Tagore Technology

TA9110K

6W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9110K EVB A

Application Note

30MHz~2700MHz

32V 40mA

Rev-1.1

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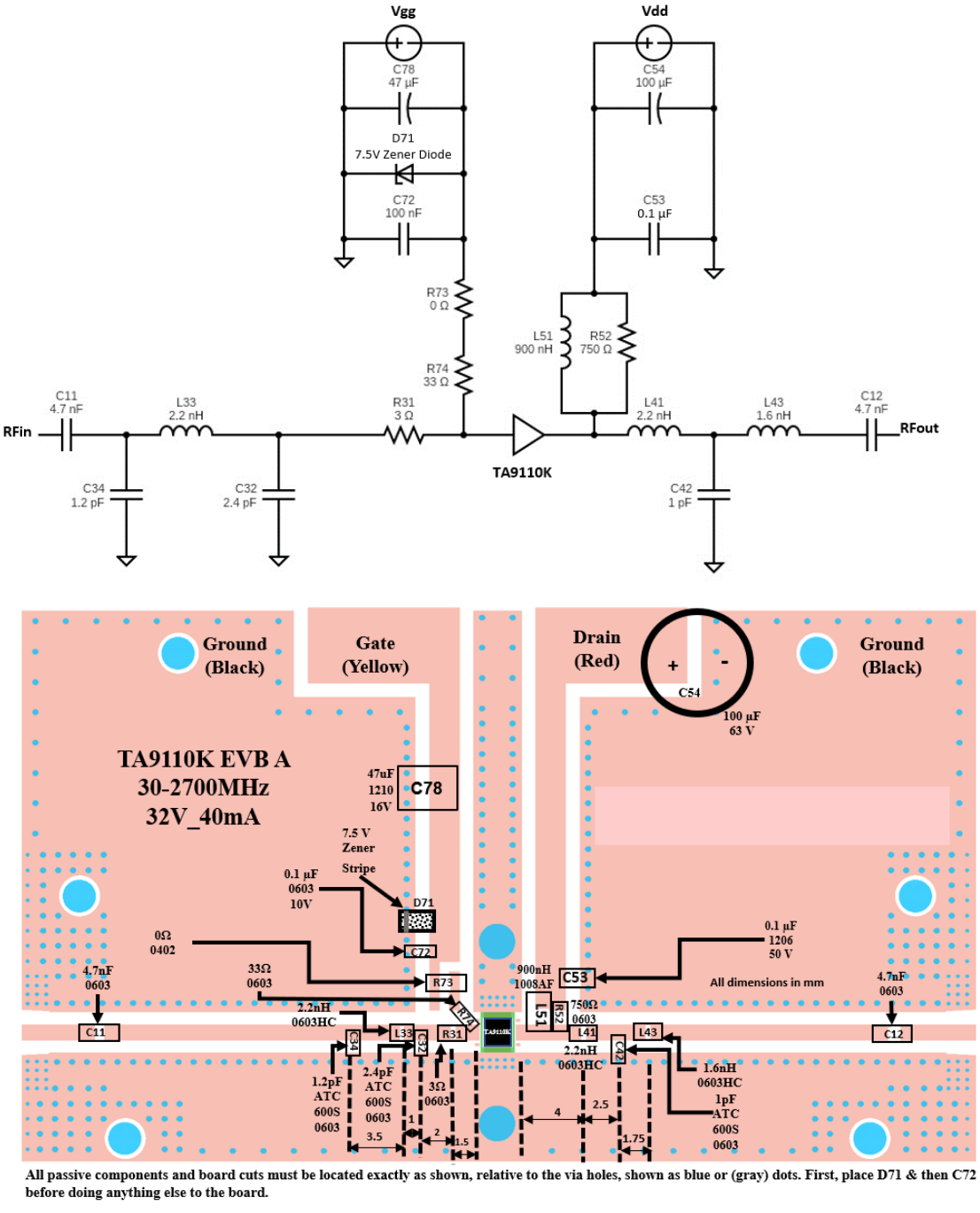
1. General Description

The TA9110K is a broadband GaN power transistor capable of delivering 6W CW from 30MHz to 4.0GHz 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) 3x3x0.8mm, 16 leads plastic package. TA9110K-EVB-A is tuned from 30MHz to 2.7GHz.

