

TA9310E

20 W CW 0.5 – 4.0 GHz GaN Power Transistor

Application Note: TA9310E EVB A

Application Note

500 MHz~2700 MHz

32 V, 100 mA

Rev-2.1

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1. General Description

The TA9310E is a broadband GaN power transistor capable of delivering 20 W CW from 500 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 TA9310E is packaged in a compact, low-cost Dual Flat No lead (DFN) 5 x 6 x 0.75 mm, 8 leads plastic package.

TA9310E-EVB-A is tuned from 500 MHz to 2700 MHz.

2. TA9310E-EVB-A Board Details

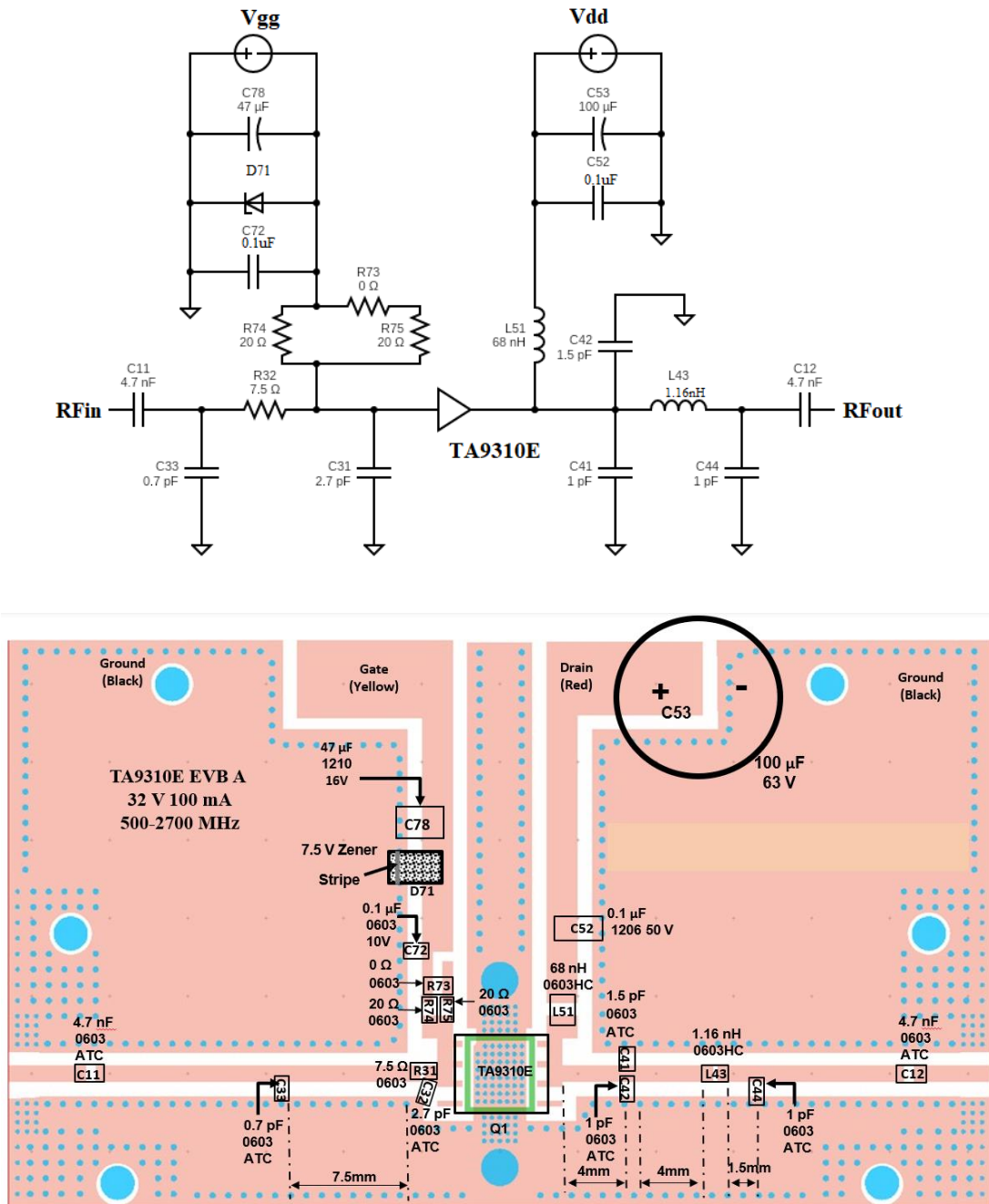


Figure 2.1 TA9310E-EVB-A 500 MHz ~ 2700 MHz Schematic and EVB Layout

3. TA9310E-EVB-A Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7 nF, 50 V	Murata	GRM1885C1H472JA01
R31	7.5 Ω	Panasonic	ERJ-3RQF7R5V
C32	2.7 pF	AVX	600S2R7CT250XT
C33	0.7 pF	AVX	600S0R7CT250XT
C41	1.5 pF	AVX	600S1R5CT250XT
C42	1.0 pF	AVX	600S1R0CT250XT
L43	1.16 nH	Coil craft	0604HQ-1N1XJLC
C44	1.0 pF	AVX	600S1R0CT250XT
L51	68 nH	Coil craft	1008HQ-68NXGLC
C52	0.1 μ F, 50 V	Murata	GRM31C5C1H104JA01L
C53	100 μ F	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	SZMMSZ5236BT1G
C72	0.1 μ F, 10 V	AVX	0603ZC104K4T2A
