TA9410E

25W CW 0.02 – 3.0 GHz GaN Power Transistor

Application Note: TA9410E EVB K

Application Note

0.5 ~ 2.5 GHz

50 V, 50 mA

Rev-2.0

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-K is an evaluation board specially tuned for frequency range of 0.5 – 2.5 GHz 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-K Board Details

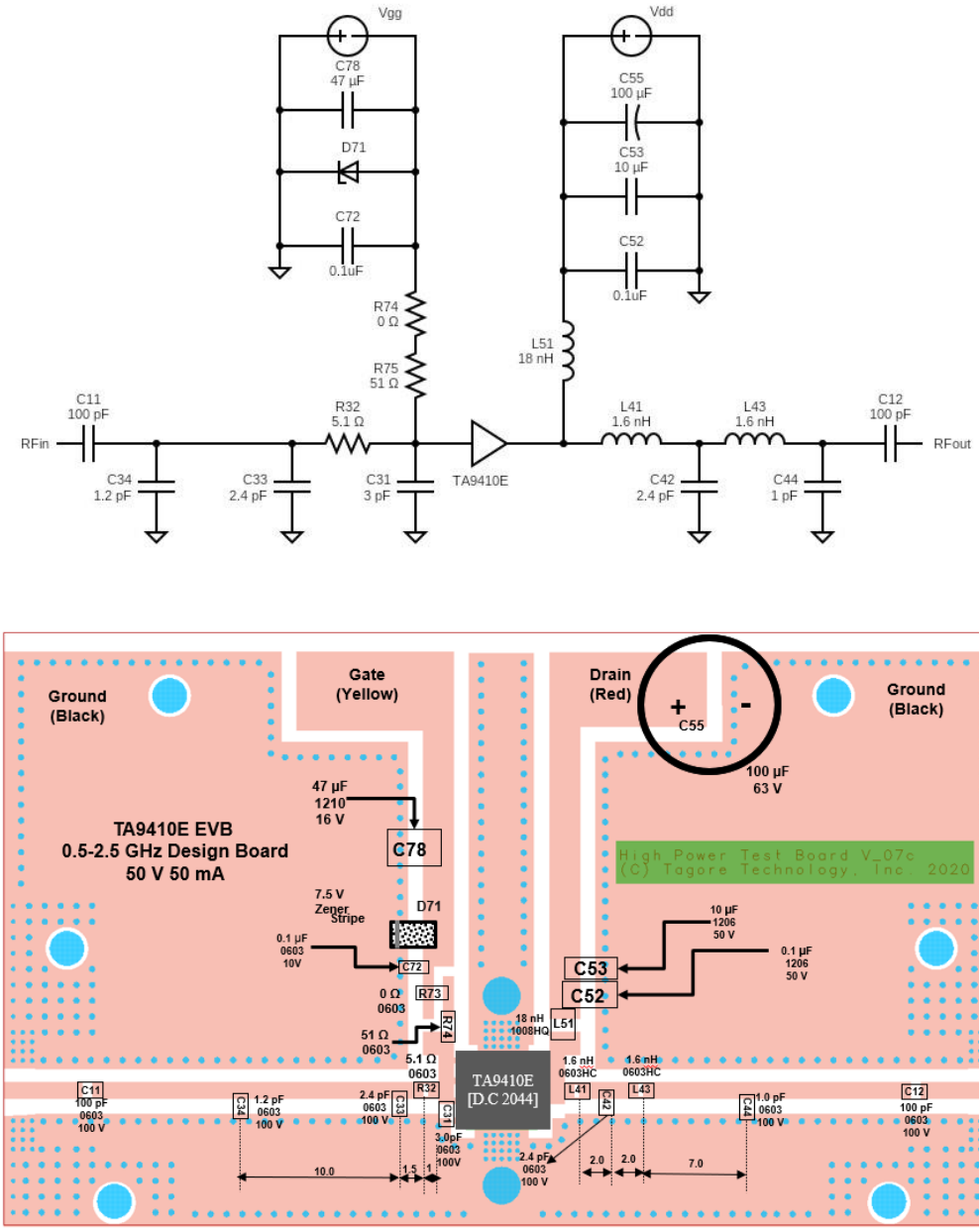

Figure 2.1 TA9410E-EVB-K 0.5 ~ 2.5 GHz Schematic and EVB Layout

3. TA9410E-EVB-K Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	100 pF	AVX	600S101JT250T
C31	3 pF	AVX	600S3R0AT250XT
R32	5.1 Ω	Vishay	CRCW06035R10FKEAHP
C33, C42	2.4 pF	AVX	600S2R4AT250XT
C34	1.2 pF	AVX	600S1R2AT250XT
L41, L43	1.6 nH	Coil craft	0603HC-1N6XGLW
C44	1 pF	AVX	600S1R0AT250XT
L51	18 nH	Coil craft	1008HQ-18NXGLC
C52	0.1 µF, 50 V	Murata	GRM31C5C1H104JA01L
C53	10 µF, 50 V	Murata	GRM32ER71H106KA12L