2. TA9110K-EVB-A Board Details



All passive components and board cuts must be located exactly as shown, relative to the via holes, shown as blue or (gray) dots. First, place D71 & then C72 before doing anything else to the board.

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

3. TA9110K-EVB-A Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11,12	4.7nF, 50V	Murata	GRM1885C1H472JA01D
R31	3Ω	Vishay	RCS06033R00FKEA
C32	2.4pF	AVX	600S2R4CT250XT
L33, L41	2.2nH	Coil craft	0402HP-2N2XJE
C34	1.2pF	AVX	600S1R2CT250XT
C42	1pF	AVX	600S1R0CT250XT
L43	1.6nH	Coil craft	0603HC-1N6XGLW
L51	900nH	Coil craft	1008AF-901XJLC
R52	750Ω	Vishay	CRCW0603750RFKEB
C53	0.1µF, 50V	Murata	GRM31C5C1H104JA01L
C54	100µF, 63V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	MMSZ5236BT1G
C72	0.1µF, 10V	AVX	0603ZC104K4T2A
R73	0Ω	Vishay	CRCW06030000Z0EAC
R74	33Ω	ROHM Semiconductor	ESR03EZPJ330
R78	47µF, 16V	Murata	GRM32ER61C476ME15L
Q1	6W GaN transistor	Tagore Technology	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 -5V 2. Set V_D to +32V 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	70	Less than -30dBc For Average power up to 35dBm With LTE 8dB PAPR 4.515MHz BW
100	18.5	-15.5	-3.9	40	68	
500	18.6	-9	-4.1	40	66	
1000	18.2	-5.2	-4.4	40	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	48	
2700	15.2	-26.9	-7.6	39	48	

Table 5.1 TA9110K-EVB-A Electrical Characteristics Summary

6. TA9110K-EVB-A Test Results

All the tests are carried out at room temperature.

