TA9210D

12.5 W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9210D EVB A

Application Note

30 MHz~2600 MHz

32 V/ 28 V, 50 mA

Rev-2.1

List of Contents

1. General Description

The TA9210D is a broadband capable 12.5 W GaN power transistor covering 30 MHz to 2.7 GHz frequency band with a single match. TA9210D is usable up to 4 GHz. 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) 3 x 6 x 0.75 mm, 32 leads plastic package. TA9210D-EVB-A is tuned from 30 MHz to 2.6 GHz.

2. TA9210D-EVB-A Board Details

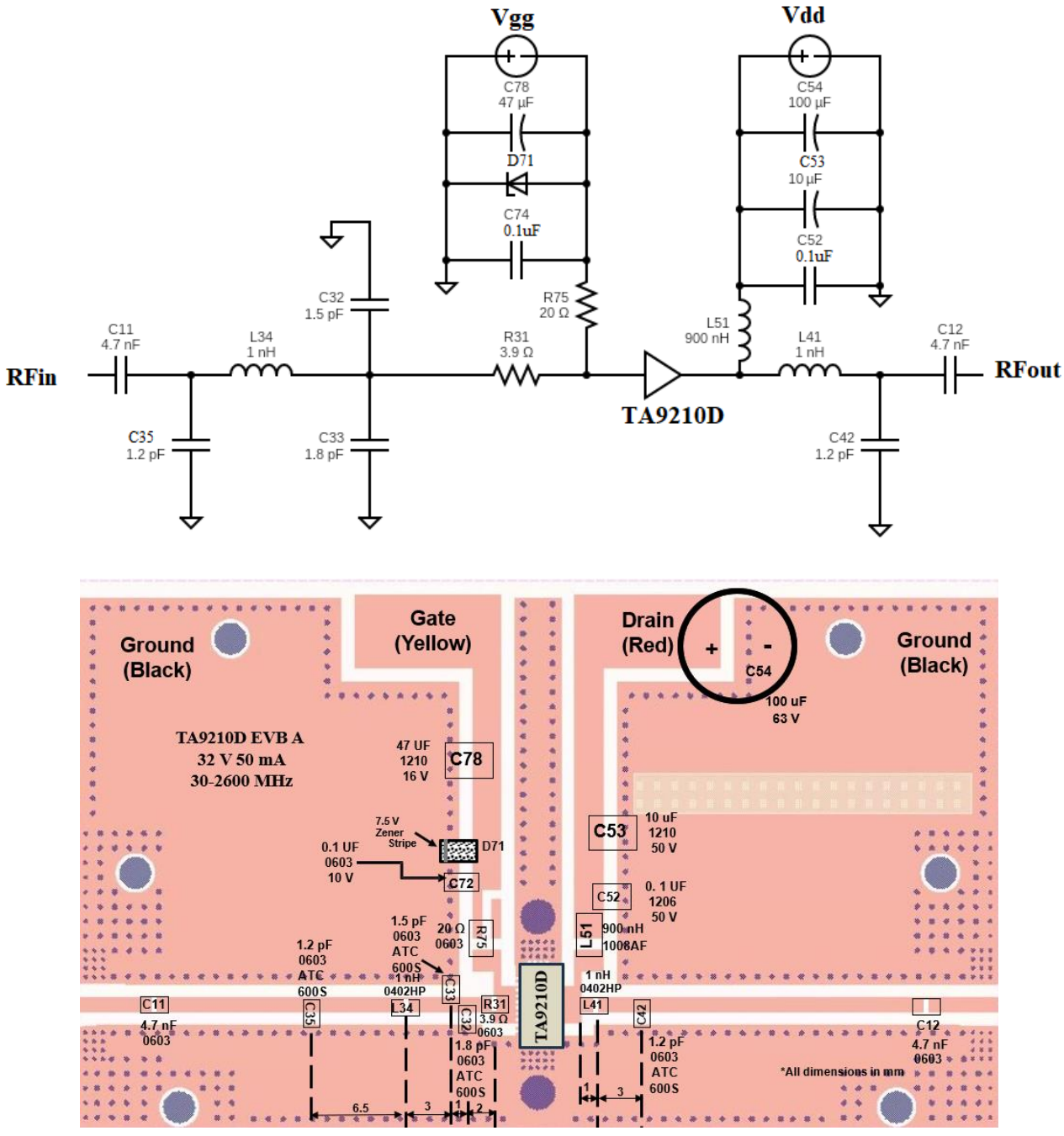

Figure 2.1 TA9210D-EVB-A 30 MHz ~ 2600 MHz Schematic and EVB Layout

3. TA9210D-EVB-A Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7 nF, 50 V	Murata	GRM1885C1H472JA01
R31	3.9 Ω, 250 mW	Panasonic	ERJ-PA3J3R9V
C32	1.8 pF	AVX	600S1R8CT250XT
C33	1.5 pF	AVX	600S1R5CT250XT
L34, L41	1.0 nH	Coil craft	0402HP-1N0XJL
C35, L42	1.2 pF	AVX	600S1R2CT250XT
L51	900 nH	Coil craft	1008AF-901XKRC
C52	0.1 uF, 50 V	Murata	GRM31C5C1H104JA01L
C53	10 uF, 50 V	Murata	GRM32ER71H106KA12L
C54	100 uF,63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V, 0.5 W Zener	On Semiconductor	SZMMSZ5236BT 1G
C72	0.1 uF, 10 V	AVX	0603ZC104K4T2A
R75	20 Ω, 250 mW	Panasonic	ERJ-PA3F20R0V
C78	47 uF,16 V	Murata	GRM32ER61C476ME15L
Q1	12.5 W GaN transistor	Tagore Tech	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
1. Set V_G to -5 V 2. Set V_D to +32 V/ 28 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 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 -35 dBc and AACPR less than -50 dBc for Average power up to 36 dBm With LTE 9.5 dB 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 32 V, 50 mA Electrical Characteristics Summary

6. TA9210D-EVB-A Test Results

All the tests are carried out at room temperature.

