

TA9110K

6 W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9110K EVB A

Application Note

30 MHz~2700 MHz

32 V, 40 mA

Rev-2.1

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1. General Description

The TA9110K is a broadband GaN power transistor capable of delivering 6 W CW from 30 MHz to 4.0 GHz frequency band. The transistor can be used at lower frequencies with reduced output power. The input and output can be matched for best power and efficiency for the desired band.

The TA9110K is packaged in a compact, low-cost Quad Flat No lead (QFN) 3 x 3 x 0.75 mm, 16 leads plastic package. TA9110K-EVB-A is tuned from 30 MHz to 2.7 GHz.

2. TA9110K-EVB-A Board Details

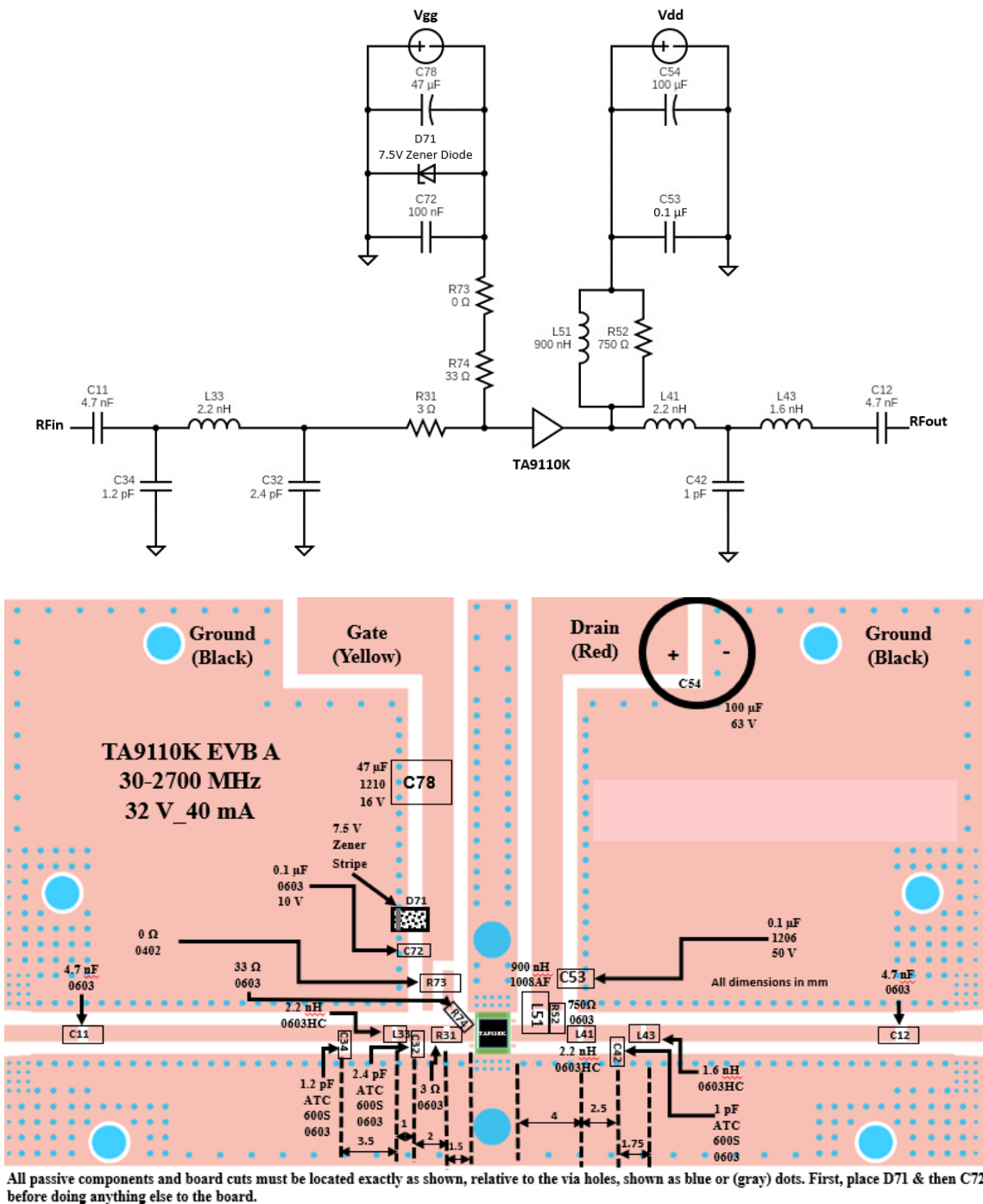


Figure 2.1 TA9110K-EVB-A 30 MHz ~ 2700 MHz Schematic and EVB Layout

3. TA9110K-EVB-A Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11,C12	4.7 nF, 50V	Murata	GRM1885C1H472JA01D
R31	3 Ω	Vishay	RCS06033R00FKEA
C32	2.4 pF	AVX	600S2R4CT250XT
L33, L41	2.2 nH	Coil craft	0402HP-2N2XJE
C34	1.2 pF	AVX	600S1R2CT250XT
C42	1 pF	AVX	600S1R0CT250XT
L43	1.6 nH	Coil craft	0603HC-1N6XGLW
L51	900 nH	Coil craft	1008AF-901XJLC
R52	750 Ω	Vishay	CRCW0603750RFKEB
C53	0.1 μ F, 50 V	Murata	GRM31C5C1H104JA01L
C54	100 μ F, 63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	MMSZ5236BT1G
C72	0.1 μ F, 10 V	AVX	0603ZC104K4T2A
R73	0 Ω	Vishay	CRCW06030000Z0EAC
R74	33 Ω	ROHM Semiconductor	ESR03EZPJ330