R73	0 Ω	Panasonic	ERJ-2GE0R00X
R74, R75	20 Ω , 250 mW	Panasonic	ERJ-PA3F20R0V
Q1	20 W GaN Transistor	Tagore Tech	TA9310E
PCB	Rogers RO4350B, 20 mils, 2 oz copper		

Table 3.1 TA9310E-EVB-A BOM

4. TA9310E-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 TA9310E-EVB-A Bias and Sequencing

5. TA9310E-EVB-A Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11 (dB)	S22 (dB)	Psat (dBm)	PAE (%) @Psat	ACPR & AACPR
500	18.5	-6.3	-3.2	42.8	64	ACPR less than -35 dBc and AACPR less than -54 dBc for Average power up to 36 dBm With LTE 6.98 dB PAPR 3 MHz BW
700	17.7	-6.0	-3.0	44.1	59	
900	16.8	-5.6	-3.4	44.6	63	
1000	16.1	-5.2	-4.3	44.4	57	
1100	15.4	-5.2	-5.2	44.3	49	
1300	14.8	-5.2	-6.3	44.5	45	
1500	14.1	-5.2	-7.4	45.0	51	
1700	14.0	-5.4	-8.2	44.8	52	
1900	13.9	-5.4	-9.5	44.3	49	
2100	13.9	-5.3	-9.4	44.3	50	
2300	14.4	-5.1	-7.9	45.0	53	
2500	15.1	-6.8	-7.5	45.2	56	
2700	15.4	-9.4	-11.9	45.0	60	

Table 5.1 TA9310E-EVB-A 32 V, 100 mA Electrical Characteristics Summary

6. TA9310E-EVB-A Test Results

All the tests are carried out at room temperature.

6.1. S parameters



Figure 6.1.1. S parameters of TA9310E-EVB-A

6.2. Large Signal Test Results

Gain and PAE Vs P_{OUT} data [V_d=32 V, I_{DQ}=100 mA, CW]