6.1. S parameters

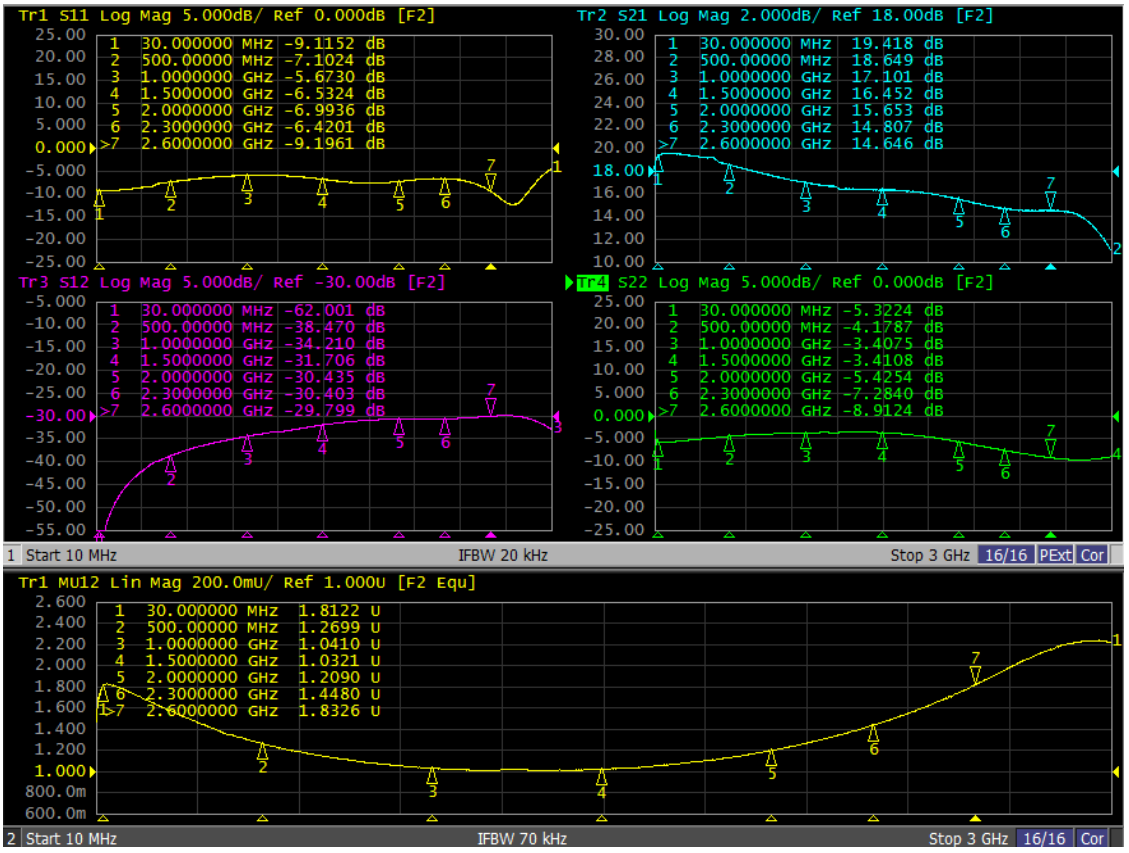

Figure 6.1.1. S parameters of TA9210D-EVB-A 32 V, 50 mA

6.2. Large Signal Test Results

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

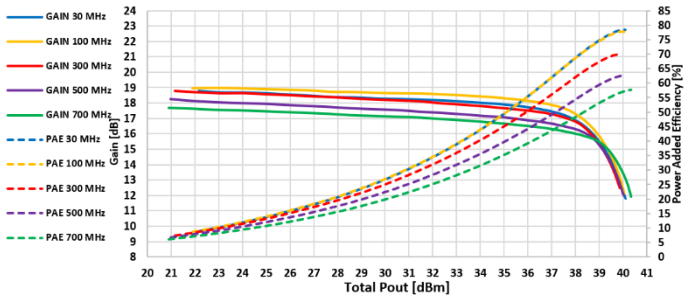

Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 32 V, 50 mA for freq: 30-700 MHz

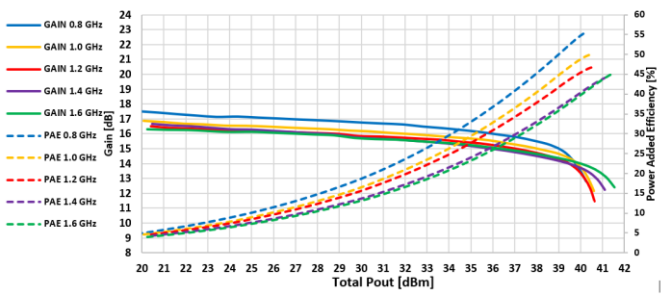