6.1. S parameters

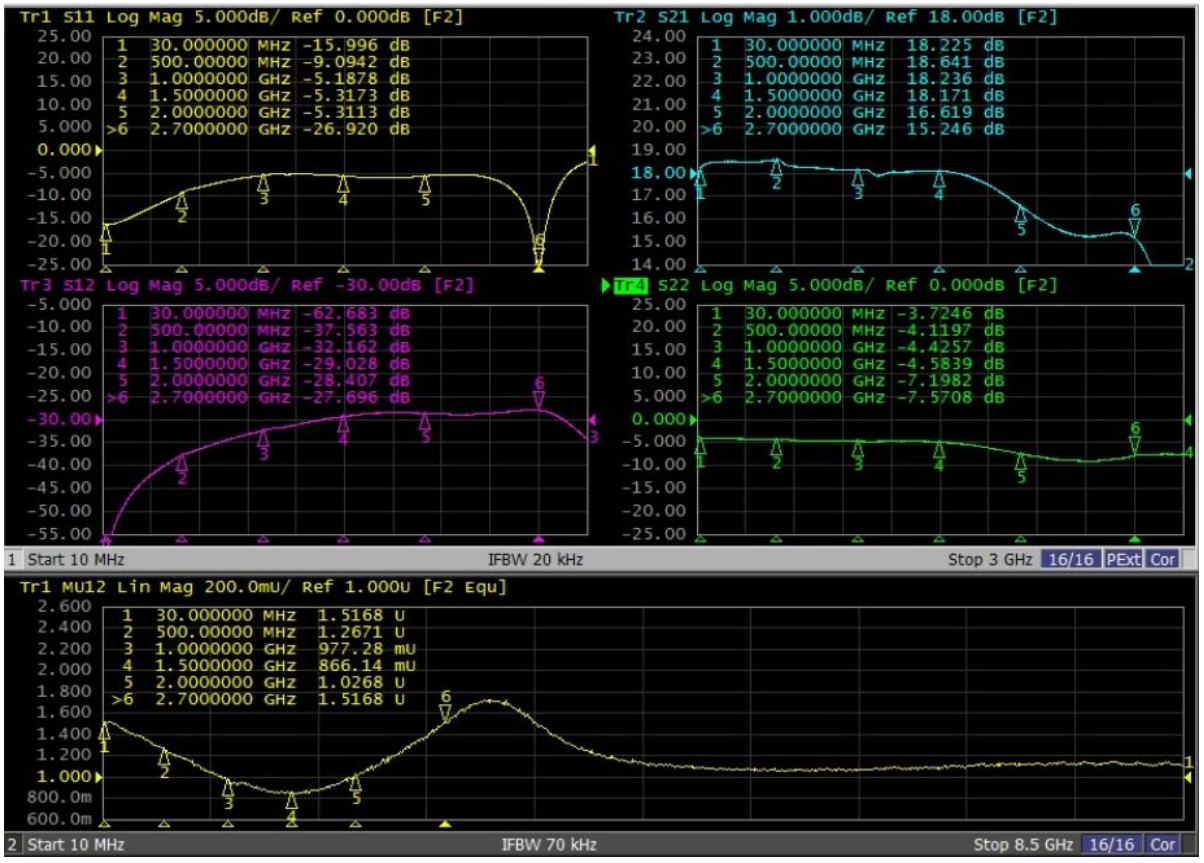


Figure 6.1.1. S parameters of TA9110K-EVB-A

6.2. Large Signal Test Results

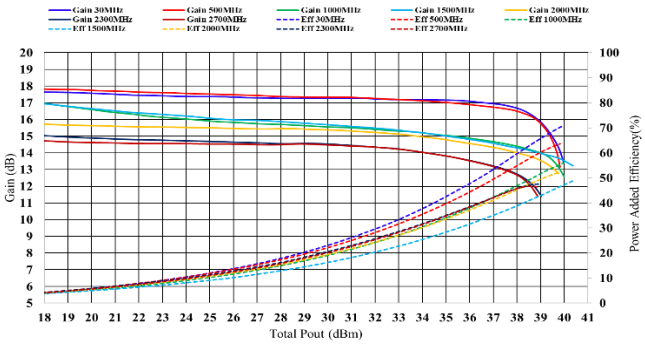


Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9110K-EVB-A

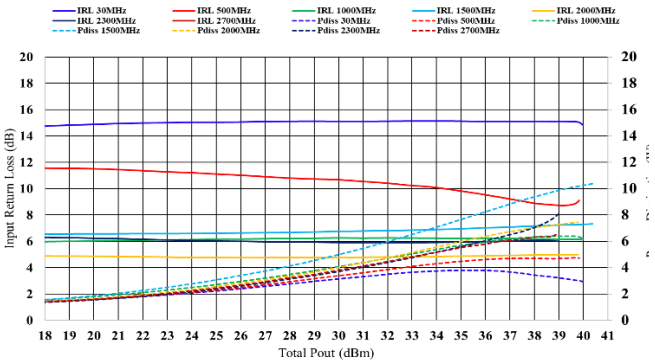


Figure 6.2.2. IRL and Pdiss vs P_{OUT} of TA9110K-EVB-A

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

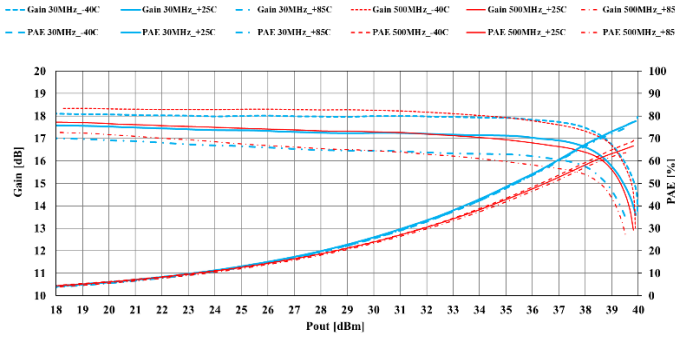


Figure 6.2.3. Gain and PAE vs P_{OUT} over temperature of TA9110K-EVB-A 30-500MHz

