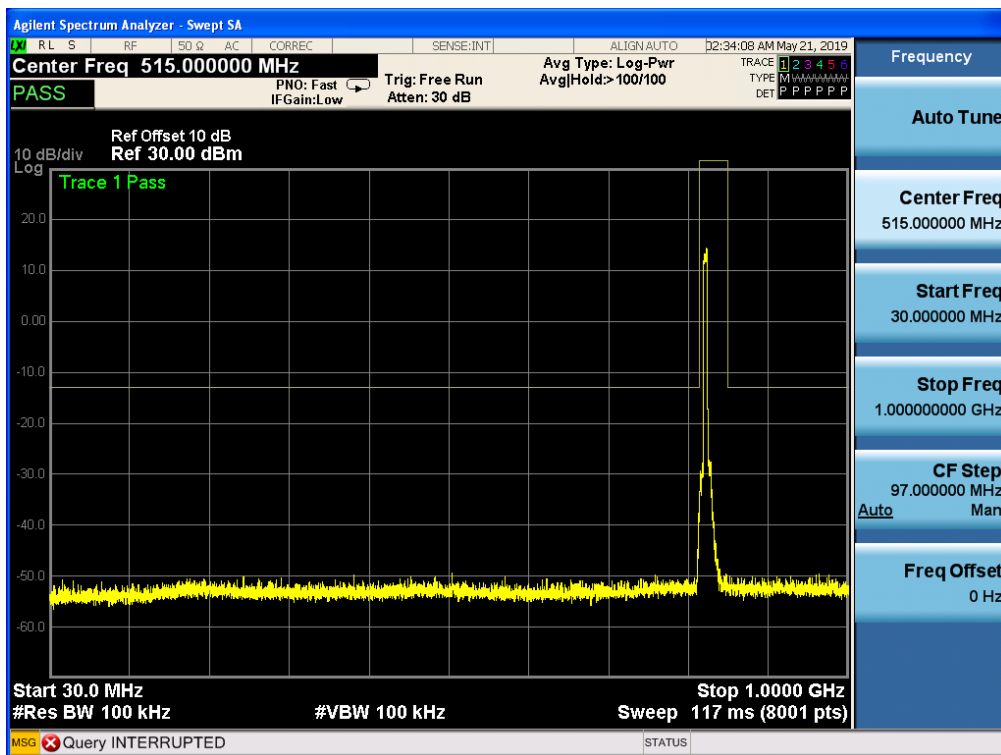
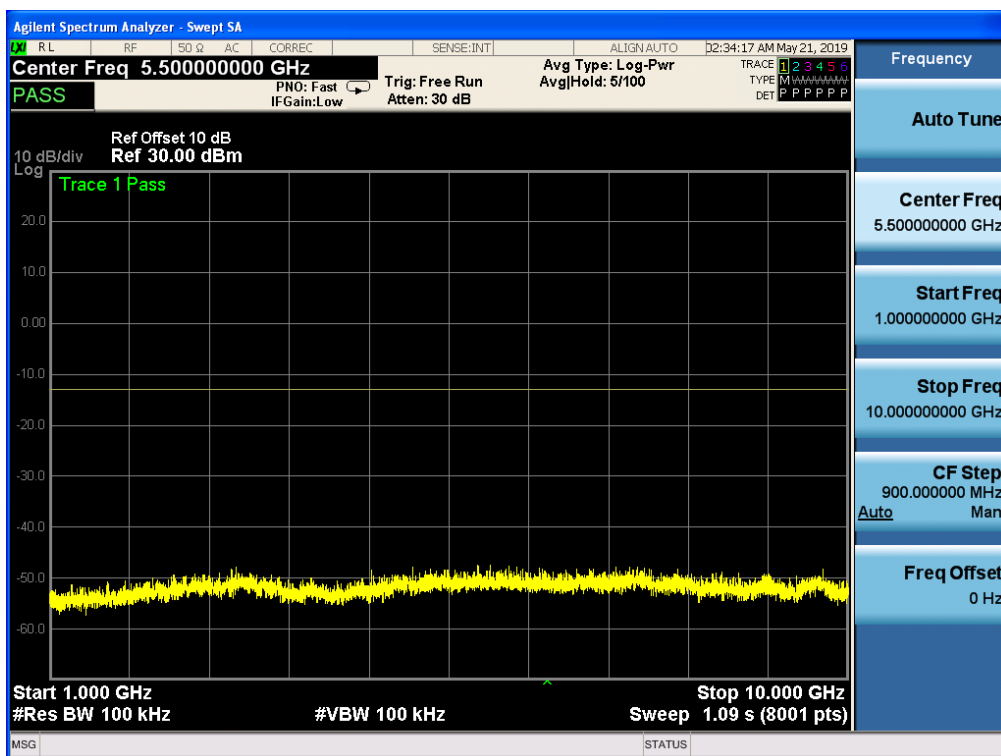


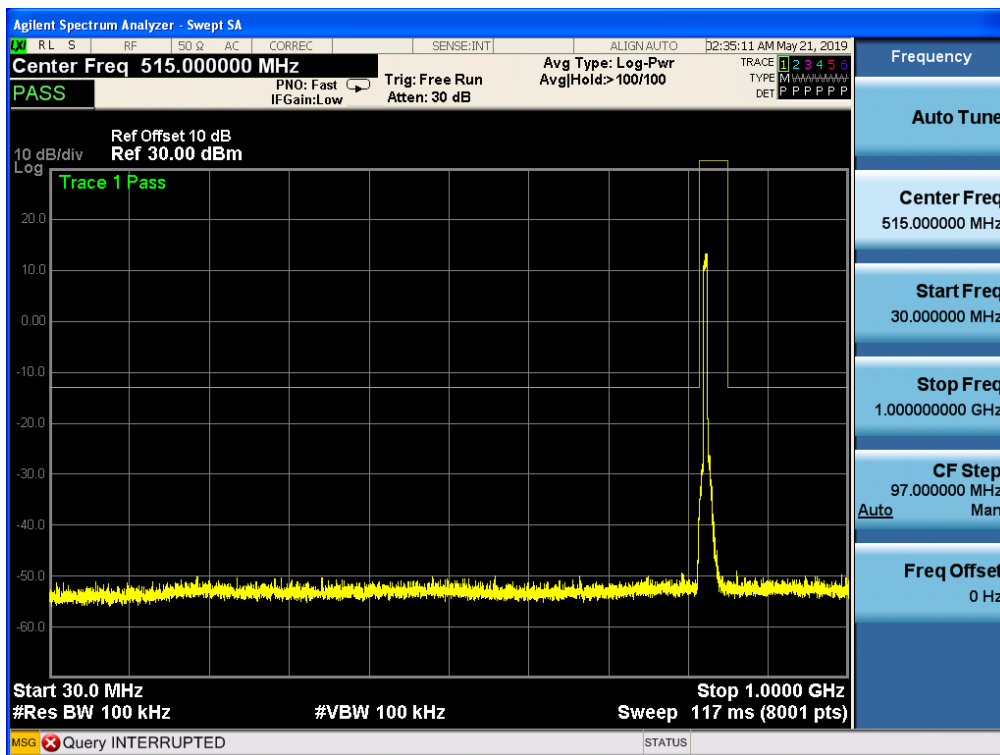
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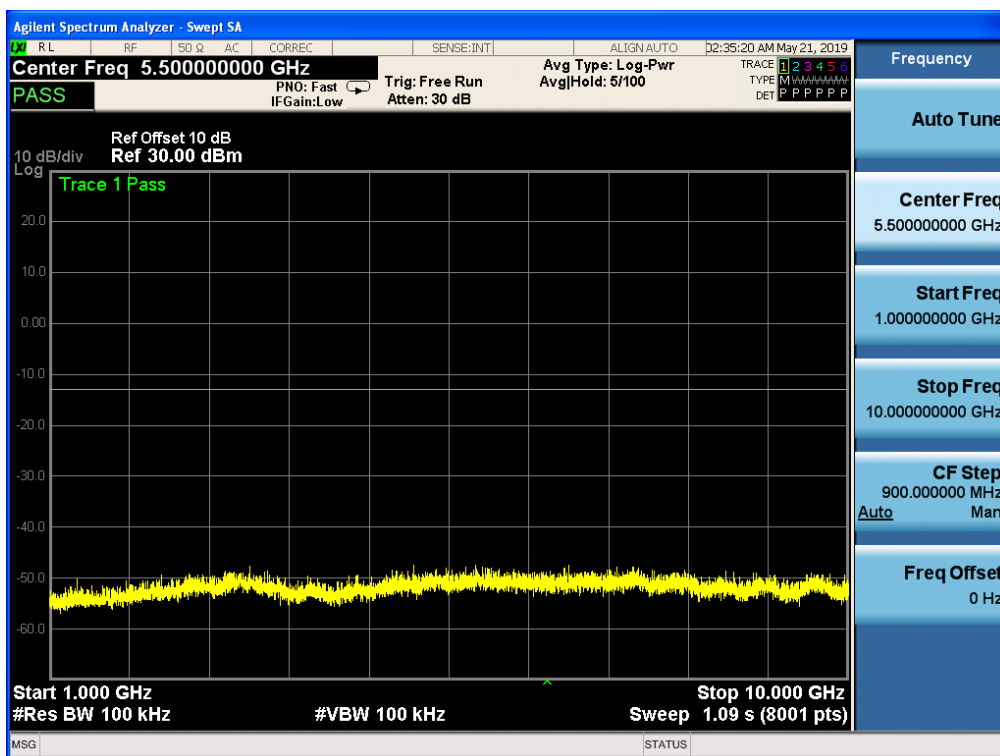
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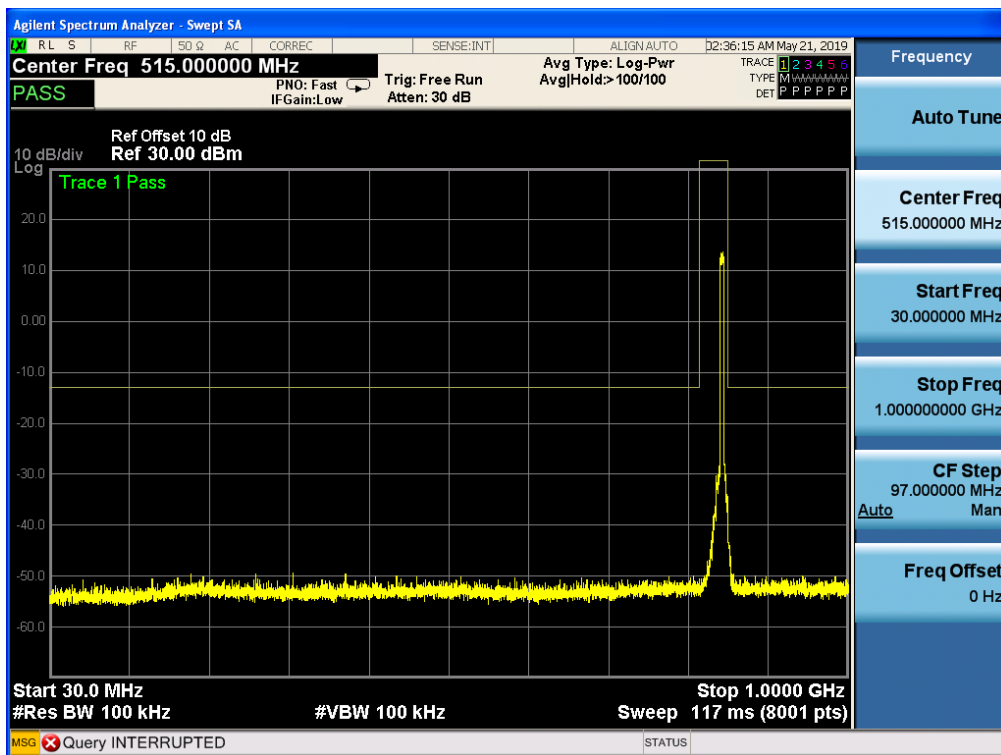
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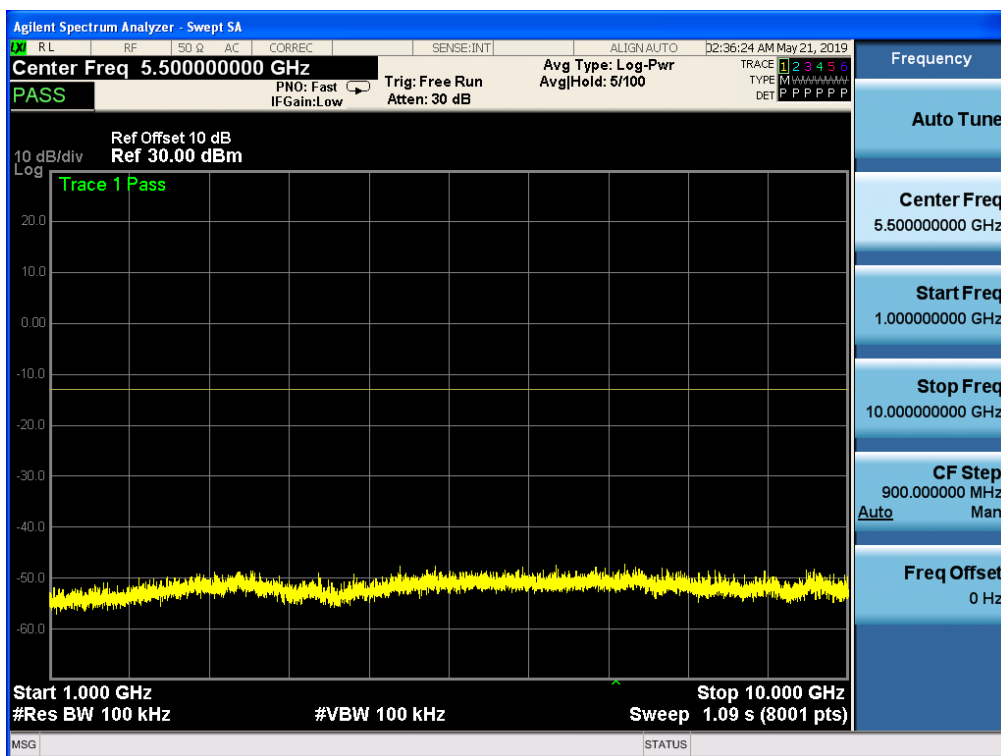
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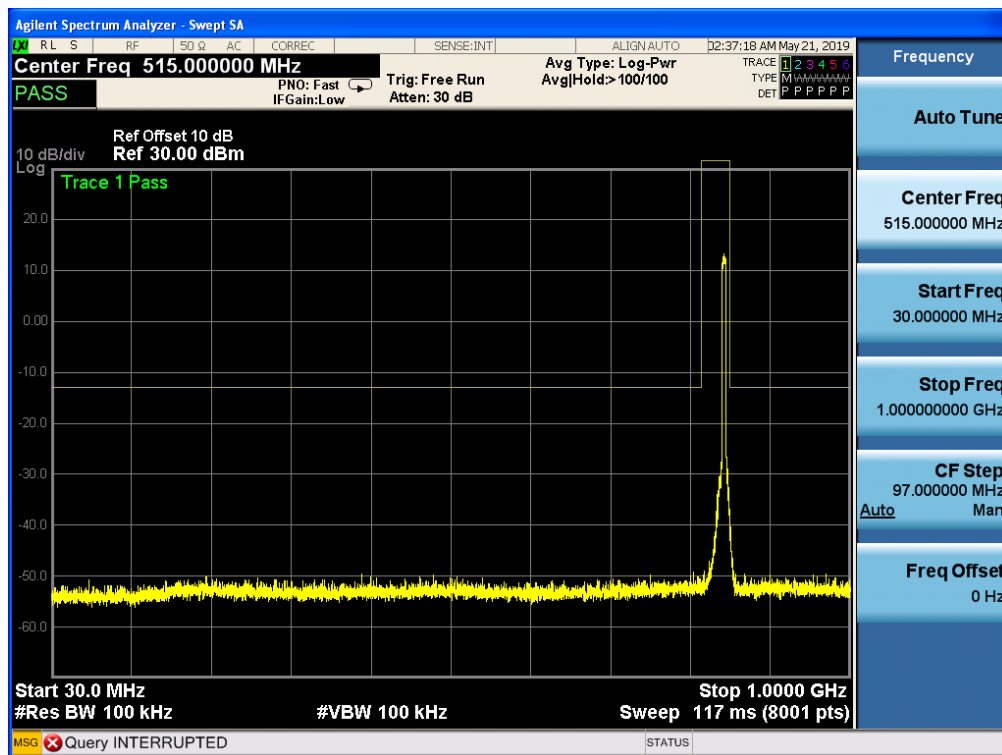
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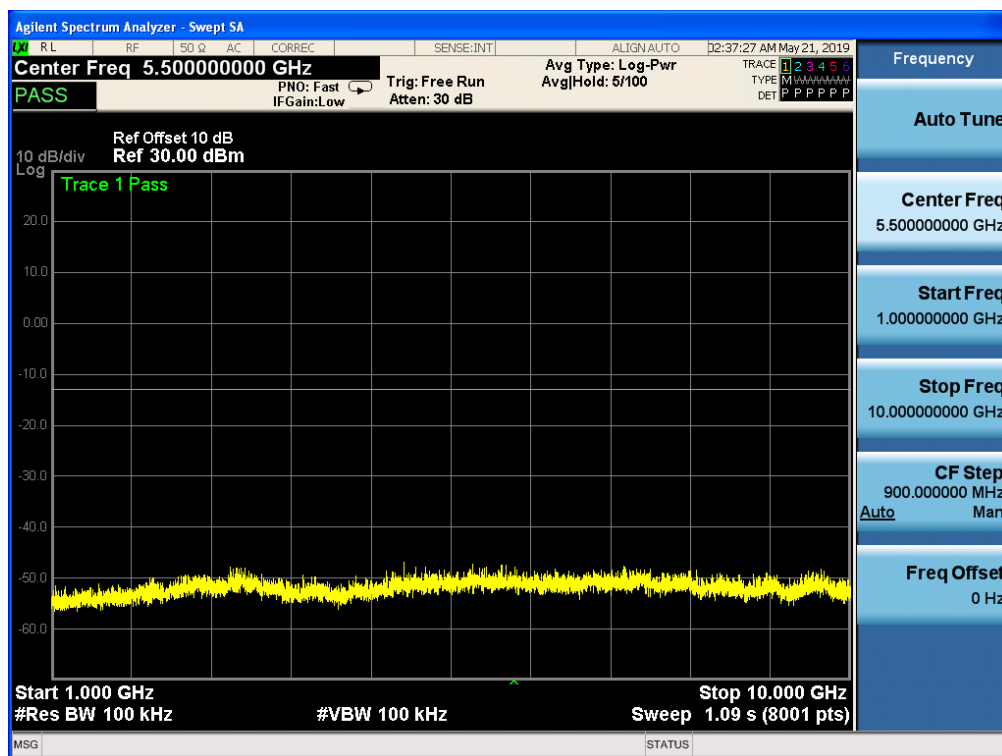
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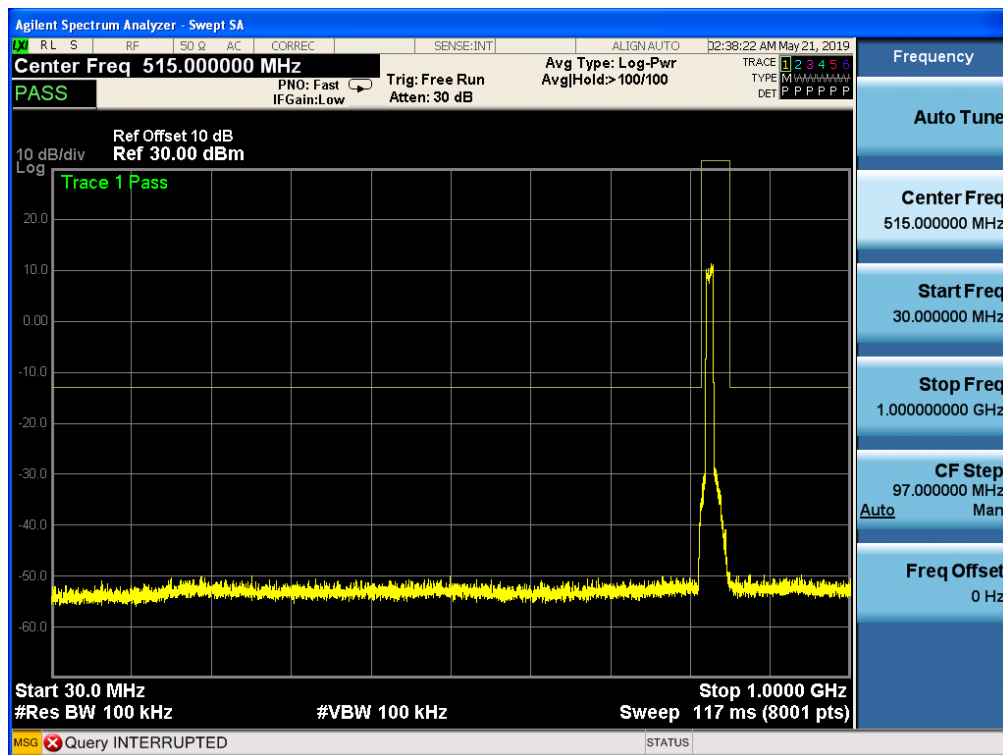
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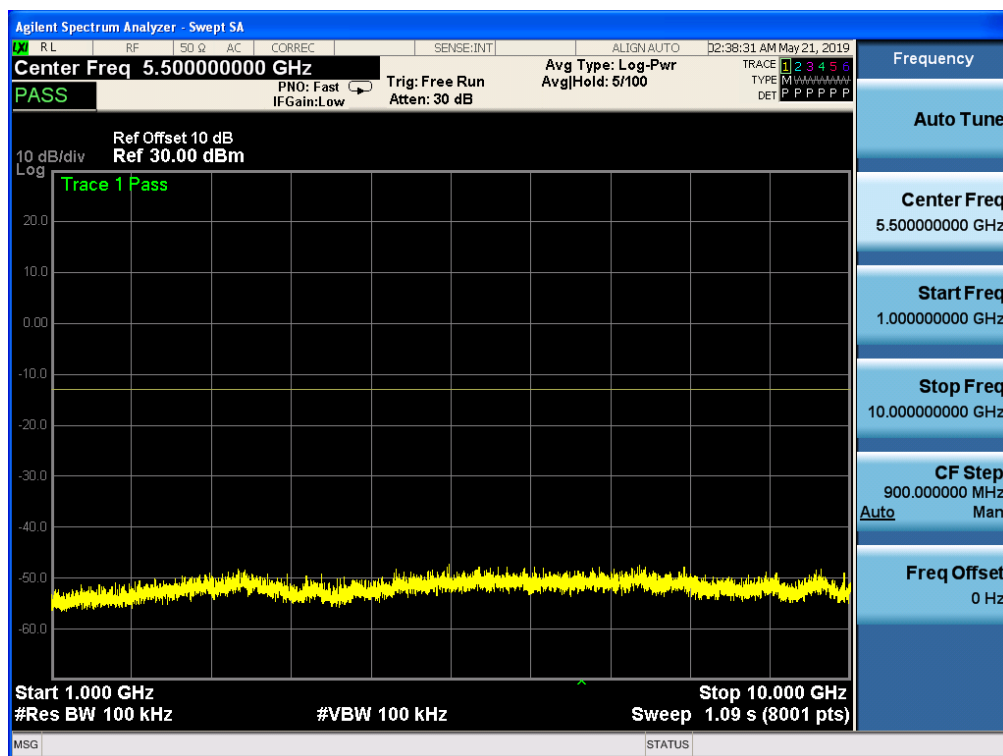
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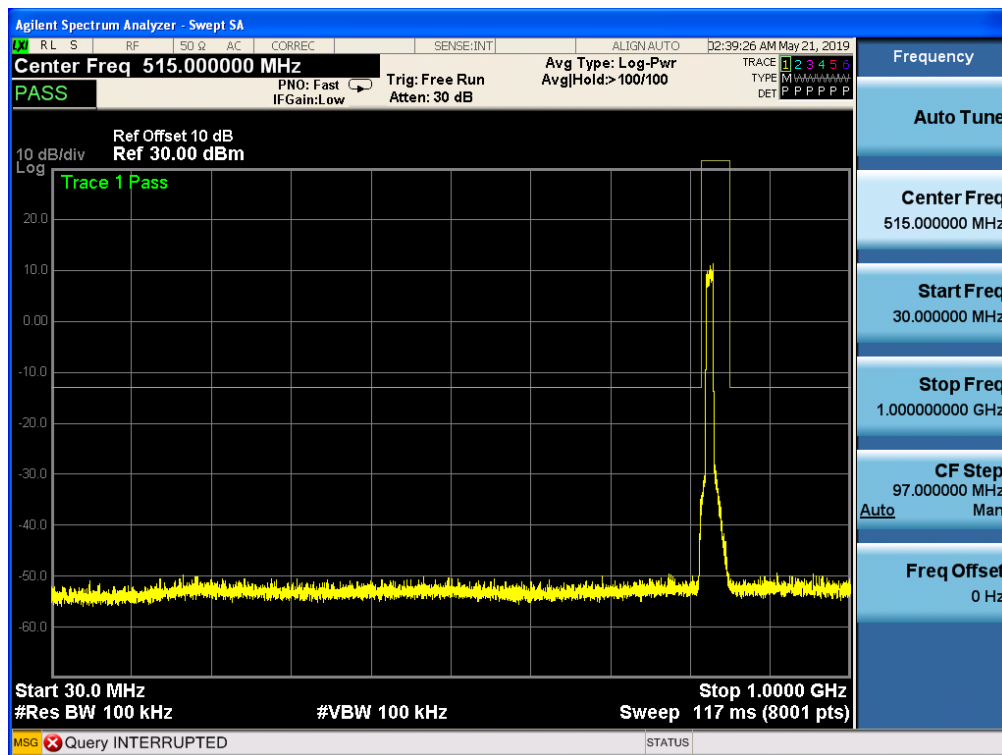
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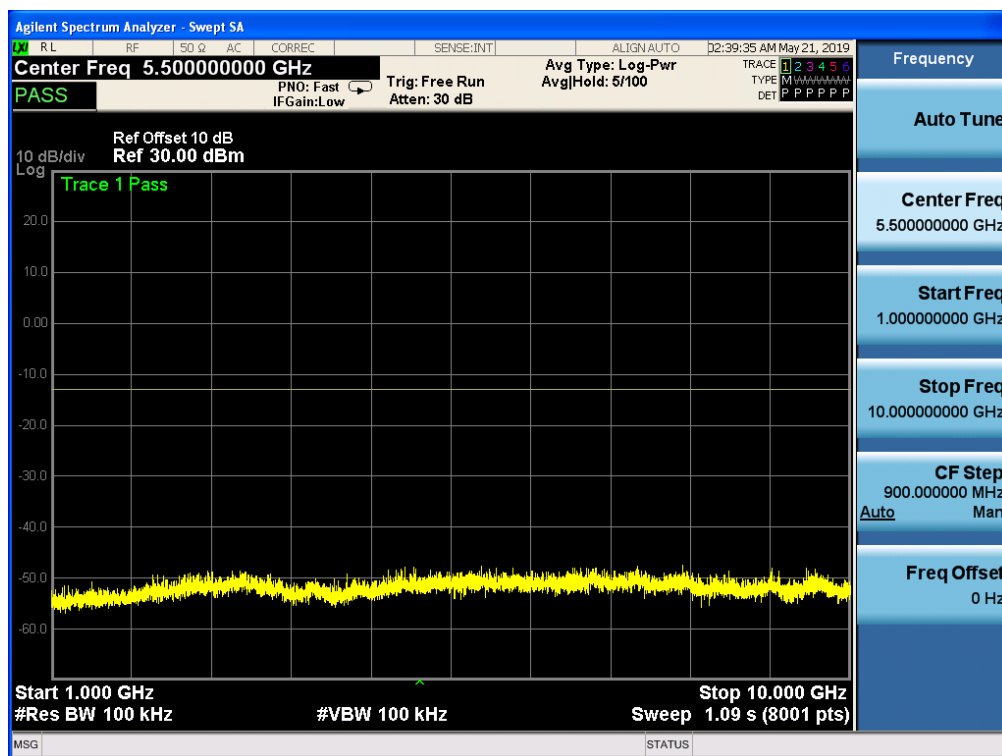
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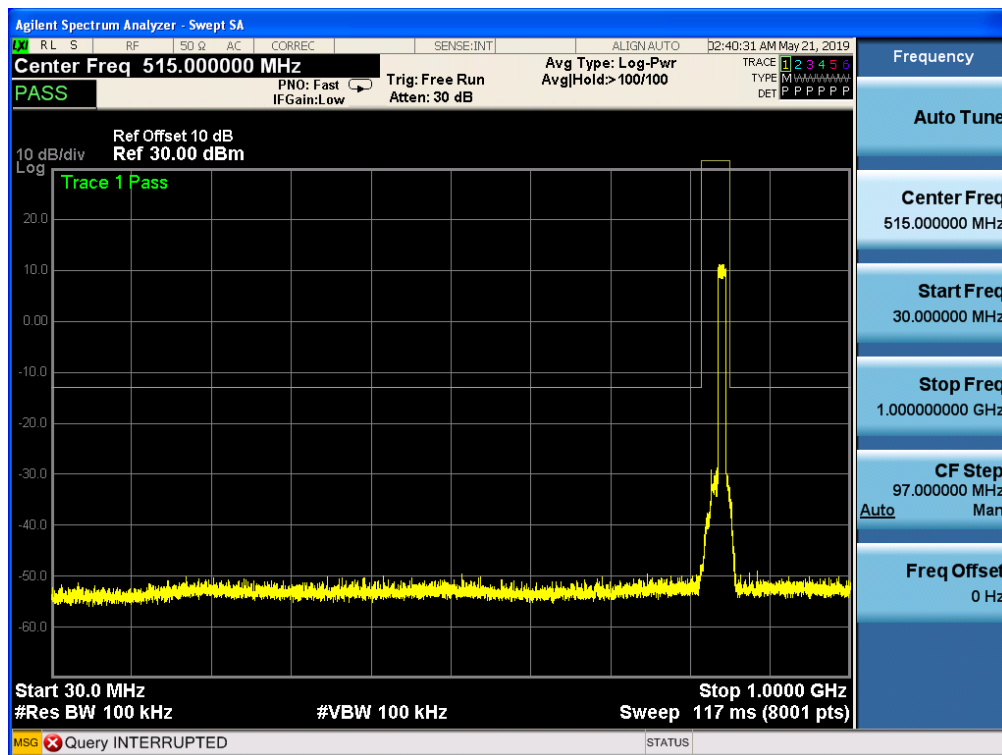
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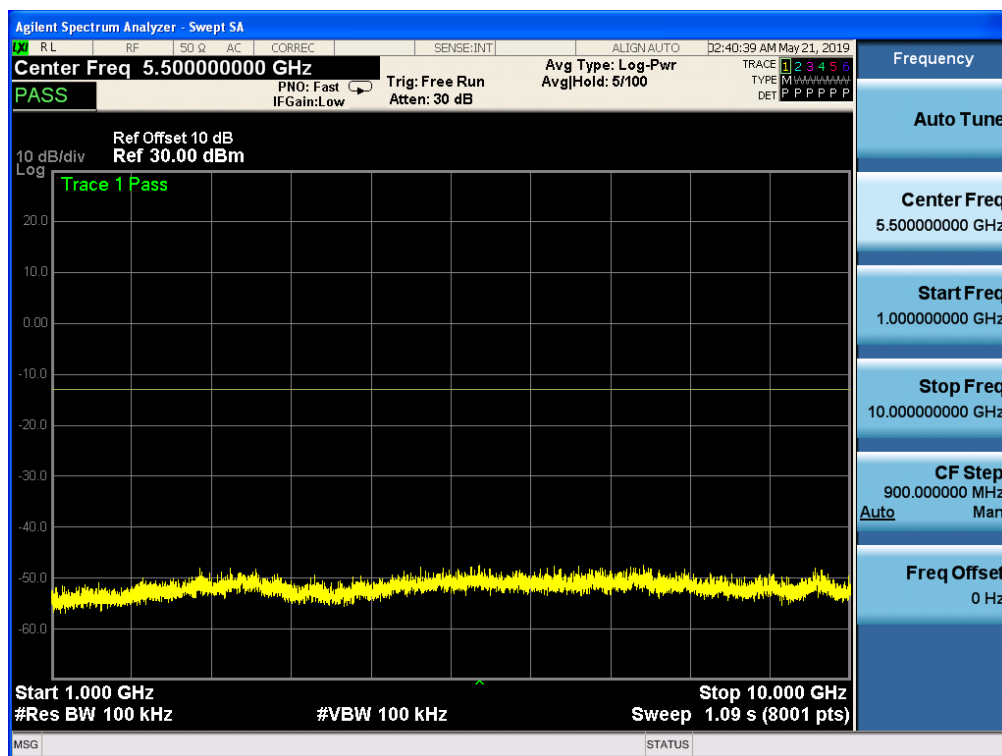
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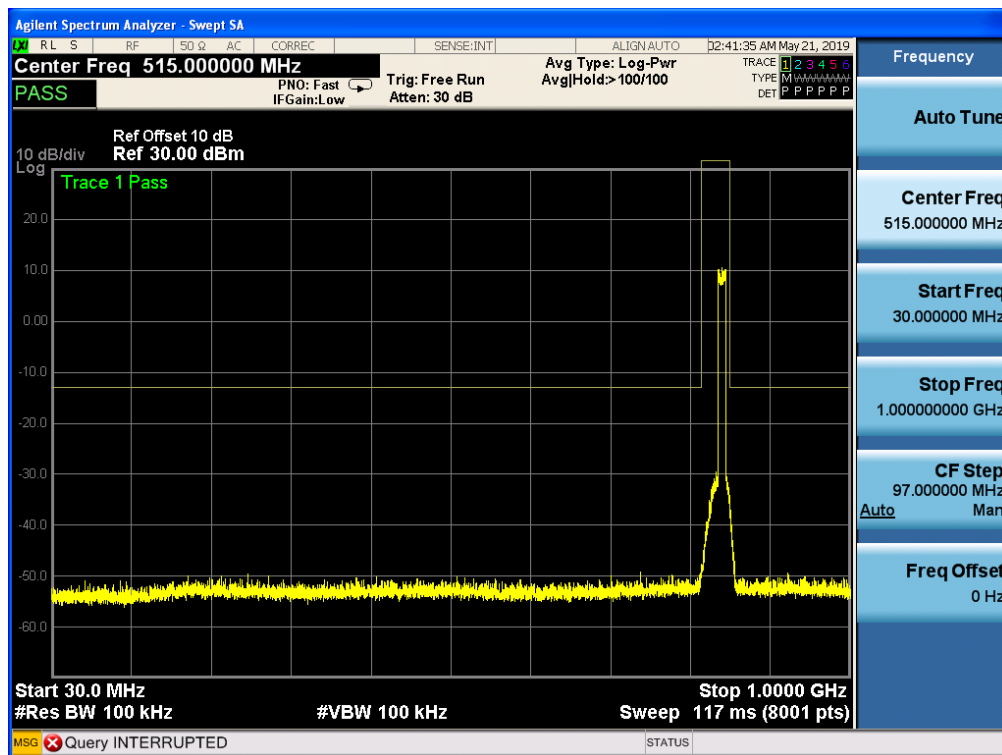
Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK



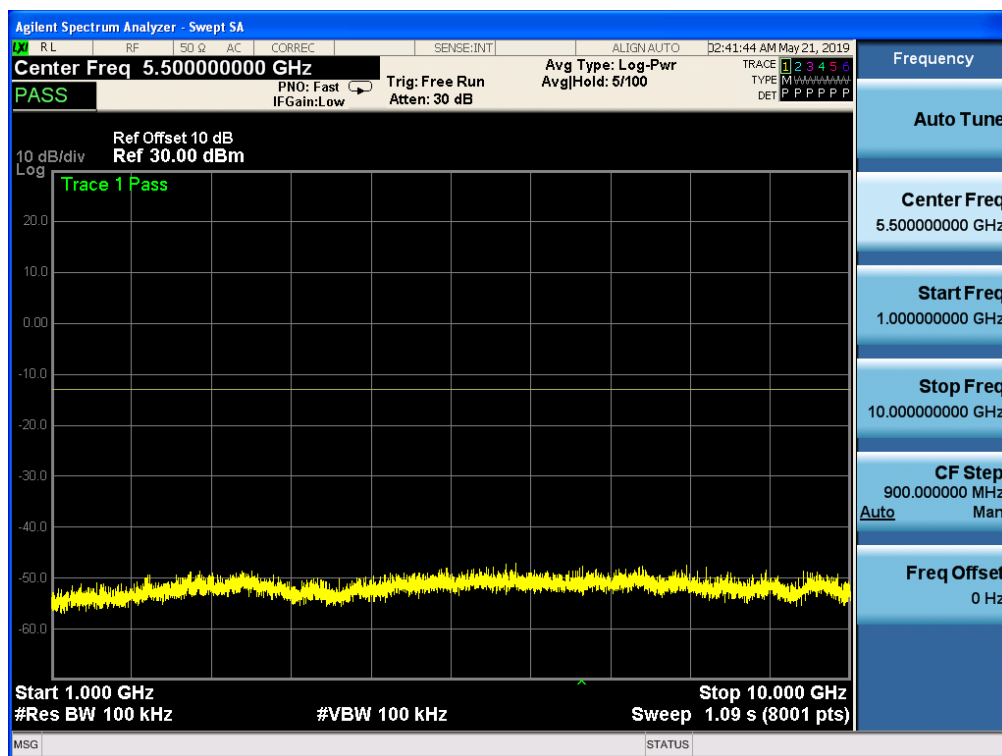
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Band 5, UL Channel 20600, UL Frequency 844.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM

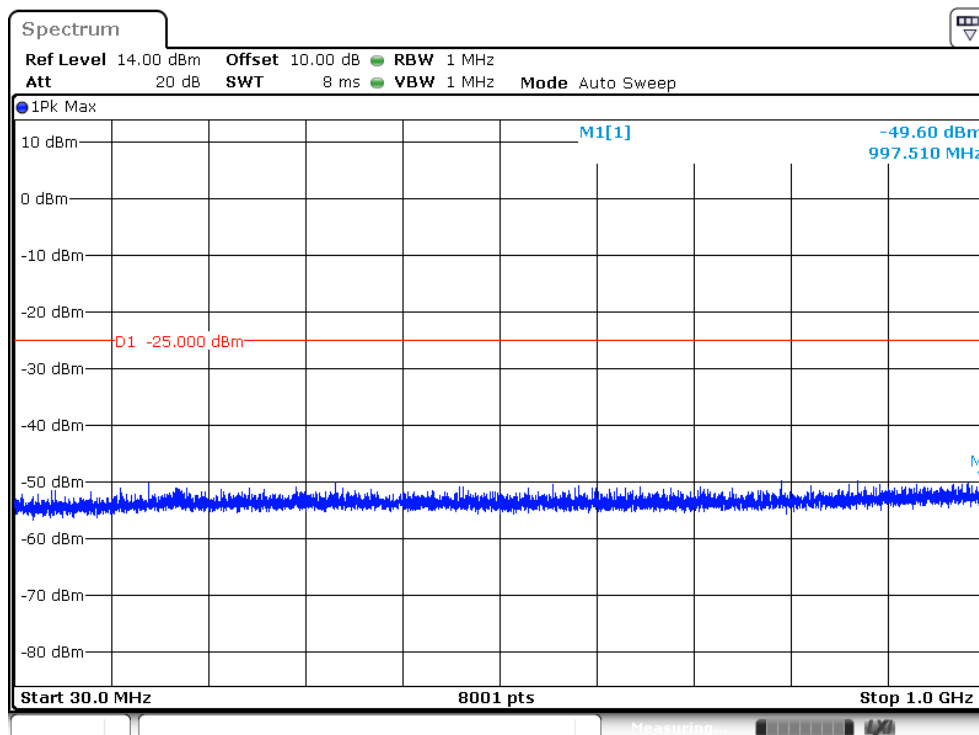


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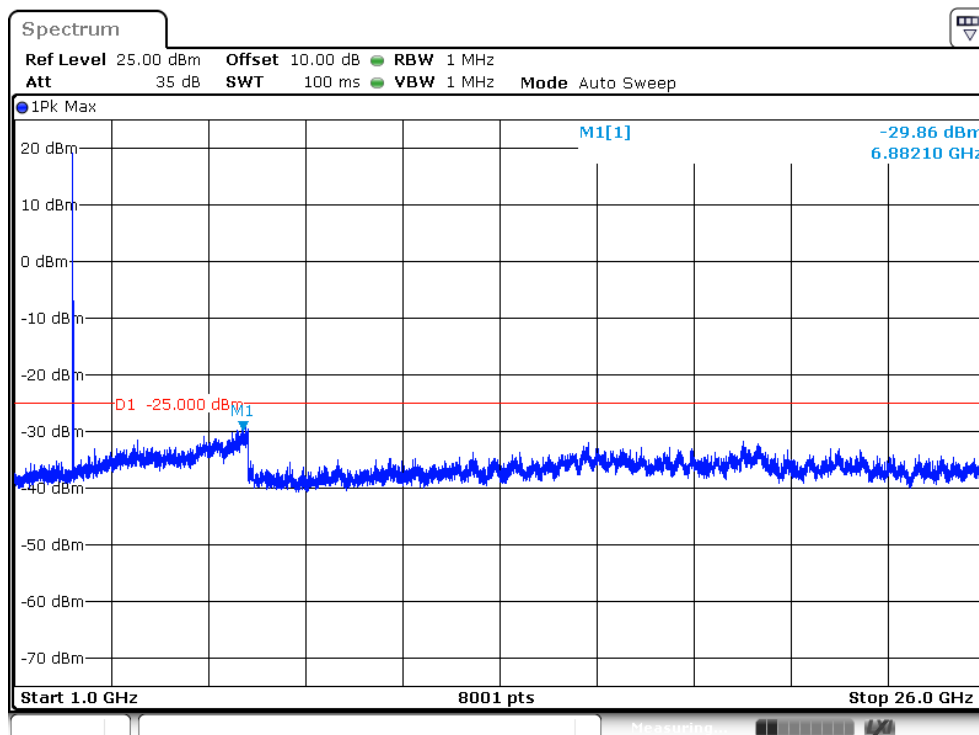


7.4 LTE BAND 7

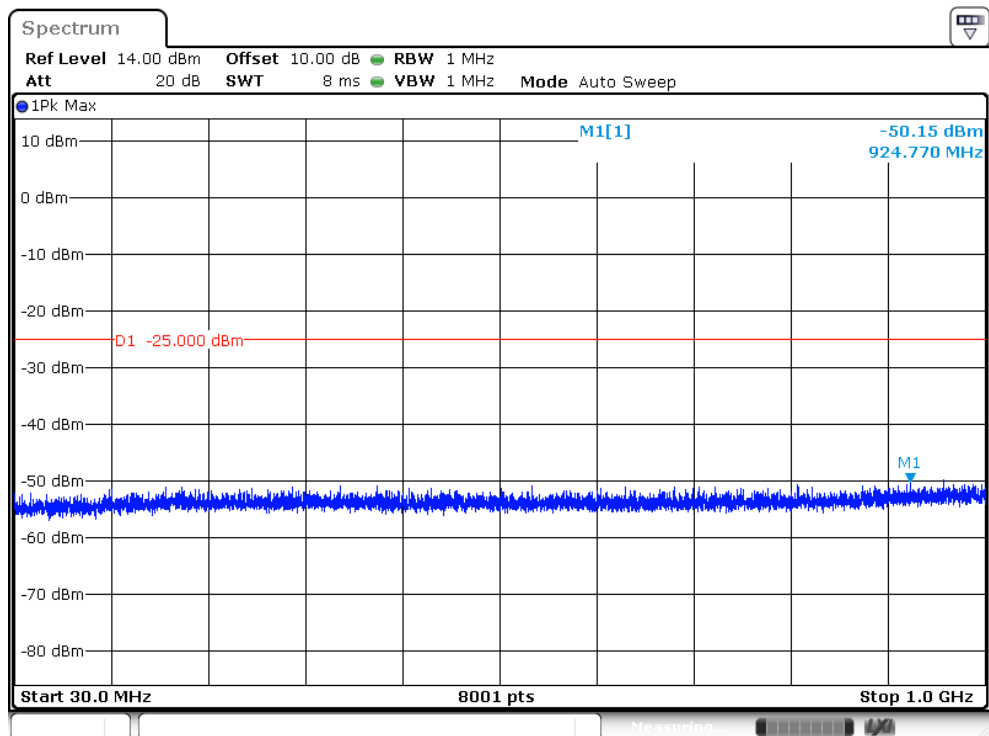
Band 7,UL Channel 20775,UL Frequency 2502.5,BW 5.0,NO. RB 25,RB POS. Low,QPSK



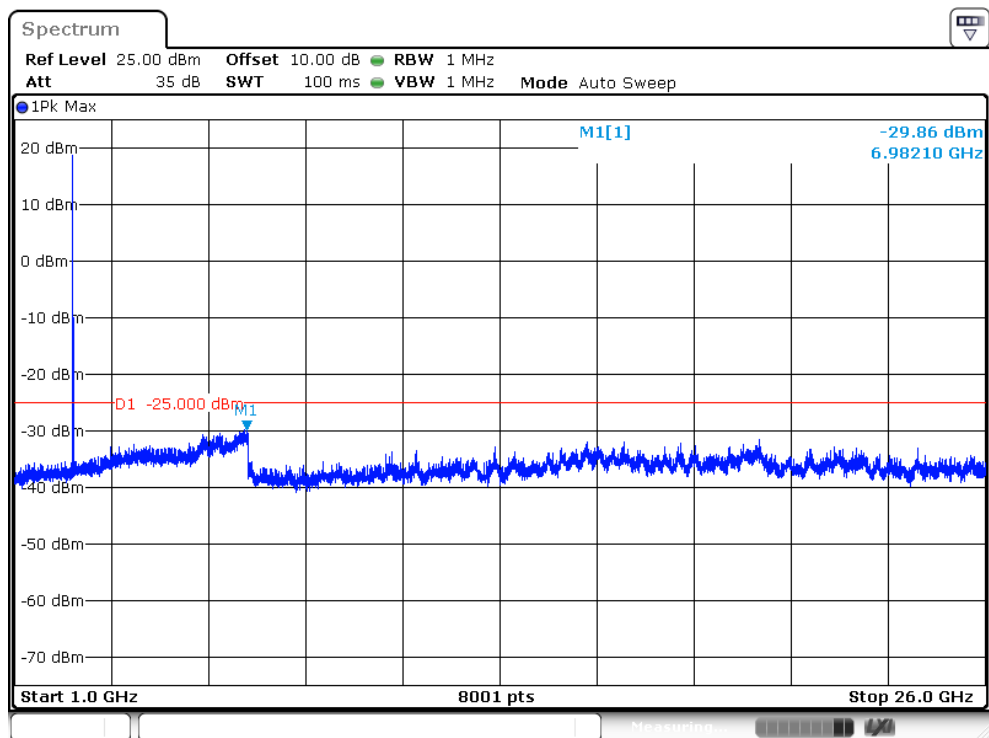
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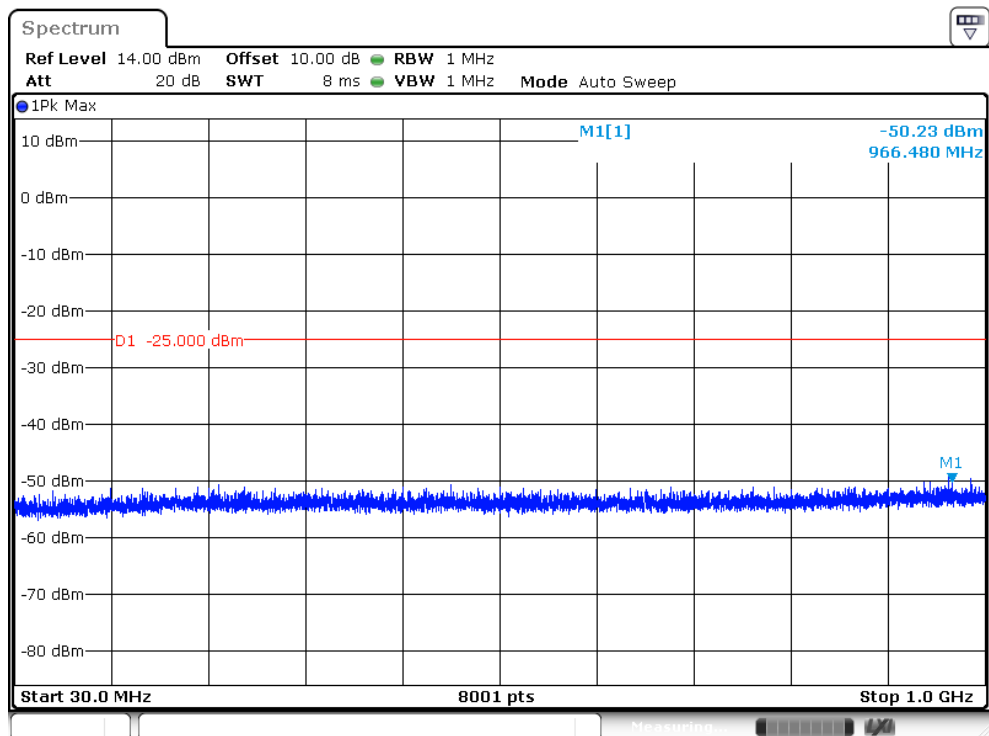
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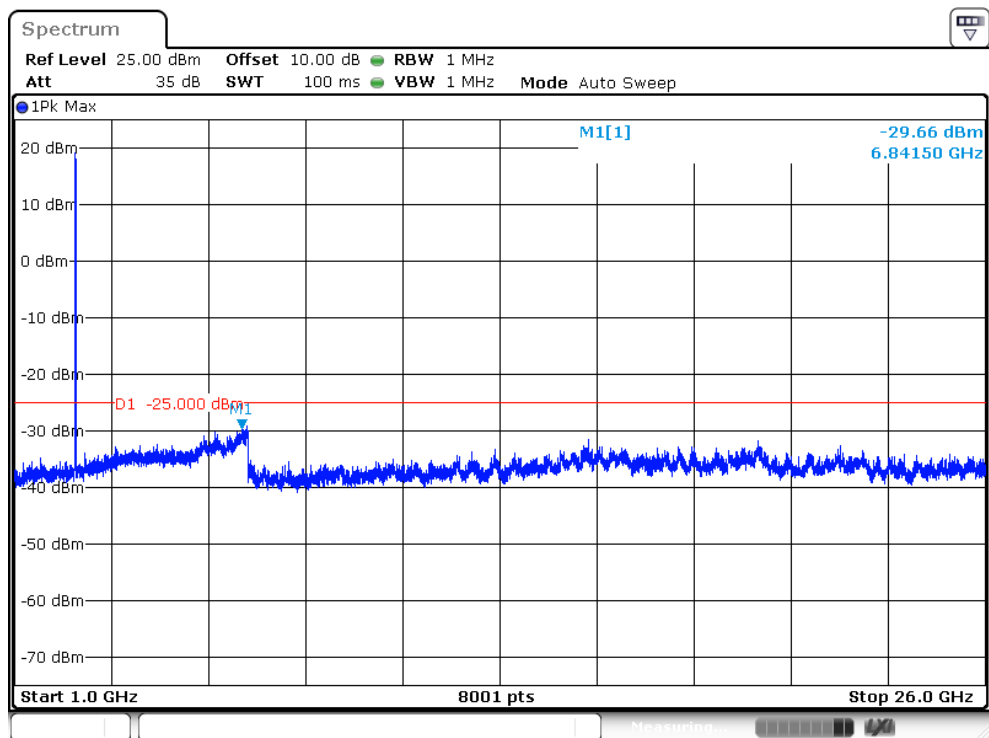
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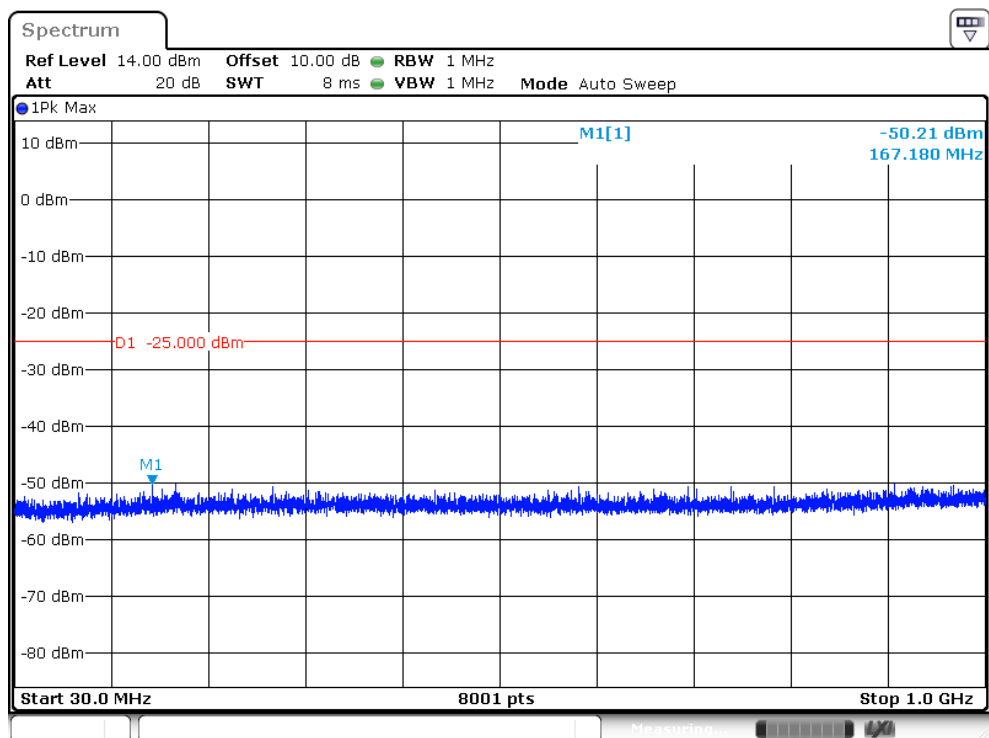
Band 7,UL Channel 21425,UL Frequency 2567.5,BW 5.0,NO. RB 25,RB POS. Low,QPSK



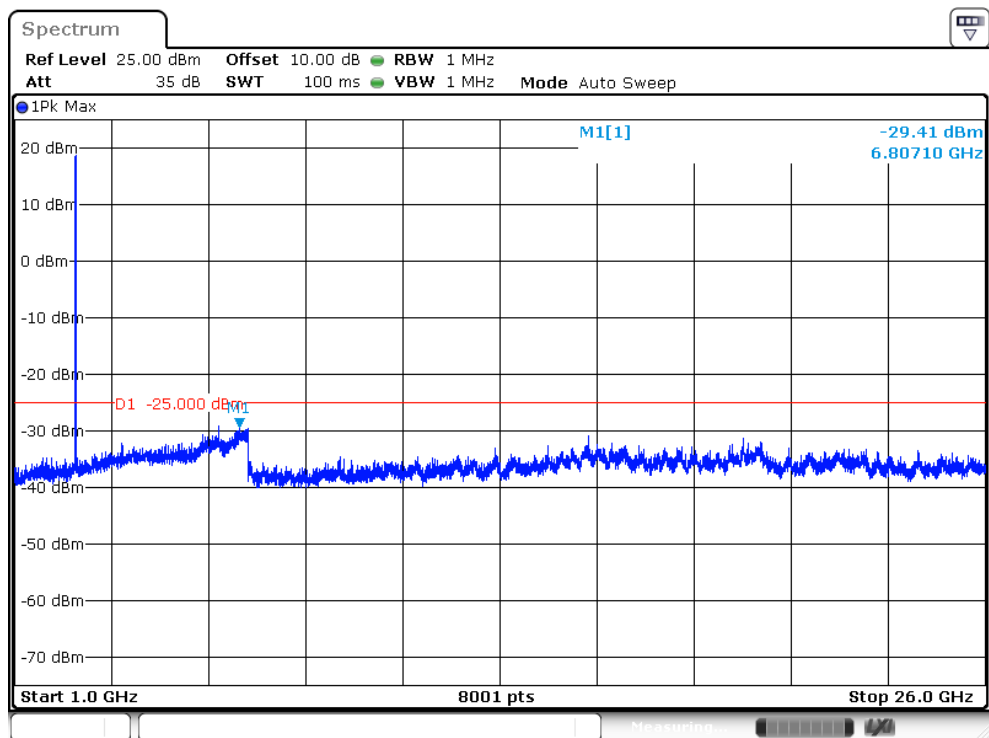
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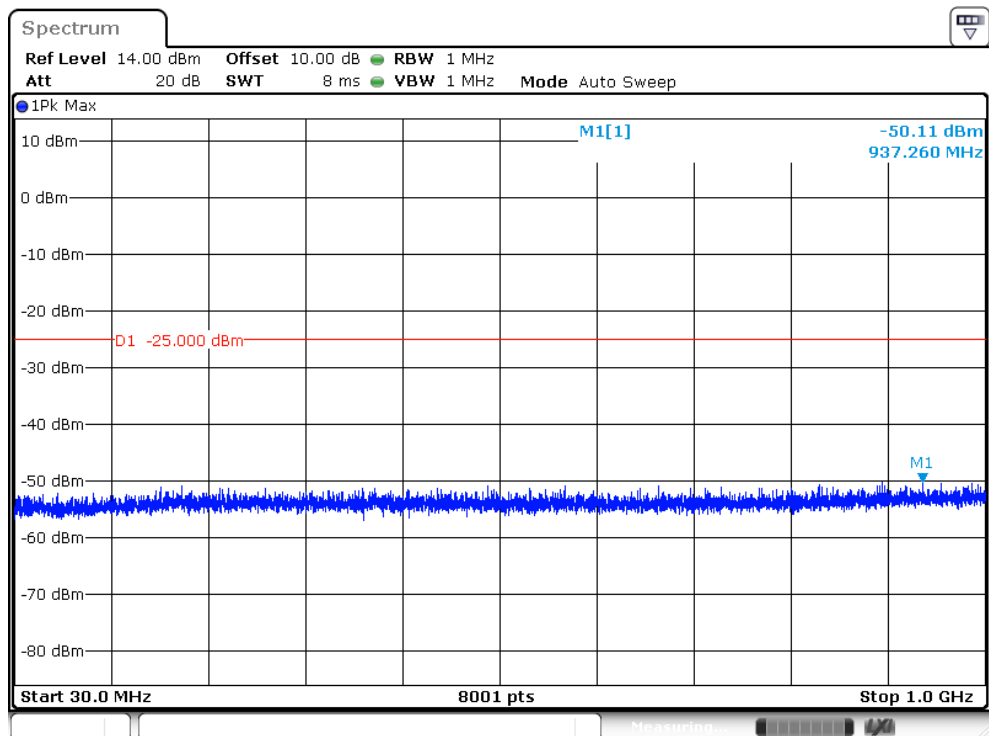
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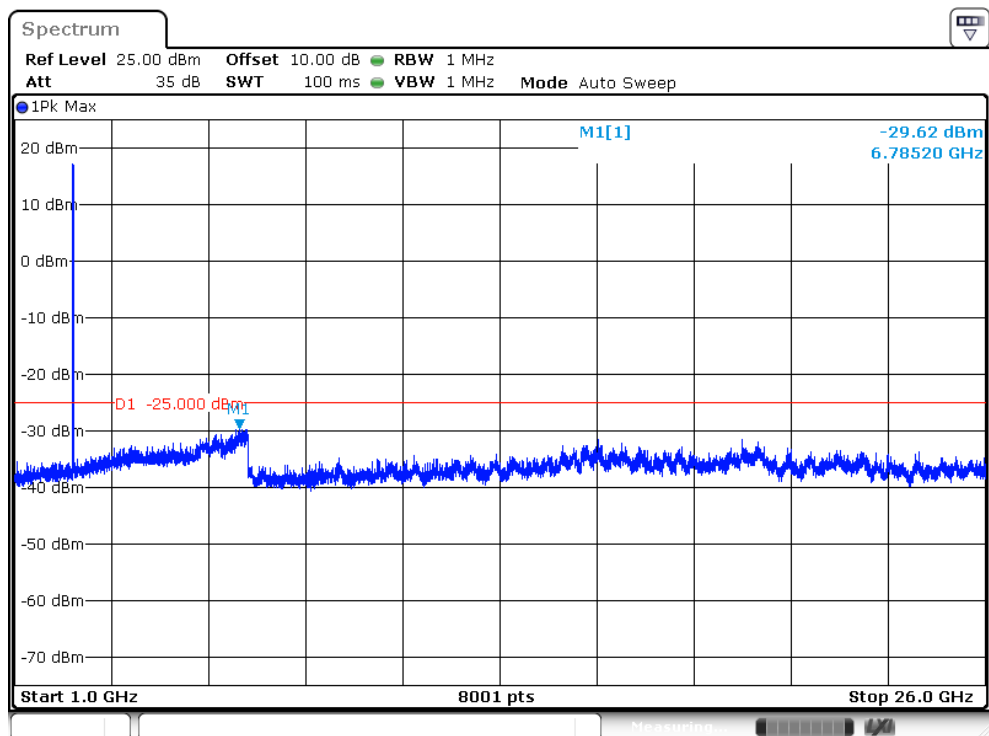
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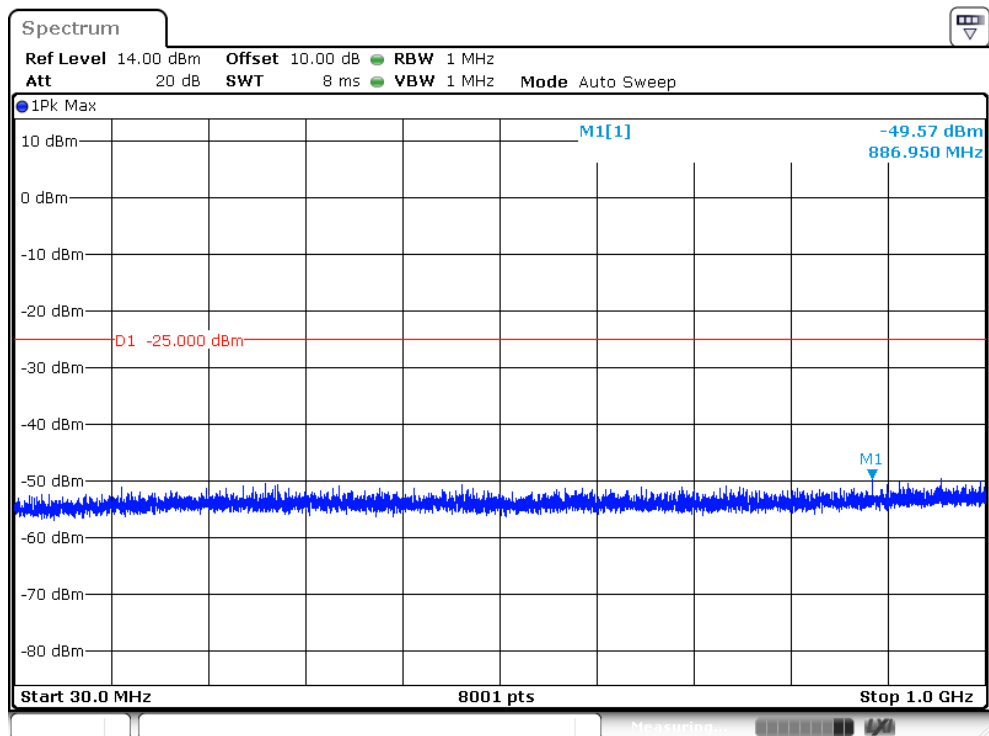
Band 7, UL Channel 20800, UL Frequency 2505.0, BW 10.0, NO. RB 50, RB POS. Low, QPSK