R78	47 μ F, 16 V	Murata	GRM32ER61C476ME15L
Q1	6 W GaN transistor	Tagore Tech	TA9110K
PCB		Rogers RO4350B, 20 mils, 2 oz copper	

Table 3.1 TA9110K-EVB-A BOM

4. TA9110K-EVB-A Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set V_G to -5 V 2. Set V_D to +32 V 3. Adjust V_G to reach required I_{DQ} current 4. Apply RF power	1. Turn RF power off 2. Turn off V_D 3. Turn off V_G

Table 4.1 TA9110K-EVB-A Bias and Sequencing

5. TA9110K-EVB-A Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11(dB)	S22(dB)	Psat(dBm)	PAE (%) @Psat	ACPR
30	18.2	-16	-3.7	40.0	70	Less than -30 dBc For Average power up to 35 dBm
100	18.5	-15.5	-3.9	40.0	68	
500	18.6	-9.0	-4.1	40.0	66	
1000	18.2	-5.2	-4.4	40.0	55	
1500	18.2	-5.3	-4.6	40.5	48	
2000	16.6	-5.3	-7.2	39.8	52	
2300	15.4	-5.1	-8.6	39.0	48	
2700	15.2	-26.9	-7.6	39.0	48	With LTE 8 dB PAPR 4.515 MHz BW

Table 5.1 TA9110K-EVB-A 32 V, 40 mA Electrical Characteristics Summary

6. TA9110K-EVB-A Test Results

All the tests are carried out at room temperature.

6.1. S parameters



Figure 6.1.1. S parameters of TA9110K-EVB- A 32 V, 40 mA

6.2. Large Signal Test Results

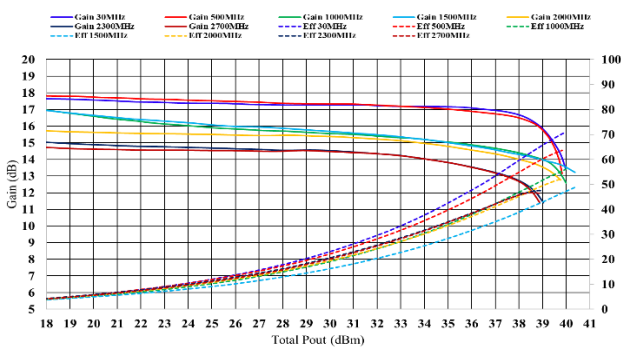


Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9110K-EVB-A

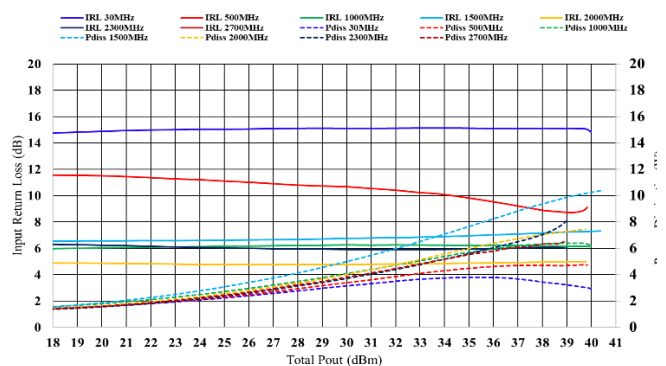


Figure 6.2.2. IRL and Pdiss vs P_{OUT} of TA9110K-EVB-A

Gain Vs PAE data over temperature [Vd=32 V, I_{DQ}=40 mA, CW, Over Temp -40 to +85°C]