Figure 6.2.2. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 32 V, 50 mA for freq: 800-1600 MHz

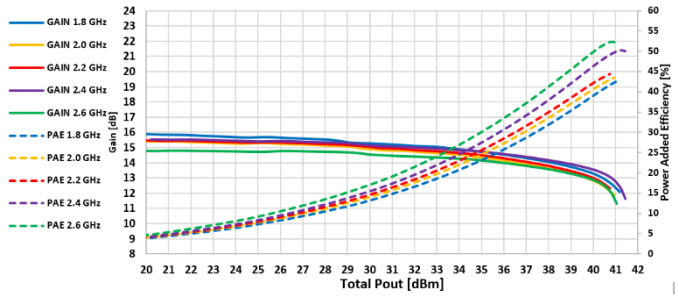

Figure 6.2.3. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 32 V, 50 mA for freq: 1800-2600 MHz

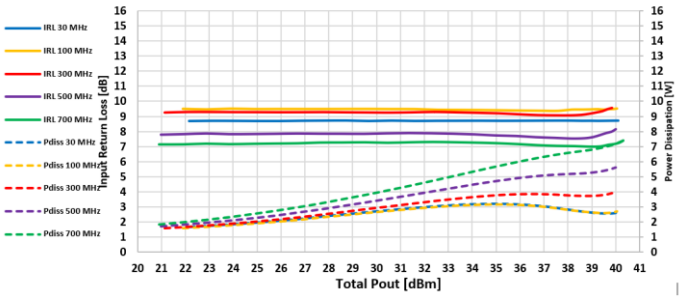

Figure 6.2.4. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 32 V, 50 mA for freq: 30-700 MHz