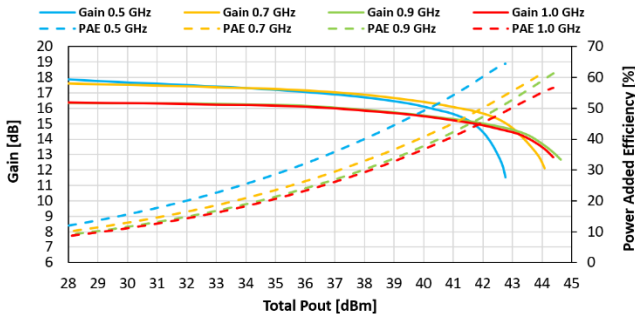


Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 500-1000 MHz

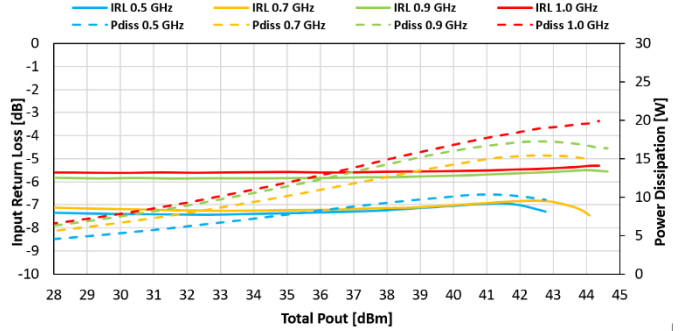


Figure 6.2.2 IRL & Pdiss vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 500-1000 MHz

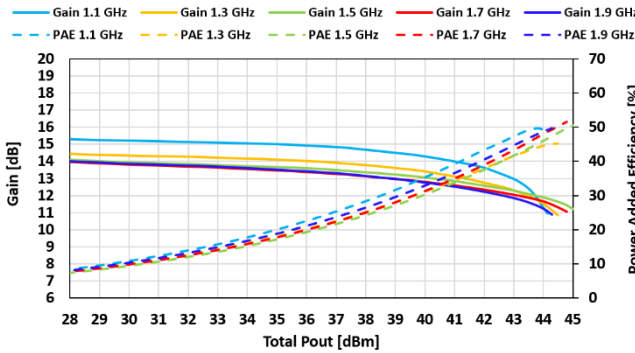


Figure 6.2.3. Gain and PAE vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 1100-1900 MHz

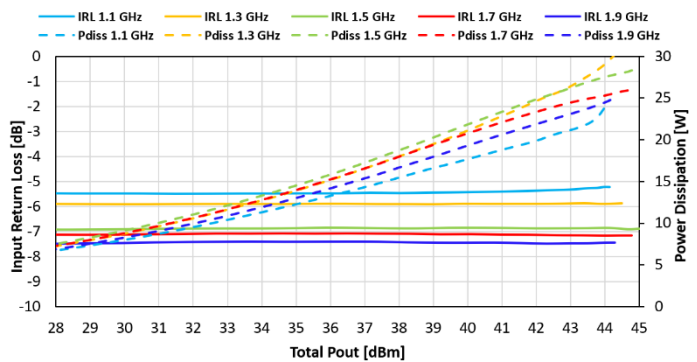


Figure 6.2.4. IRL & Pdiss vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 1100-1900 MHz

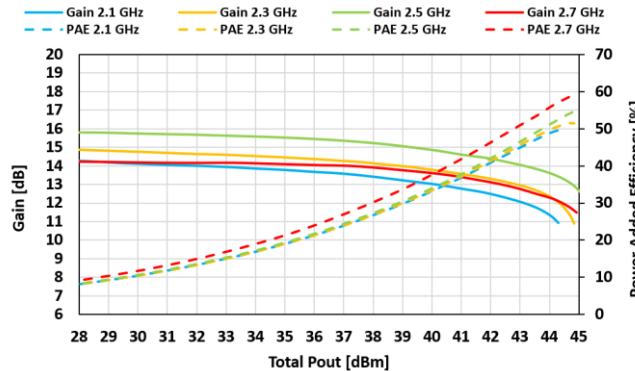


Figure 6.2.5. Gain and PAE vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 2100-2700 MHz

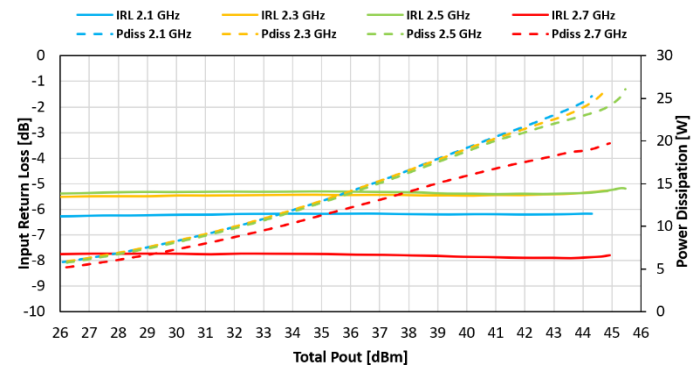


Figure 6.2.6. IRL & Pdiss vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 2100-2700 MHz