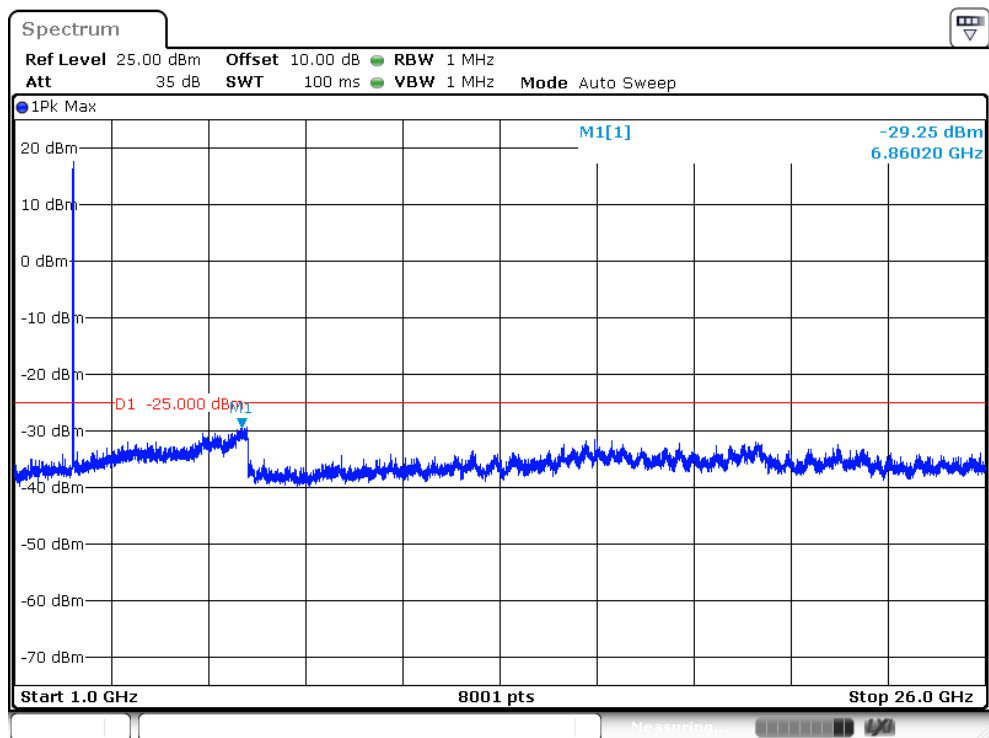
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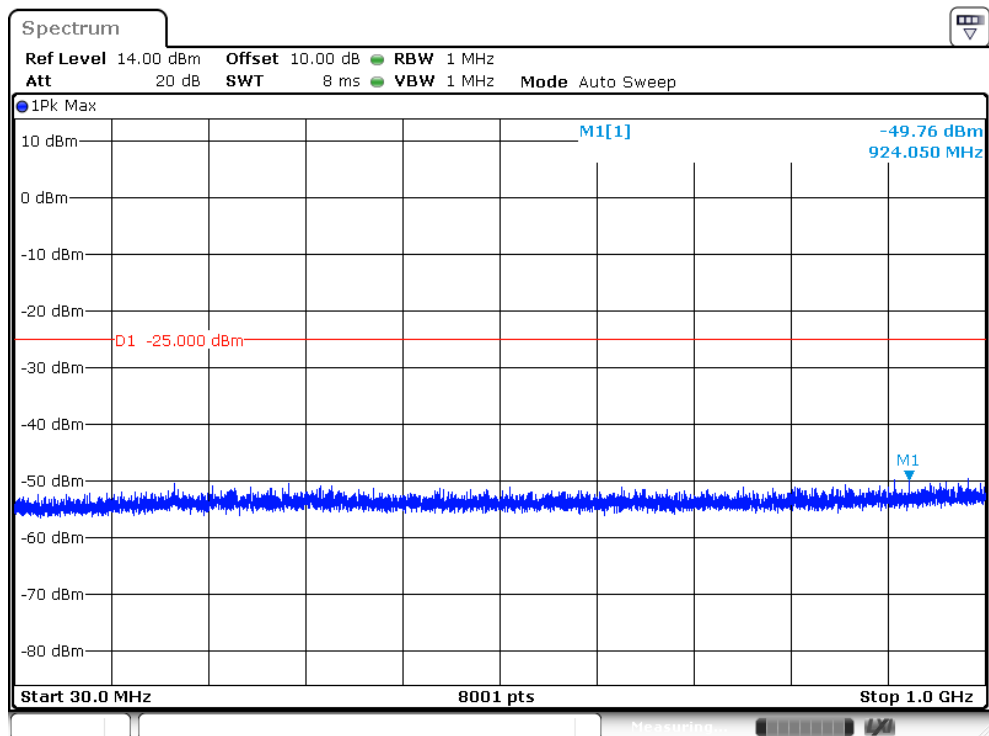
Band 7, UL Channel 20800, UL Frequency 2505.0, BW 10.0, NO. RB 50, RB POS. Low, 16-QAM



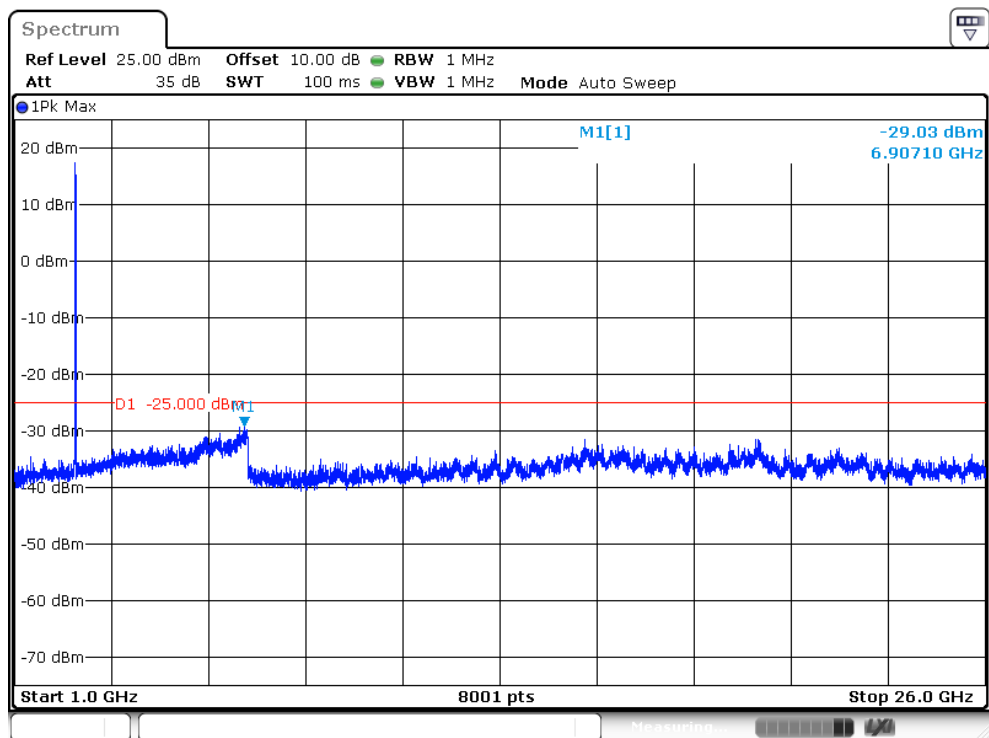
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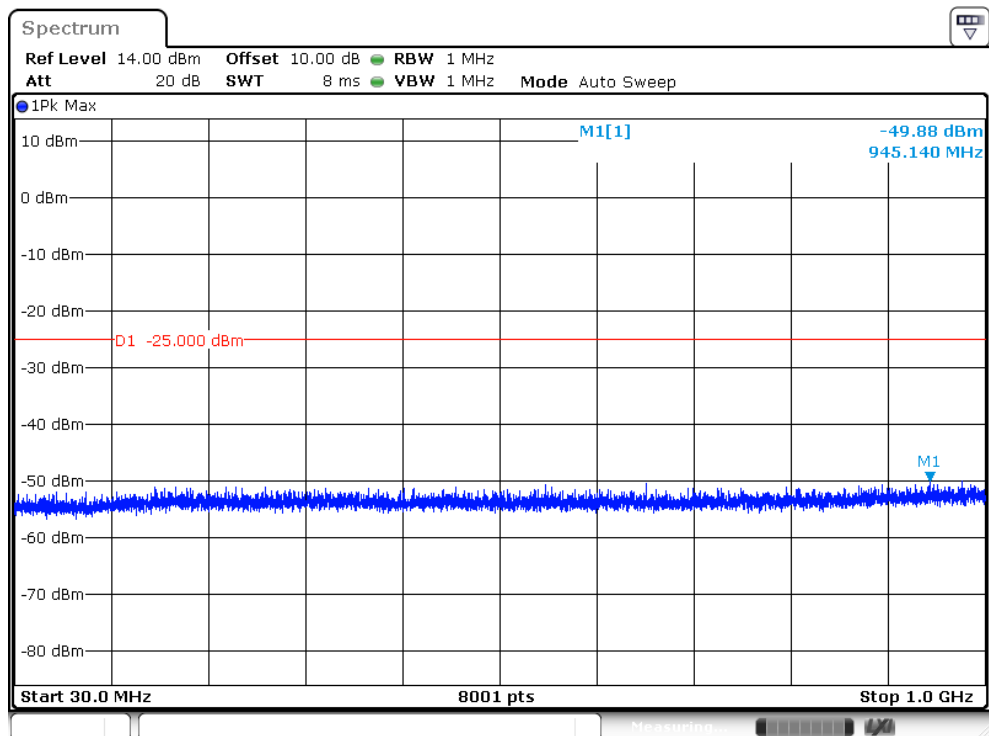
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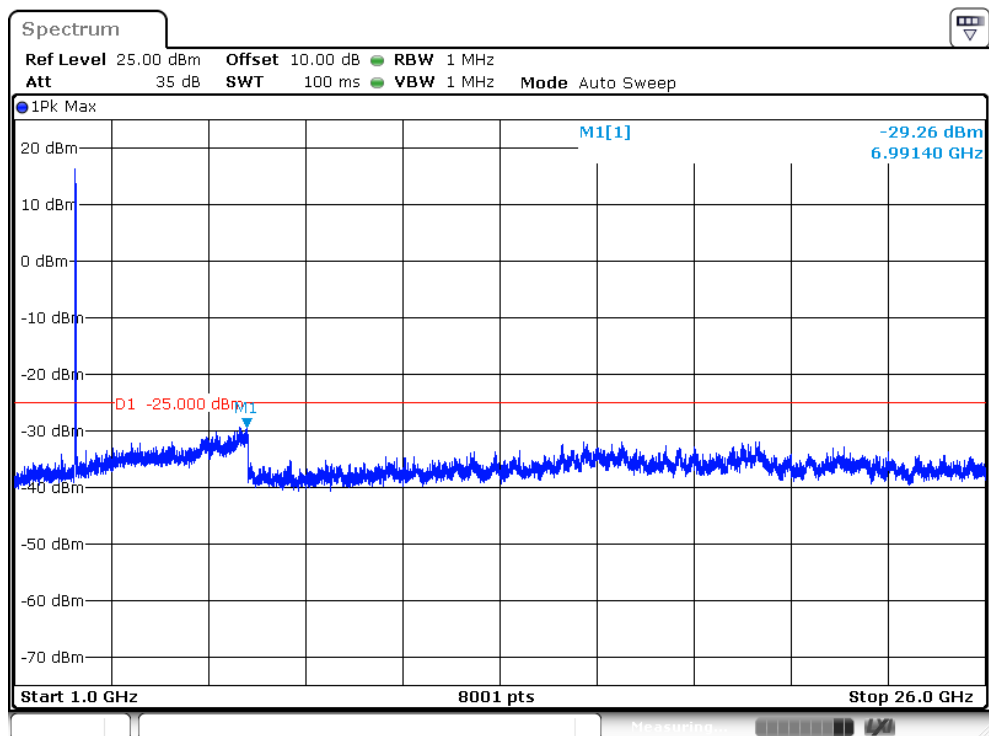
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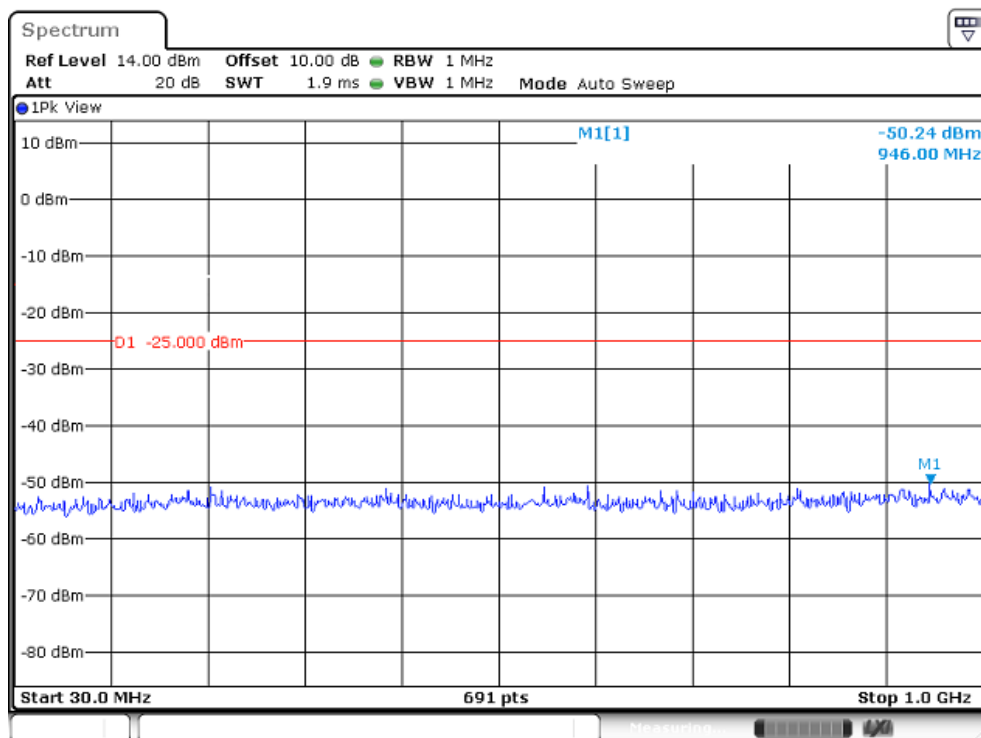
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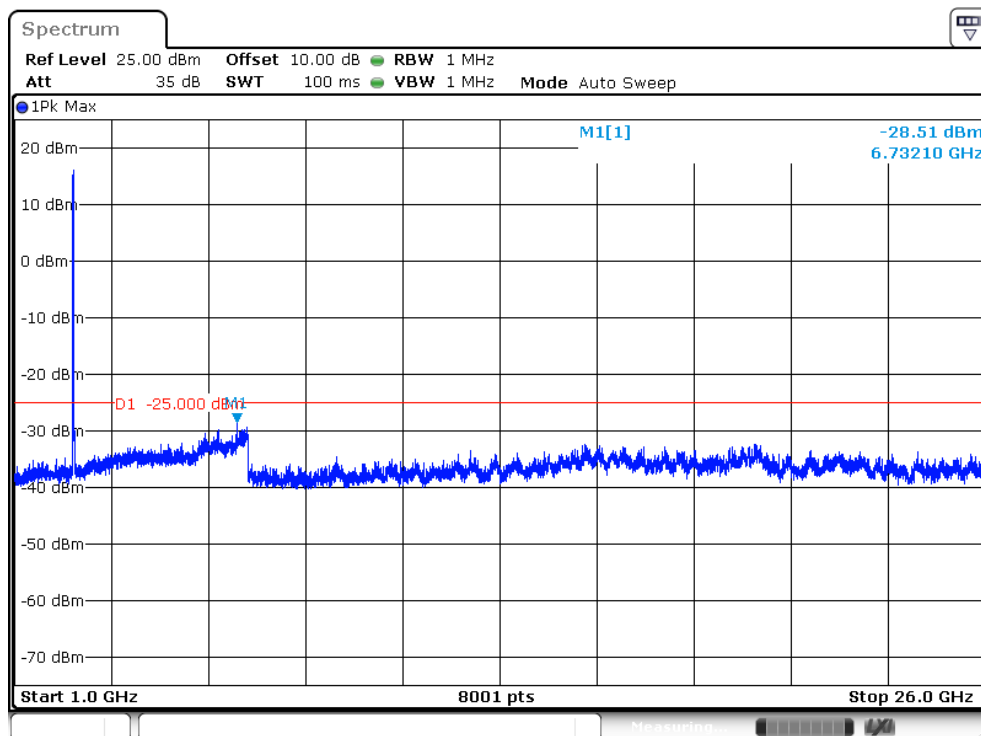
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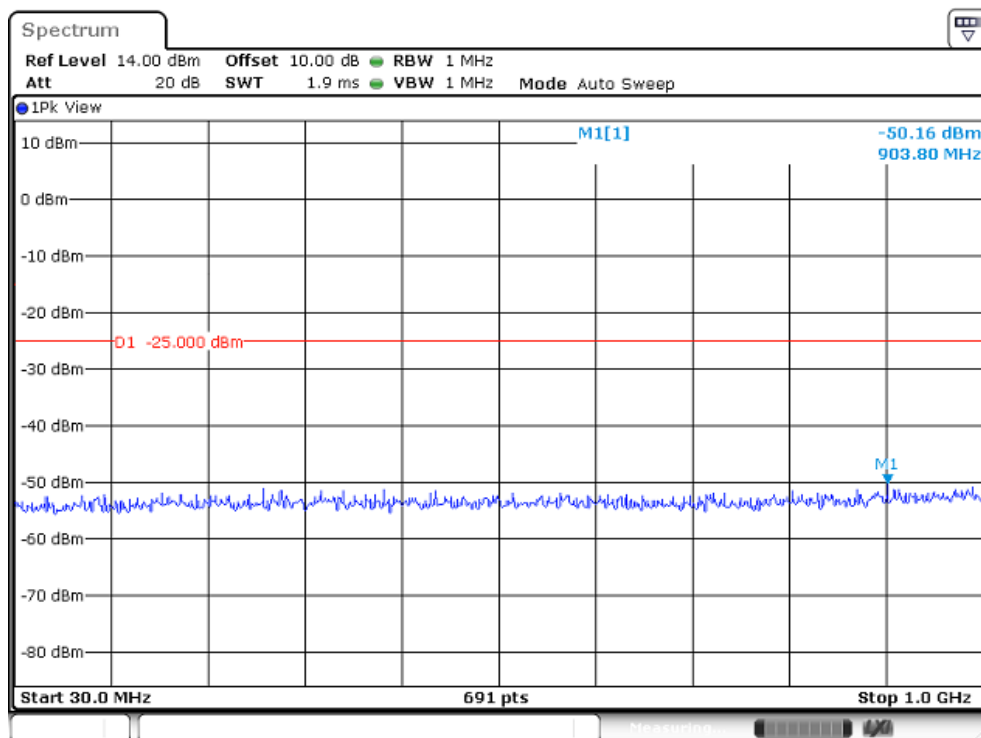
Band 7, UL Channel 20825, UL Frequency 2507.5, BW 15.0, NO. RB 75, RB POS. Low, QPSK



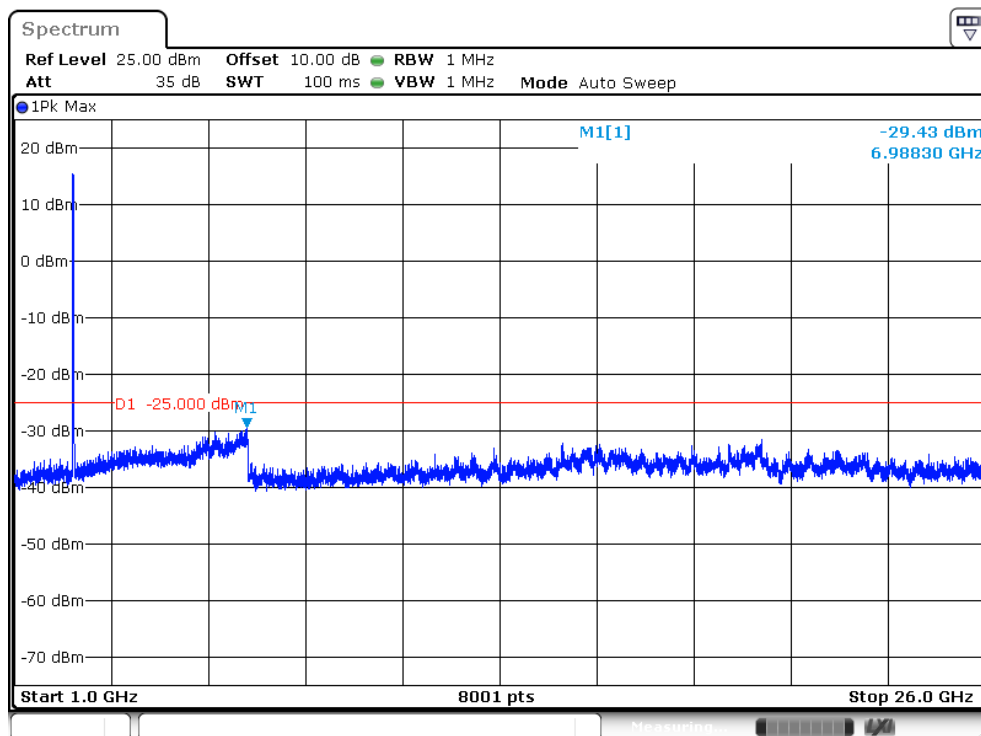
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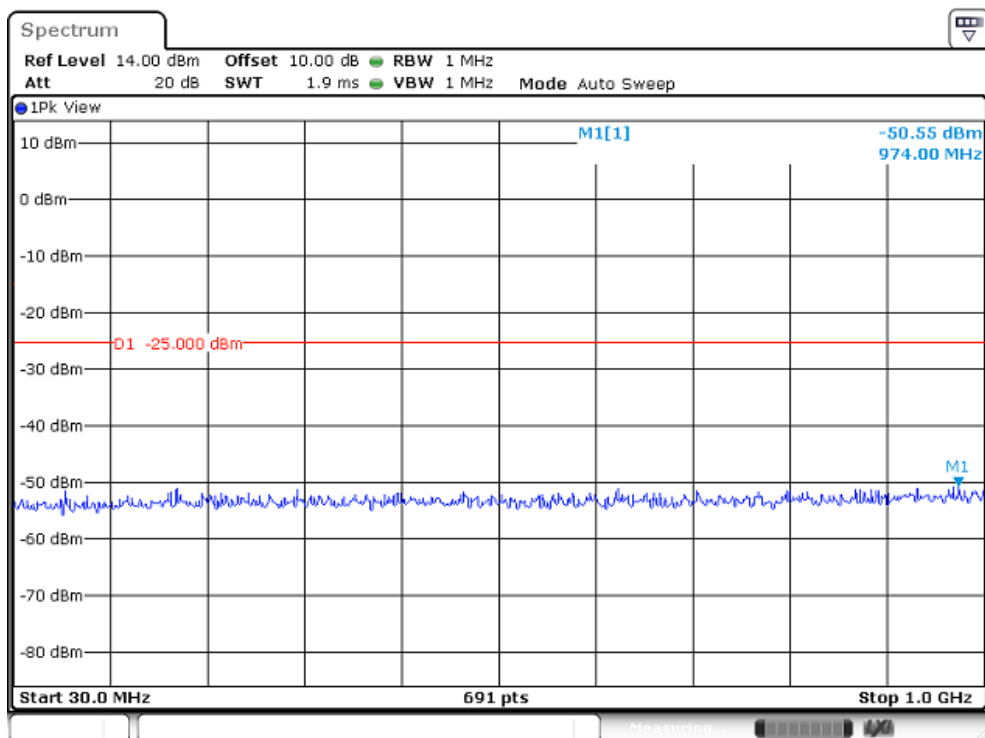
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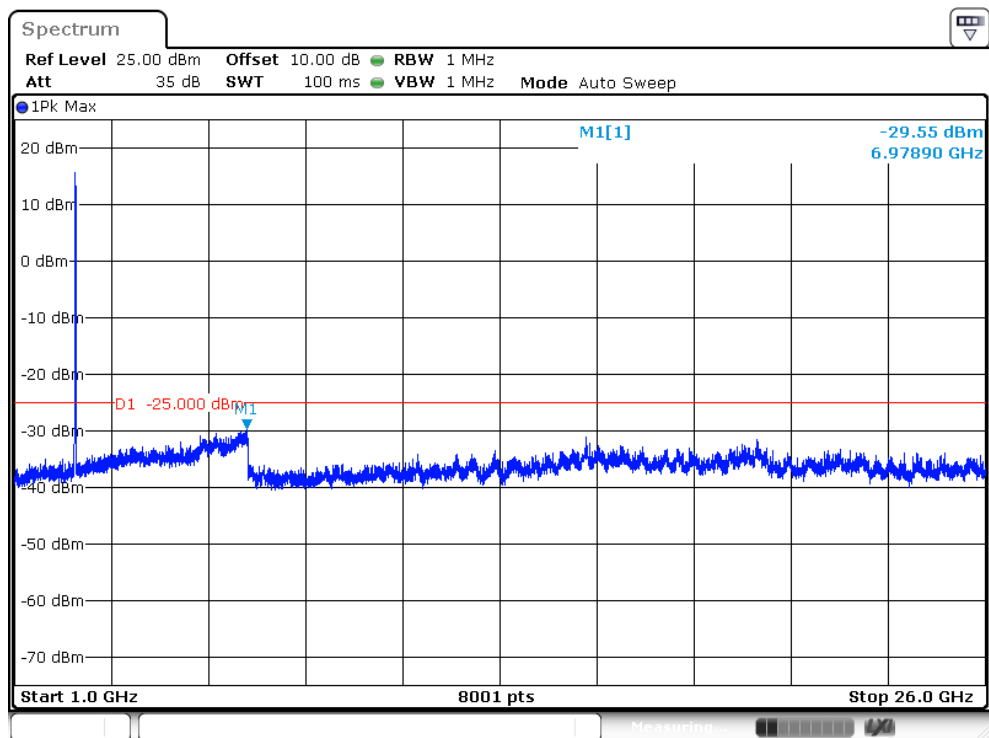
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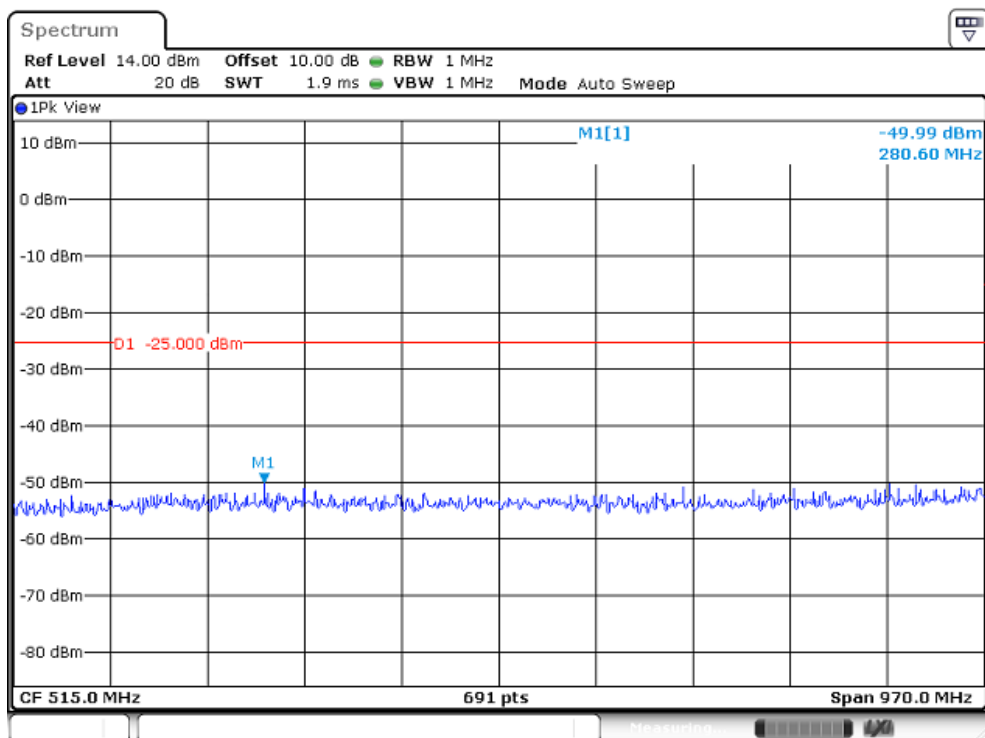
Band 7, UL Channel 21375, UL Frequency 2562.5, BW 15.0, NO. RB 75, RB POS. Low, QPSK



