

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-1.0

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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 Quad Flat No lead (QFN) 5x6x0.8 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

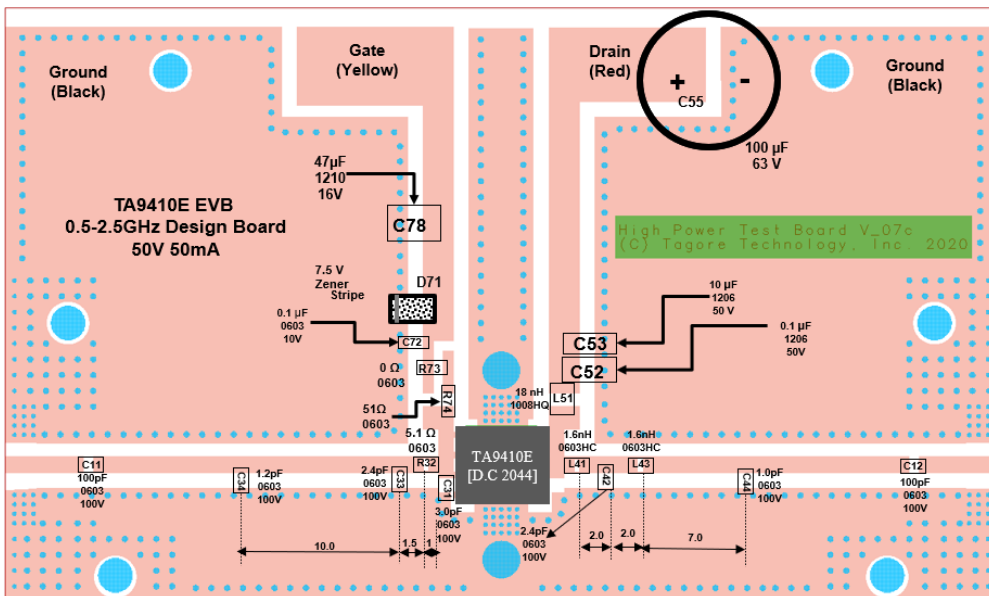
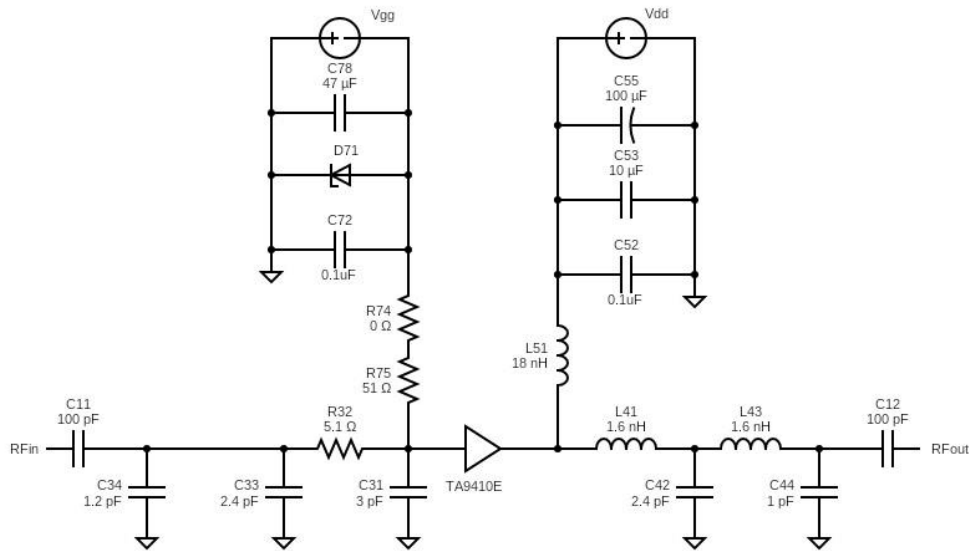


Figure 2.1 TA9410E-EVB-K 0.5 ~ 2.5 GHz Schematic and EVB Layout

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 μ F, 50 V	Murata	GRM31C5C1H104JA01L
C53	10 μ F, 50 V	Murata	GRM32ER71H106KA12L
C54	100 μ F, 63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	MMSZ5236BT 1G
C72	0.1 μ F, 10 V	AVX	0603ZC104K4T2A
R73	0 Ω	Panasonic	ERJ-2GE0R00X
R74	51 Ω	Vishay	CRCW060351R0FKEAHP
C78	47 μ F, 16 V	Murata	GRM32ER61C476ME15L
Q1	25-Watt GaN Transistor	Tagore Technology	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
<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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

