LTE Base Station MMIC Amplifier

Mini-Circuits PMA-545G1+ High Dynamic Range and Super Low Noise MMIC Amplifier is designed specifically for applications which require high linear performance, advanced digital communications systems such as LTE which require excellent ACLR suppression and low EVM.

The E-PHEMT based PMA-545G1+ provides typically +34 dBm OIP3 which translates to high linear performance in multi-carrier and complex signal environments such as LTE supporting ACLR_1 Measurements of better than -60 dBc at +4 dBm output.

The PMA-545G1+ is characterized using a high peak-to-average ratio OFDM signal used for next generation LTE within the 700MHz Downlink Band.

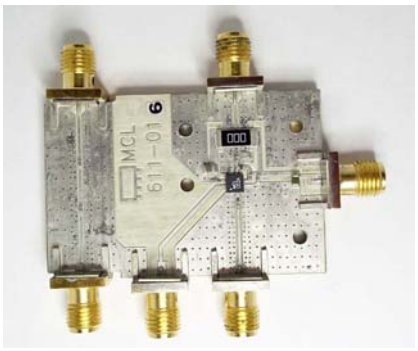


Figure 1 PMA-545G1+ Test Board

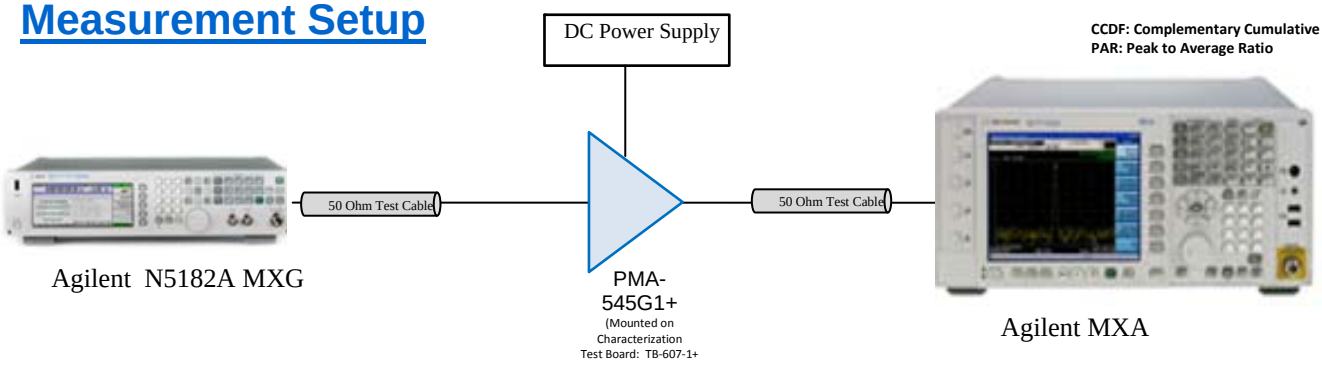
DUT Configuration:
Device: PMA-545G1+ Test board
Supply Voltage: 5V, 146 mA
Temperature: 25C
Note: All data is referenced to the test board connectors

Test Signal:
LTE FDD Downlink (2009-3),
Full filled 64 QAM,10MHz (50 RB)
Fc = 700 MHz

CCDF	PAR
10%	3.63 dB
1.0%	6.67 dB
0.1%	8.48 dB
0.01%	10.06 dB
0.001%	10.90 dB
0.0001%	11.05 dB

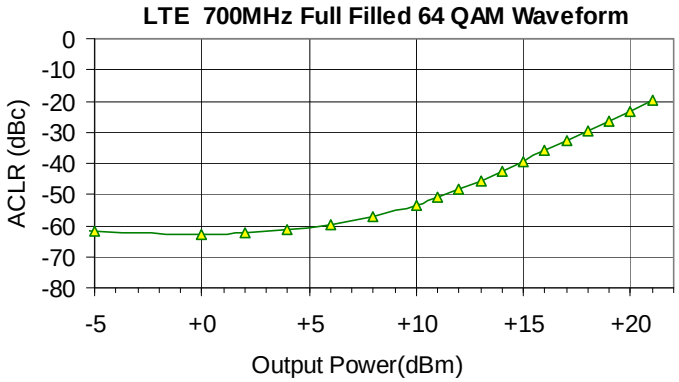
CCDF: Complementary Cumulative Distribution Function
PAR: Peak to Average Ratio