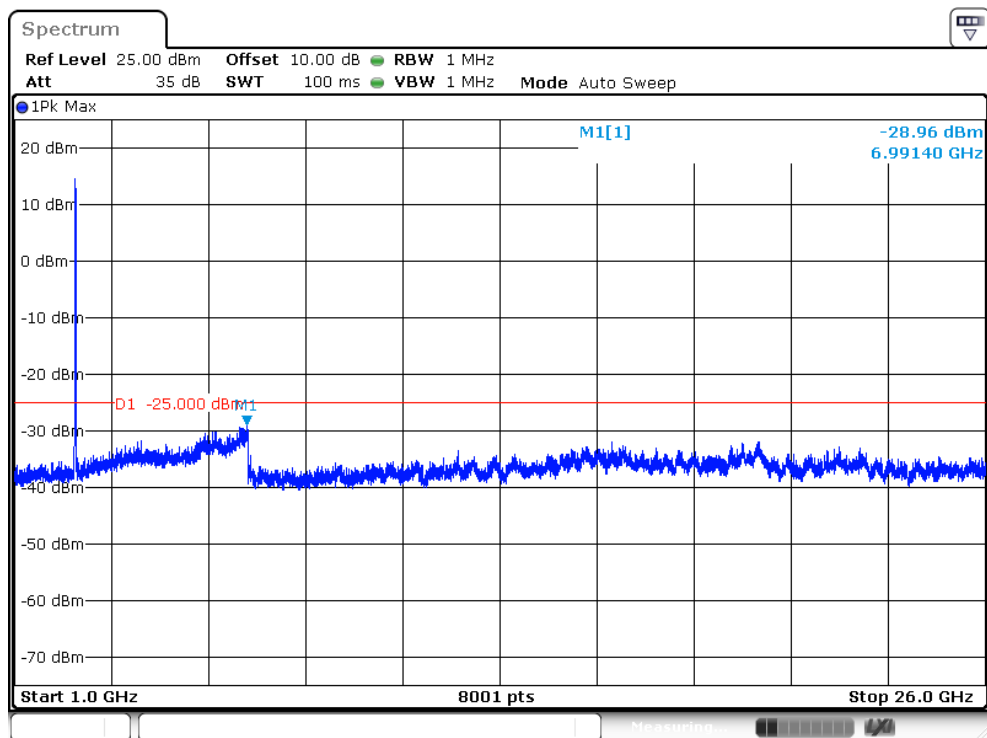
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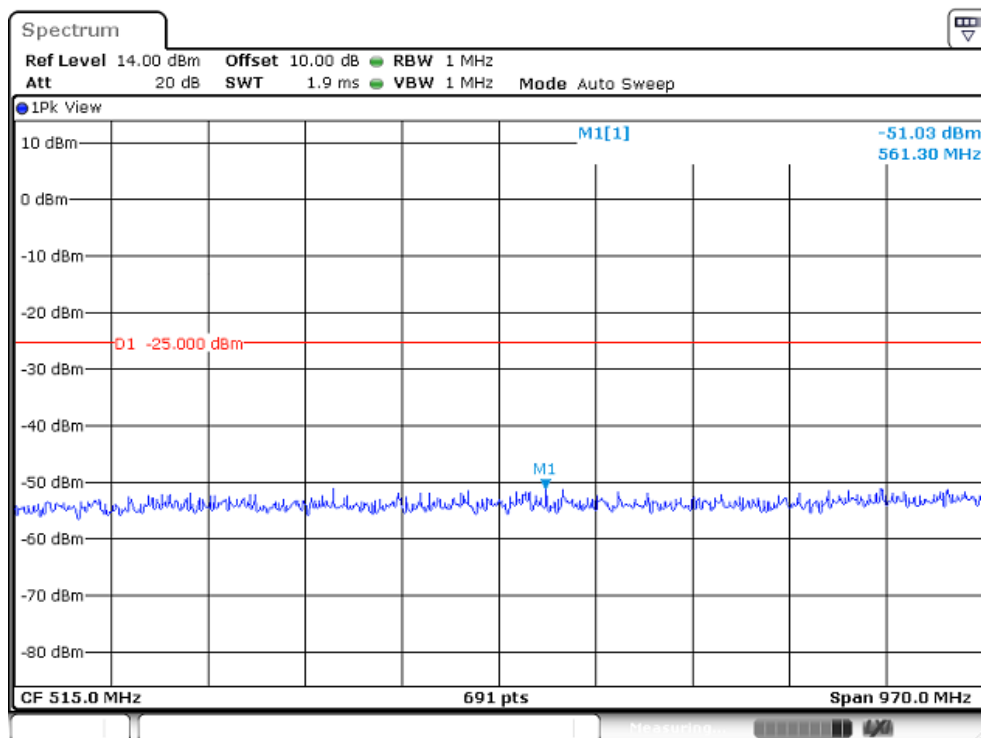
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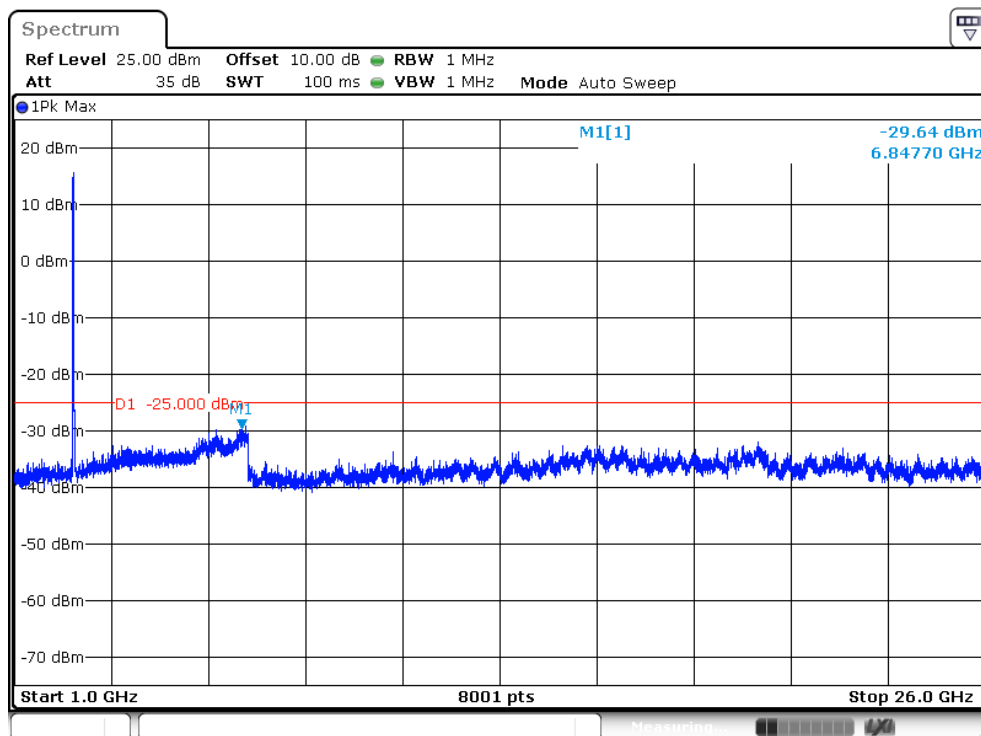
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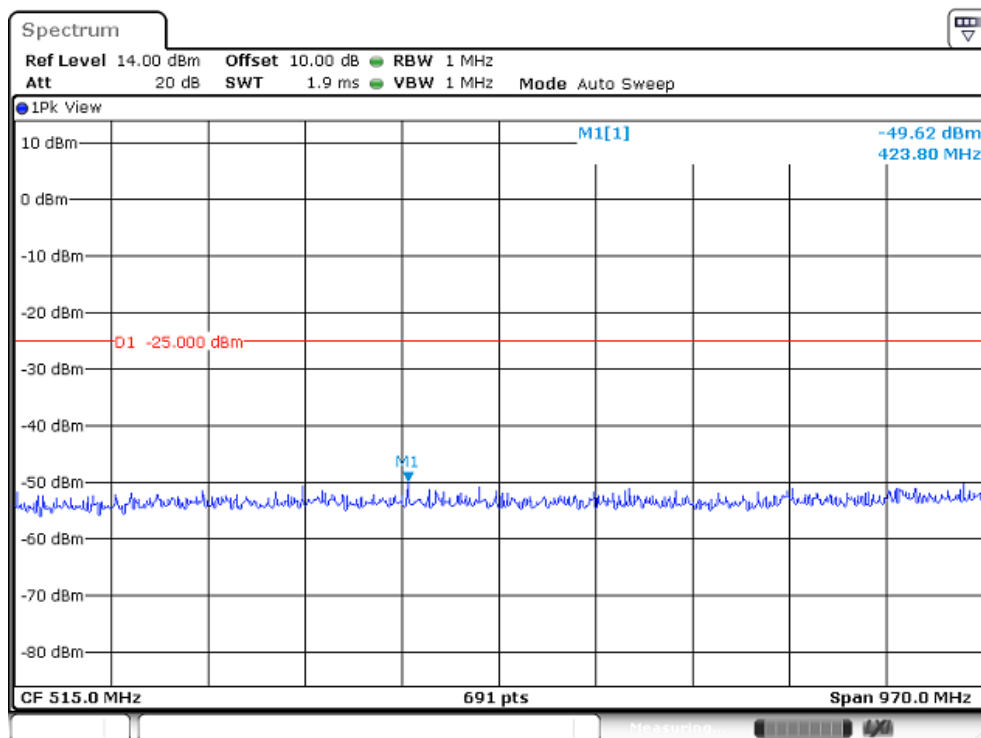
Band 7, UL Channel 20850, UL Frequency 2510.0, BW 20.0, NO. RB 100, RB POS. Low, QPSK



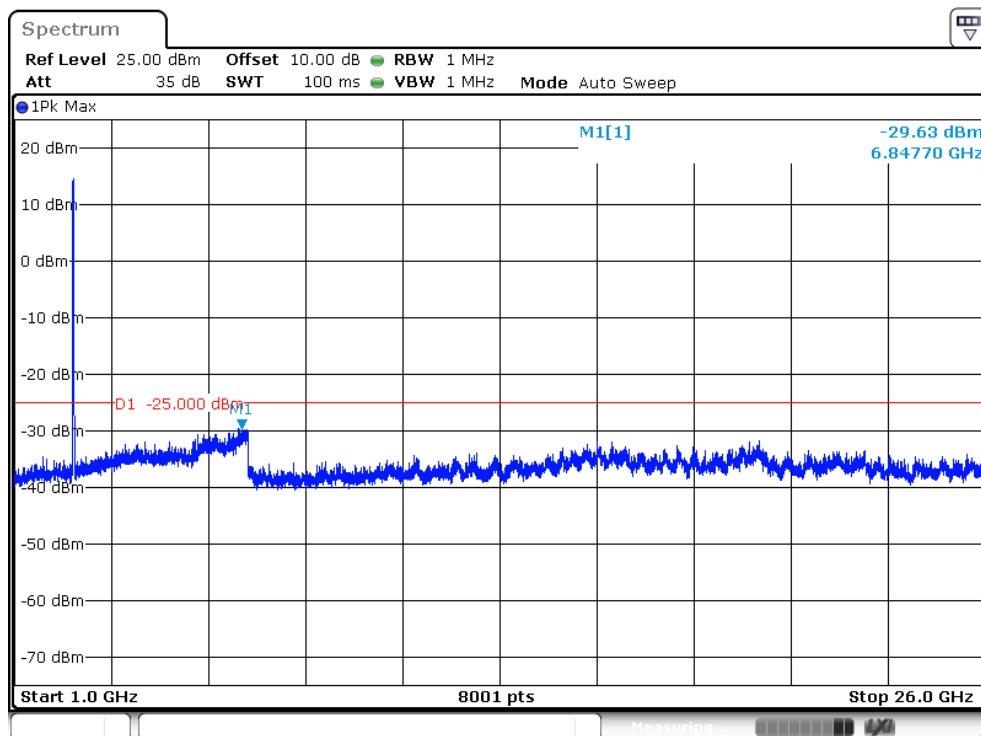
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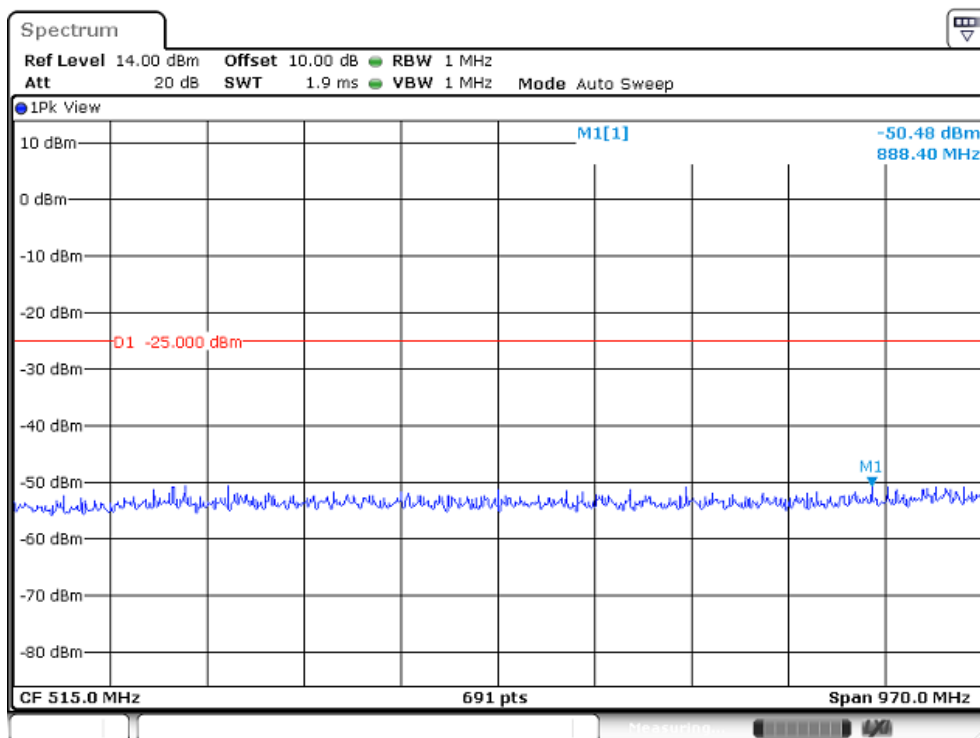
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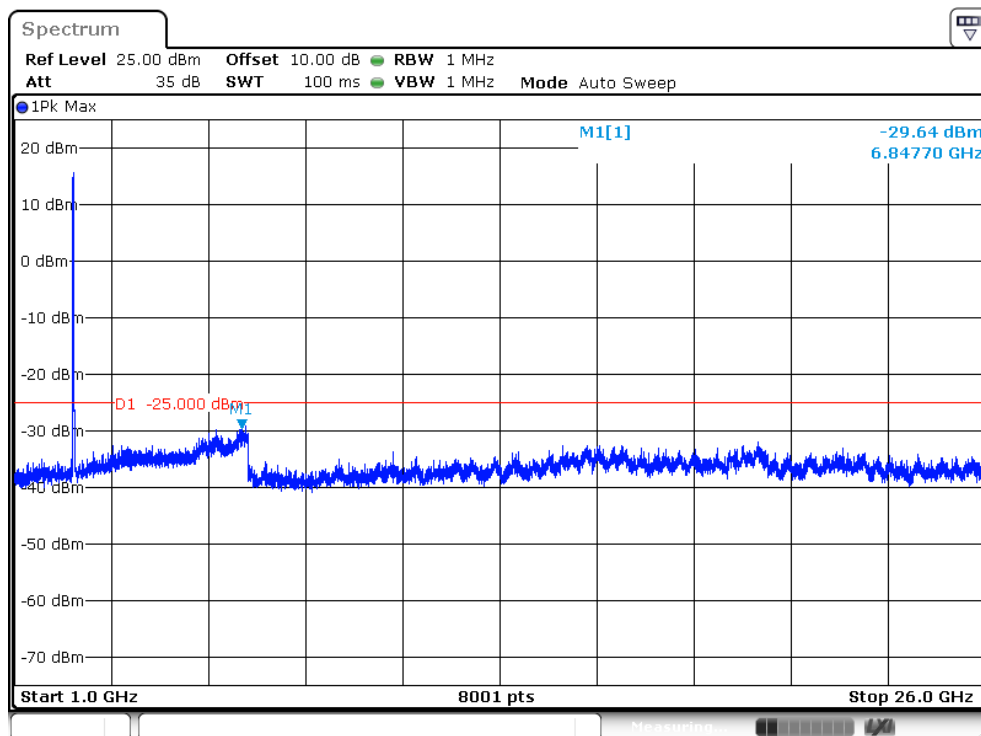
Band 7, UL Channel 20850, UL Frequency 2510.0, BW 20.0, NO. RB 100, RB POS. Low, 16-QAM



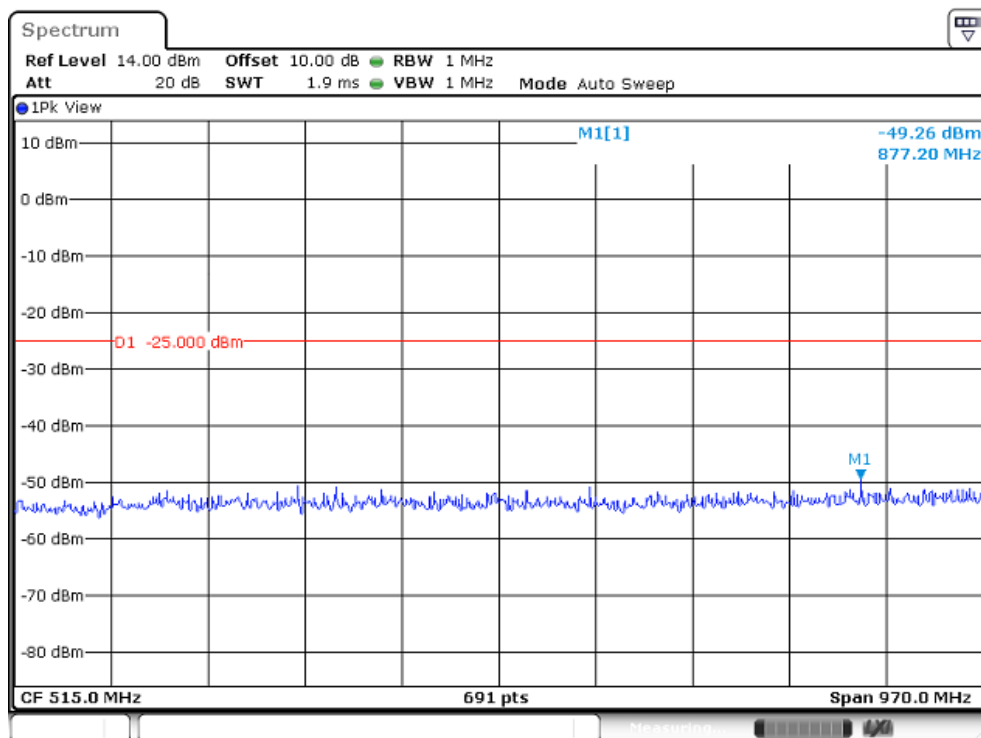
Band 7, UL Channel 21350, UL Frequency 2560.0, BW 20.0, NO. RB 100, RB POS. Low, QPSK



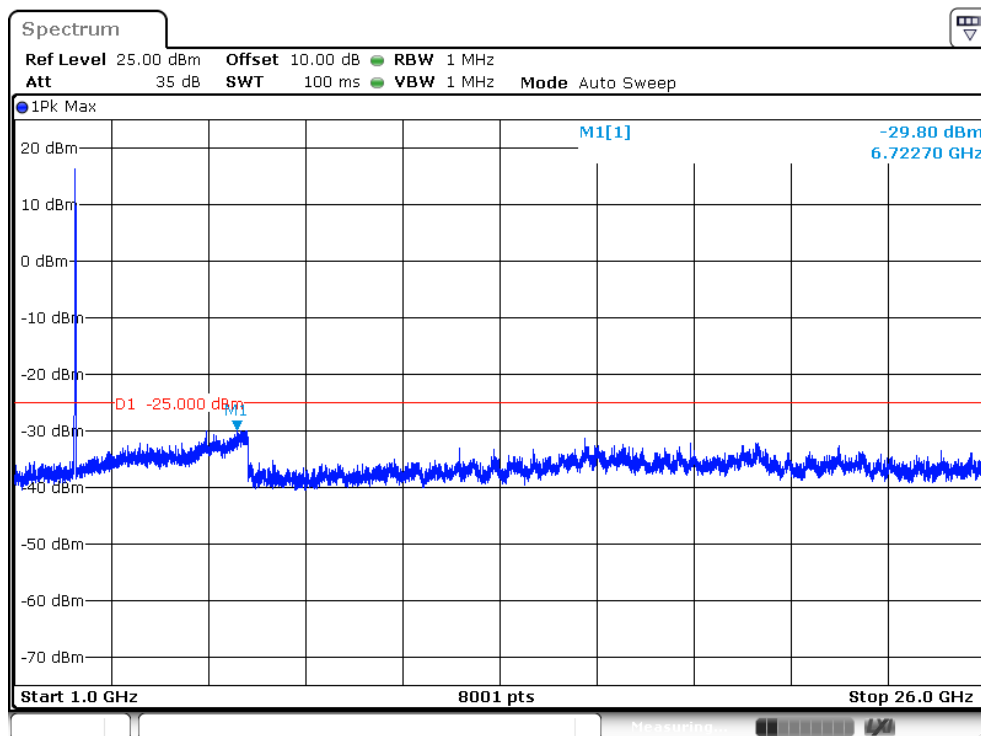
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Band 7, UL Channel 21350, UL Frequency 2560.0, BW 20.0, NO. RB 100, RB POS. Low, 16-QAM



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



8. RADIATED MEASUREMENT

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 Band 5

LTE Band 7

RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB/ RB SIZE	Frequency	Result						Conclusio n
			SG Level (dBm)	Cable Loss (dBm)	Antenn a Gain (dB)	Max. EIRP Avera ge (dBm)	Max. EIRP	Polarizati on Of Max. ERP	
							Average (mW)		
1.4MHz Band QPSK	6/0	1850.7	-2.69	3.76	28.24	21.79	151.008	Vertical	Pass
		1880	-2.36	3.91	28.22	21.95	156.675	Vertical	Pass
		1909.3	-2.42	3.93	28.20	21.85	153.109	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-3.30	3.76	28.24	21.18	131.220	Vertical	Pass
		1880	-3.03	3.91	28.22	21.28	134.276	Vertical	Pass
		1909.3	-3.14	3.93	28.20	21.13	129.718	Vertical	Pass
3.0MHz Band QPSK	15/0	1851.5	-2.63	3.77	28.23	21.83	152.405	Vertical	Pass
		1880	-2.52	3.91	28.24	21.81	151.705	Vertical	Pass
		1908.5	-2.42	3.94	28.25	21.89	154.525	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-3.19	3.77	28.23	21.27	133.968	Vertical	Pass
		1880	-3.14	3.91	28.24	21.19	131.522	Vertical	Pass
		1908.5	-3.11	3.94	28.25	21.20	131.826	Vertical	Pass
5.0MHz Band QPSK	25/0	1852.5	-2.58	3.77	28.31	21.96	157.036	Vertical	Pass
		1880	-2.50	3.91	28.22	21.81	151.705	Vertical	Pass
		1907.5	-2.53	3.94	28.20	21.73	148.936	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-3.48	3.77	28.31	21.06	127.644	Vertical	Pass
		1880	-3.28	3.91	28.22	21.03	126.765	Vertical	Pass
		1907.5	-3.15	3.94	28.20	21.11	129.122	Vertical	Pass
10.0MH z Band QPSK	50/0	1855	-2.67	3.79	28.33	21.87	153.815	Vertical	Pass
		1880	-2.45	3.95	28.22	21.82	152.055	Vertical	Pass
		1905	-2.41	3.97	28.19	21.81	151.705	Vertical	Pass
10.0MH z Band 16 QAM	50/0	1855	-3.35	3.79	28.33	21.19	131.522	Vertical	Pass
		1880	-3.24	3.95	28.22	21.03	126.765	Vertical	Pass
		1905	-3.11	3.97	28.19	21.11	129.122	Vertical	Pass
15.0MH z Band QPSK	75/0	1857.5	-2.75	3.79	28.34	21.80	151.356	Vertical	Pass
		1880	-2.38	3.95	28.22	21.89	154.525	Vertical	Pass
		1902.5	-2.33	3.97	28.18	21.88	154.170	Vertical	Pass
15.0MH z Band 16 QAM	75/0	1857.5	-3.38	3.79	28.34	21.17	130.918	Vertical	Pass
		1880	-2.99	3.95	28.22	21.28	134.276	Vertical	Pass
		1902.5	-3.00	3.97	28.18	21.21	132.130	Vertical	Pass

20.0MHz z Band QPSK	100/ 0	1860	-2.35	3.81	28.35	22.19	165.577	Vertical	Pass
		1880	-2.32	3.96	28.22	21.94	156.315	Vertical	Pass
		1900	-2.26	4.00	28.16	21.90	154.882	Vertical	Pass
20.0MHz z Band 16 QAM	100/ 0	1860	-2.52	3.81	28.35	22.02	159.221	Vertical	Pass
		1880	-2.20	3.96	28.22	22.06	160.694	Vertical	Pass
		1900	-2.27	4.00	28.16	21.89	154.525	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	-3.13	3.76	28.24	21.35	136.458	Horizontal	Pass
		1880	-2.85	3.91	28.22	21.46	139.959	Horizontal	Pass
		1909.3	-2.86	3.93	28.20	21.41	138.357	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1850.7	-3.59	3.76	28.24	20.89	122.744	Horizontal	Pass
		1880	-3.52	3.91	28.22	20.79	119.950	Horizontal	Pass
		1909.3	-3.54	3.93	28.20	20.73	118.304	Horizontal	Pass
3.0MHz Band QPSK	15/0	1851.5	-3.16	3.77	28.23	21.30	134.896	Horizontal	Pass
		1880	-2.95	3.91	28.24	21.38	137.404	Horizontal	Pass
		1908.5	-2.88	3.94	28.25	21.43	138.995	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1851.5	-3.84	3.77	28.23	20.62	115.345	Horizontal	Pass
		1880	-3.65	3.91	28.24	20.68	116.950	Horizontal	Pass
		1908.5	-3.54	3.94	28.25	20.77	119.399	Horizontal	Pass
5.0MHz Band QPSK	25/0	1852.5	-3.17	3.77	28.31	21.37	137.088	Horizontal	Pass
		1880	-2.96	3.91	28.22	21.35	136.458	Horizontal	Pass
		1907.5	-2.81	3.94	28.20	21.45	139.637	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1852.5	-3.83	3.77	28.31	20.71	117.761	Horizontal	Pass
		1880	-3.64	3.91	28.22	20.67	116.681	Horizontal	Pass
		1907.5	-3.47	3.94	28.20	20.79	119.950	Horizontal	Pass
10.0MH z Band QPSK	50/0	1855	-3.25	3.79	28.33	21.29	134.586	Horizontal	Pass
		1880	-2.94	3.95	28.22	21.33	135.831	Horizontal	Pass
		1905	-2.95	3.97	28.19	21.27	133.968	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	1855	-3.95	3.79	28.33	20.59	114.551	Horizontal	Pass
		1880	-3.59	3.95	28.22	20.68	116.950	Horizontal	Pass
		1905	-3.49	3.97	28.19	20.73	118.304	Horizontal	Pass
15.0MH z Band QPSK	75/0	1857.5	-3.20	3.79	28.34	21.35	136.458	Horizontal	Pass
		1880	-2.96	3.95	28.22	21.31	135.207	Horizontal	Pass
		1902.5	-2.78	3.97	28.18	21.43	138.995	Horizontal	Pass
15.0MH z Band 16 QAM	75/0	1857.5	-3.73	3.79	28.34	20.82	120.781	Horizontal	Pass
		1880	-3.54	3.95	28.22	20.73	118.304	Horizontal	Pass
		1902.5	-3.51	3.97	28.18	20.70	117.490	Horizontal	Pass
20.0MH z Band	100/ 0	1860	-2.75	3.81	28.35	21.79	151.008	Horizontal	Pass
		1880	-2.54	3.96	28.22	21.72	148.594	Horizontal	Pass

QPSK		1900	-2.31	4.00	28.16	21.85	153.109	Horizontal	Pass
20.0MHz Band 16 QAM	100/0	1860	-2.72	3.81	28.35	21.82	152.055	Horizontal	Pass
		1880	-2.53	3.96	28.22	21.73	148.936	Horizontal	Pass
		1900	-2.28	4.00	28.16	21.88	154.170	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	-2.16	3.12	27.58	22.30	169.824	Vertical	Pass
		1732.5	-2.09	3.27	27.61	22.25	167.880	Vertical	Pass
		1754.3	-2.01	3.29	27.63	22.33	171.002	Vertical	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-2.95	3.12	27.58	21.51	141.579	Vertical	Pass
		1732.5	-2.77	3.27	27.61	21.57	143.549	Vertical	Pass
		1754.3	-2.61	3.29	27.63	21.73	148.936	Vertical	Pass
3.0MHz Band QPSK	15/0	1711.5	-2.16	3.13	27.61	22.32	170.608	Vertical	Pass
		1732.5	-2.04	3.27	27.61	22.30	169.824	Vertical	Pass
		1753.5	-1.95	3.30	27.62	22.37	172.584	Vertical	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-2.85	3.13	27.61	21.63	145.546	Vertical	Pass
		1732.5	-2.69	3.27	27.61	21.65	146.218	Vertical	Pass
		1753.5	-2.68	3.30	27.62	21.64	145.881	Vertical	Pass
5.0MHz Band QPSK	25/0	1712.5	-2.22	3.13	27.63	22.28	169.044	Vertical	Pass
		1732.5	-2.09	3.27	27.61	22.25	167.880	Vertical	Pass
		1752.5	-1.90	3.30	27.60	22.40	173.780	Vertical	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-2.80	3.13	27.63	21.70	147.911	Vertical	Pass
		1732.5	-2.73	3.27	27.61	21.61	144.877	Vertical	Pass
		1752.5	-2.72	3.30	27.60	21.58	143.880	Vertical	Pass
10.0MHz Band QPSK	50/0	1715	-2.15	3.15	27.64	22.34	171.396	Vertical	Pass
		1732.5	-1.98	3.31	27.61	22.32	170.608	Vertical	Pass
		1750	-1.93	3.33	27.59	22.33	171.002	Vertical	Pass
10.0MHz Band 16 QAM	50/0	1715	-2.88	3.15	27.64	21.61	144.877	Vertical	Pass
		1732.5	-2.75	3.31	27.61	21.55	142.889	Vertical	Pass
		1750	-2.76	3.33	27.59	21.50	141.254	Vertical	Pass
15.0MHz Band QPSK	75/0	1717.5	-2.08	3.15	27.65	22.42	174.582	Vertical	Pass
		1732.5	-1.85	3.31	27.61	22.45	175.792	Vertical	Pass
		1747.5	-1.91	3.33	27.57	22.33	171.002	Vertical	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-3.16	3.15	27.65	21.34	136.144	Vertical	Pass
		1732.5	-2.87	3.31	27.61	21.43	138.995	Vertical	Pass
		1747.5	-2.96	3.33	27.57	21.28	134.276	Vertical	Pass

20.0MH z Band QPSK	100/0	1720	-0.65	3.17	27.66	23.84	242.103	Vertical	Pass
		1732.5	-1.08	3.32	27.61	23.21	209.411	Vertical	Pass
		1745	-0.73	3.36	27.56	23.47	222.331	Vertical	Pass
20.0MH z Band 16 QAM	100/0	1720	-1.34	3.17	27.66	23.15	206.538	Vertical	Pass
		1732.5	-0.65	3.32	27.61	23.64	231.206	Vertical	Pass
		1745	-0.67	3.36	27.56	23.53	225.424	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	-2.35	3.12	27.58	22.11	162.555	Horizontal	Pass
		1732.5	-2.17	3.27	27.61	22.17	164.816	Horizontal	Pass
		1754.3	-2.33	3.29	27.63	22.01	158.855	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	1710.7	-3.19	3.12	27.58	21.27	133.968	Horizontal	Pass
		1732.5	-3.15	3.27	27.61	21.19	131.522	Horizontal	Pass
		1754.3	-3.13	3.29	27.63	21.21	132.130	Horizontal	Pass
3.0MHz Band QPSK	15/0	1711.5	-2.48	3.13	27.61	22.00	158.489	Horizontal	Pass
		1732.5	-2.41	3.27	27.61	21.93	155.955	Horizontal	Pass
		1753.5	-2.27	3.30	27.62	22.05	160.325	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	1711.5	-3.34	3.13	27.61	21.14	130.017	Horizontal	Pass
		1732.5	-3.15	3.27	27.61	21.19	131.522	Horizontal	Pass
		1753.5	-3.12	3.30	27.62	21.20	131.826	Horizontal	Pass
5.0MHz Band QPSK	25/0	1712.5	-2.40	3.13	27.63	22.10	162.181	Horizontal	Pass
		1732.5	-2.33	3.27	27.61	22.01	158.855	Horizontal	Pass
		1752.5	-2.34	3.30	27.60	21.96	157.036	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	1712.5	-3.31	3.13	27.63	21.19	131.522	Horizontal	Pass
		1732.5	-3.03	3.27	27.61	21.31	135.207	Horizontal	Pass
		1752.5	-3.18	3.30	27.60	21.12	129.420	Horizontal	Pass
10.0MHz Band QPSK	50/0	1715	-2.54	3.15	27.64	21.95	156.675	Horizontal	Pass
		1732.5	-2.33	3.31	27.61	21.97	157.398	Horizontal	Pass
		1750	-2.23	3.33	27.59	22.03	159.588	Horizontal	Pass
10.0MHz Band 16 QAM	50/0	1715	-3.40	3.15	27.64	21.09	128.529	Horizontal	Pass
		1732.5	-3.23	3.31	27.61	21.07	127.938	Horizontal	Pass
		1750	-3.15	3.33	27.59	21.11	129.122	Horizontal	Pass
15.0MHz Band QPSK	75/0	1717.5	-2.59	3.15	27.65	21.91	155.239	Horizontal	Pass
		1732.5	-2.35	3.31	27.61	21.95	156.675	Horizontal	Pass
		1747.5	-2.22	3.33	27.57	22.02	159.221	Horizontal	Pass
15.0MHz Band 16 QAM	75/0	1717.5	-3.37	3.15	27.65	21.13	129.718	Horizontal	Pass
		1732.5	-3.13	3.31	27.61	21.17	130.918	Horizontal	Pass
		1747.5	-3.04	3.33	27.57	21.20	131.826	Horizontal	Pass
20.0MHz Band	100/0	1720	-0.98	3.17	27.66	23.51	224.388	Horizontal	Pass
		1732.5	-0.46	3.32	27.61	23.83	241.546	Horizontal	Pass

