Tagore Technology

TA9210D

12.5W CW 0.03 – 4.0 GHz GaN Power Transistor

Application Note: TA9210D EVB D2

Application Note

30-1000MHz

28V 50mA

GaN LNA with 5W Input Power Handling

Rev-1.3

List of Contents

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.

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

2. TA9210D-EVB-D2 Board Details

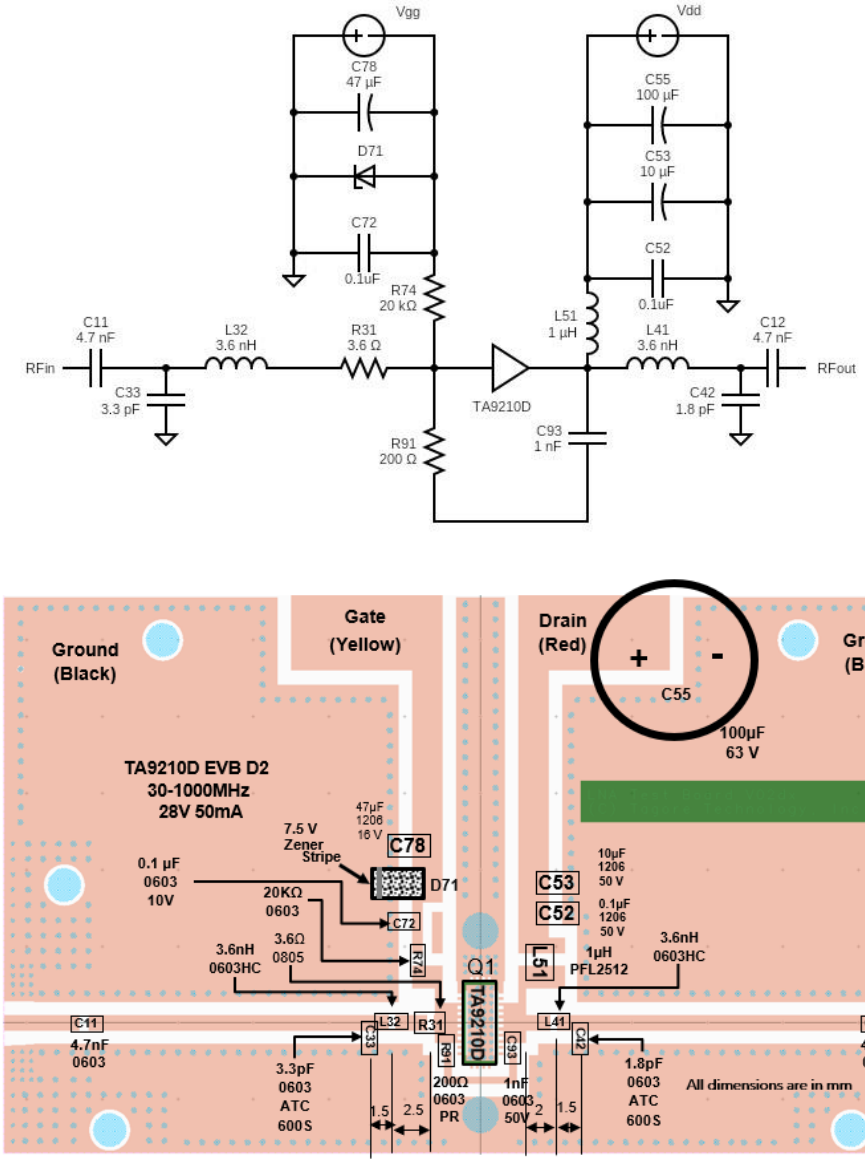

Figure 2.1 TA9210D-EVB-D2 30MHz-1000MHz Schematic and EVB Layout

3. TA9210D-EVB-D2 Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11,C12	4.7nF, 50V	Murata	GRM1885C1H472JA01D
R31	3.6Ω	Panasonic	ERJ-P06J3R6V
L32, L41	3.6nH	Coilcraft	0603HC-3N6XJRW
C33	3.3pF	AVX	600S3R3BT250XT
C42	1.8pF	AVX	600S1R8BT250XT
C51	1µH	Coilcraft	PFL2512-102MEC
C52	0.1µF, 50V	Murata	GRM31C5C1H104JA01L
C53	10µF,50V	Murata	GRM32ER71H106KA12L
C55	100µF,63V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	SZMMSZ5236BT1G
C72	0.1µF, 10V	AVX	0603ZC104K4T2A
R74	20KΩ	Vishay	CRCW060320K0FKEAHP
C78	47µF, 16V	Murata	GRM32ER61C476ME15L
R91	200Ω	Vishay	RCP0603W200RGEB
C92	1nF	Murata	GRM1885C1H102JA01D
Q1	12.5W GaN Transistor	Tagore Technology	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 -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 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 28V 50mA Electrical Characteristics Summary

6. TA9210D-EVB-D2 Test Results

All the tests are carried out at room temperature.

