TA9410E

25 W CW 0.02 – 3.0 GHz GaN Power Transistor

Application Note: TA9410E EVB B

Application Note

20 MHz~1000 MHz

50 V, 50 mA

Rev-2.2

List of Contents

1. General Description

The TA9410E is a broadband GaN power transistor capable of delivering 25 W CW from 20 MHz to 3.0 GHz frequency band. The input and output can be matched for best power and efficiency for the desired band. The TA9410E is packaged in a compact, low-cost Dual Flat No lead (DFN) 5 x 6 x 0.75 mm, 8 leads plastic package.

TA9410E-EVB-B is an evaluation board specially tuned for frequency range of 20~1000 MHz applications. Its high output power, power added efficiency performance makes it suitable for application of Private mobile radio handsets, public safety radios, Cellular infrastructure, Military radios etc.

2. TA9410E-EVB-B Board Details

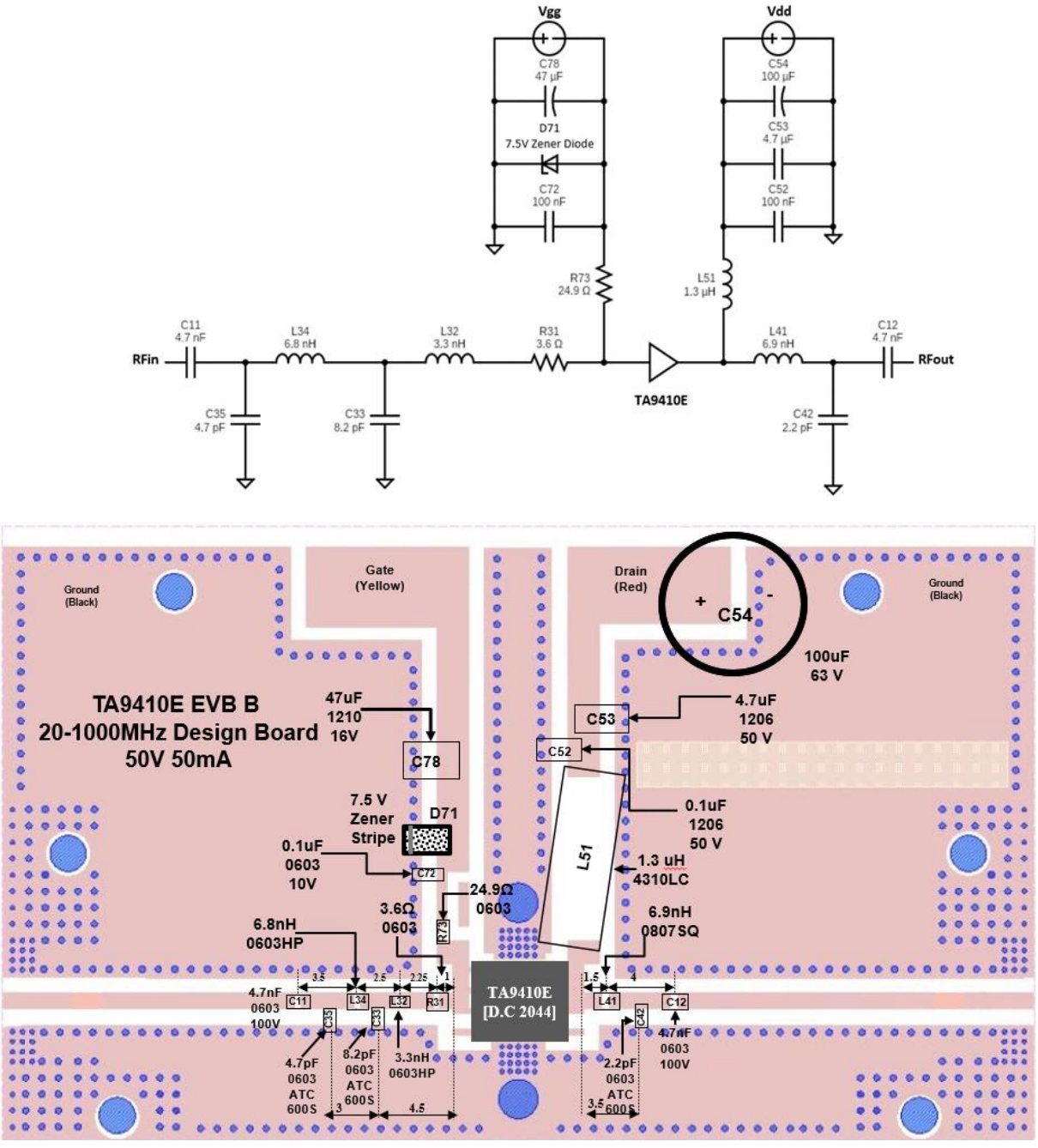

Figure 2.1 TA9410E-EVB-B 20 MHz ~ 1000 MHz Schematic and EVB Layout

3. TA9410E-EVB-B Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7 nF, 100 V	Murata	GCD188R72A472KA01
R31	3.6 Ω, 0.5 W	Panasonic	ERJ-P06J3R6V
L32	3.3 nH	Coil craft	0603HP-3N3XJLC
C33	8.2 pF	AVX	600S8R2CT250XT
L34	6.8 nH	Coil craft	0603HP-6N8XJLC
C35	4.7 pF	AVX	600S4R7BT250XT
L41	6.9 nH	Coil craft	0807SQ-6N9GLB
C42	2.2 pF	AVX	600S2R2CT250XT
L51	1.3 µH	Coil craft	4310LC-132KEC
C52	0.1 µF, 100 V	Murata	GRM31C5C2A104JA01
C53	4.7 µF, 100 V	Murata	GCM32DC72A475KE02
C54	100 µF, 63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	SZMMSZ5236BT1G
C72	0.1 µF, 10 V	AVX	0603ZC104K4T2A
R73	24.9 Ω, 0.75 W	Vishay	CRCW121024R9FKEAHP
C78	47 µF, 16 V	Murata	GRM32ER61C476ME15L
Q1	25 W GaN transistor	Tagore Tech	TA9410E
PCB	Rogers RO4350B, 20 mils, 2 oz copper		

Table 3.1 TA9410E-EVB-B BOM

4. TA9410E-EVB-B Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set V_G to -5 V 2. Set V_D to +50 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 TA9410E-EVB-B Bias and Sequencing

5. TA9410E-EVB-B Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11 (dB)	S22 (dB)	Psat (dBm)	PAE (%) @Psat
20	21.4	-11.4	-2.6	44.9	78
200	21.4	-9.0	-2.9	45.0	75
525	21.0	-11.4	-2.7	44.6	58
800	20.3	-8.7	-4.9	45.3	56
1000	20.4	-13.7	-4.9	44.6	58

Table 5.1 TA9410E-EVB-B Electrical Characteristics Summary

6. TA9410E-EVB-B Test Results

All the tests are carried out at room temperature.