QPSK		1745	-0.45	3.36	27.56	23.75	237.137	Horizontal	Pass
20.0MHz	100/0	1720	-0.58	3.17	27.66	23.91	246.037	Horizontal	Pass
z Band		1732.5	-0.39	3.32	27.61	23.90	245.471	Horizontal	Pass
16 QAM		1745	-0.28	3.36	27.56	23.92	246.604	Horizontal	Pass

Note:

SG Level= Signal generator output

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

8.4 LTE BAND 5

Radiated Power (ERP) for Band 5										
Mode	RB/ RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	6/0	824.7	5.47	2.01	19.68	2.15	20.99	125.603	Vertical	Pass
		836.5	5.29	2.01	19.77	2.15	20.90	123.027	Vertical	Pass
		848.3	5.44	2.02	19.82	2.15	21.09	128.529	Vertical	Pass
1.4MHz Band 16 QAM	6/0	824.7	3.87	2.01	19.68	2.15	19.39	86.896	Vertical	Pass
		836.5	3.85	2.01	19.77	2.15	19.46	88.308	Vertical	Pass
		848.3	3.89	2.02	19.82	2.15	19.54	89.950	Vertical	Pass
3.0MHz Band QPSK	15/0	825.5	5.42	2.01	19.70	2.15	20.96	124.738	Vertical	Pass
		836.5	5.37	2.01	19.77	2.15	20.98	125.314	Vertical	Pass
		847.5	5.30	2.02	19.81	2.15	20.94	124.165	Vertical	Pass
3.0MHz Band 16 QAM	15/0	825.5	3.92	2.01	19.70	2.15	19.46	88.308	Vertical	Pass
		836.5	3.88	2.01	19.77	2.15	19.49	88.920	Vertical	Pass
		847.5	3.79	2.02	19.81	2.15	19.43	87.700	Vertical	Pass
5.0MHz Band QPSK	25/0	826.5	5.38	2.01	19.71	2.15	20.93	123.880	Vertical	Pass
		836.5	5.34	2.01	19.77	2.15	20.95	124.451	Vertical	Pass
		846.5	5.30	2.02	19.79	2.15	20.92	123.595	Vertical	Pass
5.0MHz Band 16 QAM	25/0	826.5	3.91	2.01	19.71	2.15	19.46	88.308	Vertical	Pass
		836.5	3.88	2.01	19.77	2.15	19.49	88.920	Vertical	Pass
		846.5	3.86	2.02	19.79	2.15	19.48	88.716	Vertical	Pass
10.0MHz z Band QPSK	50/0	829	6.26	2.01	19.73	2.15	21.83	152.405	Vertical	Pass
		836.5	6.63	2.01	19.77	2.15	22.24	167.494	Vertical	Pass
		844	6.37	2.02	19.78	2.15	21.98	157.761	Vertical	Pass
10.0MHz z Band 16 QAM	50/0	829	5.83	2.01	19.73	2.15	21.40	138.038	Vertical	Pass
		836.5	6.18	2.01	19.77	2.15	21.79	151.008	Vertical	Pass
		844	6.10	2.02	19.78	2.15	21.71	148.252	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	4.98	2.01	19.68	2.15	20.50	112.202	Horizontal	Pass
		836.5	4.91	2.01	19.77	2.15	20.52	112.720	Horizontal	Pass
		848.3	4.90	2.02	19.82	2.15	20.55	113.501	Horizontal	Pass
1.4MHz Band 16 QAM	6/0	824.7	3.69	2.01	19.68	2.15	19.21	83.368	Horizontal	Pass
		836.5	3.51	2.01	19.77	2.15	19.12	81.658	Horizontal	Pass
		848.3	3.37	2.02	19.82	2.15	19.02	79.799	Horizontal	Pass
3.0MHz Band QPSK	15/0	825.5	4.92	2.01	19.70	2.15	20.46	111.173	Horizontal	Pass
		836.5	4.83	2.01	19.77	2.15	20.44	110.662	Horizontal	Pass
		847.5	4.87	2.02	19.81	2.15	20.51	112.460	Horizontal	Pass
3.0MHz Band 16 QAM	15/0	825.5	3.72	2.01	19.70	2.15	19.26	84.333	Horizontal	Pass
		836.5	3.57	2.01	19.77	2.15	19.18	82.794	Horizontal	Pass
		847.5	3.59	2.02	19.81	2.15	19.23	83.753	Horizontal	Pass
5.0MHz Band QPSK	25/0	826.5	4.96	2.01	19.71	2.15	20.51	112.460	Horizontal	Pass
		836.5	4.83	2.01	19.77	2.15	20.44	110.662	Horizontal	Pass
		846.5	4.86	2.02	19.79	2.15	20.48	111.686	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	826.5	3.71	2.01	19.71	2.15	19.26	84.333	Horizontal	Pass
		836.5	3.66	2.01	19.77	2.15	19.27	84.528	Horizontal	Pass
		846.5	3.54	2.02	19.79	2.15	19.16	82.414	Horizontal	Pass
10.0MH z Band QPSK	50/0	829	6.10	2.01	19.73	2.15	21.67	146.893	Horizontal	Pass
		836.5	5.98	2.01	19.77	2.15	21.59	144.212	Horizontal	Pass
		844	6.06	2.02	19.78	2.15	21.67	146.893	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	829	5.90	2.01	19.73	2.15	21.47	140.281	Horizontal	Pass
		836.5	5.83	2.01	19.77	2.15	21.44	139.316	Horizontal	Pass
		844	5.91	2.02	19.78	2.15	21.52	141.906	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	1.19	4.54	27.75	21.06	127.644	Vertical	Pass
		2535	1.18	4.69	27.72	21.54	142.561	Vertical	Pass
		2567.5	1.34	4.71	27.71	21.32	135.519	Vertical	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-0.07	4.54	27.75	20.84	121.339	Vertical	Pass
		2535	0.16	4.69	27.72	20.89	122.744	Vertical	Pass
		2567.5	0.13	4.71	27.71	20.83	121.060	Vertical	Pass
10.0MH z Band QPSK	50/0	2505	1.04	4.55	27.76	21.03	126.765	Vertical	Pass
		2535	1.24	4.69	27.72	21.75	149.624	Vertical	Pass
		2565	1.26	4.72	27.70	21.15	130.317	Vertical	Pass
10.0MH z Band 16 QAM	50/0	2505	-0.10	4.55	27.76	20.81	120.504	Vertical	Pass
		2535	0.14	4.69	27.72	20.87	122.180	Vertical	Pass
		2565	0.11	4.72	27.70	20.79	119.950	Vertical	Pass
15.0MH z Band QPSK	75/0	2507.5	1.12	4.55	27.77	20.12	102.802	Vertical	Pass
		2535	1.27	4.69	27.72	19.88	97.275	Vertical	Pass
		2562.5	1.35	4.72	27.69	19.69	93.111	Vertical	Pass
15.0MH z Band 16 QAM	75/0	2507.5	-0.14	4.55	27.77	20.78	119.674	Vertical	Pass
		2535	0.09	4.69	27.72	20.82	120.781	Vertical	Pass
		2562.5	0.22	4.72	27.69	20.89	122.744	Vertical	Pass
20.0MH z Band QPSK	100/ 0	2510	1.43	4.57	27.78	21.65	146.218	Vertical	Pass
		2535	1.22	4.73	27.72	21.91	155.239	Vertical	Pass
		2560	1.54	4.75	27.68	20.58	114.288	Vertical	Pass
20.0MH z Band 16 QAM	100/ 0	2510	0.94	4.57	27.78	21.85	153.109	Vertical	Pass
		2535	1.19	4.73	27.72	21.88	154.170	Vertical	Pass
		2560	1.24	4.75	27.68	21.87	153.815	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	-1.38	4.54	27.75	21.83	152.405	Horizontal	Pass
		2535	-1.18	4.69	27.72	21.85	153.109	Horizontal	Pass
		2567.5	-1.09	4.71	27.71	21.18	131.220	Horizontal	Pass
5.0MHz Band 16 QAM	25/0	2502.5	-2.24	4.54	27.75	20.97	125.026	Horizontal	Pass
		2535	-2.21	4.69	27.72	20.82	120.781	Horizontal	Pass
		2567.5	-2.27	4.71	27.71	20.73	118.304	Horizontal	Pass
10.0MH z Band QPSK	50/0	2505	-1.42	4.55	27.76	21.79	151.008	Horizontal	Pass
		2535	-1.20	4.69	27.72	21.83	152.405	Horizontal	Pass
		2565	-1.13	4.72	27.70	21.85	153.109	Horizontal	Pass
10.0MH z Band 16 QAM	50/0	2505	-2.31	4.55	27.76	20.90	123.027	Horizontal	Pass
		2535	-2.06	4.69	27.72	20.97	125.026	Horizontal	Pass
		2565	-2.09	4.72	27.70	20.89	122.744	Horizontal	Pass
15.0MH z Band QPSK	75/0	2507.5	-1.42	4.55	27.77	21.80	151.356	Horizontal	Pass
		2535	-1.20	4.69	27.72	21.83	152.405	Horizontal	Pass
		2562.5	-1.16	4.72	27.69	21.81	151.705	Horizontal	Pass
15.0MH z Band 16 QAM	75/0	2507.5	-2.38	4.55	27.77	20.84	121.339	Horizontal	Pass
		2535	-2.18	4.69	27.72	20.85	121.619	Horizontal	Pass
		2562.5	-2.14	4.72	27.69	20.83	121.060	Horizontal	Pass
20.0MH z Band QPSK	100/ 0	2510	-1.25	4.57	27.78	21.45	139.637	Horizontal	Pass
		2535	-1.08	4.73	27.72	21.48	140.605	Horizontal	Pass
		2560	-1.21	4.75	27.68	21.72	148.594	Horizontal	Pass
20.0MH z Band 16 QAM	100/ 0	2510	-1.58	4.57	27.78	21.63	145.546	Horizontal	Pass
		2535	-1.07	4.73	27.72	21.89	154.525	Horizontal	Pass
		2560	-0.84	4.75	27.68	21.33	135.831	Horizontal	Pass

Note:

SG Level= Signal generator output

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

9. SPURIOUS RADIATION EMISSION

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 $43 + 10 \log_{10}(p)$, dB; and
- b. for mobile subscriber equipment, the attenuation shall not be less than $43 + 10 \log_{10}(p)$, dB at the channel edges and $55 + 10 \log_{10}(p)$ 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 Band 5
LTE Band 7

RESULTS

PASS

9.1 LTE BAND 2

QPSK EIRP POWER FOR LTE BAND 2 (1.4MHZ BANDWIDTH)

Test Results for Low Channel 1850.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3701.4	-59.96	4.04	33.51	-30.49	-13	-17.49	Horizontal
3701.4	-59.43	4.04	33.51	-29.96	-13	-16.96	Vertical
5552.1	-61.76	5.24	35.84	-31.16	-13	-18.16	Vertical
5552.1	-61.34	5.24	35.84	-30.74	-13	-17.74	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-58.96	4.04	33.56	-29.44	-13	-16.44	Horizontal
3760	-59.96	4.04	33.56	-30.44	-13	-17.44	Vertical
5640	-57.43	5.24	35.91	-26.76	-13	-13.76	Vertical
5640	-60.34	5.24	35.91	-29.67	-13	-16.67	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-58.17	4.04	34.00	-28.21	-13	-15.21	Horizontal
3818.6	-59.84	4.04	34.00	-29.88	-13	-16.88	Vertical
5727.9	-57.19	5.24	36.04	-26.39	-13	-13.39	Vertical
5727.9	-57.55	5.24	36.04	-26.75	-13	-13.75	Horizontal

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

Test Results for Low Channel 1860MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3720	-61.76	4.07	33.54	-32.29	-13	-19.29	Horizontal
3720	-58.66	4.07	33.54	-29.19	-13	-16.19	Vertical
5580	-61.15	5.28	35.86	-30.57	-13	-17.57	Vertical
5580	-60.65	5.28	35.86	-30.07	-13	-17.07	Horizontal
Test Results for Mid Channel 1880MHz							
3760	-57.63	4.04	33.56	-28.11	-13	-15.11	Horizontal
3760	-58.68	4.04	33.56	-29.16	-13	-16.16	Vertical
5640	-60.49	5.24	35.91	-29.82	-13	-16.82	Vertical
5640	-61.63	5.24	35.91	-30.96	-13	-17.96	Horizontal
Test Results for High Channel 1900MHz							
3800	-58.37	4.04	34.00	-28.41	-13	-15.41	Horizontal
3800	-60.20	4.04	34.00	-30.24	-13	-17.24	Vertical
5700	-60.37	5.24	36.04	-29.57	-13	-16.57	Vertical
5700	-59.94	5.24	36.04	-29.14	-13	-16.14	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 (1.4MHZ 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	-58.26	4.02	29.80	-32.48	-13	-19.48	Horizontal
3421.4	-59.41	4.02	29.80	-33.63	-13	-20.63	Vertical
5132.1	-60.83	5.24	35.84	-30.23	-13	-17.23	Vertical
5132.1	-61.54	5.24	35.84	-30.94	-13	-17.94	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-60.43	4.03	30.00	-34.46	-13	-21.46	Horizontal
3465	-59.64	4.03	30.00	-33.67	-13	-20.67	Vertical
5197.5	-61.95	5.25	35.86	-31.34	-13	-18.34	Vertical
5197.5	-60.33	5.25	35.86	-29.72	-13	-16.72	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-57.44	4.05	30.01	-31.48	-13	-18.48	Horizontal
3508.6	-61.67	4.05	30.01	-35.71	-13	-22.71	Vertical
5262.9	-62.59	5.26	35.86	-31.99	-13	-18.99	Vertical
5262.9	-60.64	5.26	35.86	-30.04	-13	-17.04	Horizontal

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

Test Results for Low Channel 1720MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3440	-58.66	4.02	29.80	-32.88	-13	-19.88	Horizontal
3440	-58.64	4.02	29.80	-32.86	-13	-19.86	Vertical
5160	-57.21	5.24	35.84	-26.61	-13	-13.61	Vertical
5160	-61.39	5.24	35.84	-30.79	-13	-17.79	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465	-57.43	4.03	30.00	-31.46	-13	-18.46	Horizontal
3465	-55.87	4.03	30.00	-29.90	-13	-16.90	Vertical
5197.5	-63.21	5.25	35.86	-32.60	-13	-19.60	Vertical
5197.5	-63.36	5.25	35.86	-32.75	-13	-19.75	Horizontal
Test Results for High Channel 1745MHz							
2490	-58.69	2.91	27.68	-33.92	-13	-20.92	Horizontal
3490	-57.43	2.91	27.68	-32.66	-13	-19.66	Vertical
5235	-61.94	5.26	35.86	-31.34	-13	-18.34	Vertical
5235	-63.25	5.26	35.86	-32.65	-13	-19.65	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	-58.63	2.78	27.50	-33.91	-13	-20.91	Horizontal
1649.4	-62.97	2.78	27.50	-38.25	-13	-25.25	Vertical
2474.1	-55.84	2.90	27.80	-30.94	-13	-17.94	Vertical
2474.1	-59.65	2.90	27.80	-34.75	-13	-21.75	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-57.19	2.78	27.48	-32.49	-13	-19.49	Horizontal
1673	-58.30	2.78	27.48	-33.60	-13	-20.60	Vertical
2509.5	-57.15	2.91	27.70	-32.36	-13	-19.36	Vertical
2509.5	-59.24	2.91	27.70	-34.45	-13	-21.45	Horizontal
Test Results for High Channel 848.3MHz							
1696.6	-57.00	2.78	27.43	-32.35	-13	-19.35	Horizontal
1696.6	-60.66	2.78	27.43	-36.01	-13	-23.01	Vertical
2544.9	-56.33	2.92	27.74	-31.51	-13	-18.51	Vertical
2544.9	-57.47	2.92	27.74	-32.65	-13	-19.65	Horizontal

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

Test Results for Low Channel 829MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1658	-58.75	2.78	27.50	-34.03	-13	-21.03	Horizontal
1658	-57.43	2.78	27.50	-32.71	-13	-19.71	Vertical
2487	-59.87	2.90	27.80	-34.97	-13	-21.97	Vertical
2487	-57.74	2.90	27.80	-32.84	-13	-19.84	Horizontal
Test Results For Mid Channel 836.5MHz							
1673	-59.94	2.78	27.48	-35.24	-13	-22.24	Horizontal
1673	-60.43	2.78	27.48	-35.73	-13	-22.73	Vertical
2509.5	-59.34	2.91	27.70	-34.55	-13	-21.55	Vertical
2509.5	-57.13	2.91	27.70	-32.34	-13	-19.34	Horizontal
Test Results for High Channel 844MHz							
1688	-60.84	2.78	27.43	-36.19	-13	-23.19	Horizontal
1688	-58.94	2.78	27.43	-34.29	-13	-21.29	Vertical
2532	-59.38	2.92	27.74	-34.56	-13	-21.56	Vertical
2532	-57.43	2.92	27.74	-32.61	-13	-19.61	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.

9.4 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	-90.69	5.23	35.81	-60.11	-25	-35.11	Horizontal
5005	-86.61	5.23	35.81	-56.03	-25	-31.03	Vertical
7507.5	-91.37	5.67	36.85	-60.19	-25	-35.19	Vertical
7507.5	-88.82	5.67	36.85	-57.64	-25	-32.64	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-87.52	5.23	35.82	-56.93	-25	-31.93	Horizontal
5070	-89.41	5.23	35.82	-58.82	-25	-33.82	Vertical
7605	-90.16	5.67	36.85	-58.98	-25	-33.98	Vertical
7605	-91.28	5.67	36.85	-60.10	-25	-35.10	Horizontal
Test Results for High Channel 1754.3MHz							
5135	-89.13	5.24	35.83	-58.54	-25	-33.54	Horizontal
5135	-88.63	5.24	35.83	-58.04	-25	-33.04	Vertical
7702.5	-90.96	5.68	36.87	-59.77	-25	-34.77	Vertical
7702.5	-90.65	5.68	36.87	-59.46	-25	-34.46	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	-83.91	5.23	35.82	-53.32	-25	-28.32	Horizontal
5020	-83.74	5.23	35.82	-53.15	-25	-28.15	Vertical
7530	-84.63	5.67	36.86	-53.44	-25	-28.44	Vertical
7530	-83.66	5.67	36.86	-52.47	-25	-27.47	Horizontal
Test Results for Mid Channel 1732.5MHz							
5070	-85.65	5.23	35.82	-55.06	-25	-30.06	Horizontal
5070	-88.03	5.23	35.82	-57.44	-25	-32.44	Vertical
7605	-88.03	5.67	36.85	-56.85	-25	-31.85	Vertical
7605	-84.74	5.67	36.85	-53.56	-25	-28.56	Horizontal
Test Results for High Channel 1754.3MHz							
5120	-82.87	5.24	35.83	-52.28	-25	-27.28	Horizontal
5120	-81.92	5.24	35.83	-51.33	-25	-26.33	Vertical
7680	-84.41	5.70	36.88	-53.23	-25	-28.23	Vertical
7680	-89.05	5.70	36.88	-57.87	-25	-32.87	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.

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 3.2V, Normal, DC 3.85V and High voltage, DC 4.4V.

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

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)				
3.2	1880	6.75	0.003590	2.5
3.85	1880	-12.45	-0.006622	2.5
4.4	1880	9.55	0.005080	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	6.35	0.003378	2.5
Extreme (50C)	1880	-8.45	-0.004495	2.5
Extreme (40C)	1880	-11.65	-0.006197	2.5
Extreme (30C)	1880	-9.15	-0.004867	2.5
Extreme (10C)	1880	6.25	0.003324	2.5
Extreme (0C)	1880	11.75	0.006250	2.5
Extreme (-10C)	1880	14.55	0.007739	2.5
Extreme (-20C)	1880	6.85	0.003644	2.5
Extreme (-30C)	1880	-6.85	-0.003644	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)				
3.2	1880	11.05	0.005878	2.5
3.85	1880	6.25	0.003324	2.5
4.4	1880	7.15	0.003803	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	-7.65	-0.004069	2.5
Extreme (50C)	1880	4.35	0.002314	2.5
Extreme (40C)	1880	-7.55	-0.004016	2.5
Extreme (30C)	1880	9.75	0.005186	2.5
Extreme (10C)	1880	-12.95	-0.006888	2.5
Extreme (0C)	1880	-11.15	-0.005931	2.5
Extreme (-10C)	1880	7.95	0.004229	2.5
Extreme (-20C)	1880	-10.55	-0.005612	2.5
Extreme (-30C)	1880	6.55	0.003484	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)				
3.2	1732.5	11.45	0.006609	2.5
3.85	1732.5	5.15	0.002973	2.5
4.4	1732.5	6.75	0.003896	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	-14.05	-0.008110	2.5
Extreme (50C)	1732.5	8.35	0.004820	2.5
Extreme (40C)	1732.5	6.75	0.003896	2.5
Extreme (30C)	1732.5	-10.25	-0.005916	2.5
Extreme (10C)	1732.5	-11.15	-0.006436	2.5
Extreme (0C)	1732.5	-12.25	-0.007071	2.5
Extreme (-10C)	1732.5	8.65	0.004993	2.5
Extreme (-20C)	1732.5	9.35	0.005397	2.5
Extreme (-30C)	1732.5	7.85	0.004531	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)				
3.2	1732.5	6.45	0.003723	2.5
3.85	1732.5	-7.15	-0.004127	2.5
4.4	1732.5	-8.65	-0.004993	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	-10.25	-0.005916	2.5
Extreme (50C)	1732.5	10.85	0.006263	2.5
Extreme (40C)	1732.5	7.75	0.004473	2.5
Extreme (30C)	1732.5	-12.25	-0.007071	2.5
Extreme (10C)	1732.5	-7.95	-0.004589	2.5
Extreme (0C)	1732.5	-13.05	-0.007532	2.5
Extreme (-10C)	1732.5	-9.15	-0.005281	2.5
Extreme (-20C)	1732.5	8.95	0.005166	2.5
Extreme (-30C)	1732.5	8.35	0.004820	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)				
3.2	836.5	10.35	0.012373	2.5
3.85	836.5	8.05	0.009623	2.5
4.4	836.5	6.65	0.007950	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	-8.05	-0.009623	2.5
Extreme (50C)	836.5	-12.25	-0.014644	2.5
Extreme (40C)	836.5	11.65	0.013927	2.5
Extreme (30C)	836.5	4.95	0.005918	2.5
Extreme (10C)	836.5	8.95	0.010699	2.5
Extreme (0C)	836.5	7.75	0.009265	2.5
Extreme (-10C)	836.5	-7.65	-0.009145	2.5
Extreme (-20C)	836.5	7.95	0.009504	2.5
Extreme (-30C)	836.5	-7.95	-0.009504	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)				
3.2	836.5	6.25	0.007472	2.5
3.85	836.5	7.05	0.008428	2.5
4.4	836.5	-14.05	-0.016796	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	11.85	0.014166	2.5
Extreme (50C)	836.5	7.75	0.009265	2.5
Extreme (40C)	836.5	8.65	0.010341	2.5
Extreme (30C)	836.5	-8.75	-0.010460	2.5
Extreme (10C)	836.5	-7.85	-0.009384	2.5
Extreme (0C)	836.5	4.85	0.005798	2.5
Extreme (-10C)	836.5	6.35	0.007591	2.5
Extreme (-20C)	836.5	5.35	0.006396	2.5
Extreme (-30C)	836.5	8.25	0.009863	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)				
3.2	2535	-12.75	-0.005030	2.5
3.85	2535	-9.65	-0.003807	2.5
4.4	2535	-8.05	-0.003176	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	5.95	0.002347	2.5
Extreme (50C)	2535	7.85	0.003097	2.5
Extreme (40C)	2535	12.55	0.004951	2.5
Extreme (30C)	2535	9.25	0.003649	2.5
Extreme (10C)	2535	-12.75	-0.005030	2.5
Extreme (0C)	2535	-9.95	-0.003925	2.5
Extreme (-10C)	2535	-10.65	-0.004201	2.5
Extreme (-20C)	2535	5.15	0.002032	2.5
Extreme (-30C)	2535	6.15	0.002426	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)				
3.2	2535	10.35	0.012373	2.5
3.85	2535	8.05	0.009623	2.5
4.4	2535	6.65	0.007950	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	-8.05	-0.009623	2.5
Extreme (50C)	2535	-12.25	-0.014644	2.5
Extreme (40C)	2535	11.65	0.013927	2.5
Extreme (30C)	2535	4.95	0.005918	2.5
Extreme (10C)	2535	8.95	0.010699	2.5
Extreme (0C)	2535	7.75	0.009265	2.5
Extreme (-10C)	2535	-7.65	-0.009145	2.5
Extreme (-20C)	2535	7.95	0.009504	2.5
Extreme (-30C)	2535	-7.95	-0.009504	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.

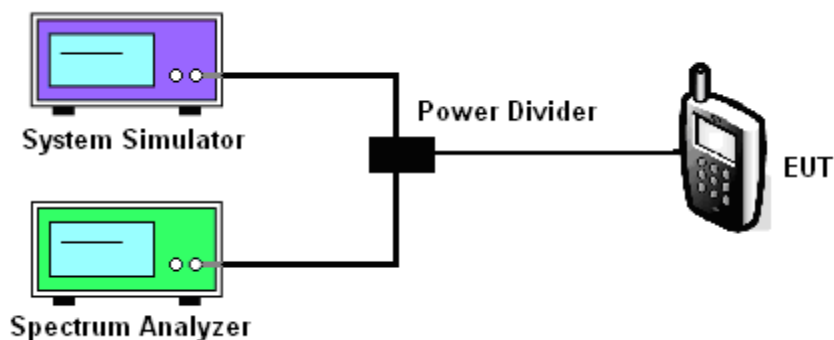
11.2 Measuring Instruments

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

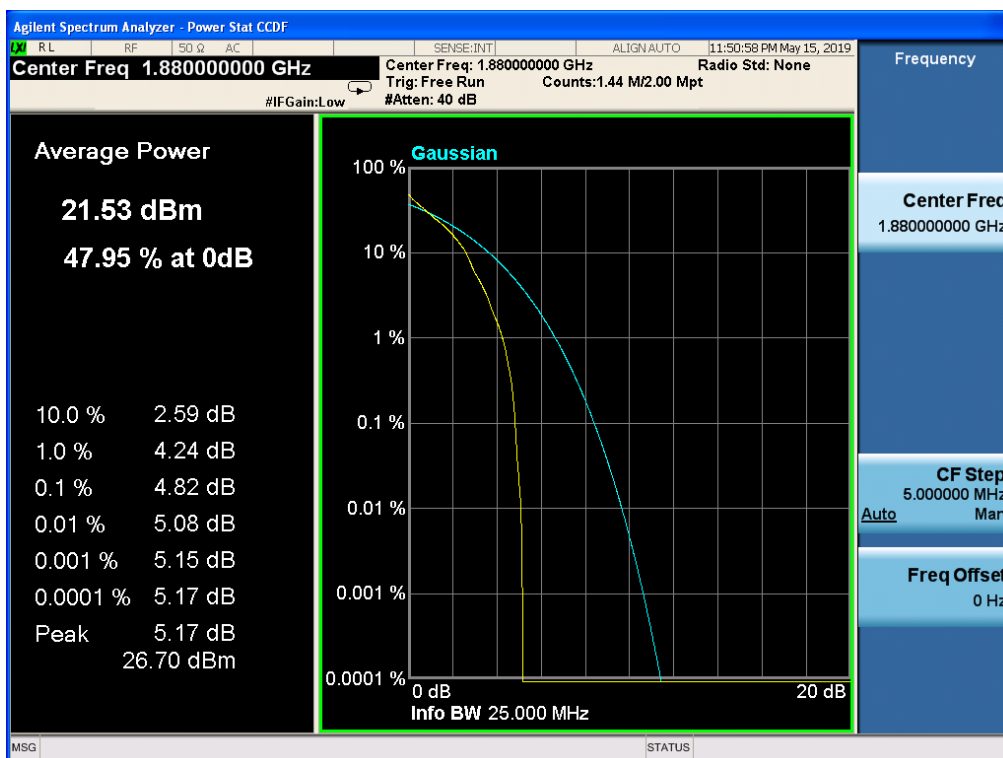
- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 7

BAND	CHANNEL	Frequency [MHz]	BANDWIDTH	NO. RB	RB POS.	MODULATION	PAR [dB]
2	18900	1880.0	1.4	1	Low	QPSK	4.82
2	18900	1880.0	1.4	1	Low	16-QAM	5.58
2	18900	1880.0	3.0	1	Low	QPSK	4.60
2	18900	1880.0	3.0	1	Low	16-QAM	5.17
2	18900	1880.0	5.0	1	Low	QPSK	4.82
2	18900	1880.0	5.0	1	Low	16-QAM	5.65
2	18900	1880.0	10.0	1	Low	QPSK	4.72
2	18900	1880.0	10.0	1	Low	16-QAM	5.64
2	18900	1880.0	15.0	1	Low	QPSK	4.80
2	18900	1880.0	15.0	1	Low	16-QAM	5.31
2	18900	1880.0	20.0	1	Low	QPSK	4.92
2	18900	1880.0	20.0	1	Low	16-QAM	5.58
4	20175	1732.5	1.4	1	Low	QPSK	4.98
4	20175	1732.5	1.4	1	Low	16-QAM	5.71
4	20175	1732.5	3.0	1	Low	QPSK	4.93
4	20175	1732.5	3.0	1	Low	16-QAM	5.71
4	20175	1732.5	5.0	1	Low	QPSK	5.03
4	20175	1732.5	5.0	1	Low	16-QAM	5.82
4	20175	1732.5	10.0	1	Low	QPSK	5.08
4	20175	1732.5	10.0	1	Low	16-QAM	5.70

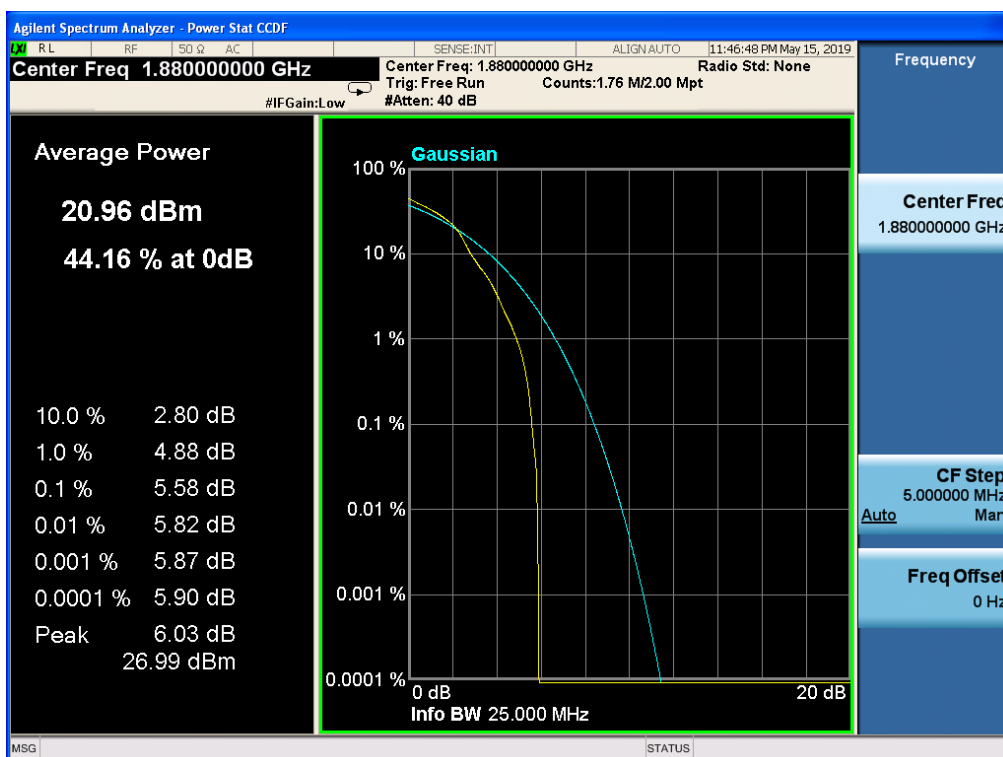
4	20175	1732.5	15.0	1	Low	QPSK	4.79
4	20175	1732.5	15.0	1	Low	16-QAM	5.72
4	20175	1732.5	20.0	1	Low	QPSK	5.03
4	20175	1732.5	20.0	1	Low	16-QAM	5.71
5	20525	836.5	1.4	1	Low	QPSK	4.71
5	20525	836.5	1.4	1	Low	16-QAM	4.94
5	20525	836.5	3.0	1	Low	QPSK	4.88
5	20525	836.5	3.0	1	Low	16-QAM	5.41
5	20525	836.5	5.0	1	Low	QPSK	4.69
5	20525	836.5	5.0	1	Low	16-QAM	5.43
5	20525	836.5	10.0	1	Low	QPSK	4.71
5	20525	836.5	10.0	1	Low	16-QAM	5.47
7	21100	2535.0	5.0	1	Low	QPSK	5.21
7	21100	2535.0	5.0	1	Low	16-QAM	5.67
7	21100	2535.0	10.0	1	Low	QPSK	5.20
7	21100	2535.0	10.0	1	Low	16-QAM	5.56
7	21100	2535.0	15.0	1	Low	QPSK	5.16
7	21100	2535.0	15.0	1	Low	16-QAM	5.78
7	21100	2535.0	20.0	1	Low	QPSK	5.25
7	21100	2535.0	20.0	1	Low	16-QAM	5.71