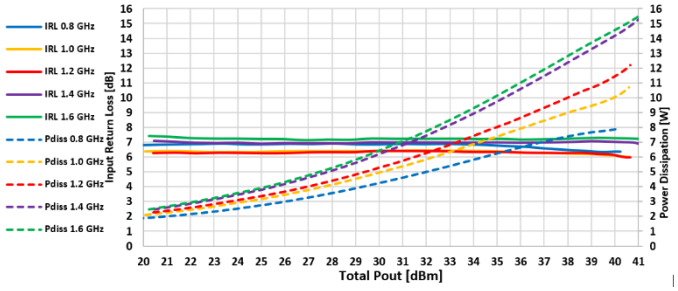

Figure 6.2.5. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 32 V, 50 mA for freq: 800-1600 MHz

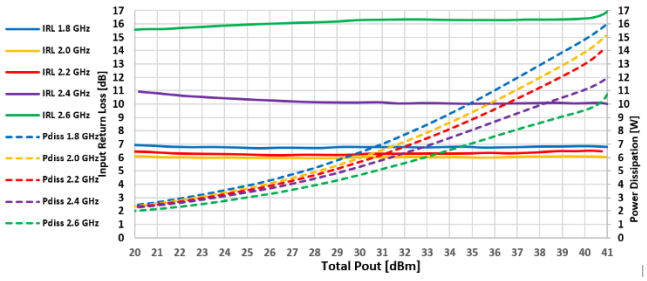

Figure 6.2.6. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 32 V, 50 mA for freq: 1800-2600 MHz

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

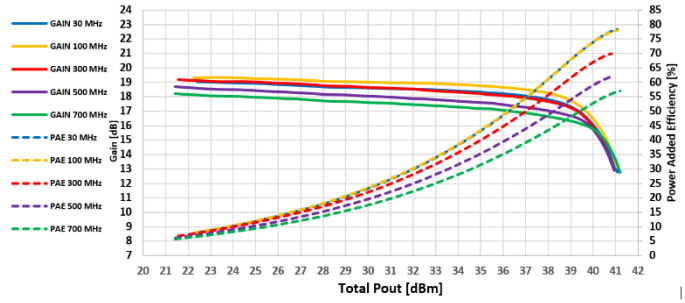

Figure 6.2.7. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 28 V, 50 mA for freq: 30-700 MHz

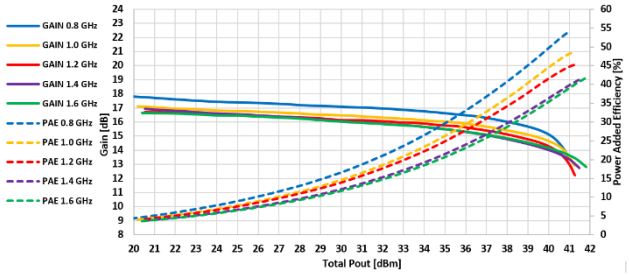

Figure 6.2.8. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 28 V, 50 mA for freq: 800-1600 MHz

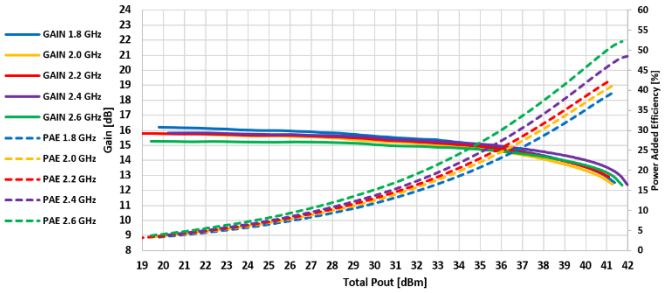

Figure 6.2.9. Gain and PAE vs P_{OUT} of TA9210D-EVB-A for 28 V, 50 mA for freq: 1800-2600 MHz