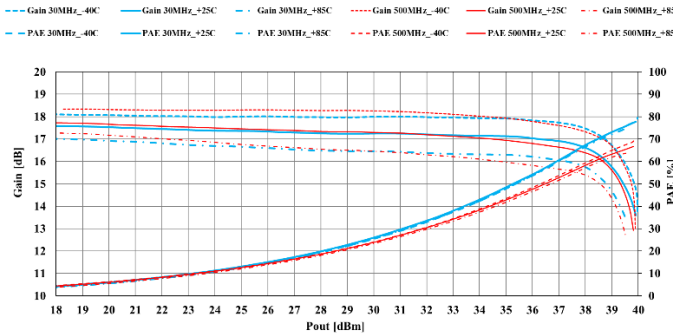


Figure 6.2.3. Gain and PAE vs P_{OUT} over temperature of TA9110K-EVB-A 30-500 MHz

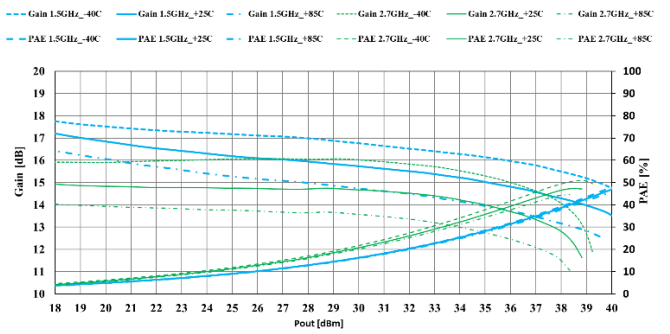


Figure 6.2.4. Gain and PAE vs P_{OUT} over temperature of TA9110K-EVB-A 1500-2700 MHz

6.3. ACPR Test Results

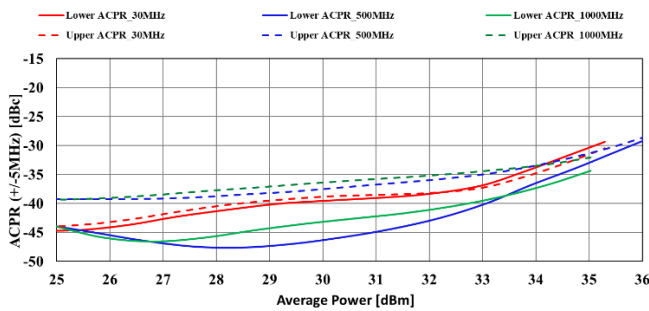


Figure 6.3.1 ACPR vs P_{OUT} (30-1000 MHz) of TA9110K-EVB-A

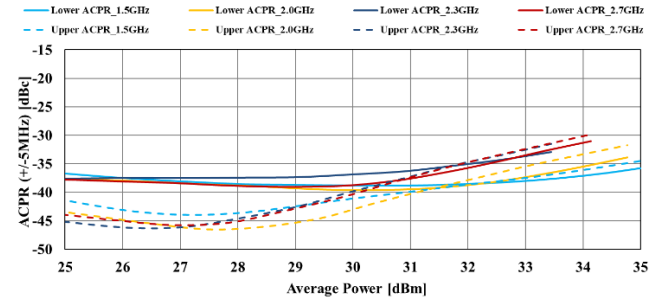


Figure 6.3.2 ACPR vs P_{OUT} (1500-2700 MHz) of TA9110K-EVB-A

6.4. AACPR Test Results

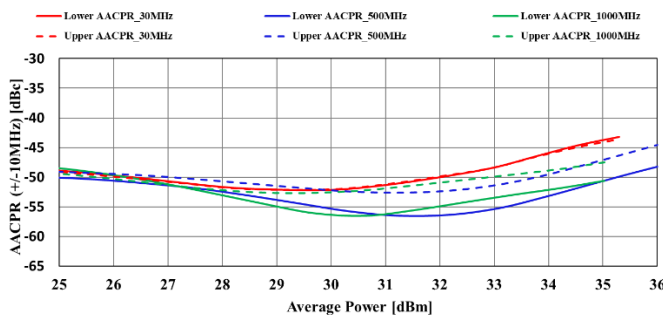


Figure 6.4.1 AACPR vs P_{OUT} (30-1000 MHz) of TA9110K-EVB-A

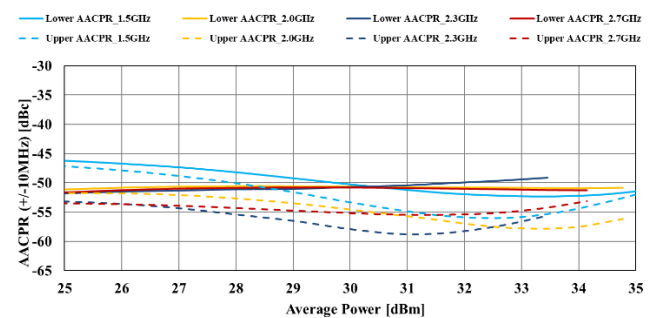


Figure 6.4.2 AACPR vs P_{OUT} (1500-2700 MHz) of TA9110K-EVB-A

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