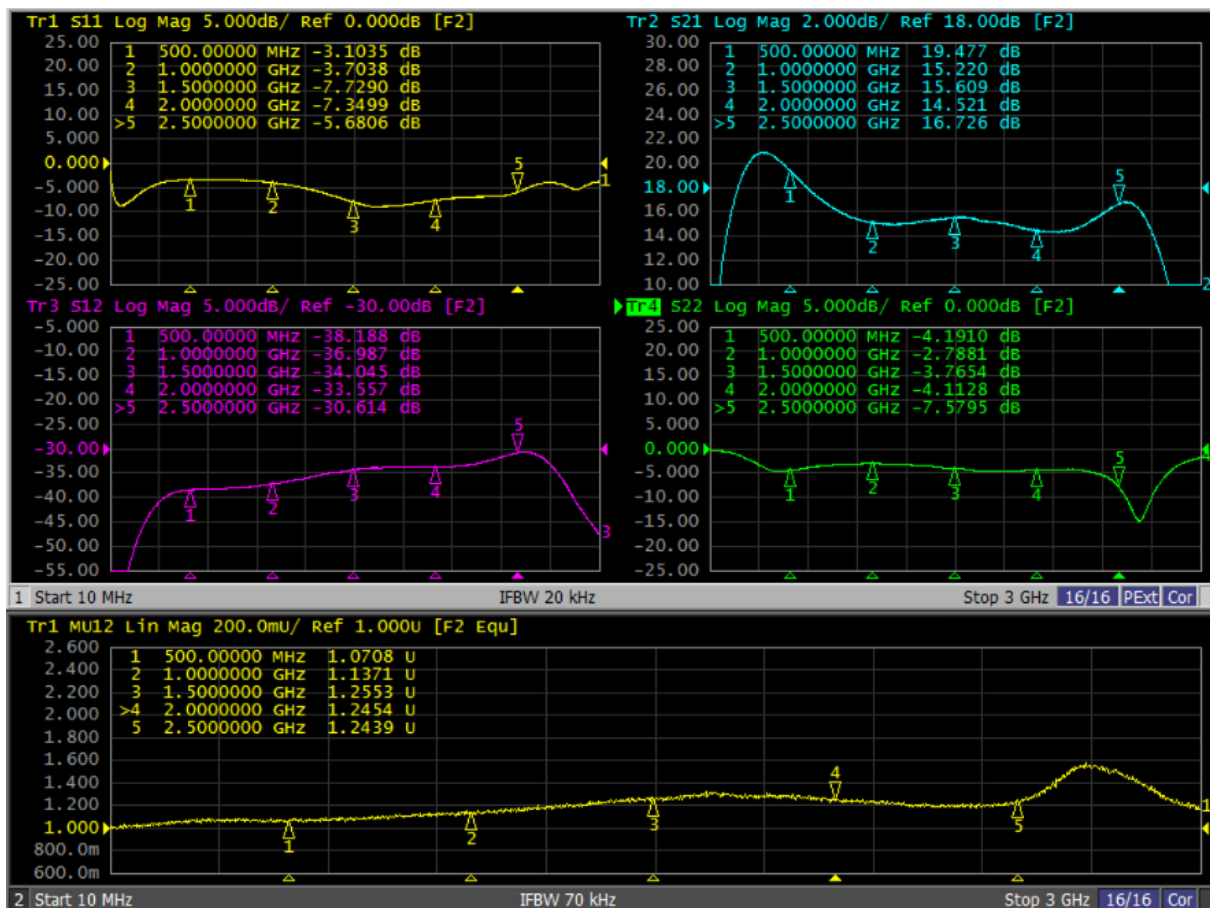


Figure 6.1.1. S parameters of TA9410E-EVB-K

6.2. Large Signal Test Results

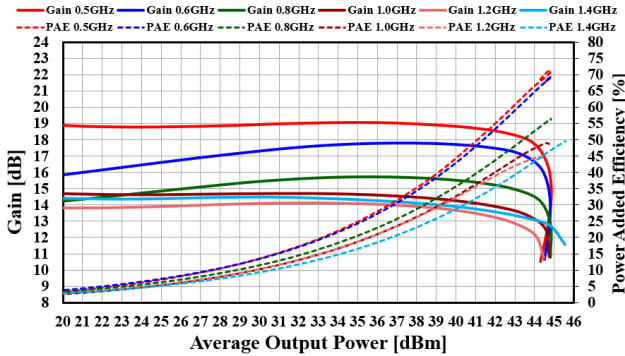


Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

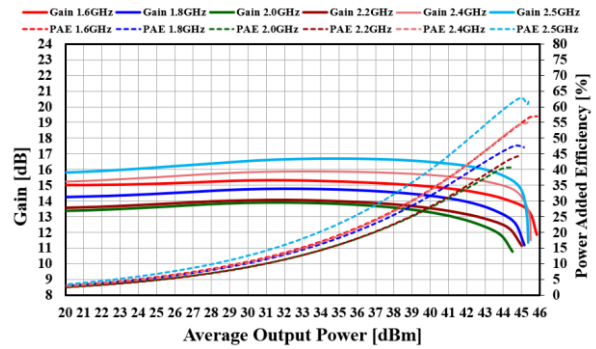


Figure 6.2.2. Gain and PAE vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

