

TA9210D

12.5W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9210D EVB A

Application Note

30MHz~2600MHz

32V/28V 50mA

Rev-1.1

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1. General Description

The TA9210D is a broadband capable 12.5W GaN power transistor covering 30MHz to 2.7GHz frequency band with a single match. TA9210D is usable up to 4GHz. The input and output can be matched for best power and efficiency for the desired band.

The TA9210D is packaged in a compact, low-cost Quad Flat No lead (QFN) 3x6x0.75mm, 32 leads plastic package. TA9210D-EVB-A is tuned from 30MHz to 2.6GHz.

2. TA9210D-EVB-A Board Details

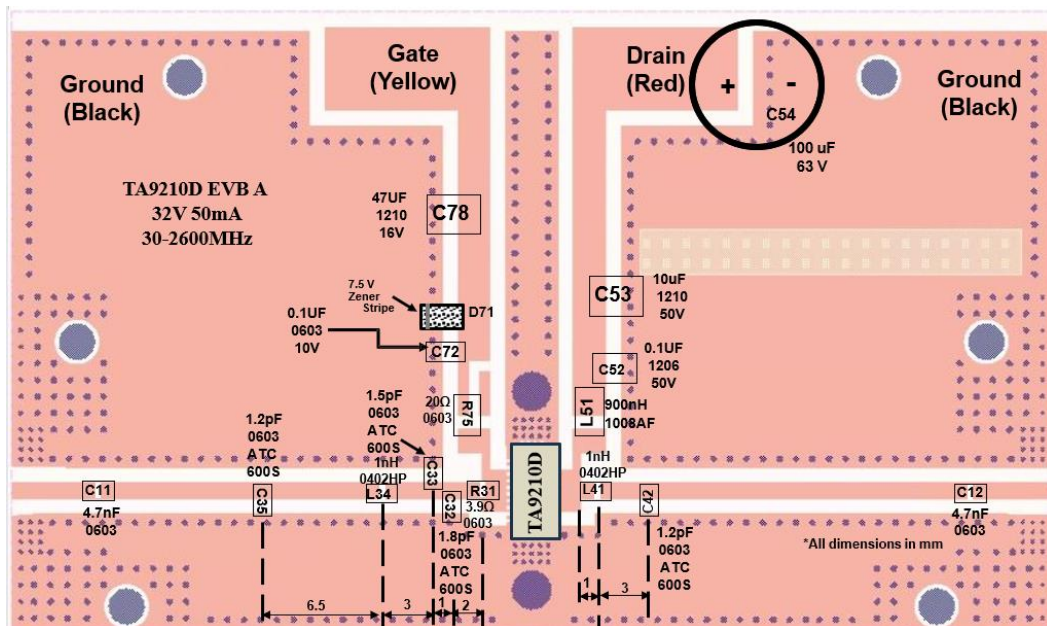
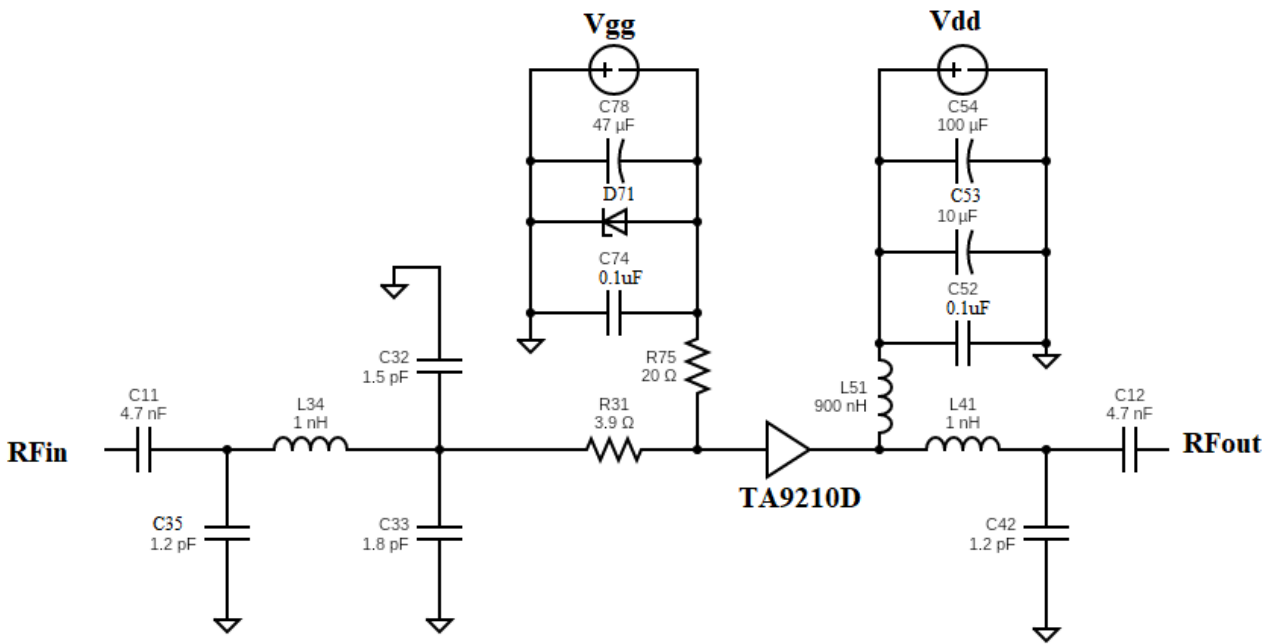


