Tagore Technology

TA9110K

6W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9110K EVB G

Application Note

200MHz~2000MHz

28V 30mA

Rev-1.1

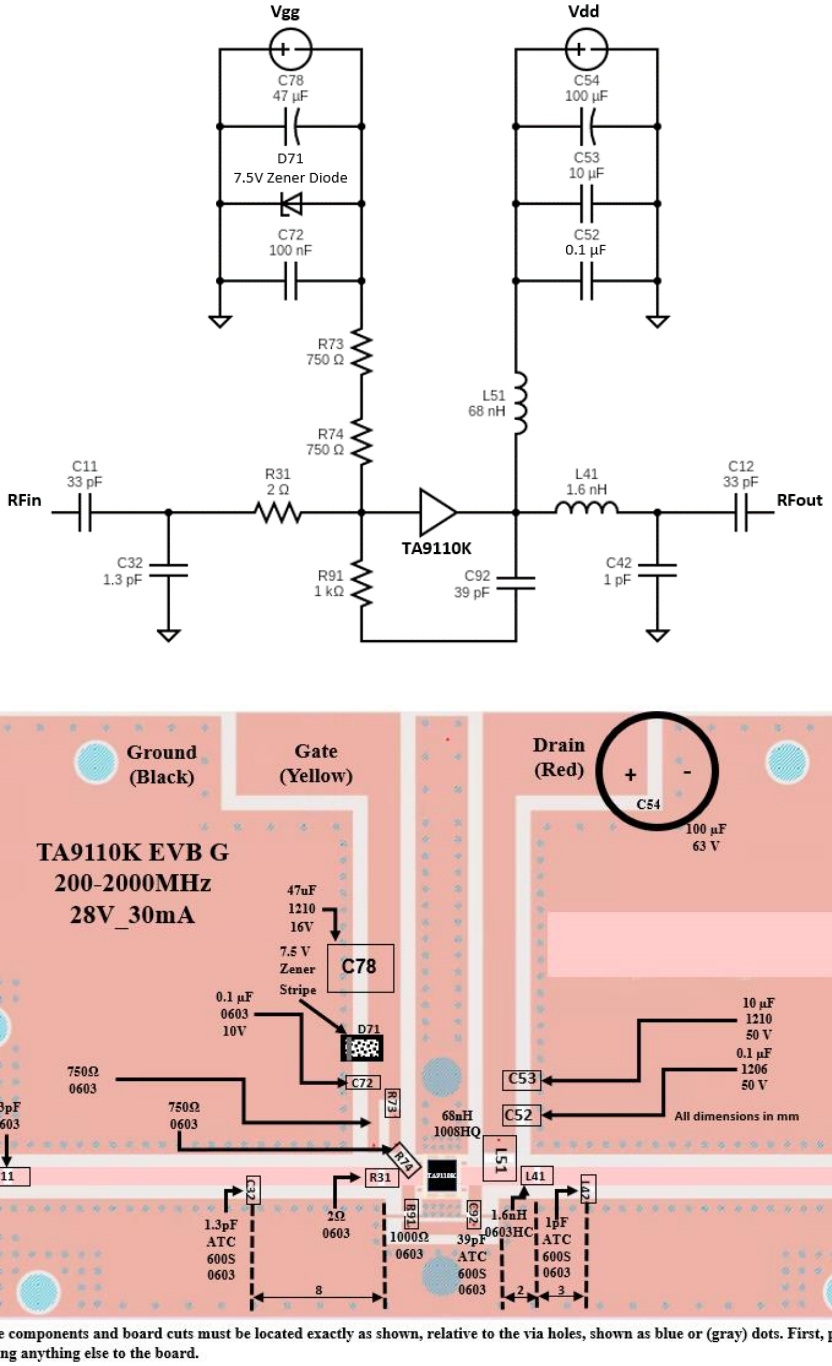
List of Contents

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-G is tuned from 200MHz to 2GHz.