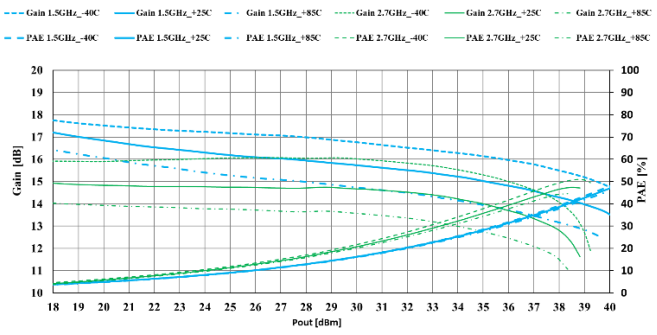


Figure 6.2.4. Gain and PAE vs P_{OUT} over temperature of TA9110K-EVB-A 1500-2700MHz

6.3. ACPR Test Results

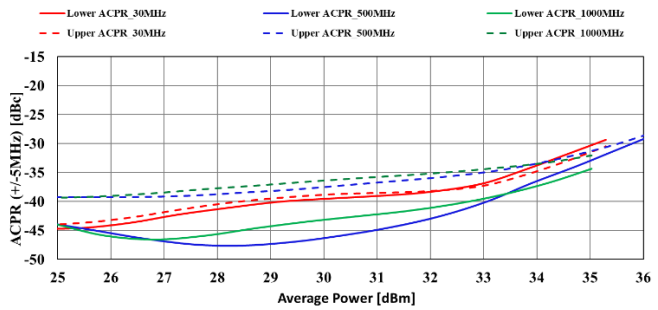


Figure 6.3.1 ACPR vs P_{OUT} (30-1000MHz) of TA9110K-EVB-A

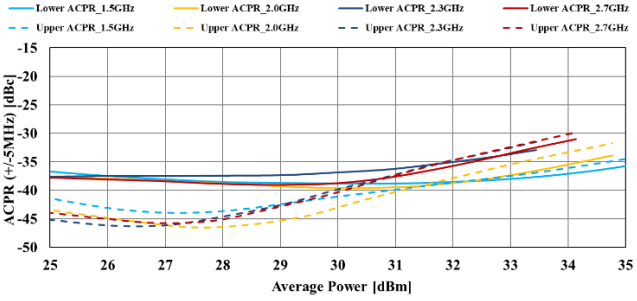


Figure 6.3.2 ACPR vs P_{OUT} (1500-2700MHz) of TA9110K-EVB-A

6.4. AACPR Test Results

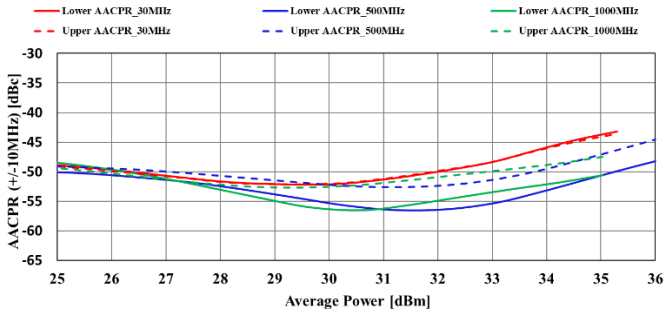


Figure 6.4.1 AACPR vs P_{OUT} (30-1000MHz) of TA9110K-EVB-A

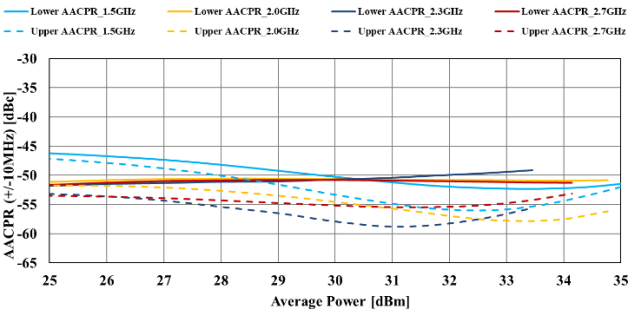


Figure 6.4.2 AACPR vs P_{OUT} (1500-2700MHz) of TA9110K-EVB-A

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