C54	100 µF, 63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	MMSZ5236BT 1G
C72	0.1 µF, 10 V	AVX	0603ZC104K4T2A
R73	0 Ω	Panasonic	ERJ-2GE0R00X
R74	51 Ω	Vishay	CRCW060351R0FKEAHP
C78	47 µF, 16 V	Murata	GRM32ER61C476ME15L
Q1	25-Watt GaN Transistor	Tagore Tech	TA9410E
PCB	Rogers RO4350B, 20 mils, 2 oz copper		

Table 3.1 TA9410E-EVB-K BOM

4. TA9410E-EVB-K 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-K Bias and Sequencing

5. TA9410E-EVB-K Board Measurement Summary

Frequency (GHz)	S21 Gain (dB)	S11 (dB)	S22 (dB)	Psat (dBm)	PAE (%) @Psat
0.5	19.5	-3.1	-4.2	44.9	70
1.0	15.2	-3.7	-2.8	44.8	48
1.5	15.6	-7.7	-3.8	45.5	52
2.0	14.5	-7.3	-4.1	44.5	45
2.5	16.7	-5.7	-7.6	45.4	62

Table 5.1 TA9410E-EVB-K Electrical Characteristics Summary

6. TA9410E-EVB-K Test Results

All the tests are carried out at room temperature.