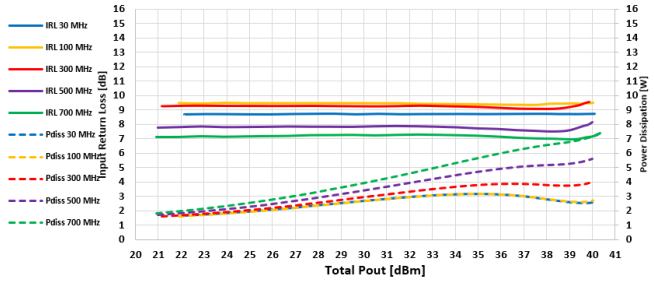

Figure 6.2.10. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 28 V, 50 mA for freq: 30-700 MHz

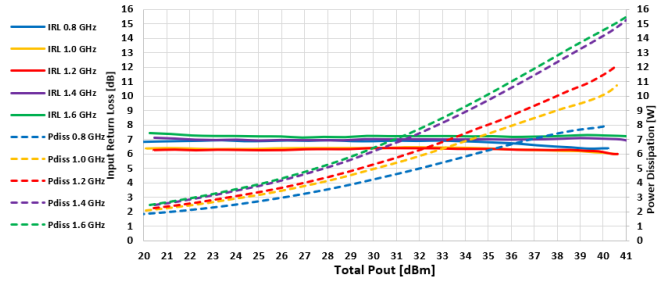

Figure 6.2.11. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 28 V, 50 mA for freq: 800-1600 MHz

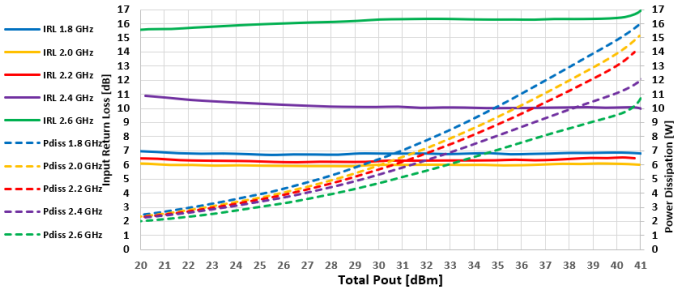

Figure 6.2.12. IRL and Pdiss vs P_{OUT} of TA9210D-EVB-A for 28 V, 50 mA for freq: 1800-2600 MHz

6.3. IMD Test Results

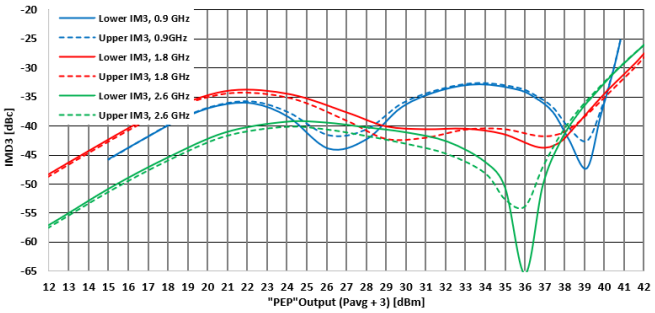

Figure 6.3.1 IMD3 Vs P_{OUT} V_D=28 V, I_{DQ}=50 mA, CW, Fsp=200 kHz, T_A=+25°C of TA910D-EVB-A

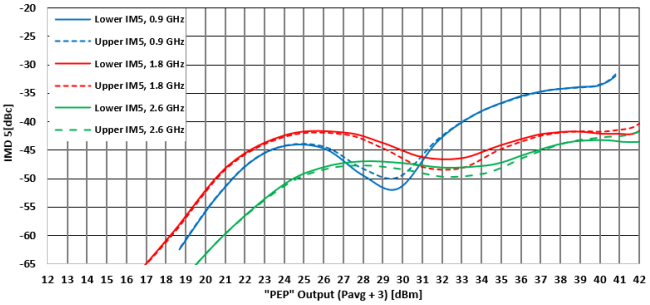

Figure 6.3.2 IMD5 Vs P_{OUT} V_D=28 V, I_{DQ}=50 mA, CW, Fsp=200 kHz, T_A=+25°C of TA910D-EVB-A

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