Figure 2.1 TA9210D-EVB-A 30MHz ~ 2600MHz Schematic and EVB Layout

3. TA9210D-EVB-A Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7nF, 50V	Murata	GRM1885C1H472JA01
R31	3.9Ω, 250mW	Panasonic	ERJ-PA3J3R9V
C32	1.8pF	AVX	600S1R8CT250XT
C33	1.5pF	AVX	600S1R5CT250XT
L34, L41	1.0nH	Coil craft	0402HP-1N0XJL
C35, L42	1.2pF	AVX	600S1R2CT250XT
L51	900nH	Coil craft	1008AF-901XKRC
C52	0.1uF, 50V	Murata	GRM31C5C1H104JA01L
C53	10uF, 50V	Murata	GRM32ER71H106KA12L
C54	100uF, 63V	Nichicon	UPW1J101MPD1TD
D71	7.5 V, 0.5W Zener	On Semiconductor	SZMMSZ5236BT 1G
C72	0.1uF, 10V	AVX	0603ZC104K4T2A
R75	20Ω, 250mW	Panasonic	ERJ-PA3F20R0V
C78	47uF, 16V	Murata	GRM32ER61C476ME15L
Q1	12.5W GaN transistor	Tagore Technology	TA9210D
PCB	Rogers RO4350B, 20 mils, 2 oz copper		

Table 3.1 TA9210D-EVB-A BOM

4. TA9210D-EVB-A Biasing Sequence

Turn ON Device	Turn OFF Device
<ol style="list-style-type: none"> 1. Set V_G to -5V 2. Set V_D to +32V/28V 3. Adjust V_G to reach required I_{DQ} current 4. Apply RF power 	<ol style="list-style-type: none"> 1. Turn RF power off 2. Turn off V_D 3. Turn off V_G

Table 4.1 TA9210D-EVB-A Bias and Sequencing

5. TA9210D-EVB-A Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11(dB)	S22(dB)	Psat(dBm)	PAE (%) @Psat	ACPR & AACPR
30	19.4	-9	-5.3	41	78	ACPR less than -35dBc and AACPR less than -50dBc for Average power up to 36dBm With LTE 9.5dB PAPR 10MHz BW
500	18.6	-7.1	-4.2	41	62.5	
1000	17.1	-5.7	-3.4	41.5	49	
1500	16.4	-6.5	-3.4	41.7	41	
2000	15.6	-7	-5.2	41.7	40.5	
2300	14.8	-6.4	-7.3	42	43	
2600	14.6	-9.2	-8.9	41.8	52.5	

Table 5.1 TA9210D-EVB-A 32V 50mA Electrical Characteristics Summary

6. TA9210D-EVB-A Test Results

All the tests are carried out at room temperature.