6.1. S parameters

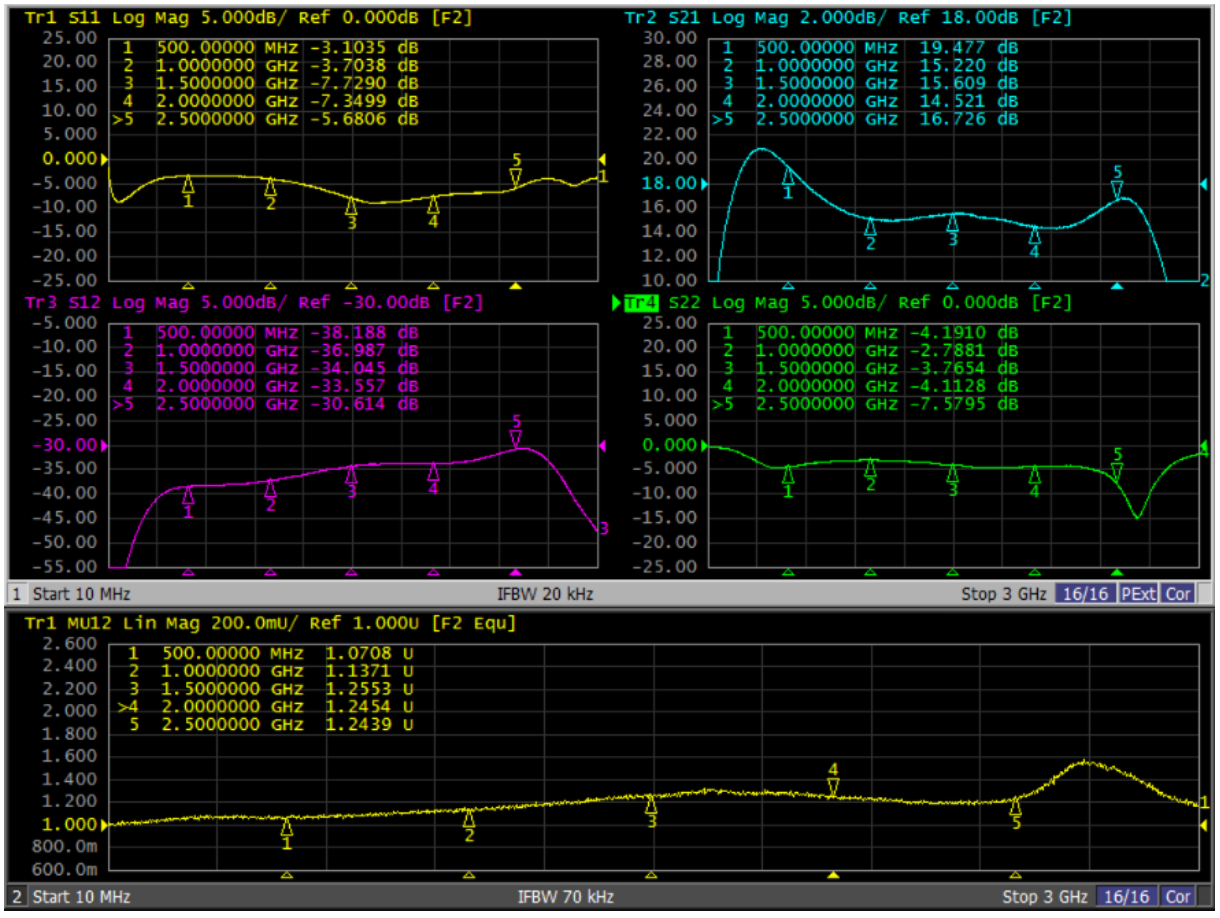

Figure 6.1.1. S parameters of TA9410E-EVB-K

6.2. Large Signal Test Results

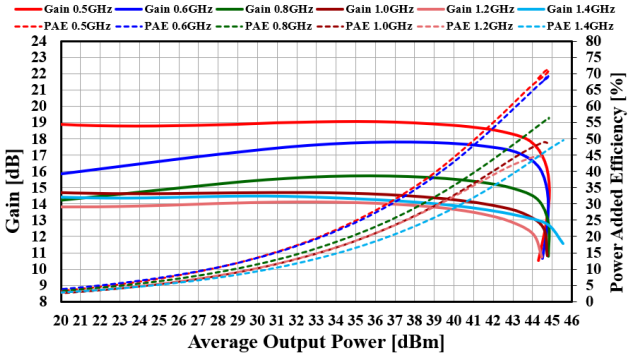

Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

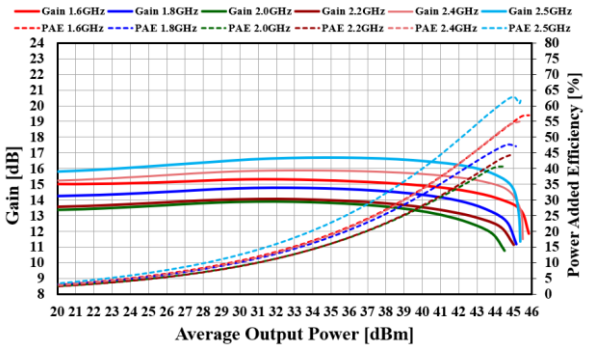

Figure 6.2.2. Gain and PAE vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

