TA9210D

12.5 W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9210D EVB D2

Application Note

30-1000 MHz

28 V, 50 mA

GaN LNA with 5 W Input Power Handling

Rev-2.3

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.

This application note describes rugged broadband Low Noise Amplifier design using TA9210D which can handle 5 W of input power. TA9210D-EVB-D2 is tuned from 30 MHz to 1000 MHz with noise figure of 1.6-1.9 dB and gain of 16 dB.

2. TA9210D-EVB-D2 Board Details

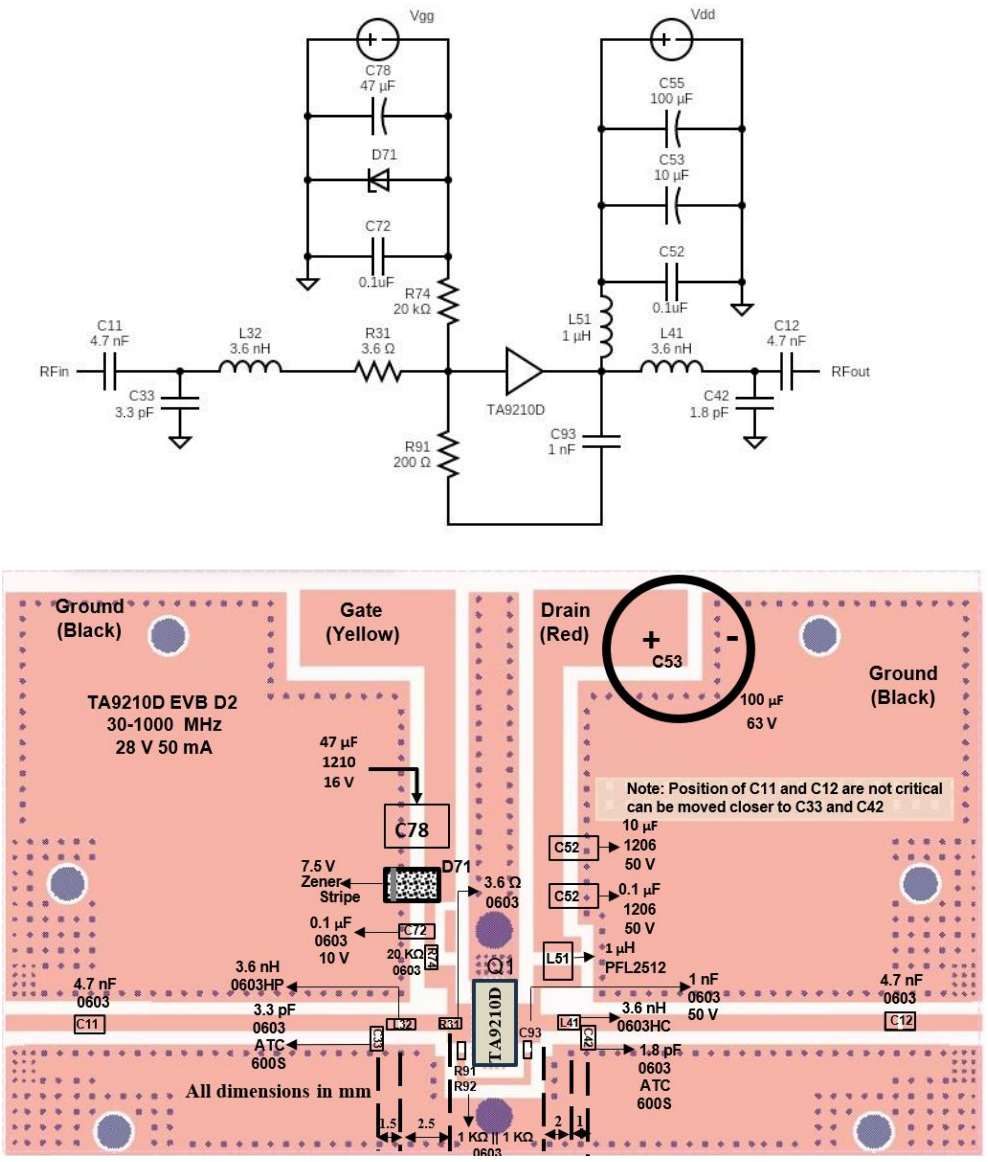

Figure 2.1 TA9210D-EVB-D2 30 MHz-1000 MHz Schematic and EVB Layout

3. TA9210D-EVB-D2 Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7 nF, 50 V	Murata	GRM1885C1H472JA01D
R31	3.6 Ω	Panasonic	ERJ-P06J3R6V
L32, L41	3.6 nH	Coil craft	0603HC-3N6XJRW
C33	3.3 pF	AVX	600S3R3BT250XT
C42	1.8 pF	AVX	600S1R8BT250XT
C51	1 µH	Coil craft	PFL2512-102MEC
C52	0.1 µF, 50 V	Murata	GRM31C5C1H104JA01L
C53	10 µF,50 V	Murata	GRM32ER71H106KA12L
C55	100 µF,63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	SZMMSZ5236BT1G