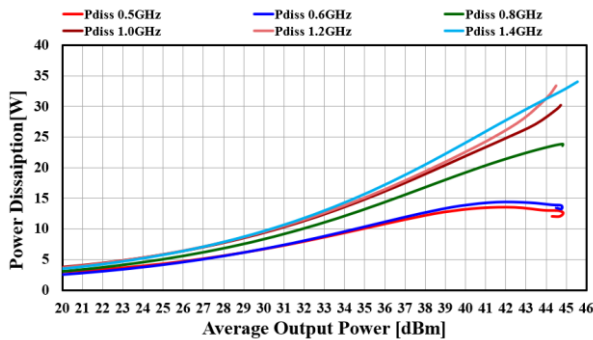


Figure 6.2.3. Pdiss vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

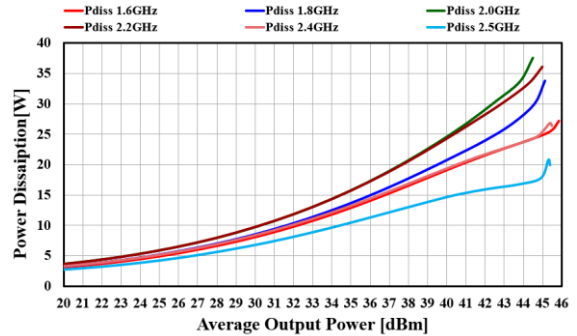


Figure 6.2.4. Pdiss vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

Second and Third harmonics levels in dBc

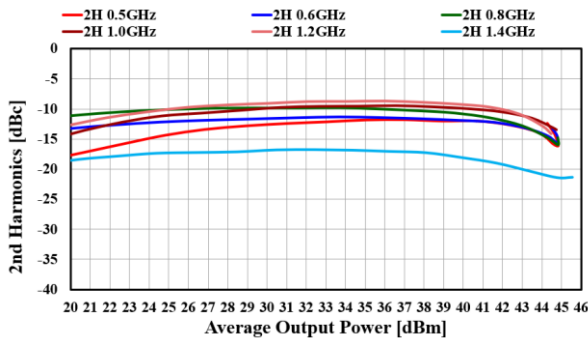


Figure 6.2.5. D2HdBc vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

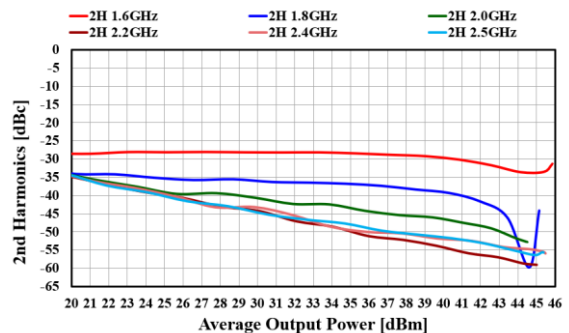


Figure 6.2.6. D2HdBc vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

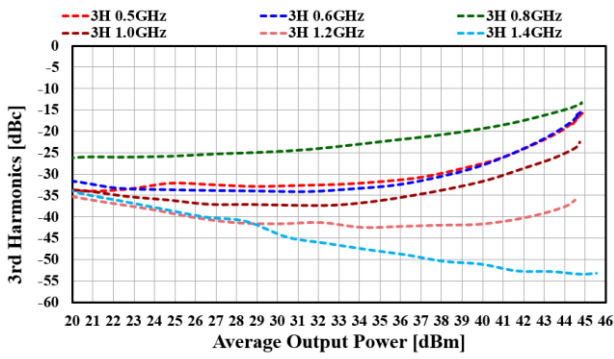


Figure 6.2.7. D3HdBc vs P_{OUT} of TA9410E-EVB-K [0.5-1.4 GHz]

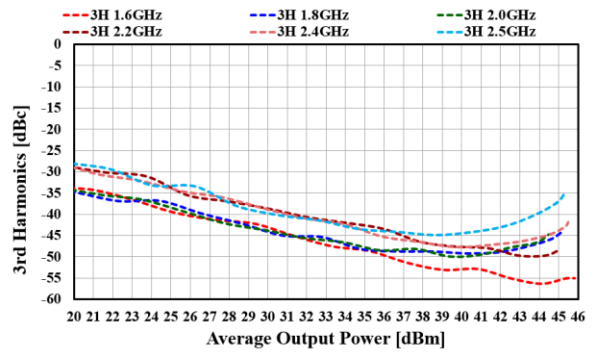


Figure 6.2.8. D3HdBc vs P_{OUT} of TA9410E-EVB-K [1.6-2.5 GHz]

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