11.5 LTE BAND 2

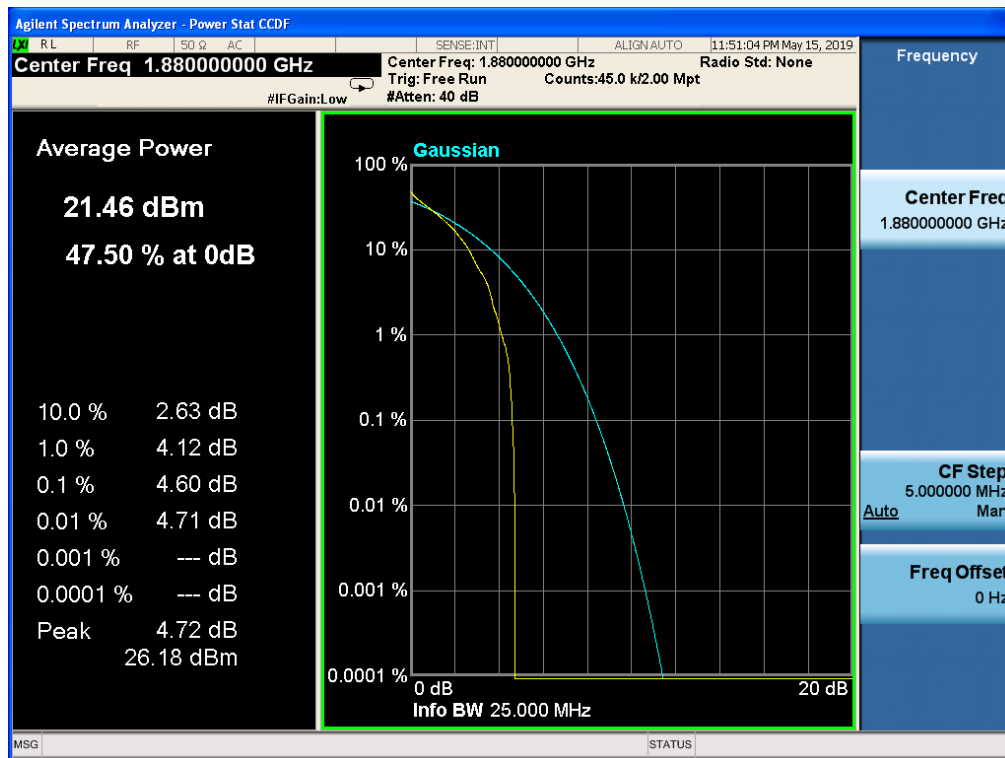
Band 2, UL Channel 18900, UL Frequency 1880.0, BW 1.4, NO. RB 1, RB POS. Low, QPSK



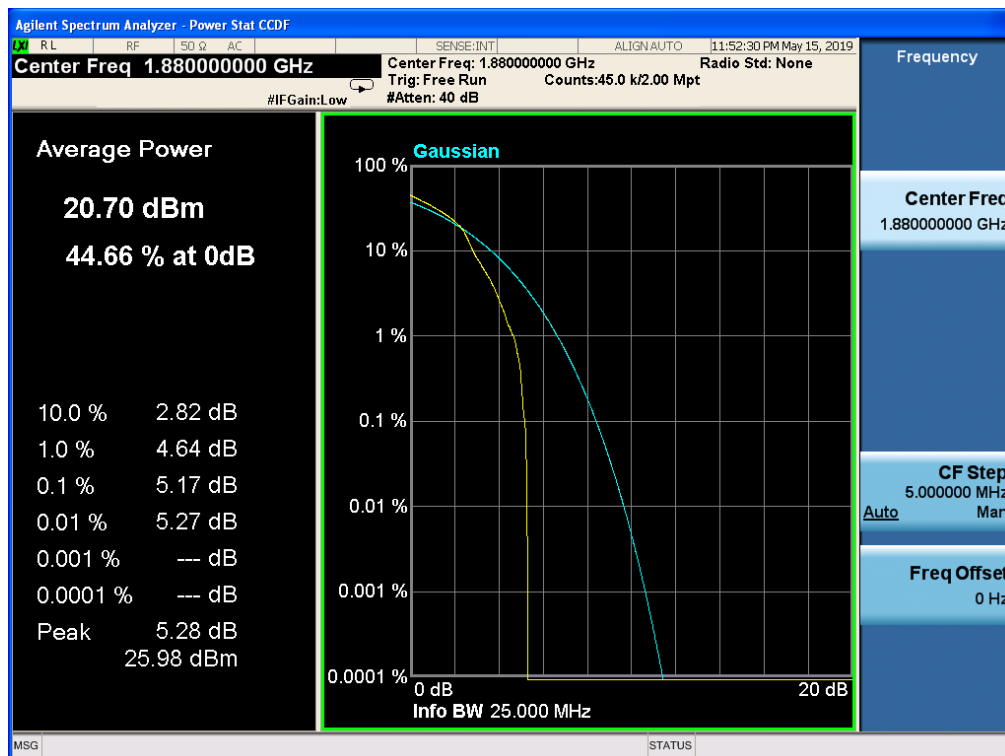
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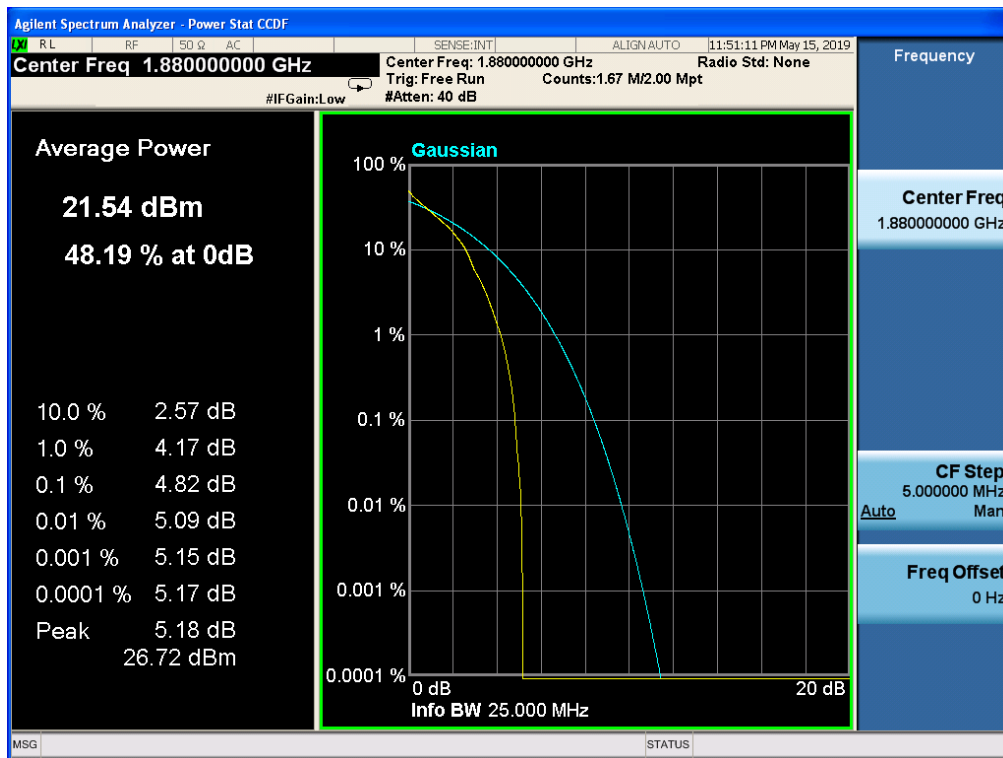
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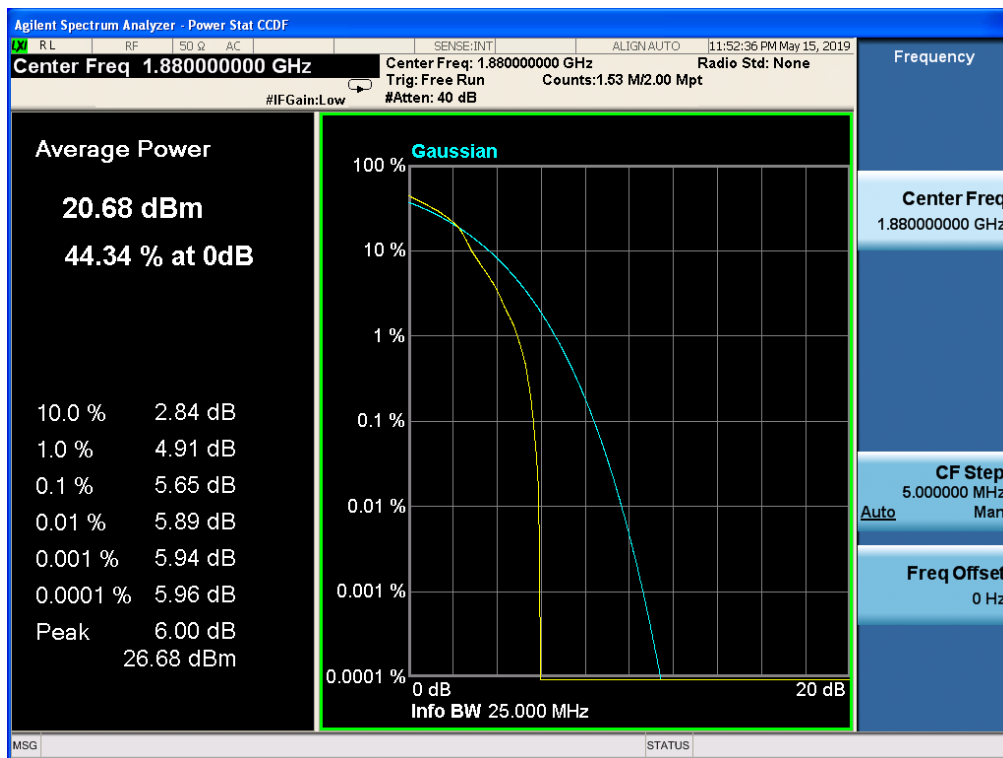
Band 2, UL Channel 18900, UL Frequency 1880.0, BW 3.0, NO. RB 1, RB POS. Low, 16-QAM



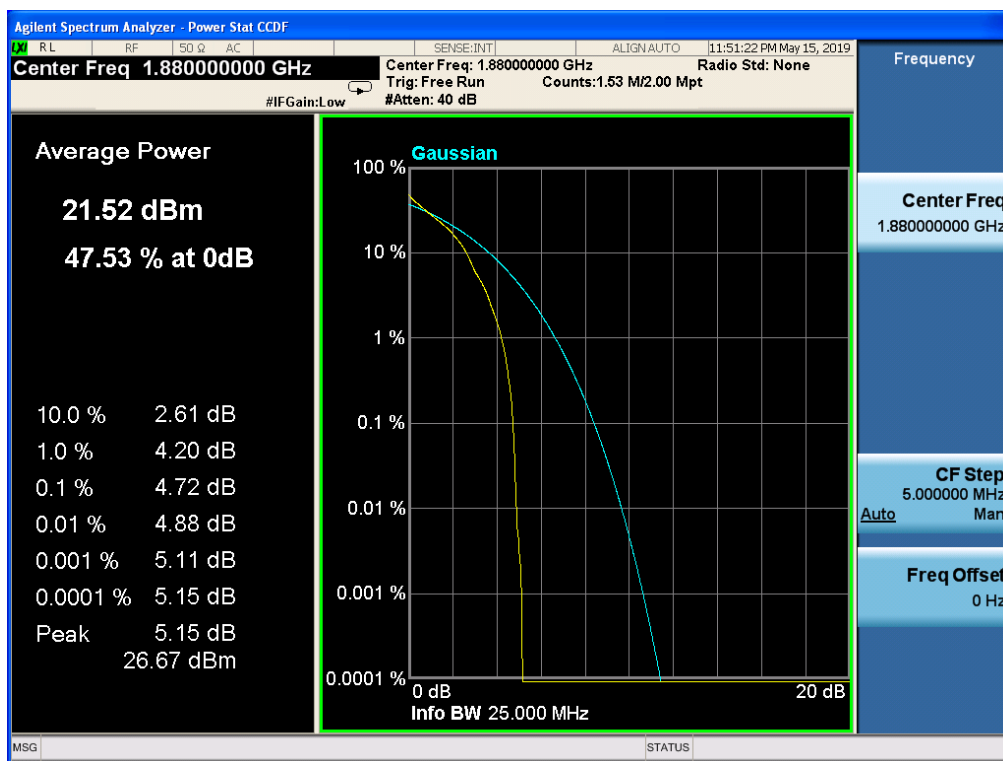
Band 2, UL Channel 18900, UL Frequency 1880.0, BW 5.0, NO. RB 1, RB POS. Low, QPSK



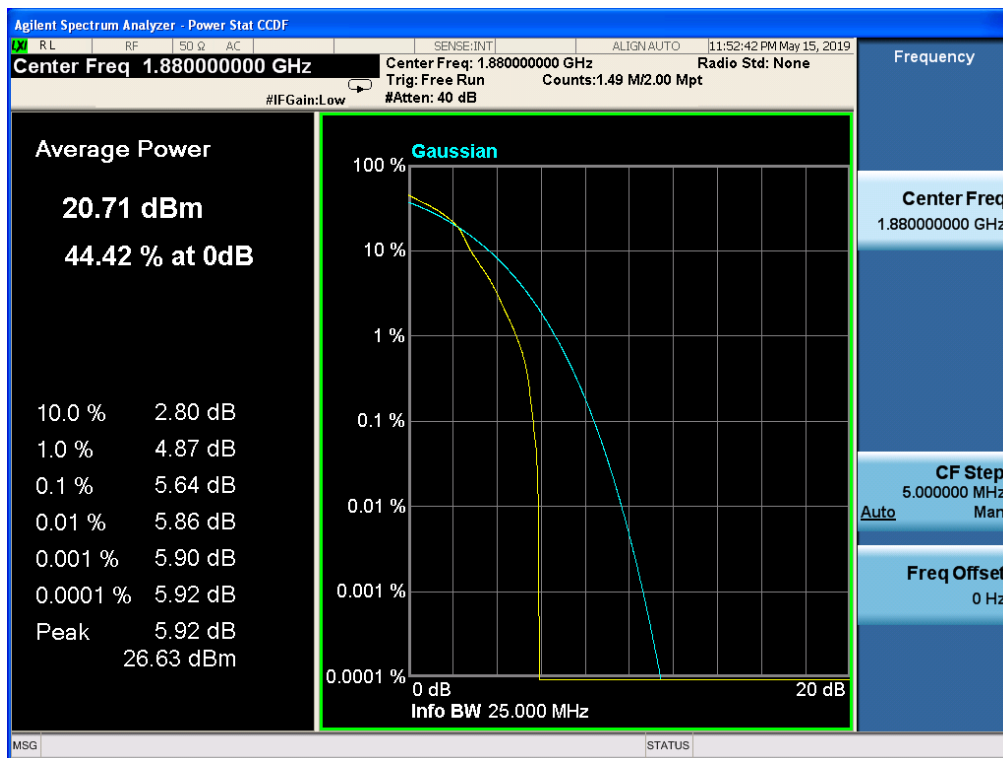
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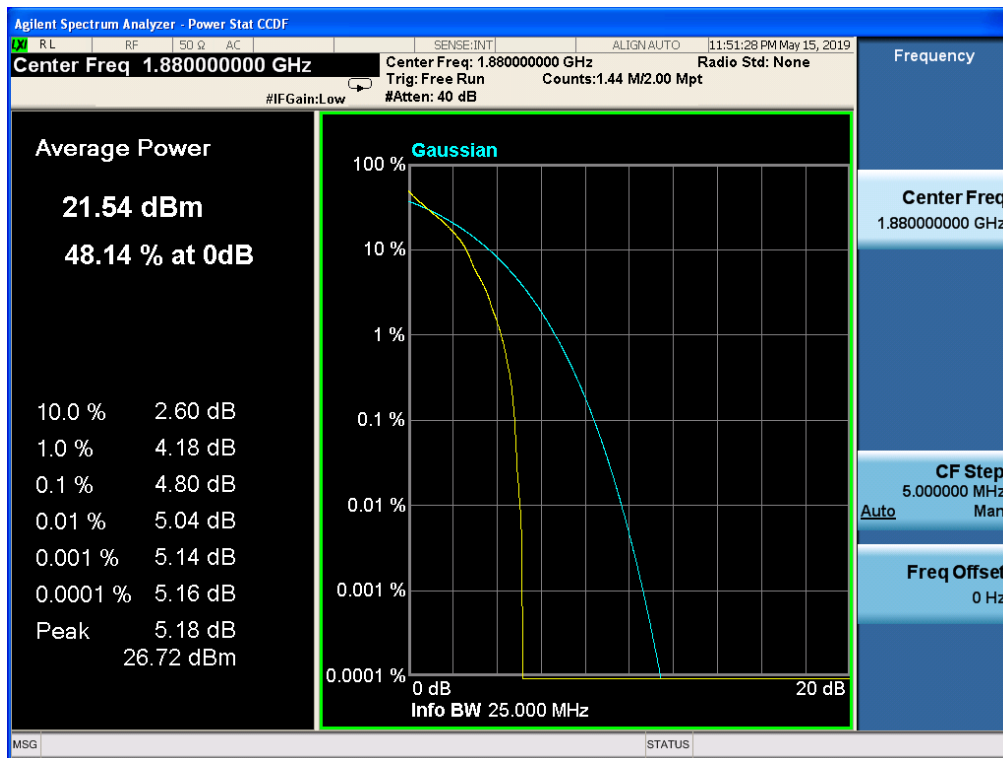
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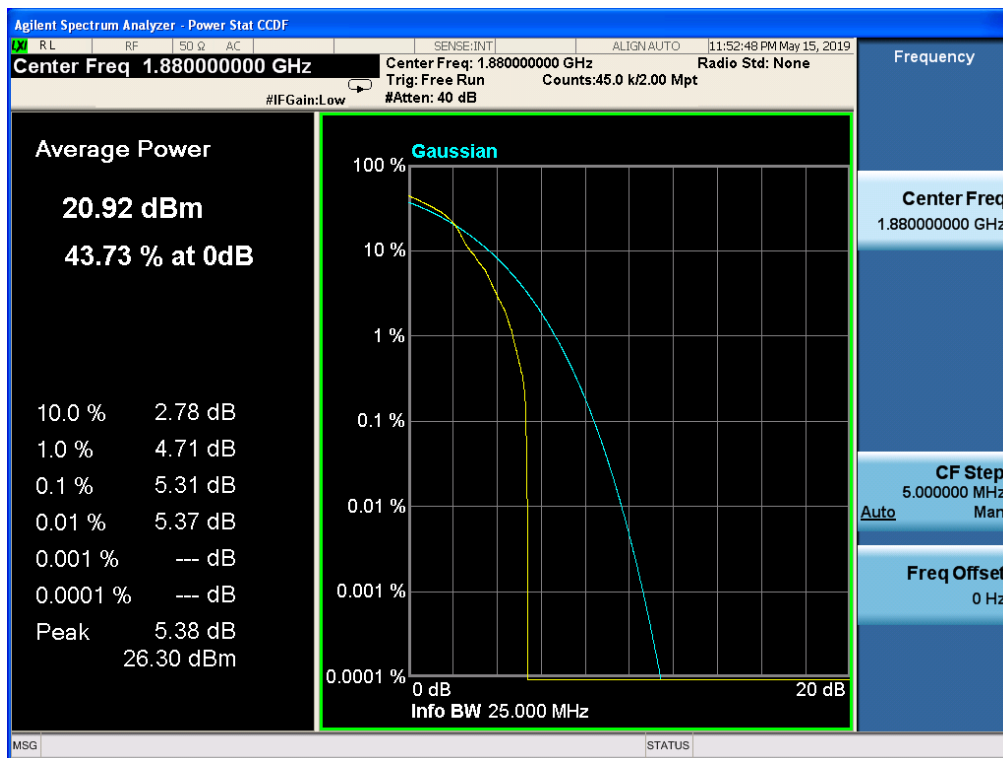
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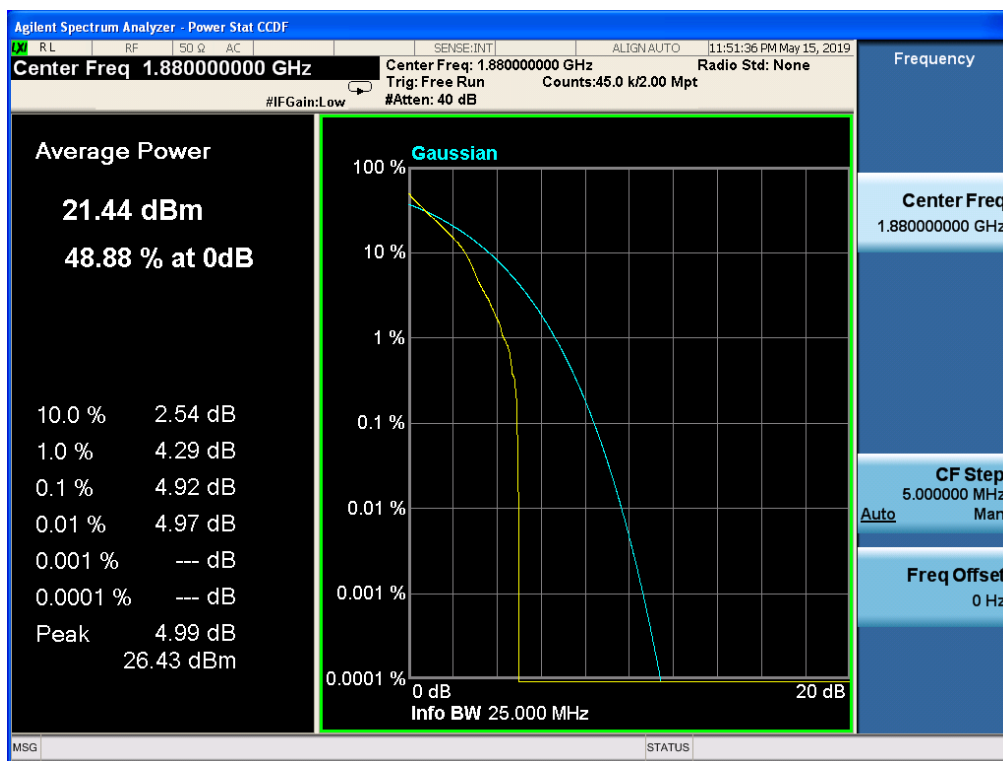
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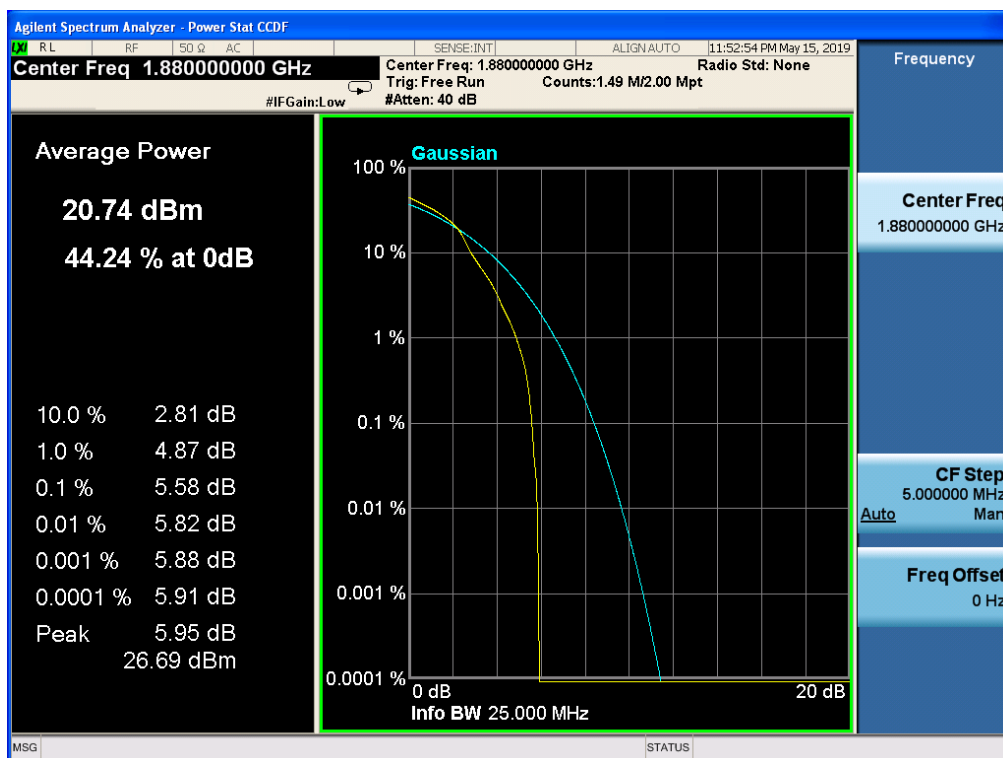
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Band 2, UL Channel 18900, UL Frequency 1880.0, BW 20.0, NO. RB 1, RB POS. Low, QPSK

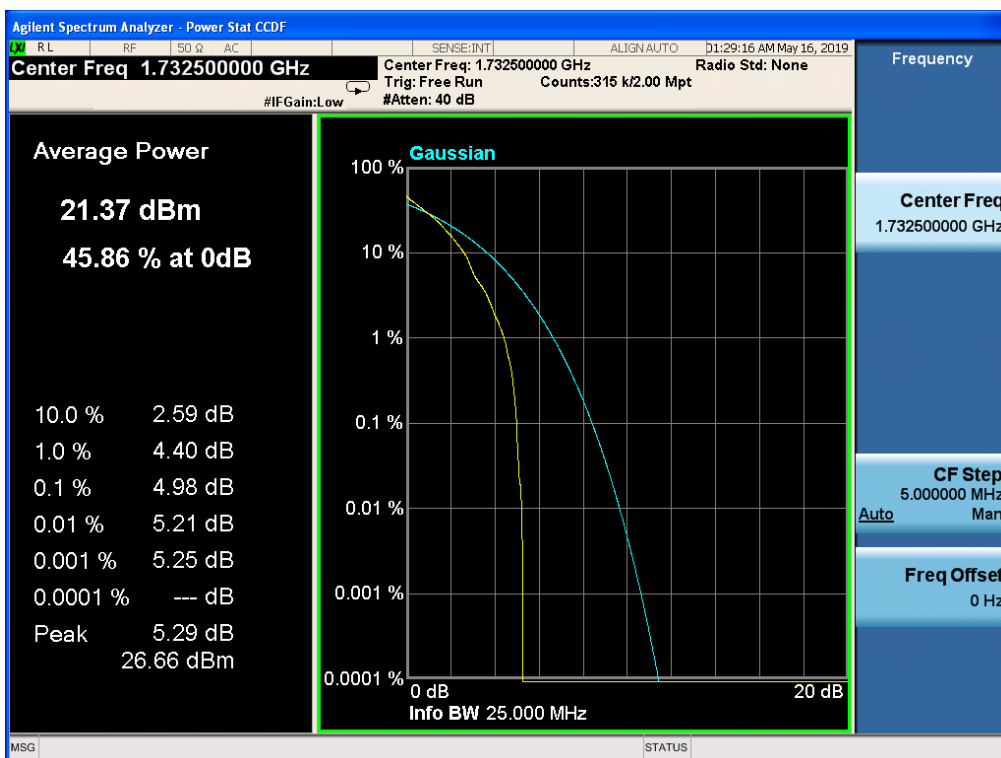


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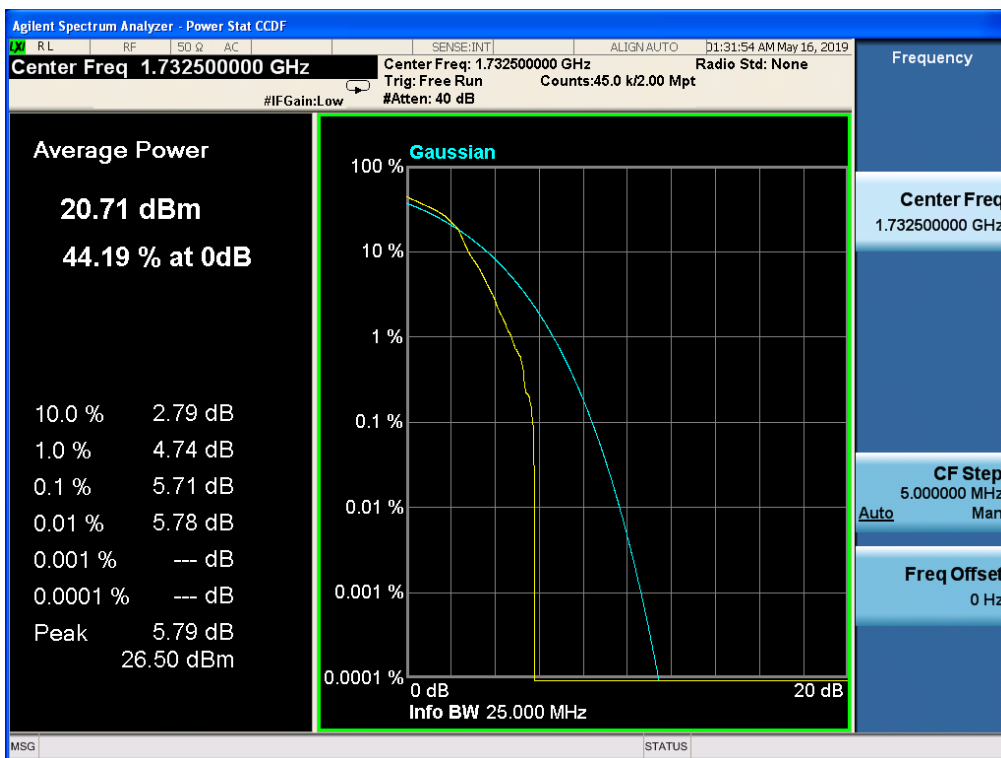