C72	0.1 µF, 10 V	AVX	0603ZC104K4T2A
R74	20 KΩ	Vishay	CRCW060320K0FKEAHP
C78	47 µF, 16 V	Murata	GRM32ER61C476ME15L
R91	200 Ω	Vishay	RCP0603W200RGEB
C92	1 nF	Murata	GRM1885C1H102JA01D
Q1	12.5 W GaN Transistor	Tagore Tech	TA9210D

Table 3.1 TA9210D-EVB-D2 BOM

4. TA9210D-EVB-D2 Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set V_G to -5 V 2. Set V_D to 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-D2 Bias and Sequencing

5. TA9210D-EVB-D2 Board Measurement Summary

Frequency (MHz)	Noise Figure(dB)	S21 Gain(dB)	S11 (dB)	S22 (dB)	Mu1	Psat (dBm)	PAE (%)
30	1.9	15.5	-6.2	-3.5	1.1	38.5	50
100	1.7	15.4	-6.4	-3.7	1.1	39.0	53
200	1.6	15.6	-6.7	-3.9	1.1	39.5	54
300	1.8	15.7	-7.4	-4.5	1.1	39.5	53
400	1.9	15.9	-8.3	-5.3	1.2	39.8	51
512	1.9	16.2	-9.6	-6.6	1.2	39.9	52
600	1.9	16.4	-11.0	-7.7	1.2	40.0	45
800	1.9	16.6	-15.1	-10.7	1.3	41.0	49
1000	1.9	16.6	-16.8	-11.4	1.5	41.0	49

Table 5.1 TA9210D-EVB-D2 28 V, 50 mA Electrical Characteristics Summary

6. TA9210D-EVB-D2 Test Results

All the tests are carried out at room temperature.