6.1. S parameters

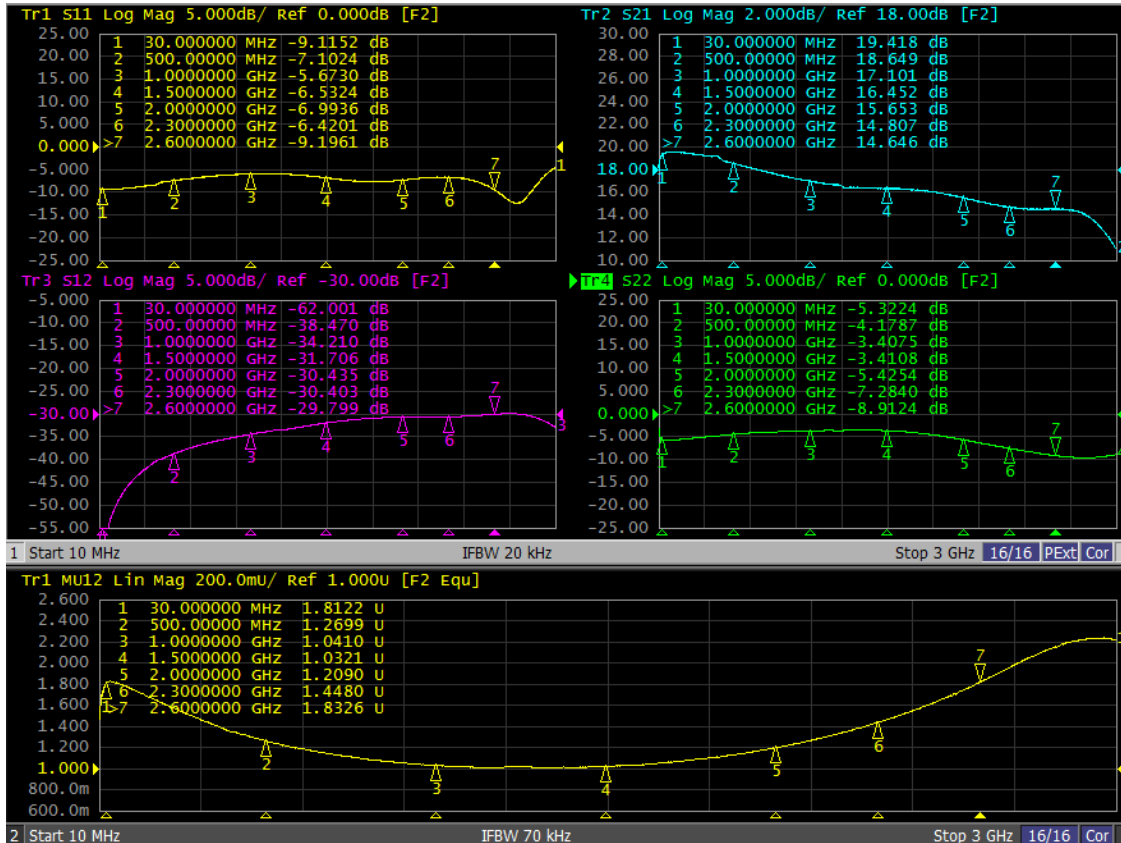


Figure 6.1.1. S parameters of TA9210D-EVB-A 32V 50mA

6.2. Large Signal Test Results

Gain and PAE Vs P_{OUT} data and IRL and Pdiss Vs P_{OUT} [Vd=32V, IdQ=50mA, CW]

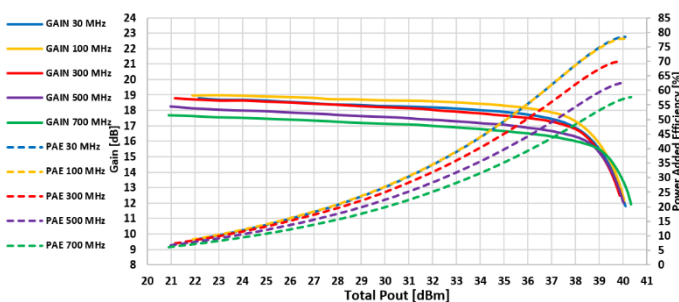


Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 32V 50mA for freq:30-700MHz

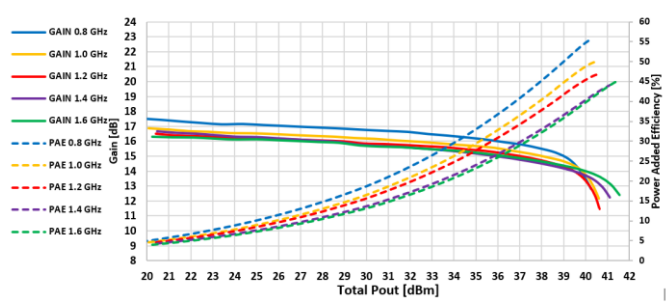


Figure 6.2.2. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 32V 50mA for freq:800-1600MHz

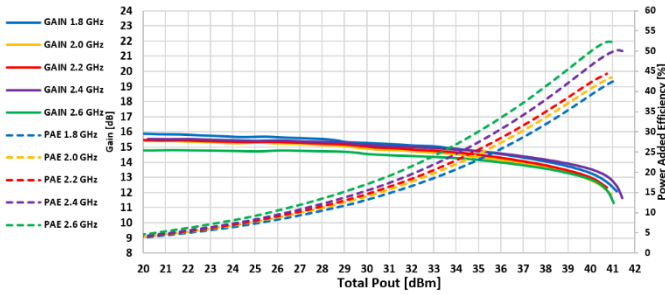


Figure 6.2.3. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 32V 50mA for freq:1800-2600MHz