11.6 LTE BAND 4

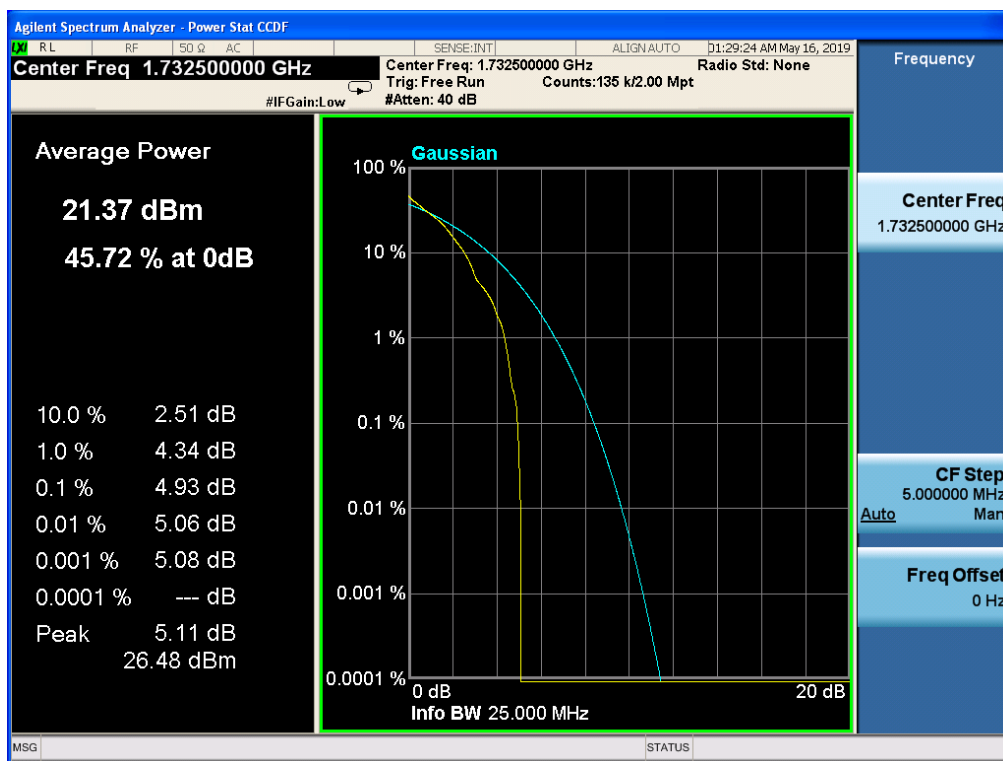
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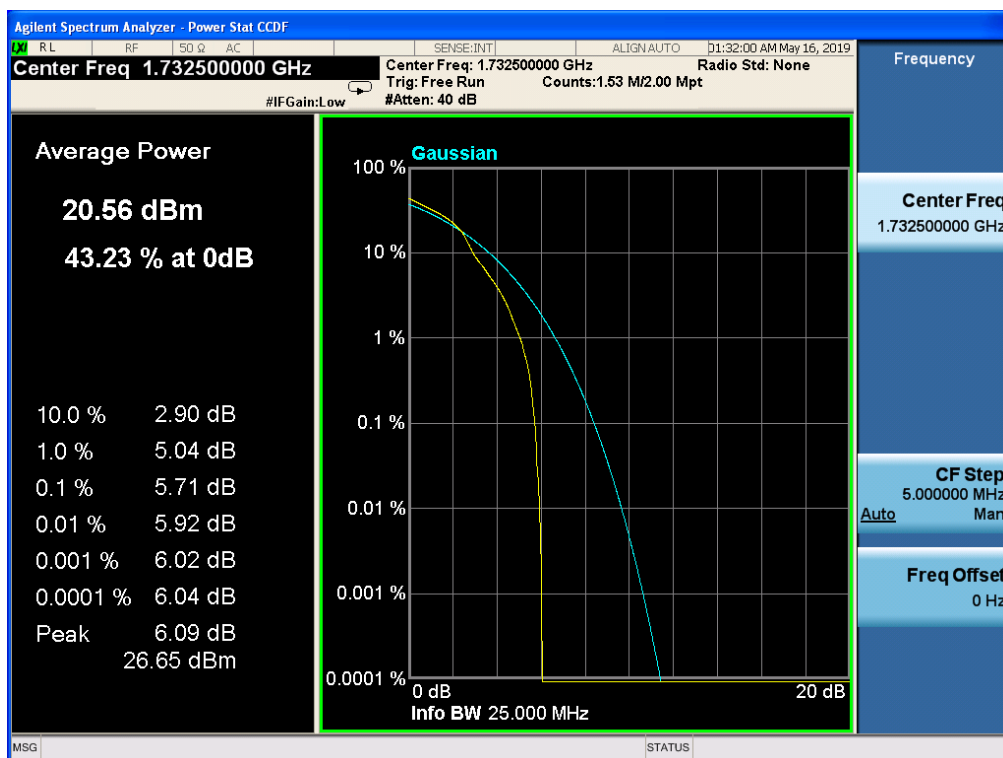
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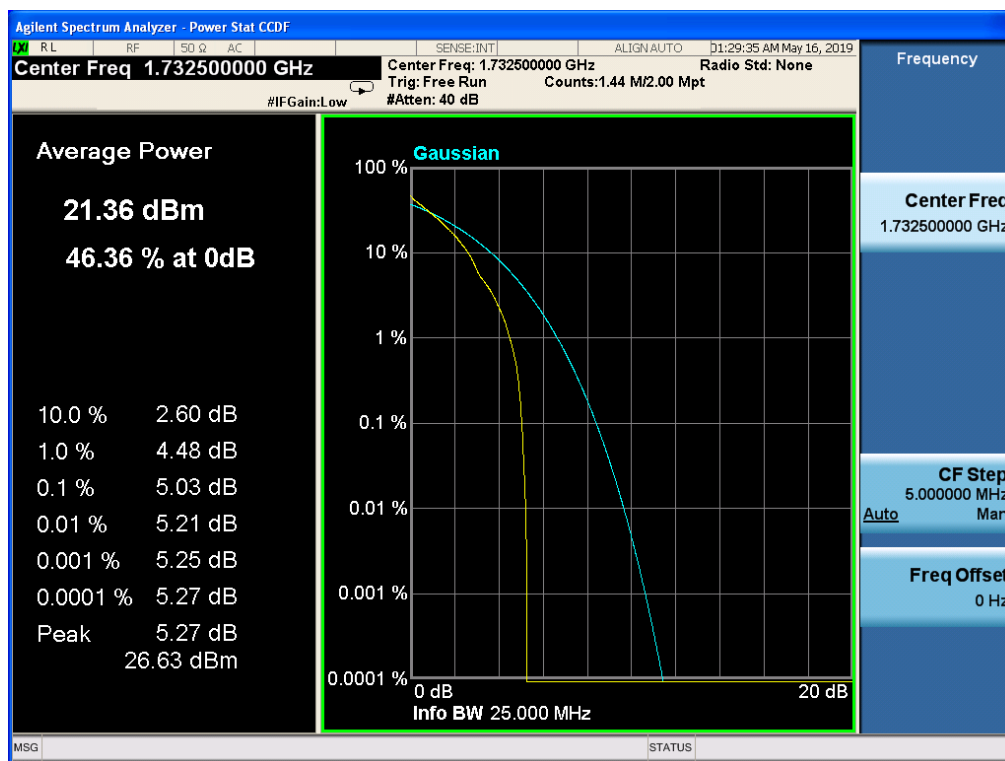
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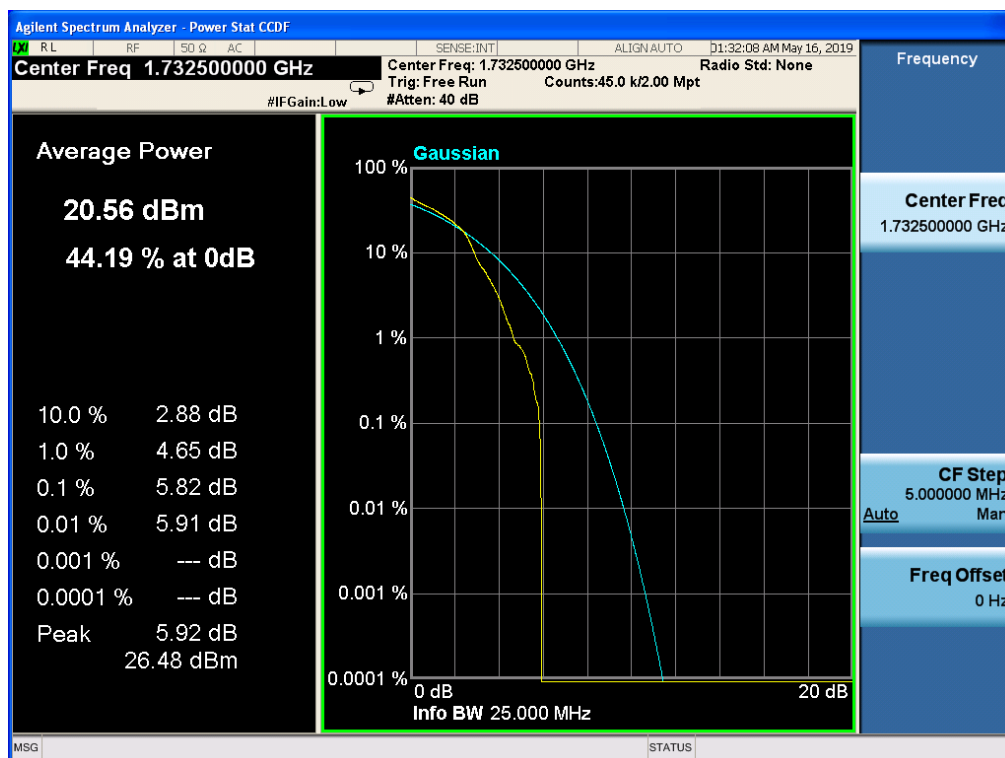
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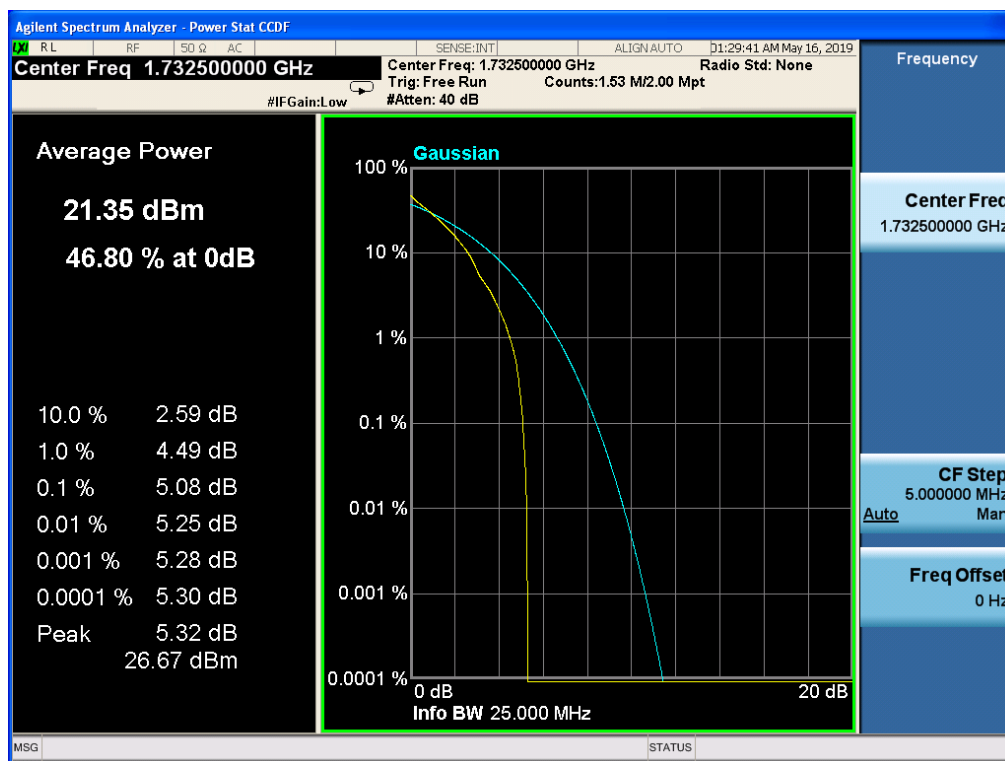
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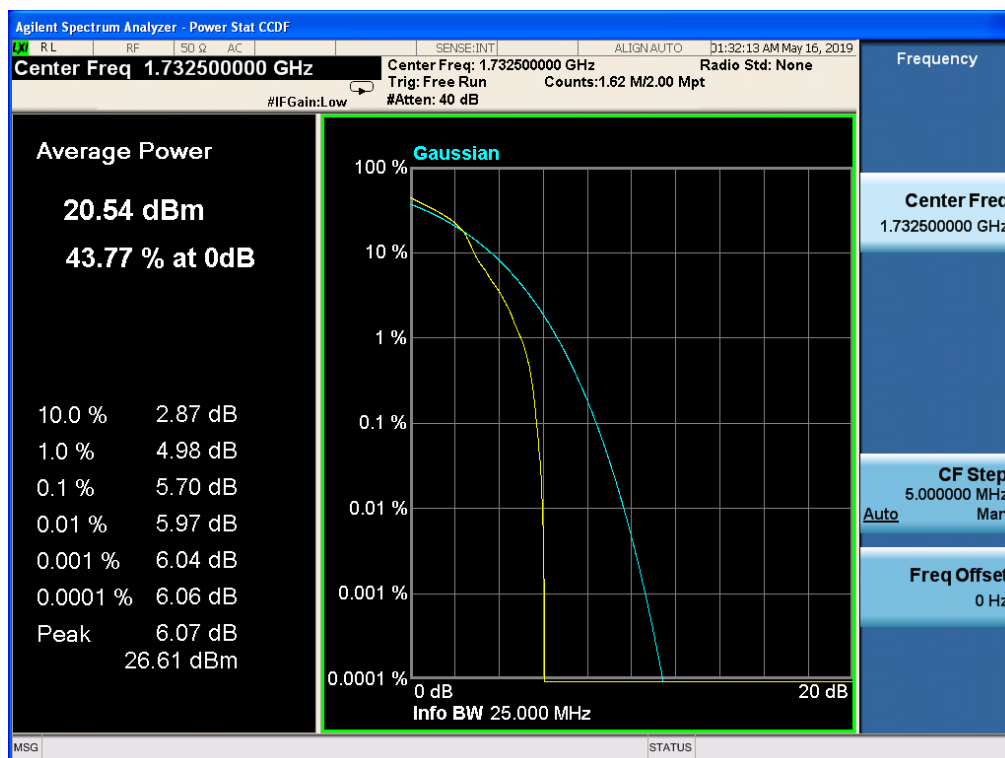
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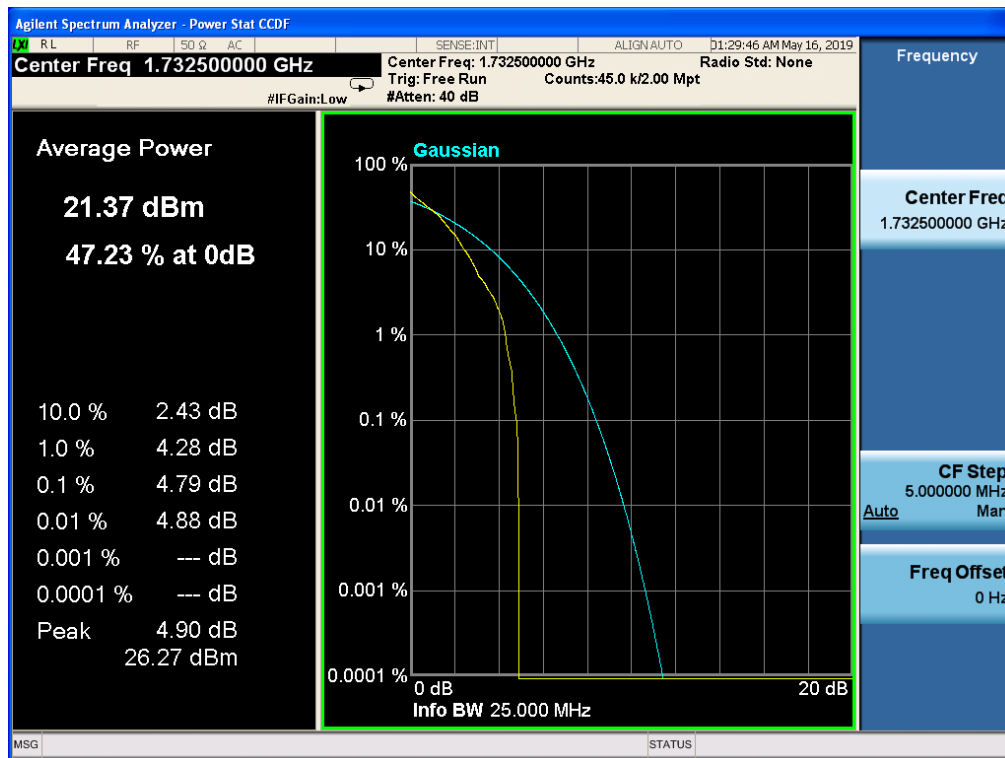
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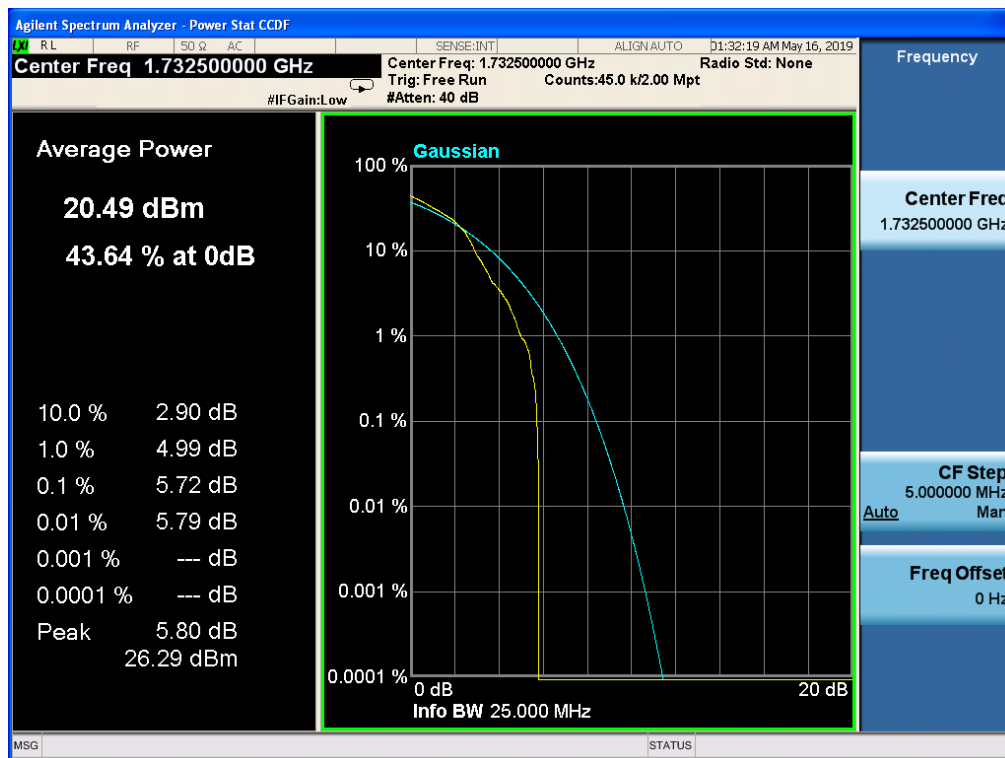
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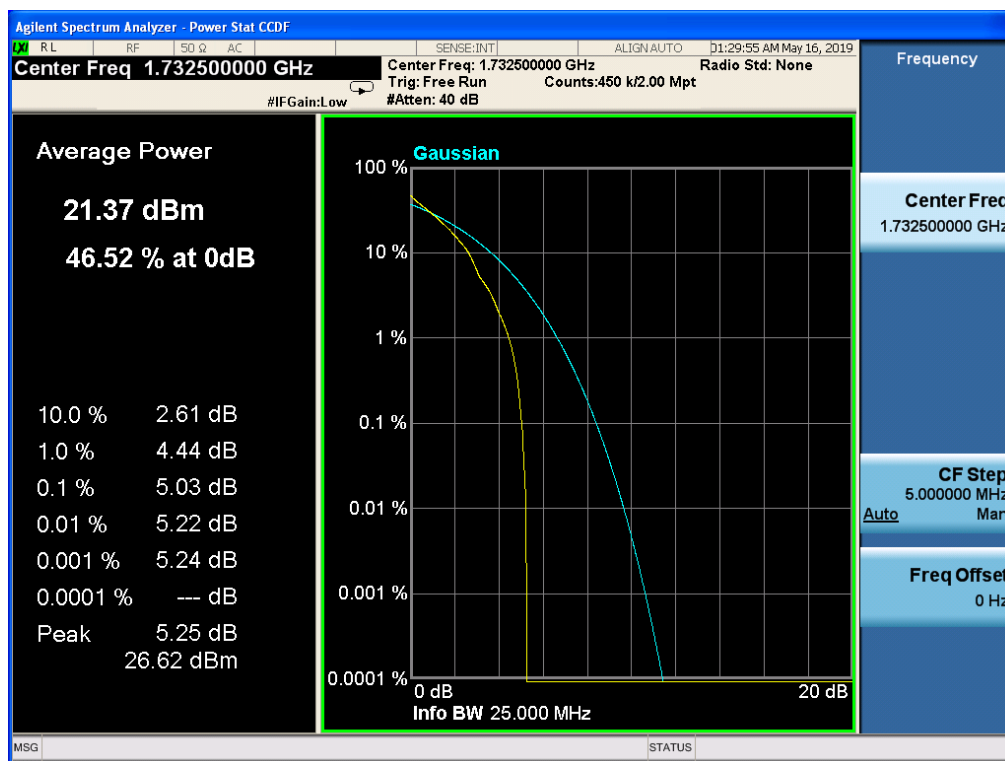
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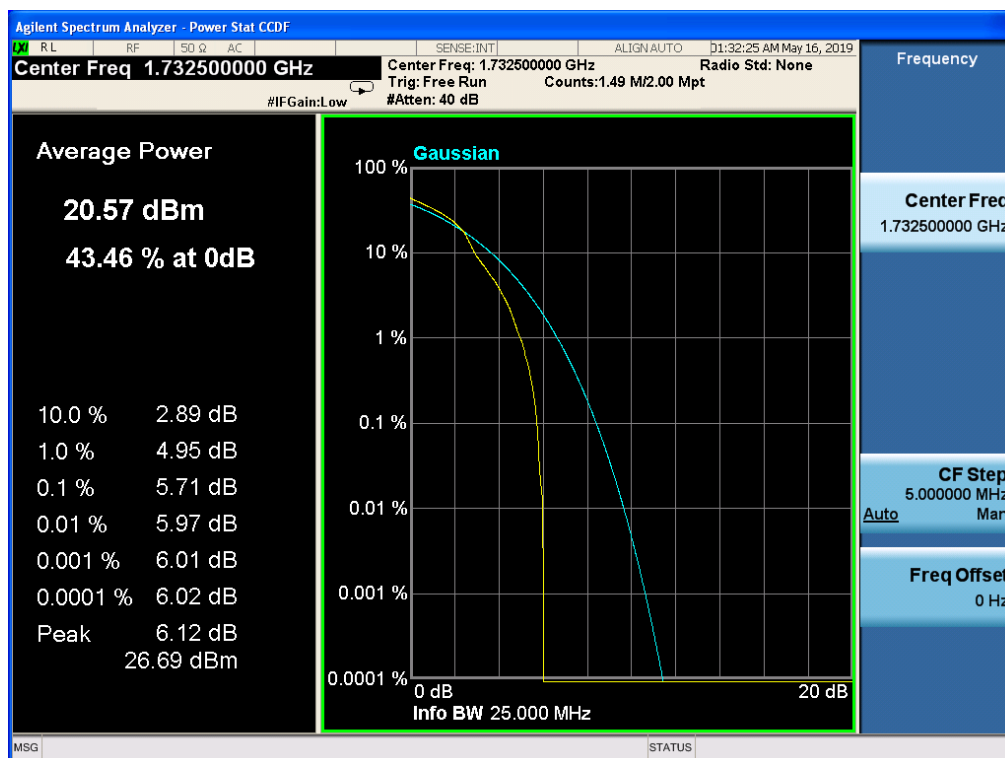
Band 4, UL Channel 20175, UL Frequency 1732.5, BW 15.0, NO. RB 1, RB POS. Low, 16-QAM



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

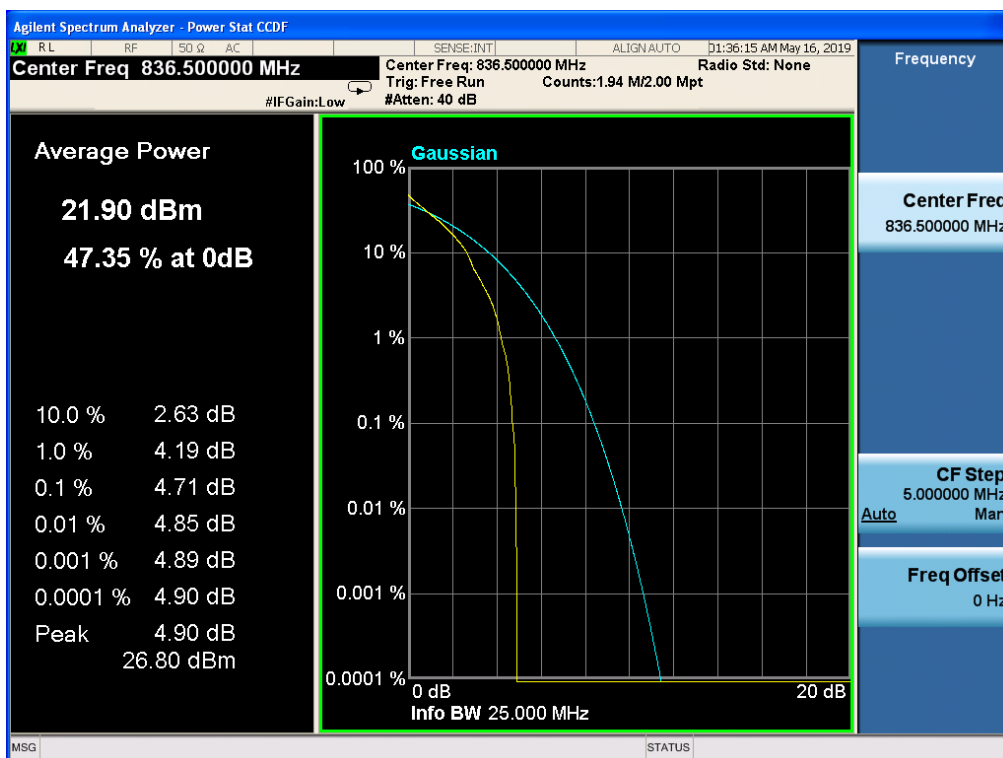


Band 4, UL Channel 20175, UL Frequency 1732.5, BW 20.0, NO. RB 1, RB POS. Low, 16-QAM

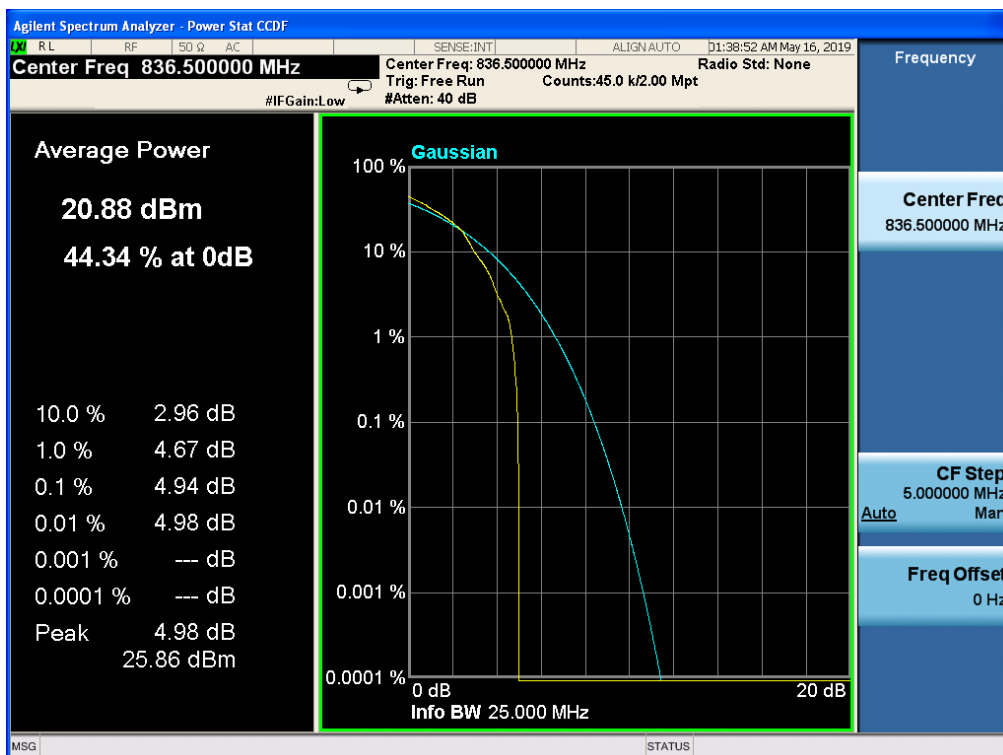


11.7 LTE BAND 5

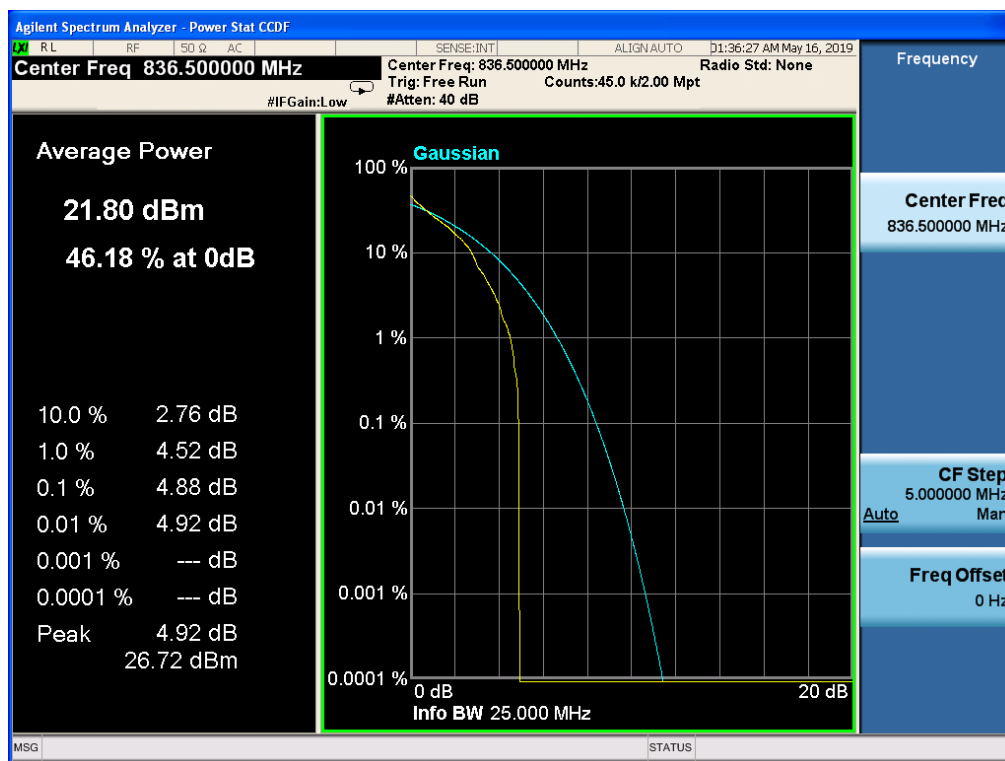
Band 5, UL Channel 20525, UL Frequency 836.5, BW 1.4, NO. RB 1, RB POS. Low, QPSK