Measurement Setup



Summary Data

ACLR_1 vs. Output Power



EVM vs. Output Power

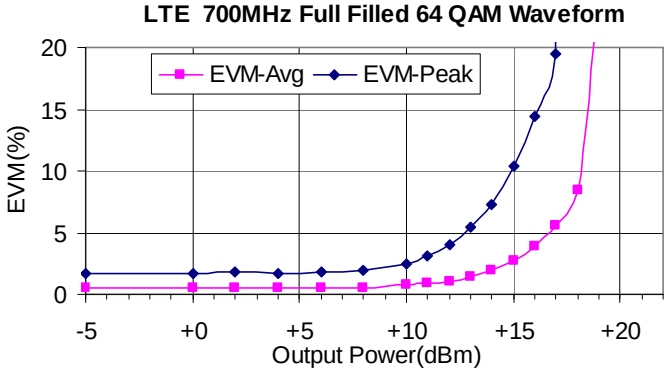


Table 1 Data of ACLR and EVM vs. Output Power

Output Power (carrier) dBm	ACLR (dBc)				EVM (%)	
	ACLR2 LOW 20MHz	ACLR1 LOW 10MHz	ACLR1 HIGH 10MHz	ACLR2 HIGH 20MHz	RMS	Peak
+21	-42.9	-19.6	-19.5	-43.4	47.680	126.73
+20	-49.2	-23.5	-23.4	-49.3	45.070	106.11
+19	-53.1	-26.7	-26.7	-53.1	25.350	98.73
+18	-56.5	-29.7	-29.8	-56.5	8.449	88.28
+17	-59.2	-32.9	-32.9	-59.2	5.555	19.42
+16	-61.2	-36.0	-36.1	-61.3	3.891	14.39
+15	-62.5	-39.3	-39.2	-62.6	2.726	10.43
+14	-63.1	-42.4	-42.2	-63.2	1.934	7.28
+13.32	-63.3	-44.6	-44.4	-63.8	1.536	6.01
+13	-63.7	-45.5	-45.3	-63.6	1.417	5.42
+12	-63.8	-48.3	-47.8	-63.8	1.087	4.00
+11	-63.7	-50.9	-50.3	-63.7	0.875	3.12
+10	-63.7	-53.3	-52.6	-63.8	0.788	2.42
+8	-63.8	-57.2	-56.5	-63.8	0.577	1.94
+6	-63.6	-59.8	-59.3	-63.7	0.517	1.79
+4	-63.5	-61.5	-61.3	-63.5	0.480	1.75
+2	-63.4	-62.5	-62.4	-63.5	0.483	1.87
+0	-63.2	-62.6	-62.6	-63.2	0.471	1.73
-5	-62.0	-61.7	-61.8	-62.2	0.467	1.75

Note:
For output powers less than -5dBm, ACLR measurement accuracy is limited by the dynamic range of the test equipment.

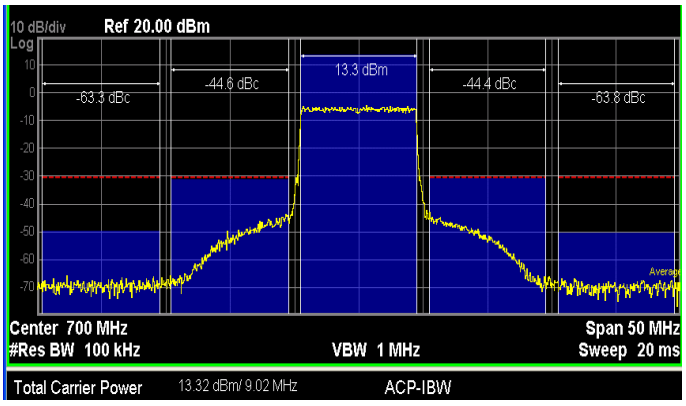


Figure 2 ACLR Plot at Output Power of +13.32 dBm

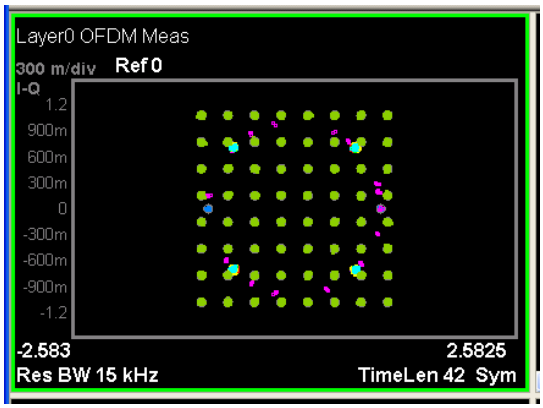


Figure 3 EVM Plot at Output Power of +13.32 dBm