6.1. S parameters

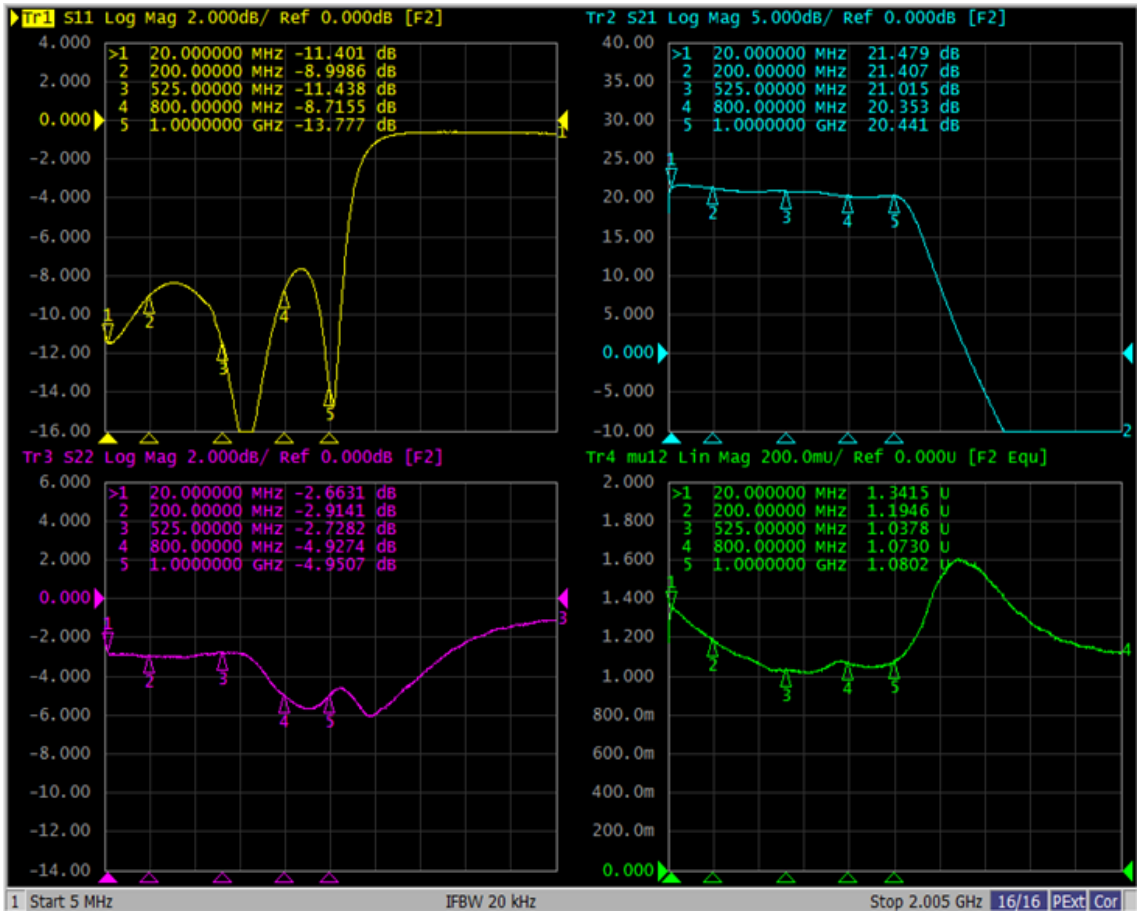

Figure 6.1.1. S parameters of TA9410E-EVB-B

6.2. Large Signal Test Results

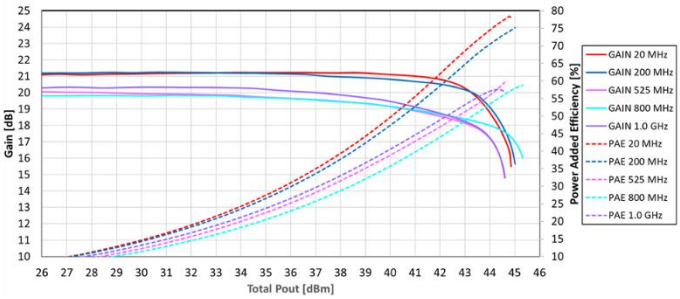

Figure 6.2.1. Gain Vs Pout of TA9410E-EVB-B

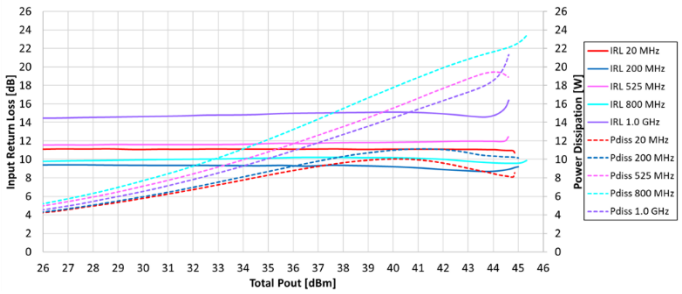