2. TA9110K-EVB-G 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-G 200MHz ~ 2000MHz Schematic and EVB Layout

3. TA9110K-EVB-G Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	33pF	AVX	600S330JT250XT
R31	2Ω	Vishay	CRCW06032R00FKEAHP
C32	1.3pF	AVX	600S1R3AT250XT
L41	1.6nH	Coil craft	0603HC-1N6XJRW
C42	1pF	AVX	600S1R0AT250XT
L51	68nH	Coil craft	1008HQ-68NXGLC
C52	0.1μF, 50V	Murata	GRM31C5C1H104JA01L
C53	10μF, 50V	Murata	GRM32ER71H106KA12L
C54	100μF, 63V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	MMSZ5236BT 1G
C72	0.1μF, 10V	AVX	0603ZC104K4T2A
R73, R74	750Ω	Vishay	CRCW0603750RFKEB
C78	47μF, 16V	Murata	GRM32ER61C476ME15L
R91	1KΩ, 1.5W	Vishay	RCP0603W1K00GEB
C92	39pF	AVX	600S390JT250XT
Q1	6W GaN transistor	Tagore Technology	TA9110K
PCB		Rogers RO4350B, 20 mils, 2 oz copper	

Table 3.1 TA9110K-EVB-G BOM

4. TA9110K-EVB-G Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set V_G to -5V 2. Set V_D to +28V 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-G Bias and Sequencing

5. TA9110K-EVB-G Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11(dB)	S22(dB)	Noise Figure (dB)	Psat(dBm)	PAE (%) @Psat
200	20.0	-5.1	-12.3	1.4	38.7	67
400	19.0	-4.4	-8.9	1.4	39.0	62
600	18.0	-3.9	-7.7	1.5	39.0	64
800	17.1	-3.6	-7.0	1.5	39.3	63
1000	16.4	-3.6	-6.5	1.5	39.6	62
1200	15.7	-3.7	-6.3	1.7	39.2	47
1400	15.3	-4.0	-6.2	1.7	39.5	45
1600	15.1	-4.5	-6.4	1.7	39.9	46
1800	15.0	-5.3	-6.8	1.8	39.5	45
2000	14.9	-6.2	-7.4	1.9	39.8	55

Table 5.1 TA9110K-EVB-G 28V 30mA Electrical Characteristics Summary

6. TA9110K-EVB-G Test Results

All the tests are carried out at room temperature.