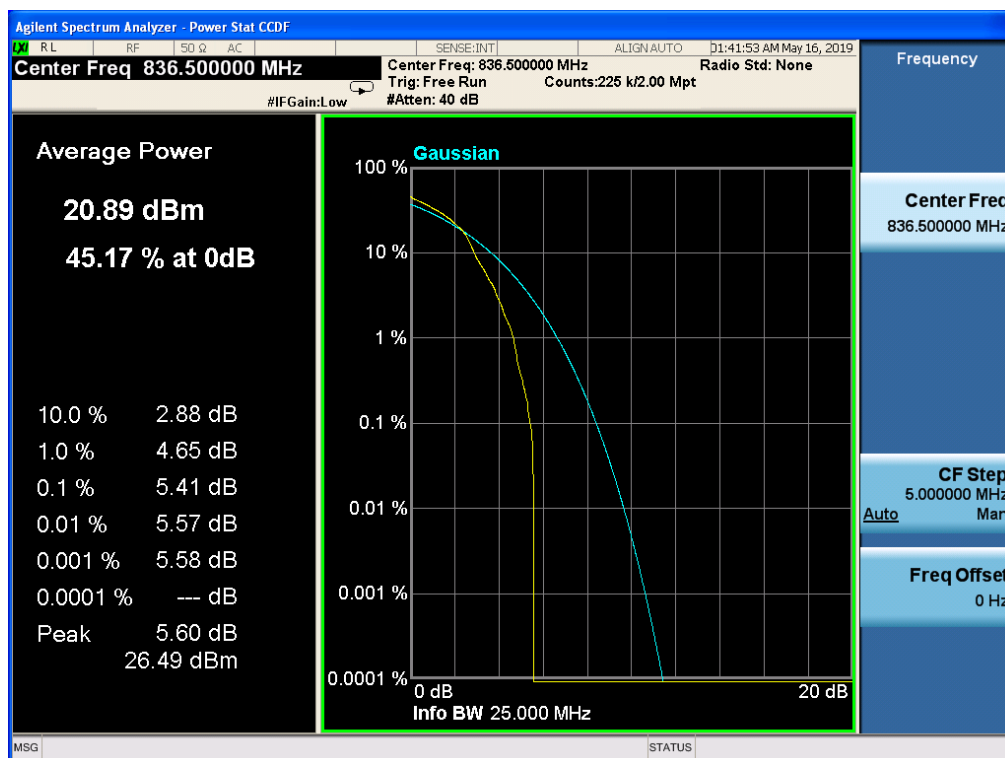
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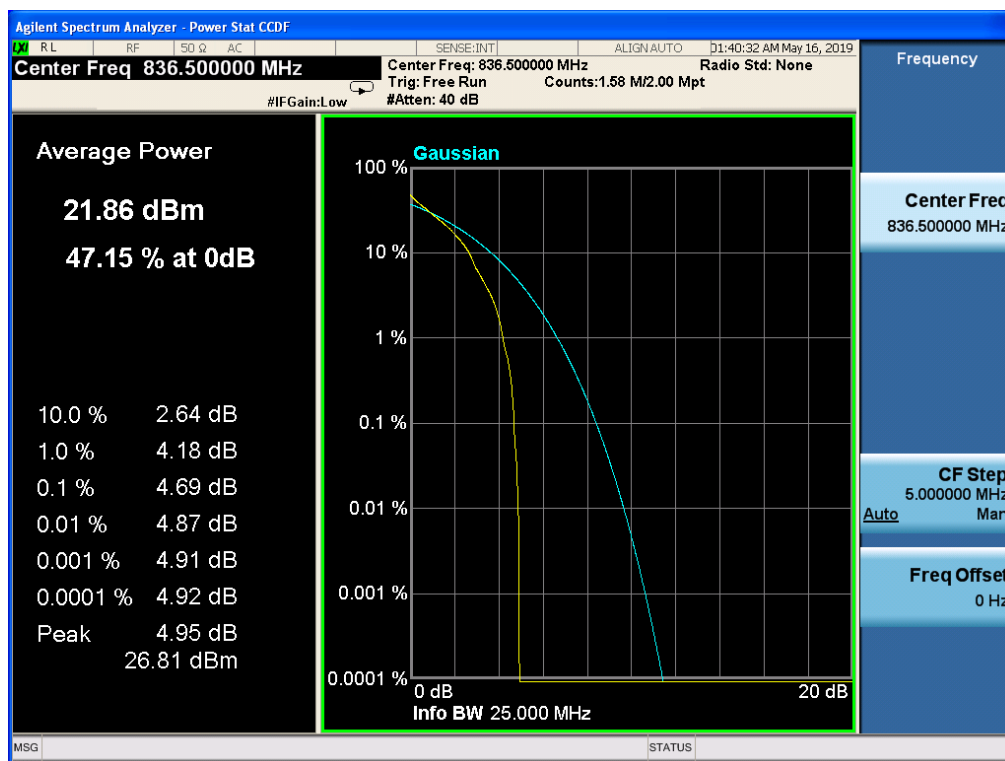
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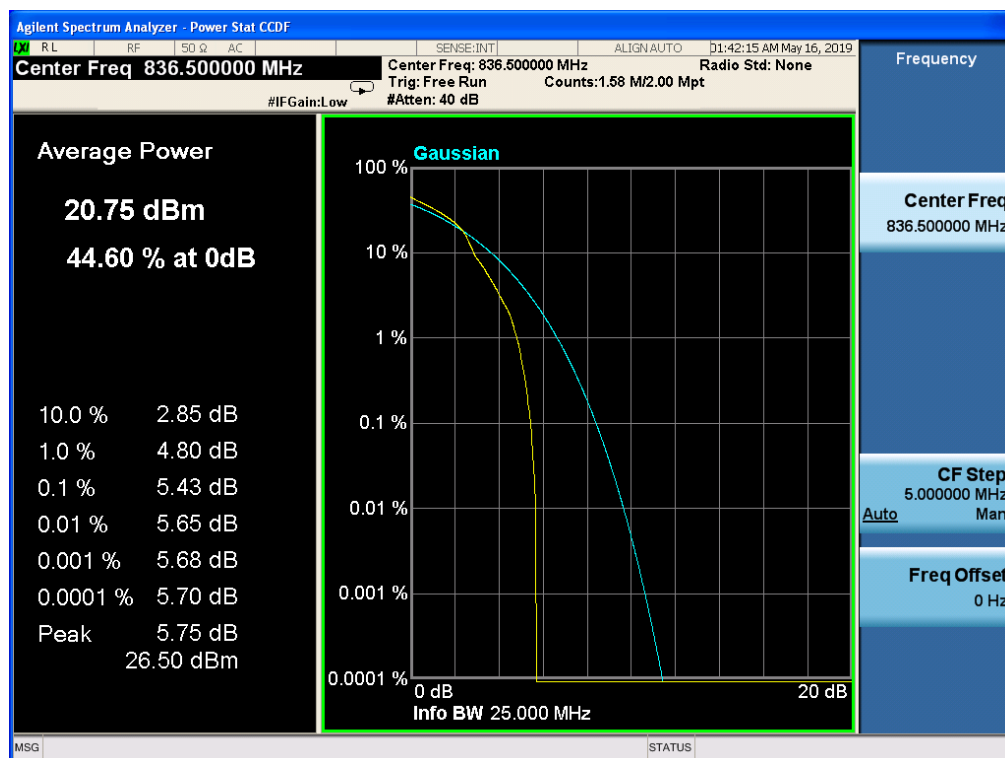
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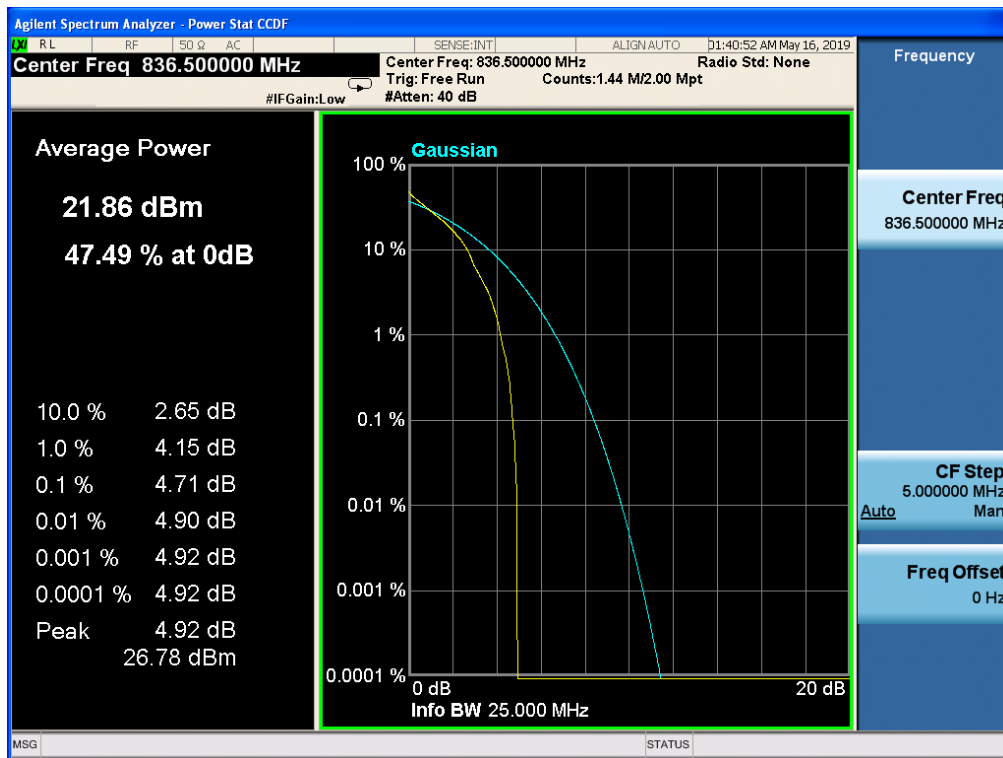
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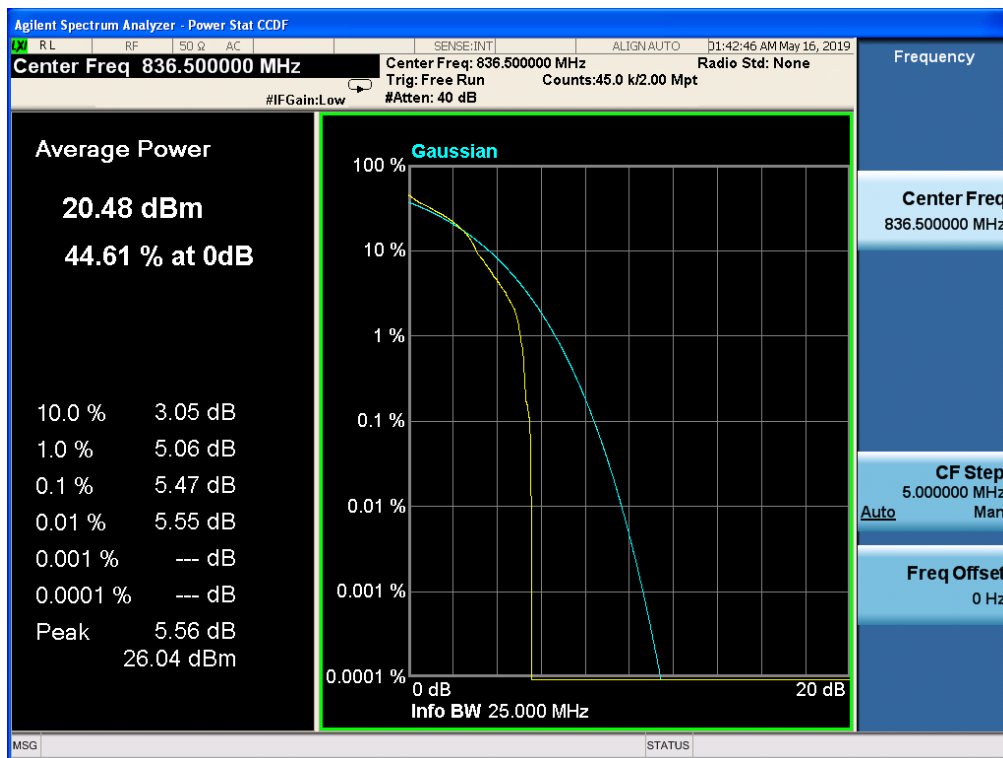
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Band 5, UL Channel 20525, UL Frequency 836.5, BW 10.0, NO. RB 1, RB POS. Low, QPSK

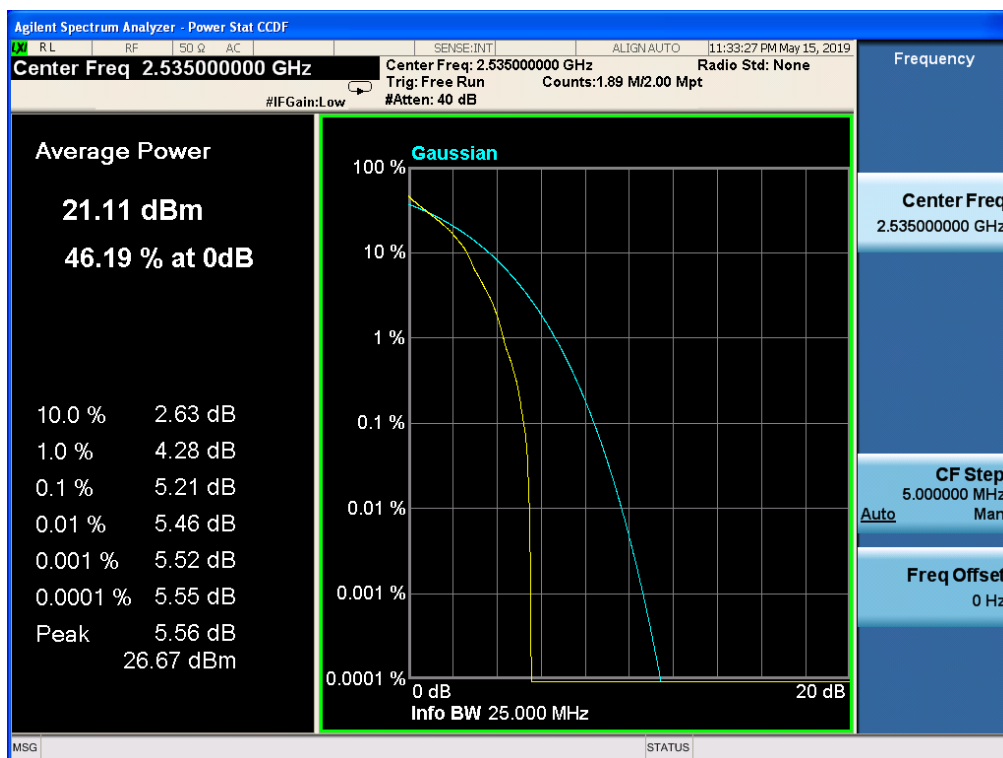


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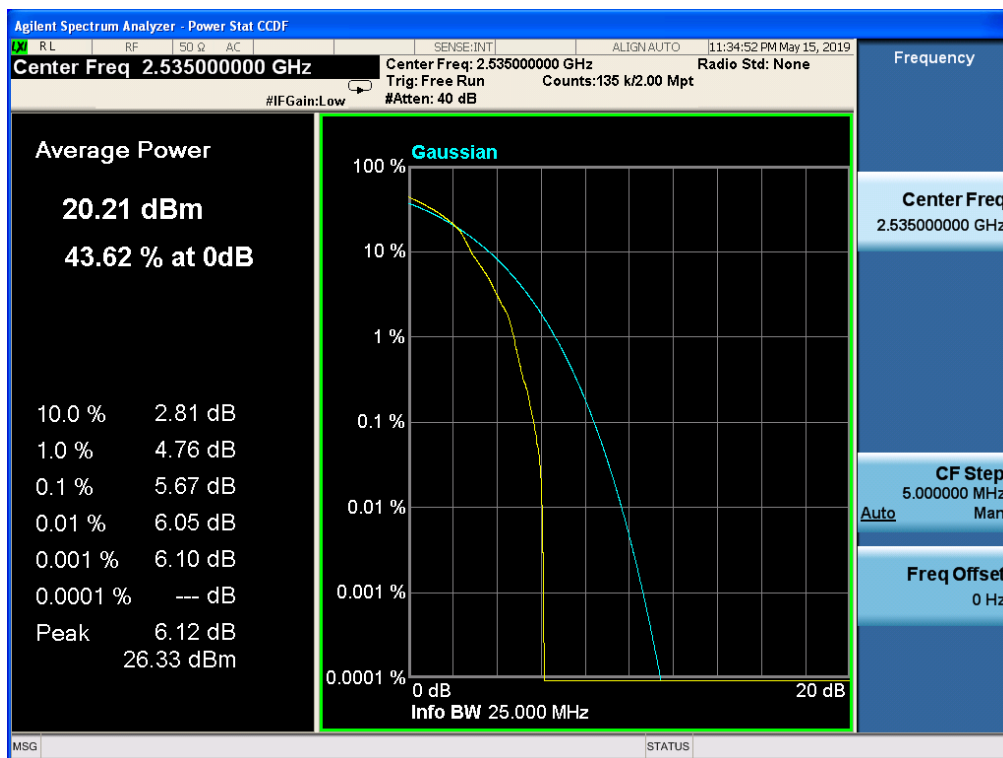


11.8 LTE BAND 7

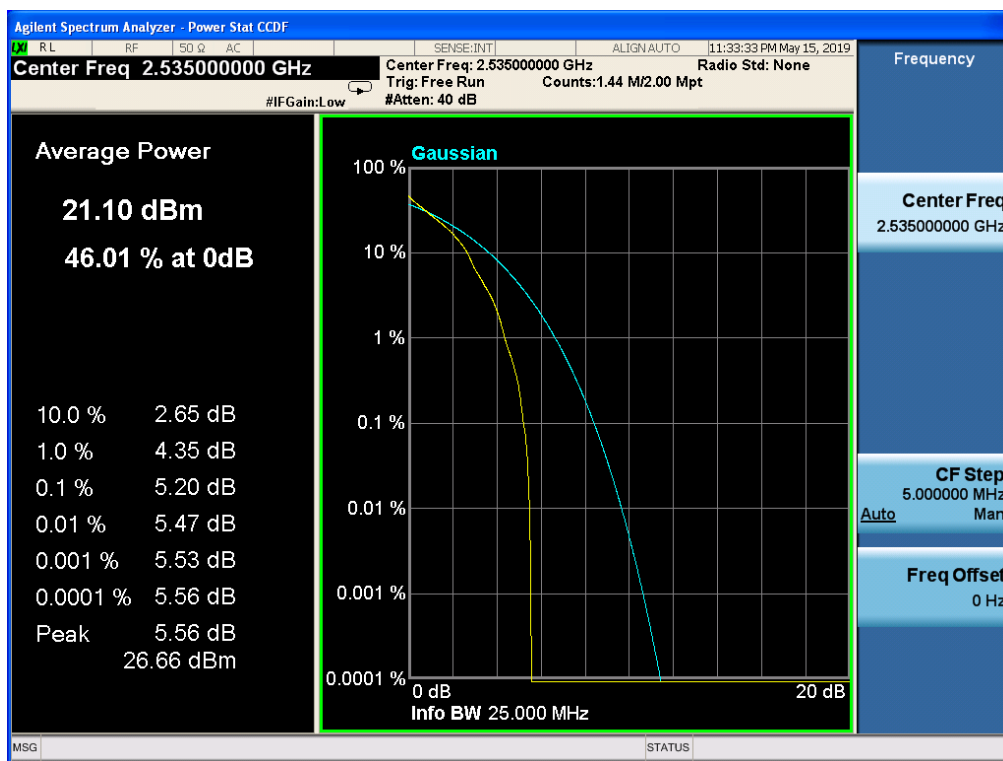
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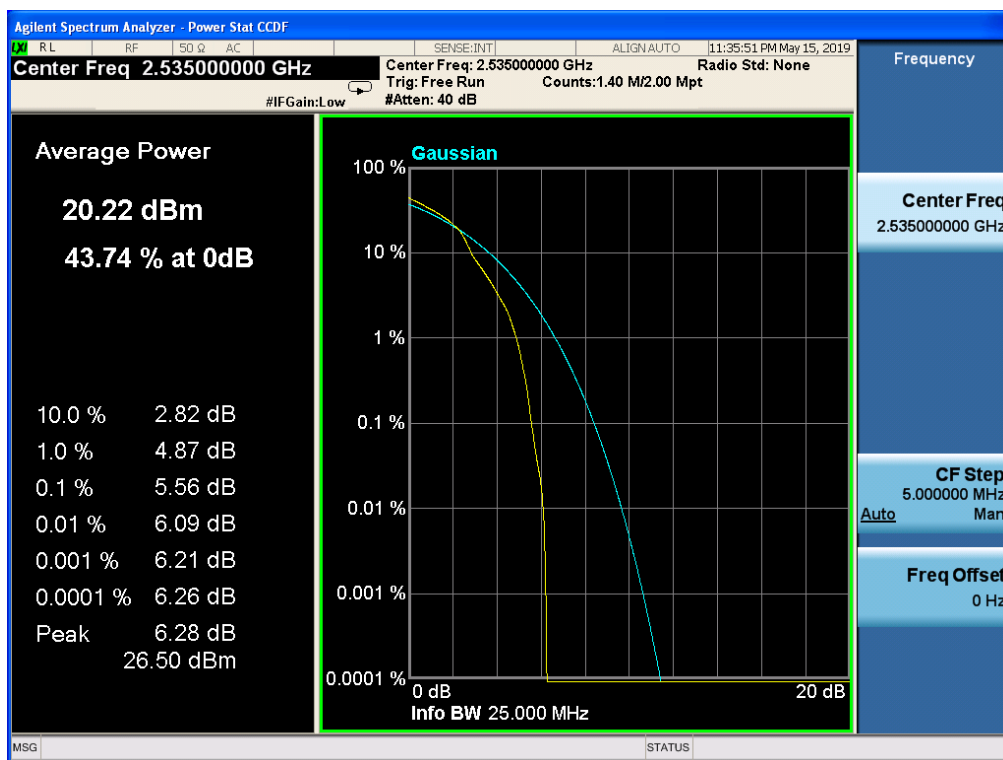
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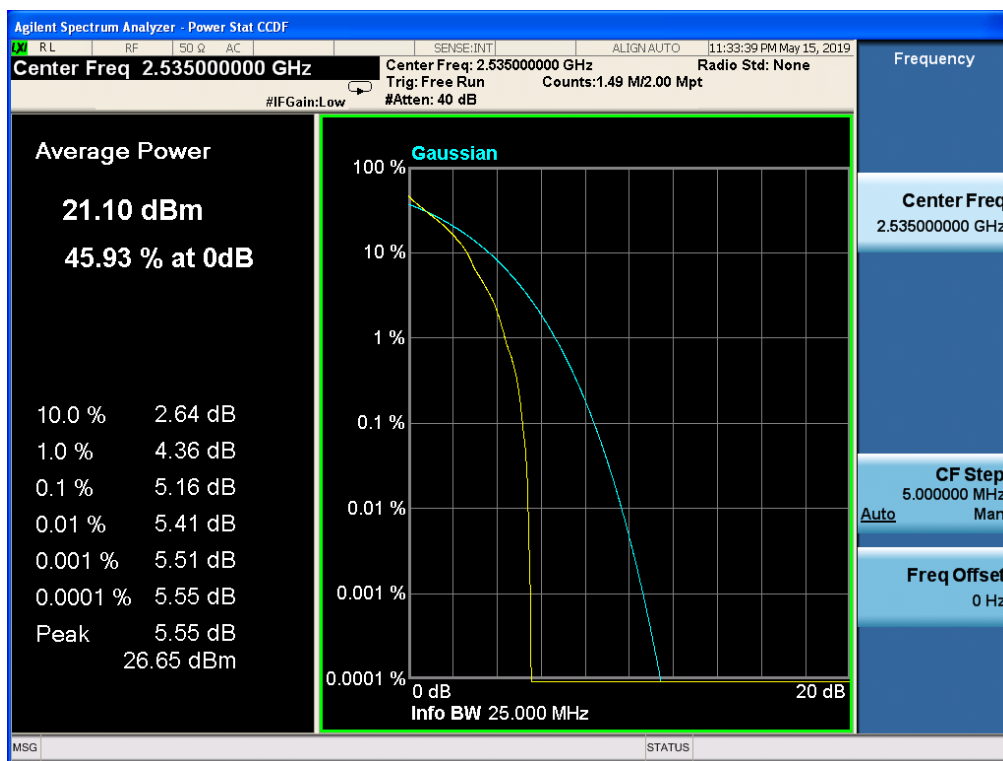
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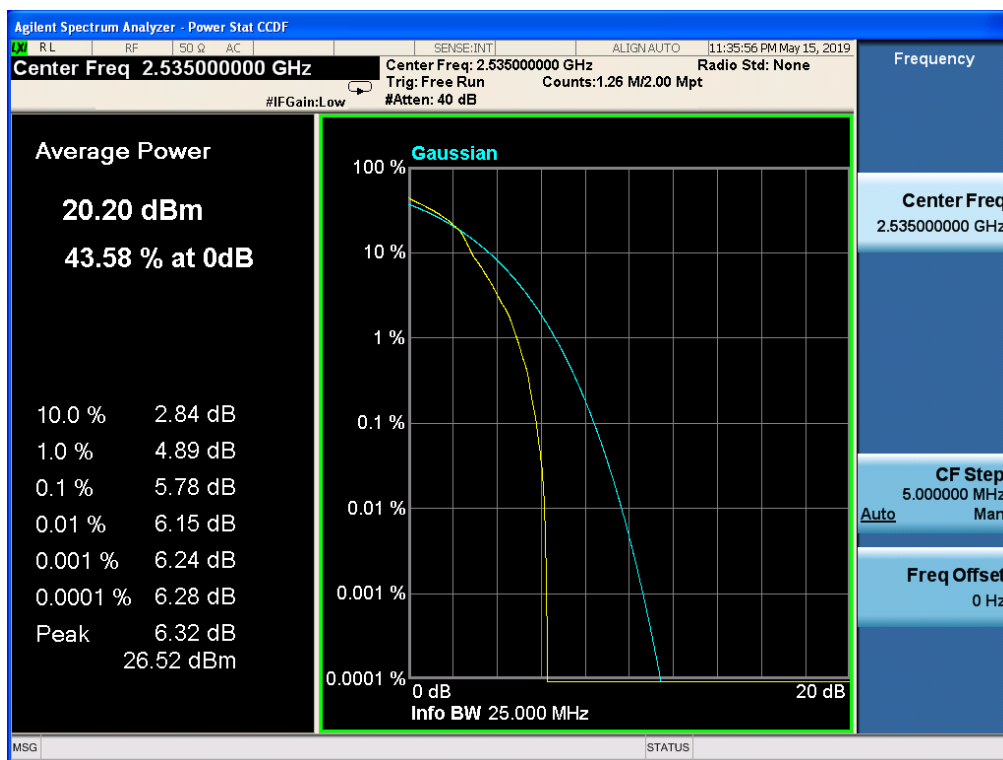
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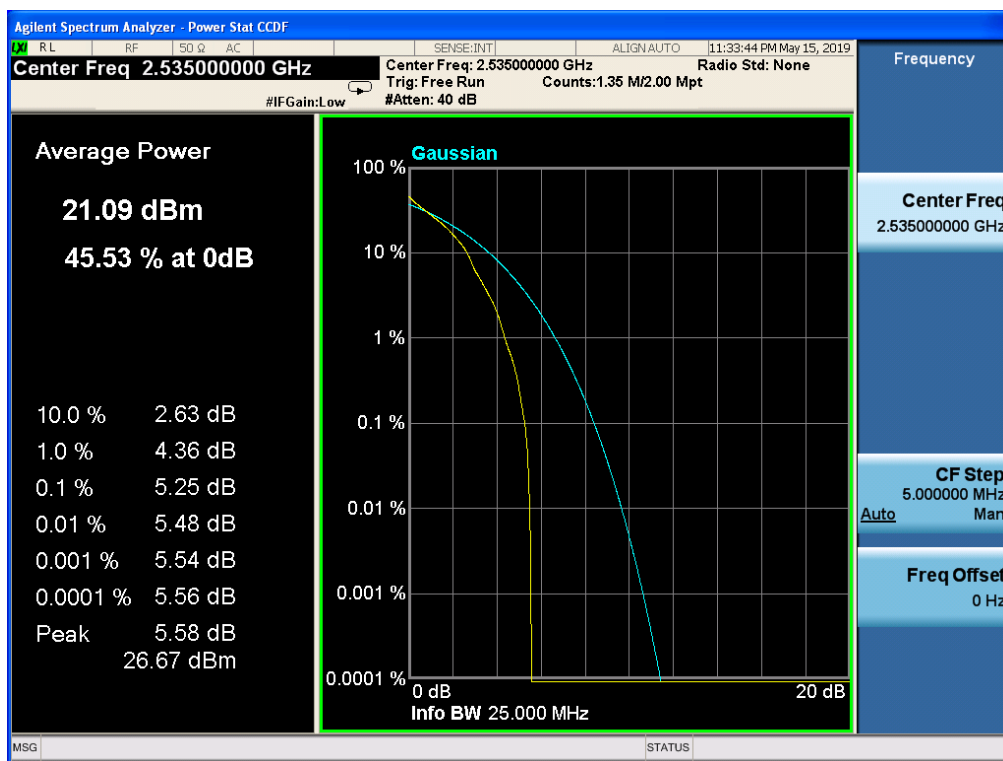
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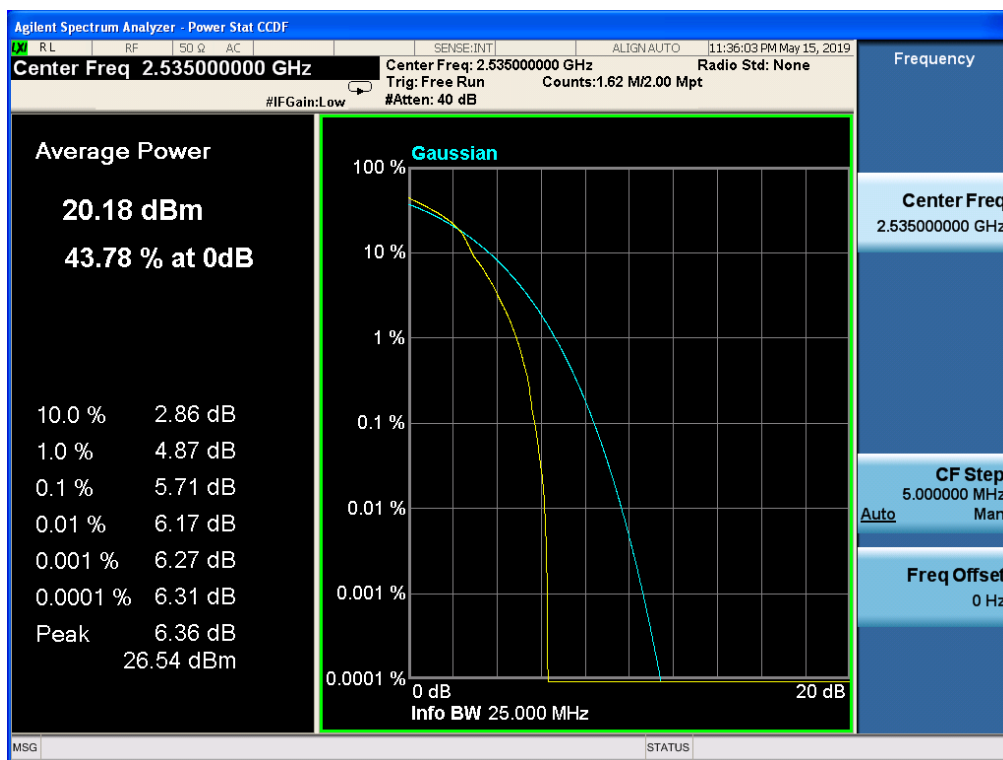
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Band 7, UL Channel 21100, UL Frequency 2535.0, BW 20.0, NO. RB 1, RB POS. Low, QPSK



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



----END OF REPORT----