6.1. S parameters

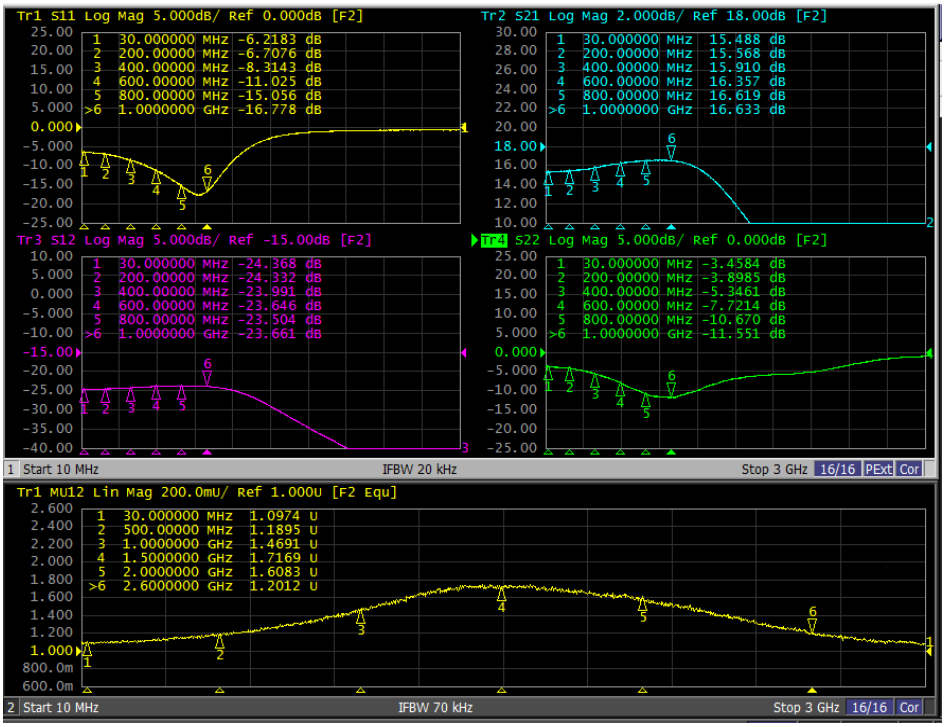

Figure 6.1.1. S-parameters of TA9210D-EVB-D2 28 V, 50 mA

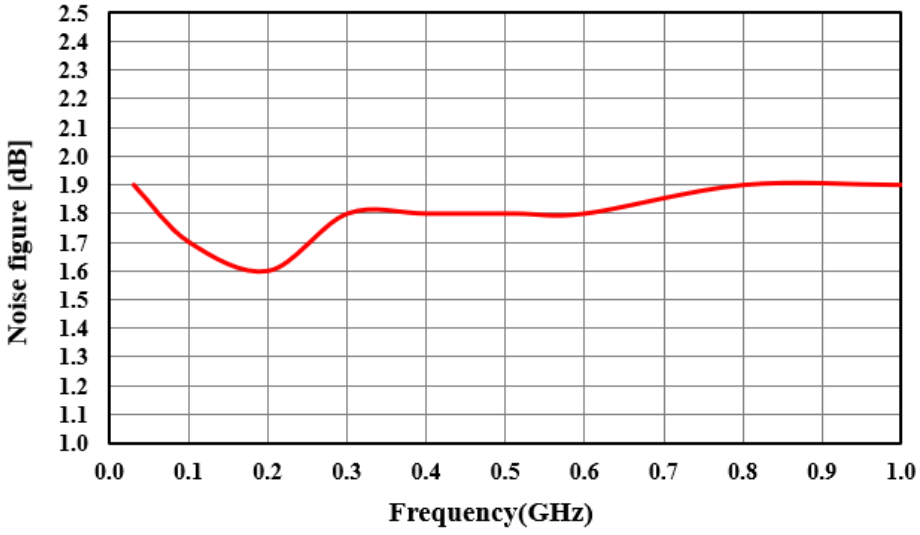

Figure 6.1.2. Noise figure measurement of TA9210D-EVB-D2 28 V, 50 mA

6.2. Large Signal Test Results

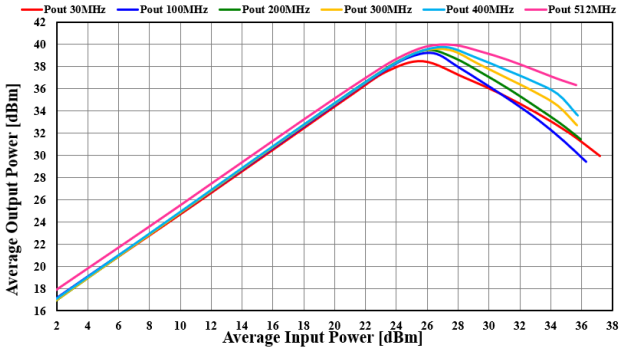

Figure 6.2.1 P_{OUT} Vs P_{IN} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [30-512 MHz]

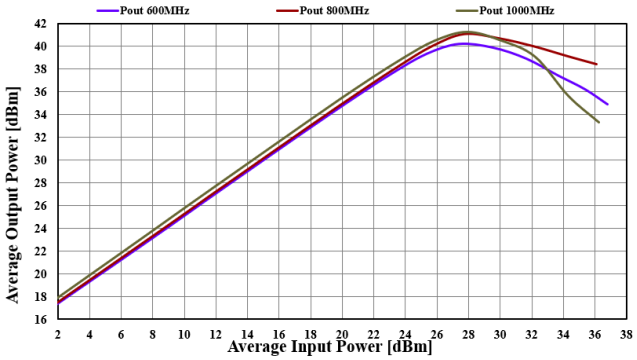

Figure 6.2.2 P_{OUT} Vs P_{IN} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [600-1000 MHz]

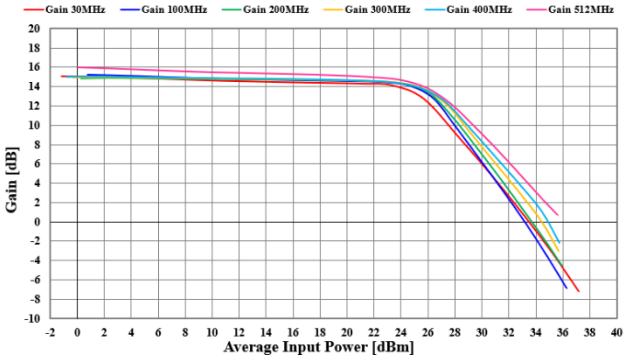

Figure 6.2.3 Gain Vs P_{IN} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [30-512 MHz]