6.1. S parameters

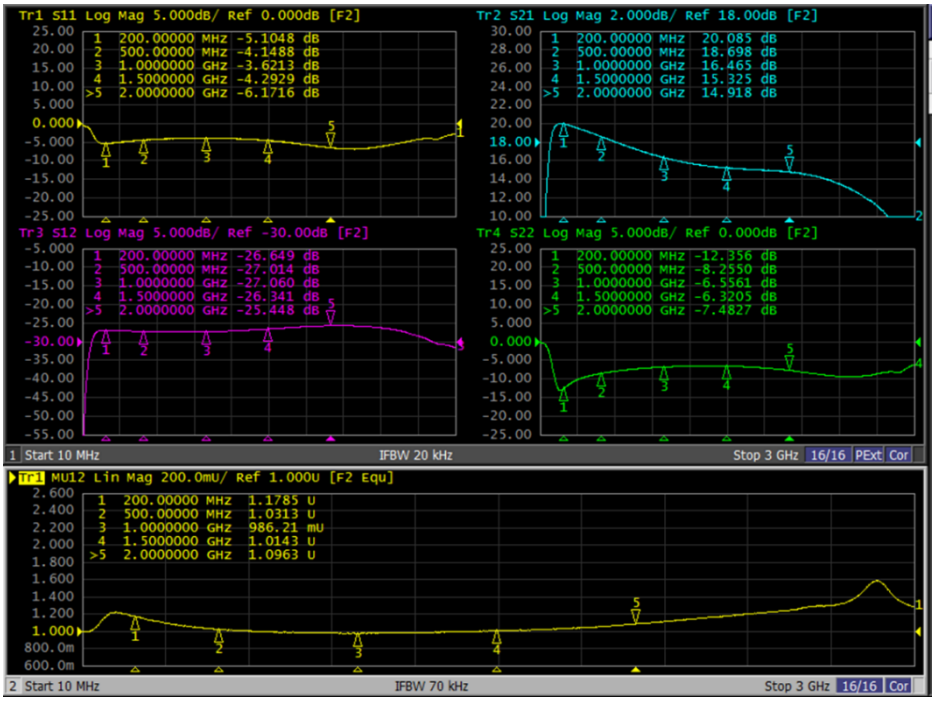


Figure 6.1.1. S parameters of TA9110K-EVB-G 28V 30mA

6.2. SMA to SMA Noise Figure

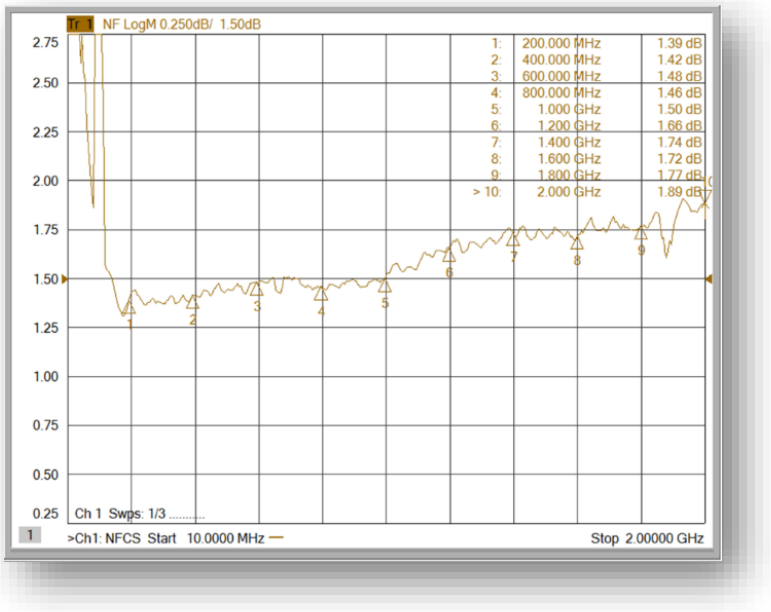


Figure 6.2.1. Noise Figure of TA9110K-EVB-G 28V 30mA

6.3. Large Signal Test Results

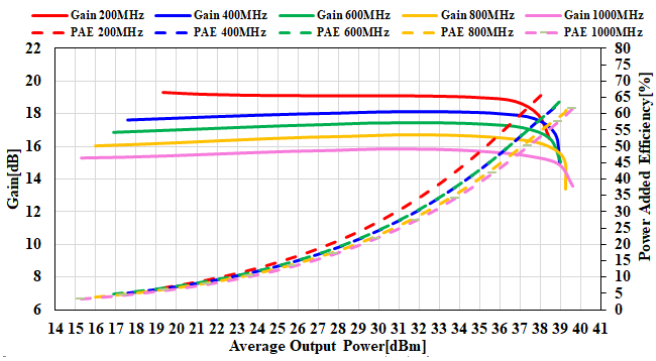


Figure 6.3.1. Gain and PAE vs P_{OUT} of TA9110K-EVB-G [for 200-1000MHz]

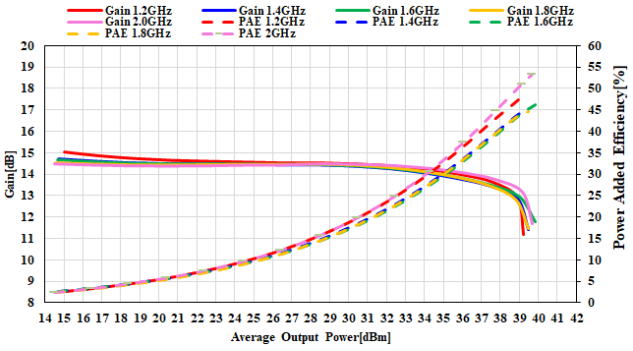


Figure 6.3.2. Gain and PAE vs P_{OUT} of TA9110K-EVB-G [for 1.2G-2GHz]