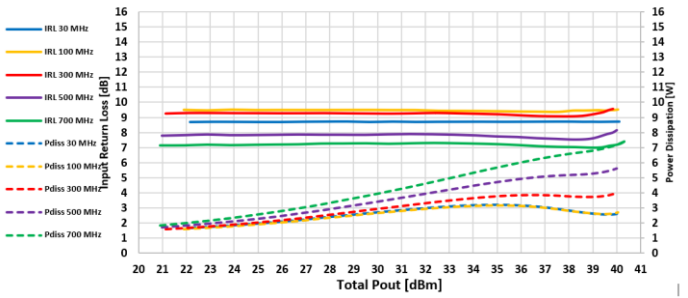


Figure 6.2.4. IRL and P_{diss} vs P_{OUT} of TA9210D-EVB-A for 32V 50mA for freq:30-700MHz

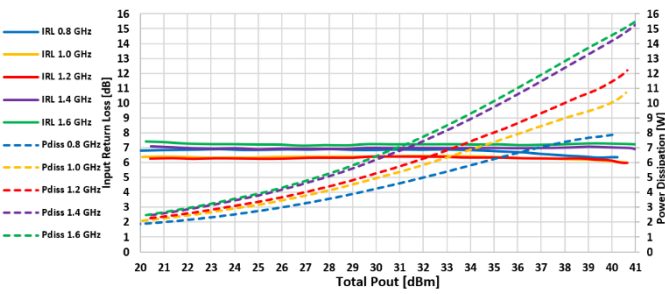


Figure 6.2.5. IRL and P_{diss} vs P_{OUT} of TA9210D-EVB-A for 32V 50mA for freq:800-1600MHz

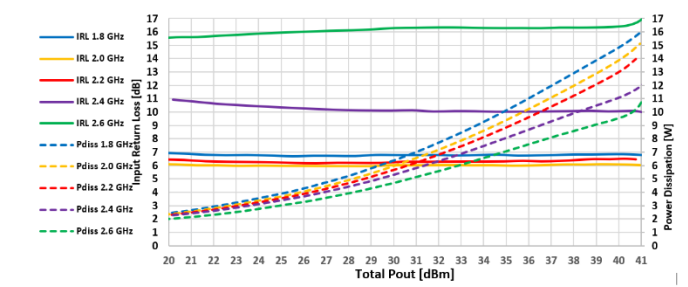


Figure 6.2.6. IRL and P_{diss} vs P_{OUT} of TA9210D-EVB-A for 32V 50mA for freq:1800-2600MHz

Gain and PAE Vs P_{OUT} data and IRL and P_{diss} Vs P_{OUT} [$V_d=28V$, $I_{DQ}=50mA$, CW]

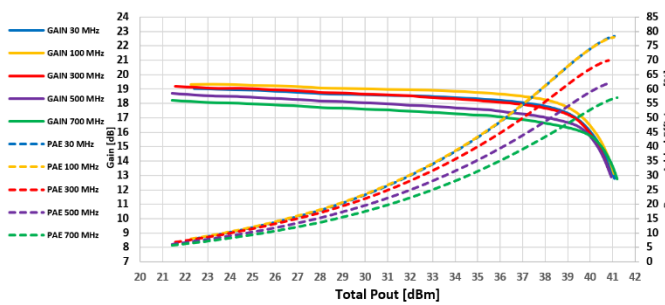


Figure 6.2.7. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 28V 50mA for freq:30-700MHz

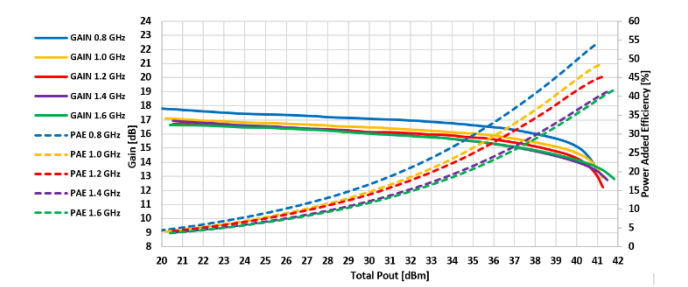


Figure 6.2.8. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 28V 50mA for freq:800-1600MHz