6.1. S parameters

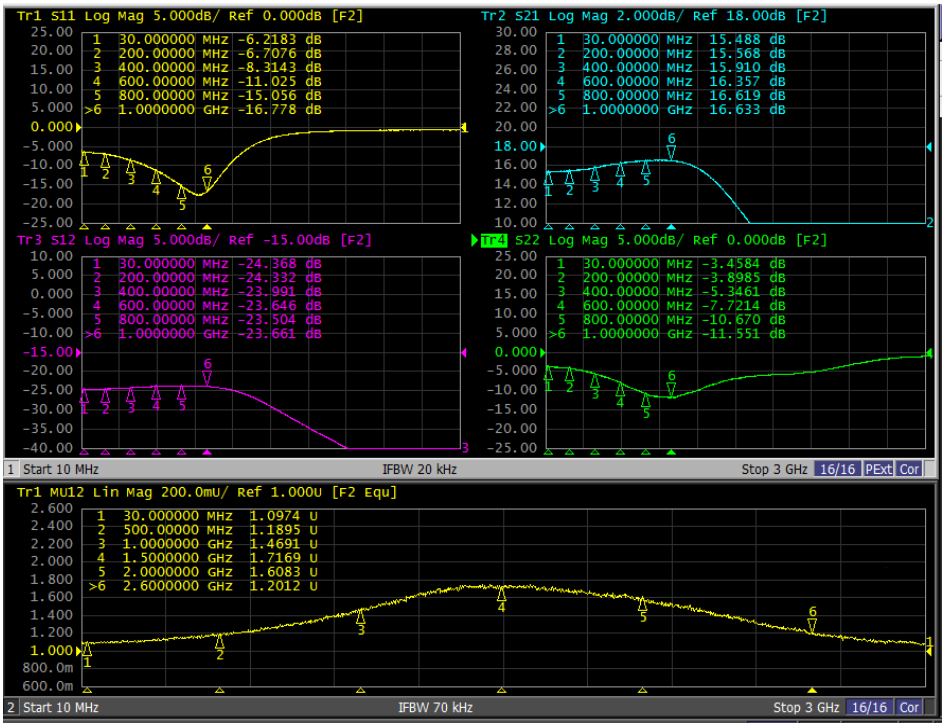

Figure 6.1.1. S-parameters of TA9210D-EVB-D2 28V 50mA

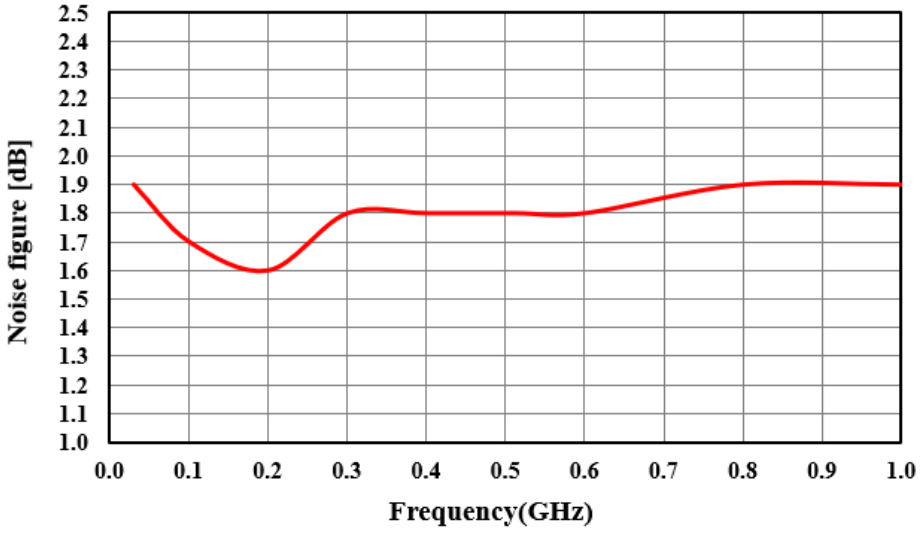

Figure 6.1.2. Noise figure measurement of TA9210D-EVB-D2 28V 50mA

6.2. Large Signal Test Results

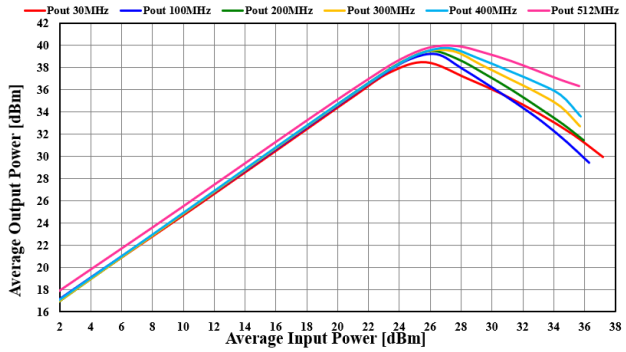