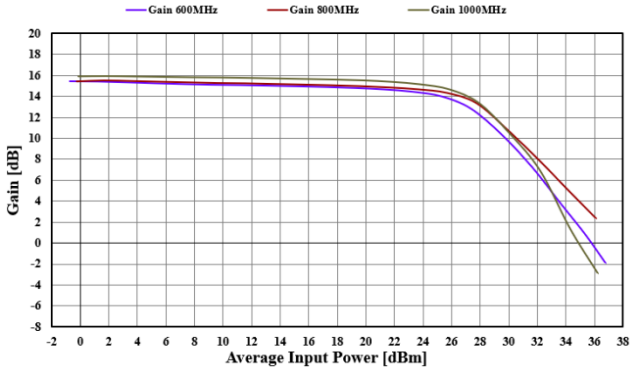

Figure 6.2.4 Gain Vs P_{IN} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [600-1000 MHz]

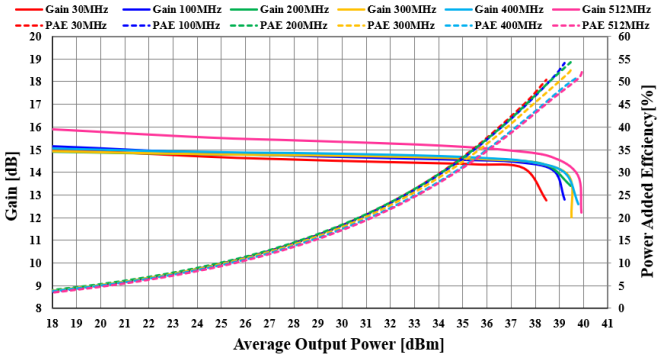

Figure 6.2.5 Gain and PAE Vs P_{OUT} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [30-512 MHz]

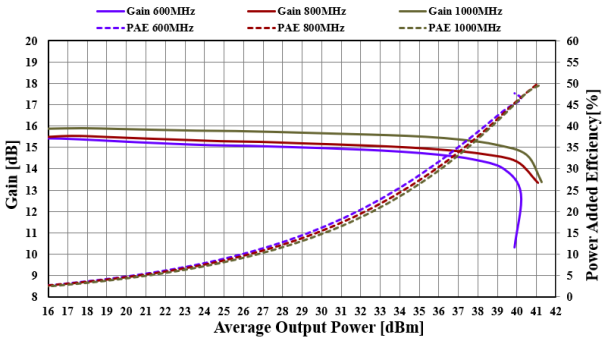

Figure 6.2.6 Gain and PAE Vs P_{OUT} Of TA9210D-EVB-D2, VD=28V, IDQ=50 mA, [600-1000 MHz]

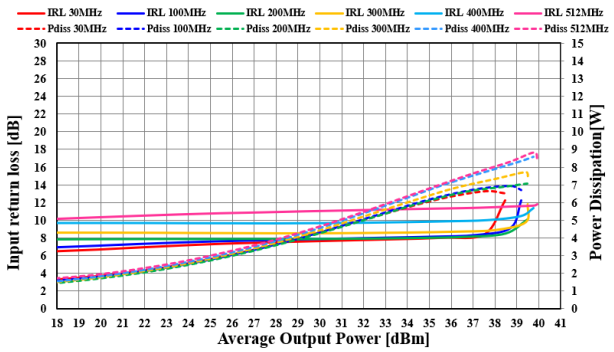

Figure 6.2.7 IRL and Pdiss Vs P_{OUT} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [30-512 MHz]

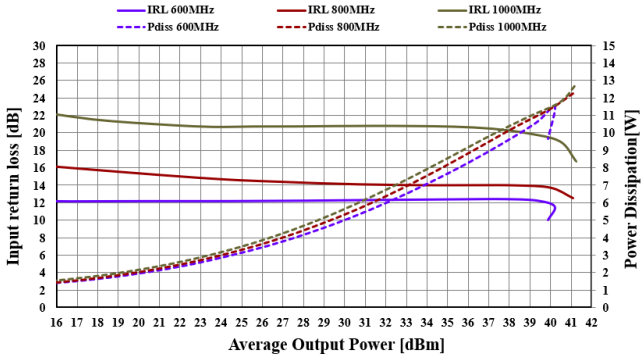

Figure 6.2.8 IRL and Pdiss Vs P_{OUT} Of TA9210D-EVB-D2, VD=28 V, IDQ=50 mA, [600-1000 MHz]

Edition Revision 2.3 - 2024-07-30

Published by

Tagore Tech Inc.

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Arlington Heights, IL 60004, USA

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