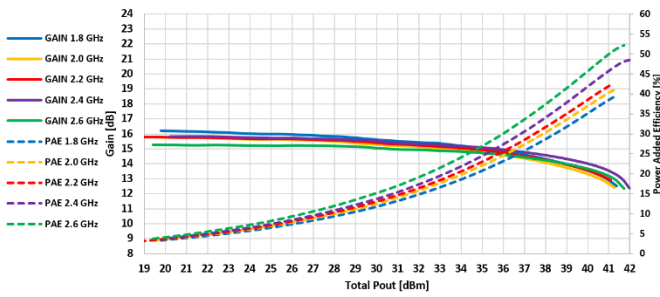


Figure 6.2.9. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 28V 50mA for freq:1800-2600MHz

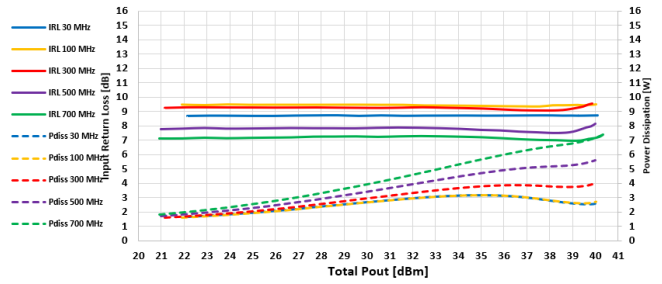


Figure 6.2.10. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 28V 50mA for freq:30-700MHz

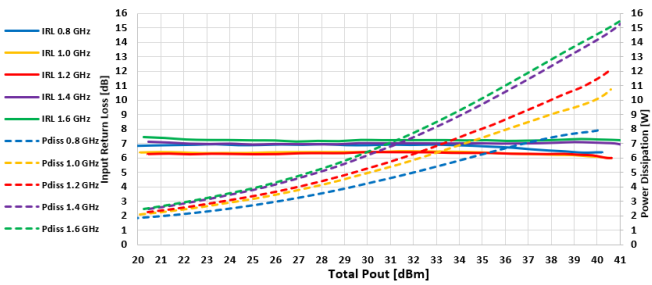


Figure 6.2.11. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 28V 50mA for freq:800-1600MHz

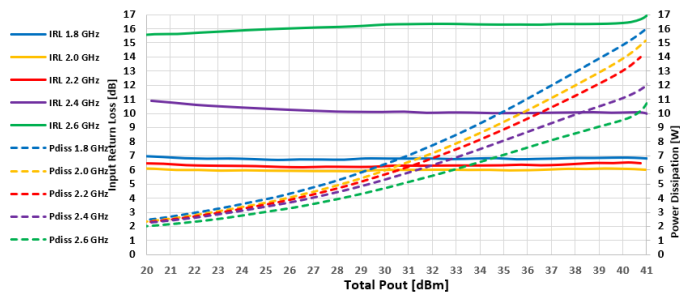


Figure 6.2.12. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 28V 50mA for freq:1800-2600MHz

6.3. IMD Test Results

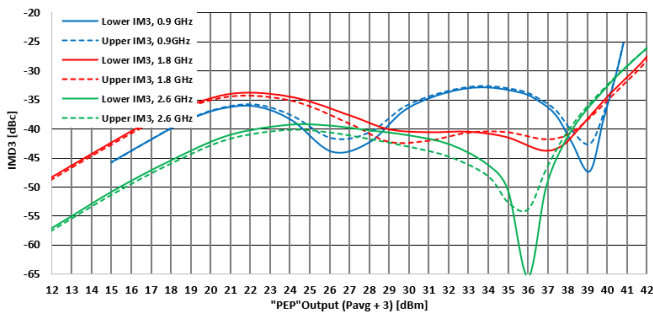


Figure 6.3.1 IMD3 Vs P_{OUT} V_D=28V, I_{DQ}=50mA, CW, F_{sp}=200kHz, T_A=+25°C of TA910D-EVB-A

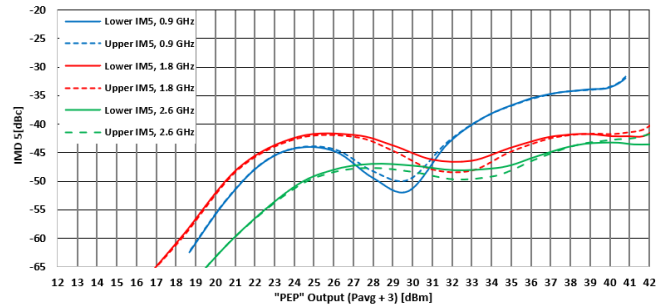


Figure 6.3.2 IMD5 Vs P_{OUT} V_D=28V, I_{DQ}=50mA, CW, F_{sp}=200kHz, T_A=+25°C of TA910D-EVB-A

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