Figure 6.2.1 P_{OUT} Vs P_{IN} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [30-512MHz]

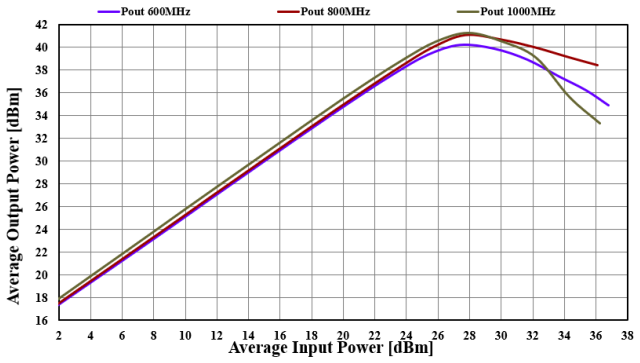

Figure 6.2.2 P_{OUT} Vs P_{IN} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [600-1000MHz]

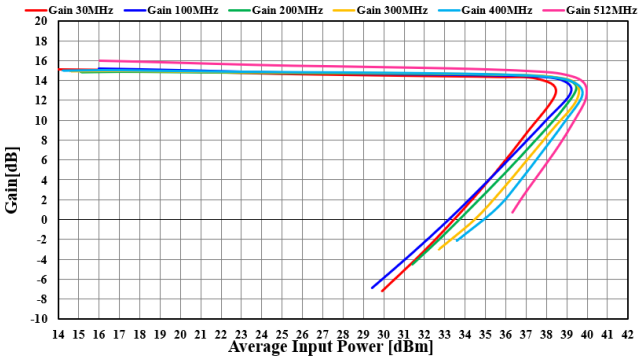

Figure 6.2.3 Gain Vs P_{IN} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [30-512MHz]