Figure 6.2.2. IRL and Pdiss Vs Pout of TA9410E-EVB-B

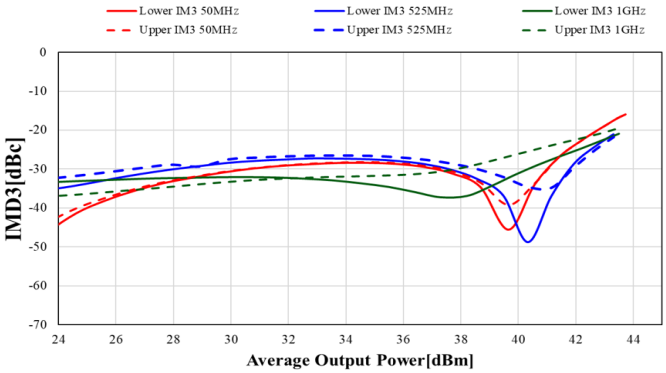

Figure 6.2.3. IMD3 Vs Pout of TA9410E-EVB-B (Vdd=50 V, Idq = 50 mA, 1 MHz tone spacing)

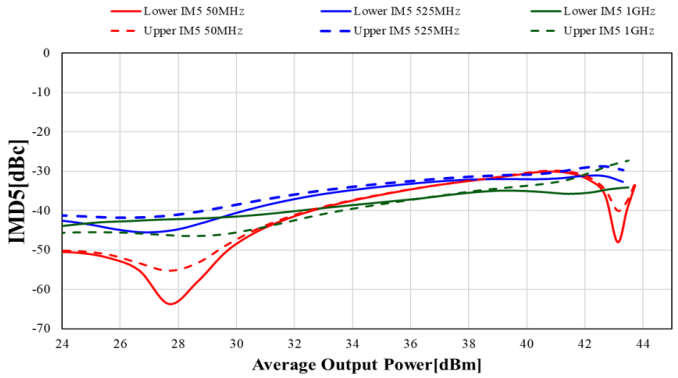

Figure 6.2.4. IMD5 Vs Pout of TA9410E-EVB-B (Vdd=50 V, Idq = 50 mA, 1 MHz tone spacing)