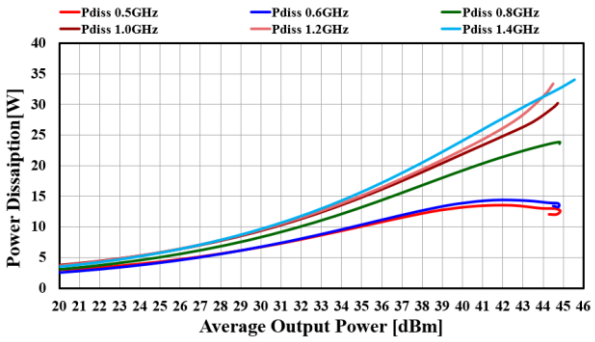

Figure 6.2.3. Pdiss vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

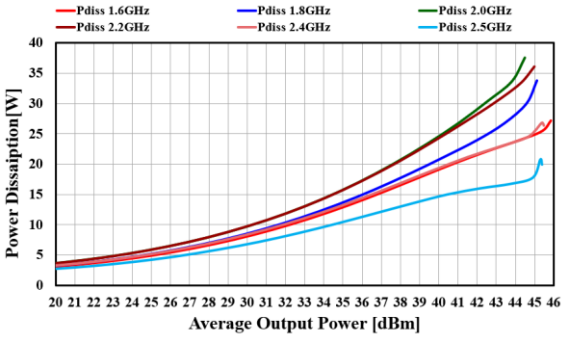

Figure 6.2.4. Pdiss vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

Second and Third harmonics levels in dBc

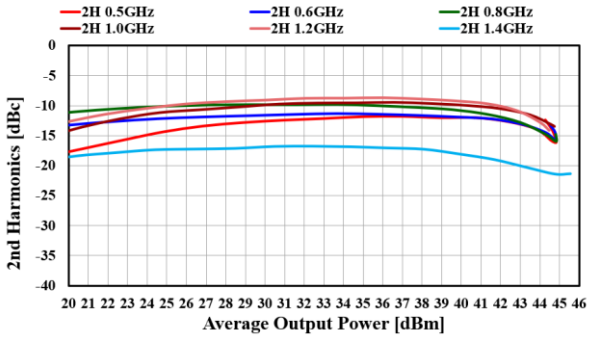

Figure 6.2.5. D2HdBc vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

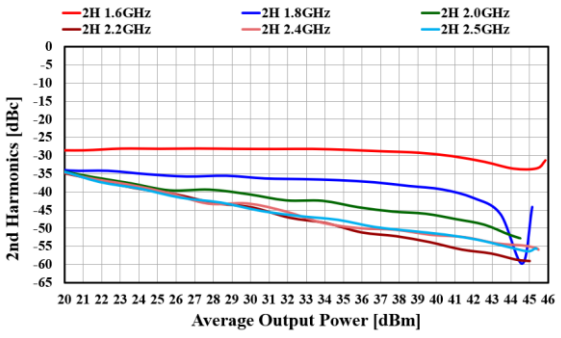

Figure 6.2.6. D2HdBc vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

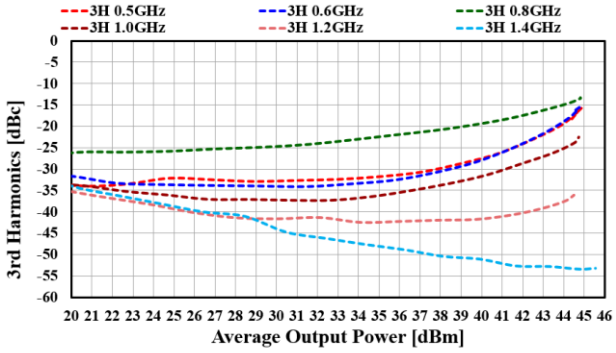

Figure 6.2.7. D3HdBc vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

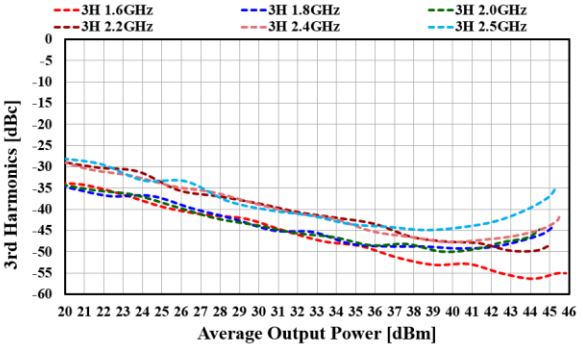

Figure 6.2.8. D3HdBc vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

Edition Revision 2.0 - 2024-07-30

Published by

Tagore Tech Inc.

601 W Campus Dr. Ste C1

Arlington Heights, IL 60004, USA

©2024 All Rights Reserved

Legal Disclaimer

The information provided in this document shall in no event be regarded as a guarantee of conditions or characteristics. Tagore Tech assumes no responsibility for the consequences of the use of this information, nor for any infringement of patents or of other rights of third parties which may result from the use of this information. No license is granted by implication or otherwise under any patent or patent rights of Tagore Tech. The specifications mentioned in this document are subject to change without notice.

Information

For further information on technology, delivery terms and conditions and prices, please contact Tagore Tech: support@tagoretech.com.