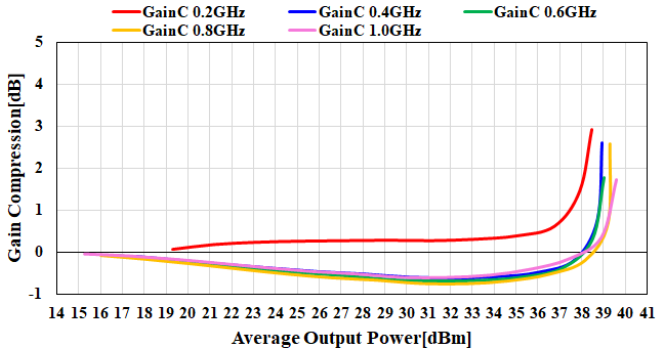


Figure 6.3.3. Gain Compression vs P_{OUT} of TA9110K-EVB-G [for 200-1000MHz]

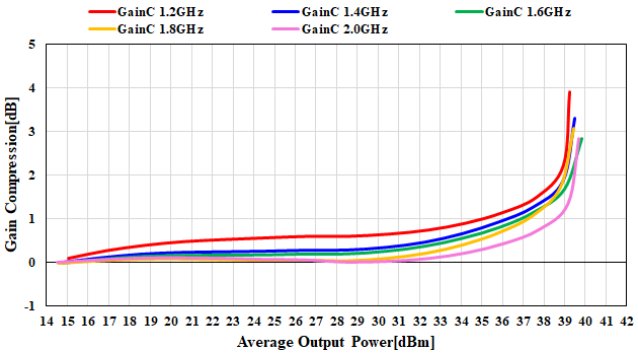


Figure 6.3.4. Gain Compression vs P_{OUT} of TA9110K-EVB-G [for 1.2G-2GHz]

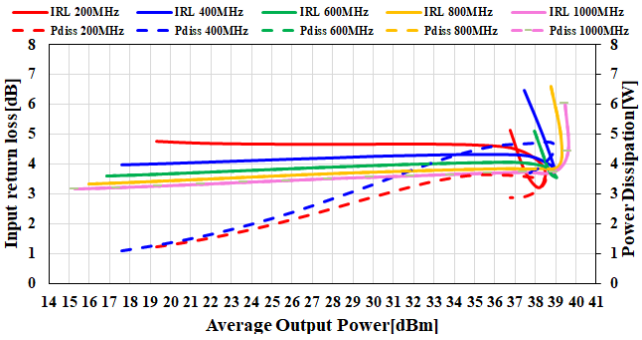


Figure 6.3.5. IRL and Pdiss vs P_{OUT} of TA9110K-EVB-G [for 200-1000MHz]

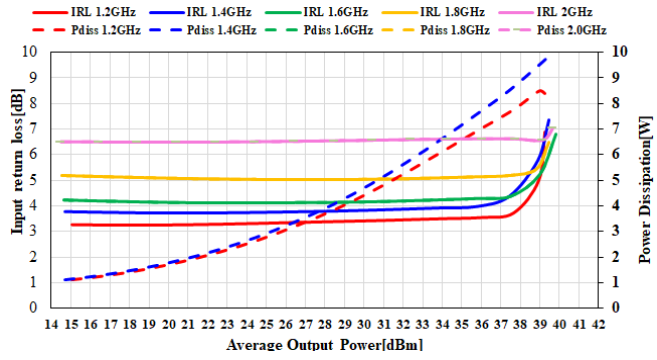


Figure 6.3.6. IRL and Pdiss vs P_{OUT} of TA9110K-EVB-G [for 1.2G-2GHz]

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Tagore Technology Inc.

601 W Campus Dr. Ste C1

Arlington Heights, IL 60004, USA

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