ACPR and AACPR Vs P_{OUT} data [V_d=32 V, I_{DQ}=100 mA]

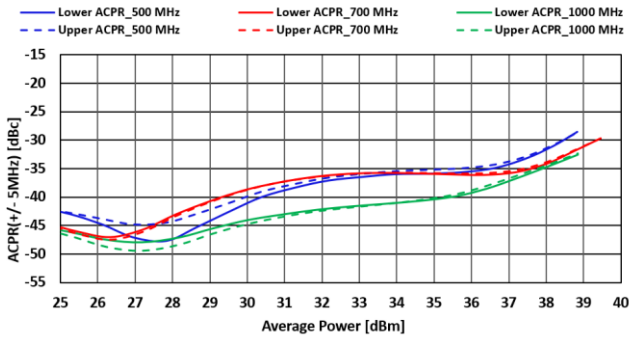


Figure 6.2.7. ACPR vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 500-1000 MHz

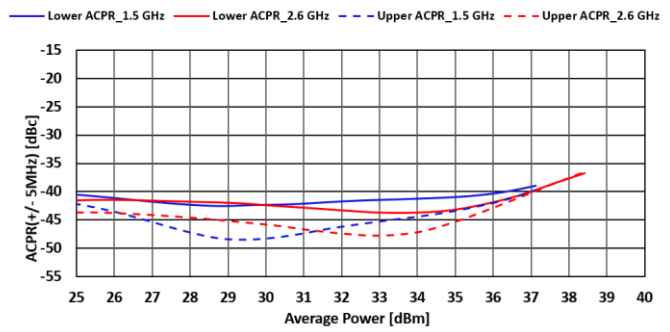


Figure 6.2.8. ACPR vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 1500-2600 MHz

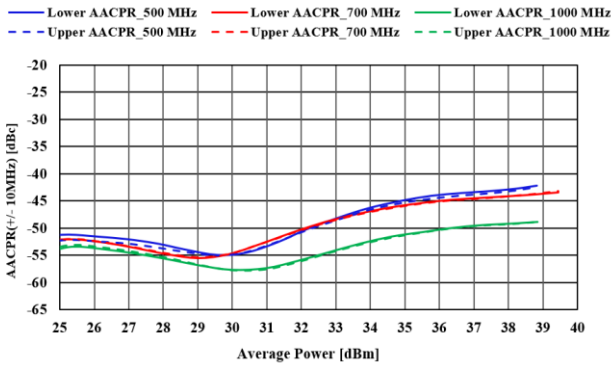


Figure 6.2.9. AACPR vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 500-1000 MHz

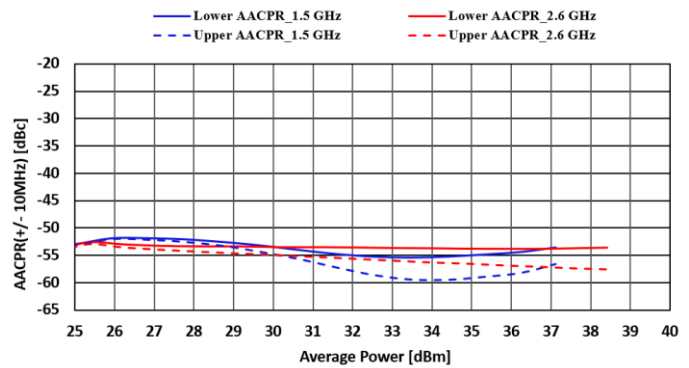


Figure 6.2.10. AACPR vs P_{OUT} of TA9310E-EVB-A for 32 V, 100 mA for freq: 1500-2600 MHz

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