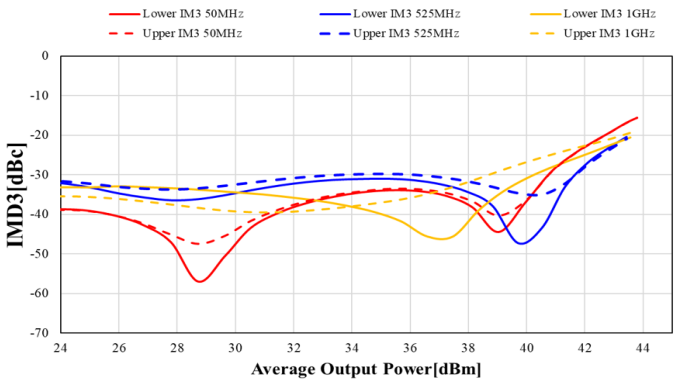

Figure 6.2.5. IMD3 Vs Pout of TA9410E-EVB-B (Vdd=50 V, Idq = 75 mA, 1 MHz tone spacing)

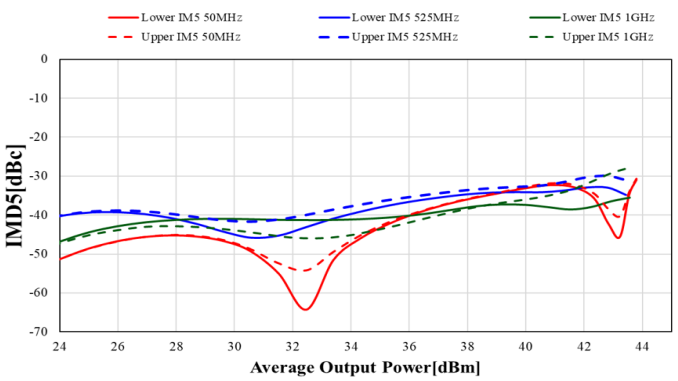

Figure 6.2.6. IMD3 Vs Pout of TA9410E-EVB-B (Vdd=50 V, Idq = 75 mA, 1 MHz tone spacing)

Temperature data: -40^{0}C, 25^{0}C, 85^{0}C

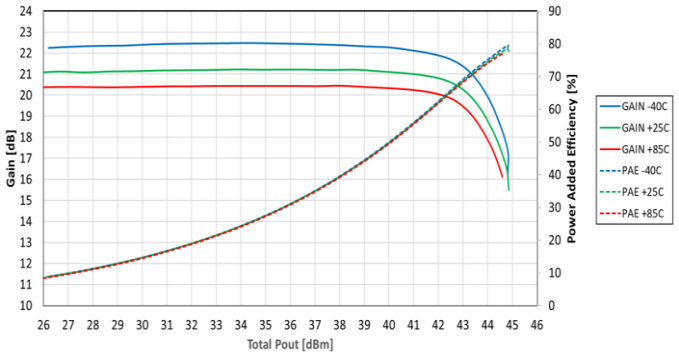

Figure 6.2.7. Gain and PAE vs Pout over temperature at 20MHz of TA9410E-EVB-B

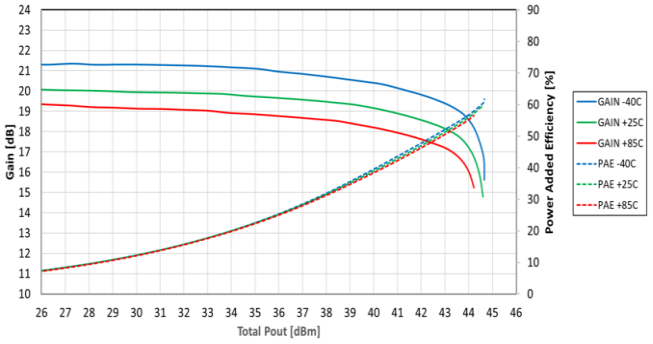

Figure 6.2.8. Gain and PAE vs Pout over temperature at 525MHz of TA9410E-EVB-B

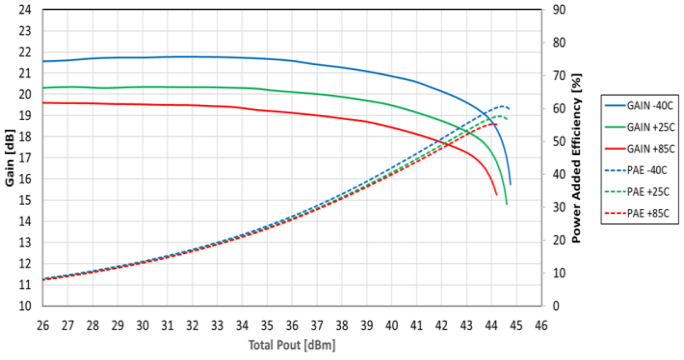

Figure 6.2.9. Gain and PAE vs Pout over temperature at 1000MHz of TA9410E-EVB-B

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601 W Campus Dr. Ste C1

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