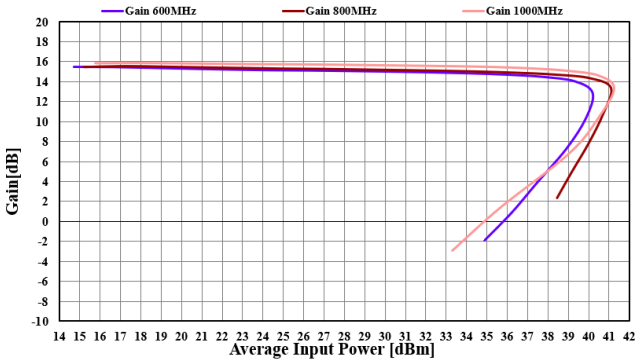

Figure 6.2.4 Gain Vs P_{IN} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [600-1000MHz]

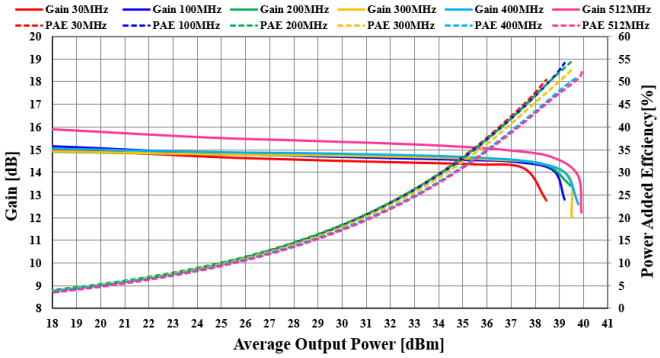

Figure 6.2.3 Gain and PAE Vs P_{OUT} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [30-512MHz]

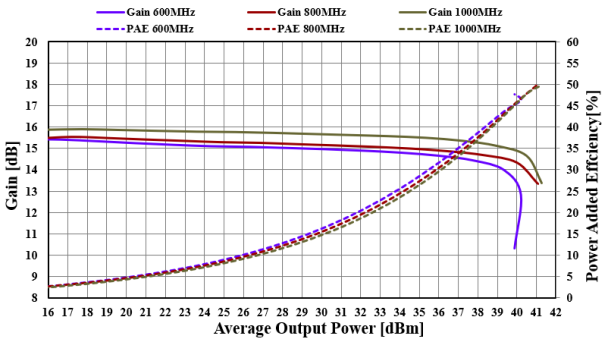

Figure 6.2.4 Gain and PAE Vs P_{OUT} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [600-1000MHz]

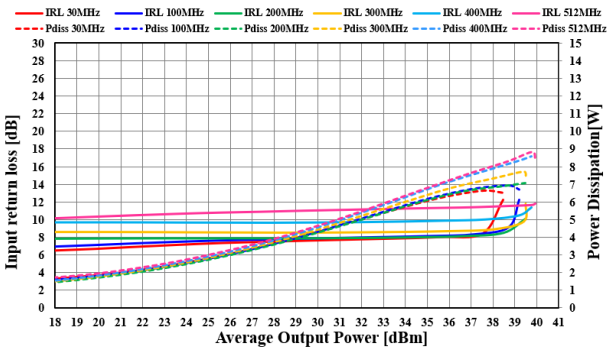

Figure 6.2.3 IRL and Pdiss Vs P_{OUT} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [30-512MHz]

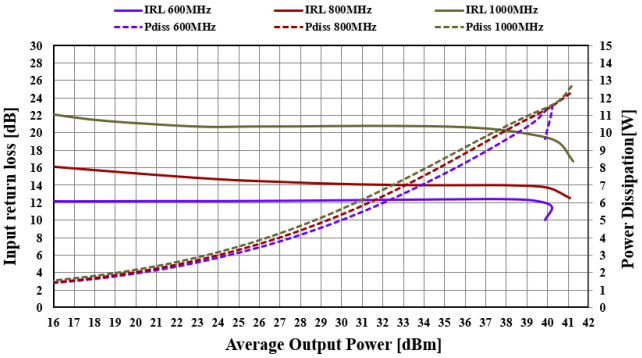

Figure 6.2.4 IRL and Pdiss Vs P_{OUT} Of TA9210D-EVB-D2, VD=28V, IDQ=50mA, [600-1000MHz]

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