

# TA9410E

25W CW 0.02 – 3.0 GHz GaN Power Transistor

Application Note: TA9410E EVB J

## Application Note

130MHz~860MHz

55V 100mA

Rev-1.1

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## 1. General Description

The TA9410E is a broadband GaN power transistor capable of delivering 25W CW from 20MHz to 3.0GHz 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) 5x6x0.8mm, 8 leads plastic package.

TA9410E-EVB-J is an evaluation board specially tuned for frequency range of 130MHz~860MHz 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-J Board Details

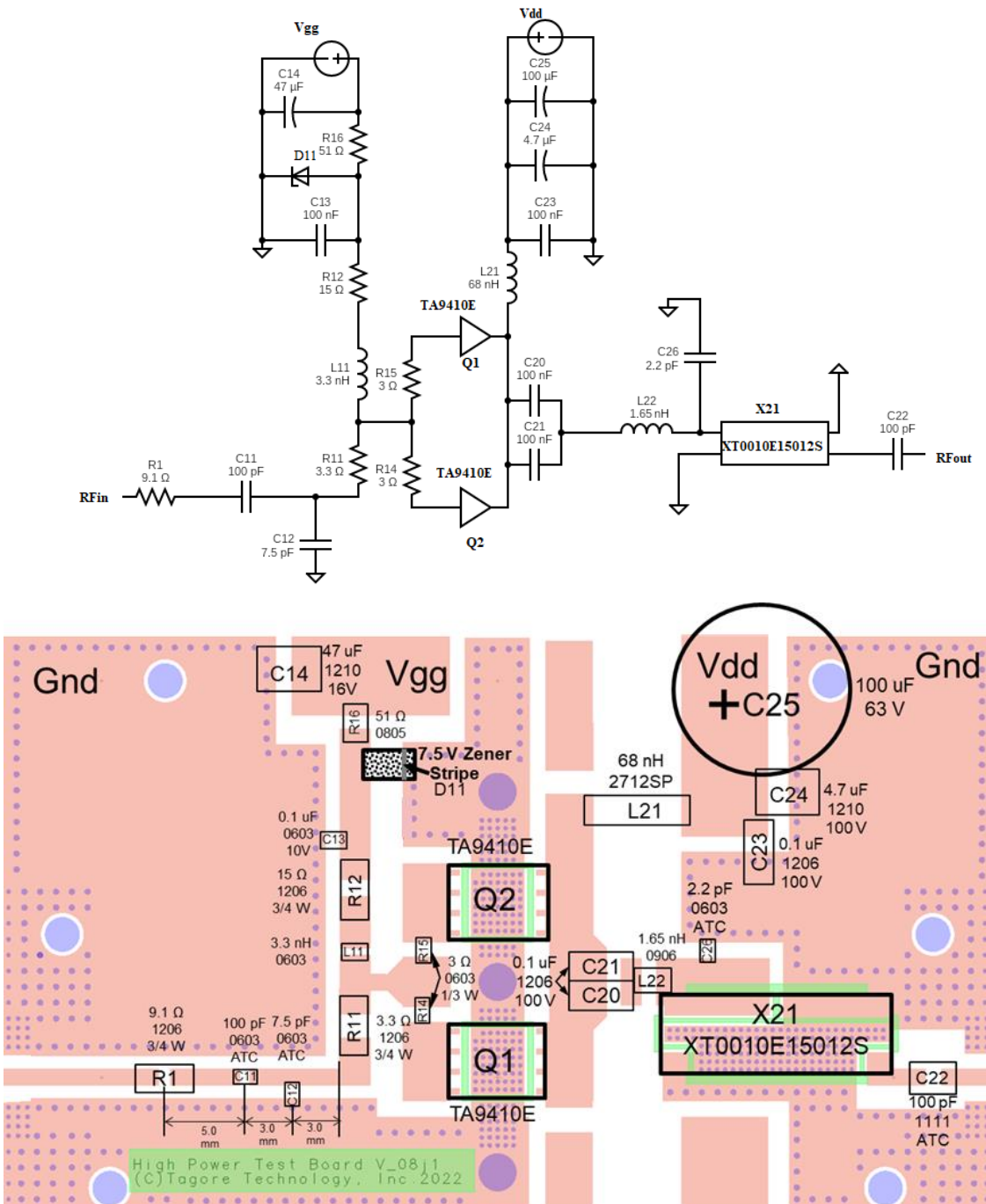


Figure 2.1 TA9410E-EVB-J 130MHz ~ 860MHz Schematic and EVB Layout

### 3. TA9410E-EVB-J Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
R1	9.1 $\Omega$	Vishay	CRCW12069R10FKEAHP
C11	100 pF	AVX	600S101GT250XT
C12	7.5 pF	AVX	600S7R5CT250XT
R11	3.3 $\Omega$	Vishay	CRCW12063R30FKEAHP
R12	15 $\Omega$	Vishay	CRCW120615R0FKEAHP
L11	3.3 nH	Coil craft	0603HP-3N3XG
R14, R15	3.0 $\Omega$	Vishay	CRCW06033R00JNEAHP
R16	51 $\Omega$	Panasonic	ERJ-P06J510V
D11	7.5 V Zener	On Semiconductor	SZMMSZ5236BT1G
C13	0.1 $\mu$ F, 10V	AVX	0603ZC104K4T2A
C14	47 $\mu$ F, 16V	Murata	GRM32EC81C476KE15L
C20, C21, C23	0.1 $\mu$ F, 100V	Murata	GRM31C5C2A104JA01L
L21	68 nH	Coil craft	2712SP-68NG1E
L22	1.65 nH	Coil craft	0906-2GL
C26	2.2 pF	AVX	600S2R2BT250XT
C22	100 pF	AVX	800B101JT500XT
C24	4.7 $\mu$ F, 100V	Murata	GCM32DC72A475KE02L
C25	100 $\mu$ F, 63V	Nichicon	UPW1J101MPD1TD
X21	Transformer	TTM Technologies	XT0010E15012S
Q1, Q2	25Watt GaN Transistor	Tagore Technology	TA9410E
PCB	Rogers RO4350B, 20 mils, 2 oz Copper		

**Table 3.1 TA9410E-EVB-J BOM**

### 4. TA9410E-EVB-J Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set $V_G$ to -5V 2. Set $V_D$ to +55V 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-J Bias and Sequencing**

## 5. TA9410E-EVB-J Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11(dB)	S22(dB)	Psat(dBm)	PAE (%) @Psat	Peak Power and Test temperature Test
130	18.9	-9.9	-1.43	48.4	53	<u>Peak power</u> 47.5-48.5dBm for CW 47.8-49.3dBm for TDMA  <u>Case temp variation:</u> 105-86 °C for CW  60-50 °C for TDMA
330	20.2	-7.4	-3.7	48.3	53	
530	18.3	-6	-5.9	48.6	52	
730	17.5	-7.34	-6.25	48	51	
860	18	-12.2	-8.75	47.1	54	

Table 5.1 TA9410E-EVB-J Electrical Characteristics Summary

## 6. TA9410E-EVB-J Test Results

All the tests are carried out at room temperature.

### 6.1. S parameters

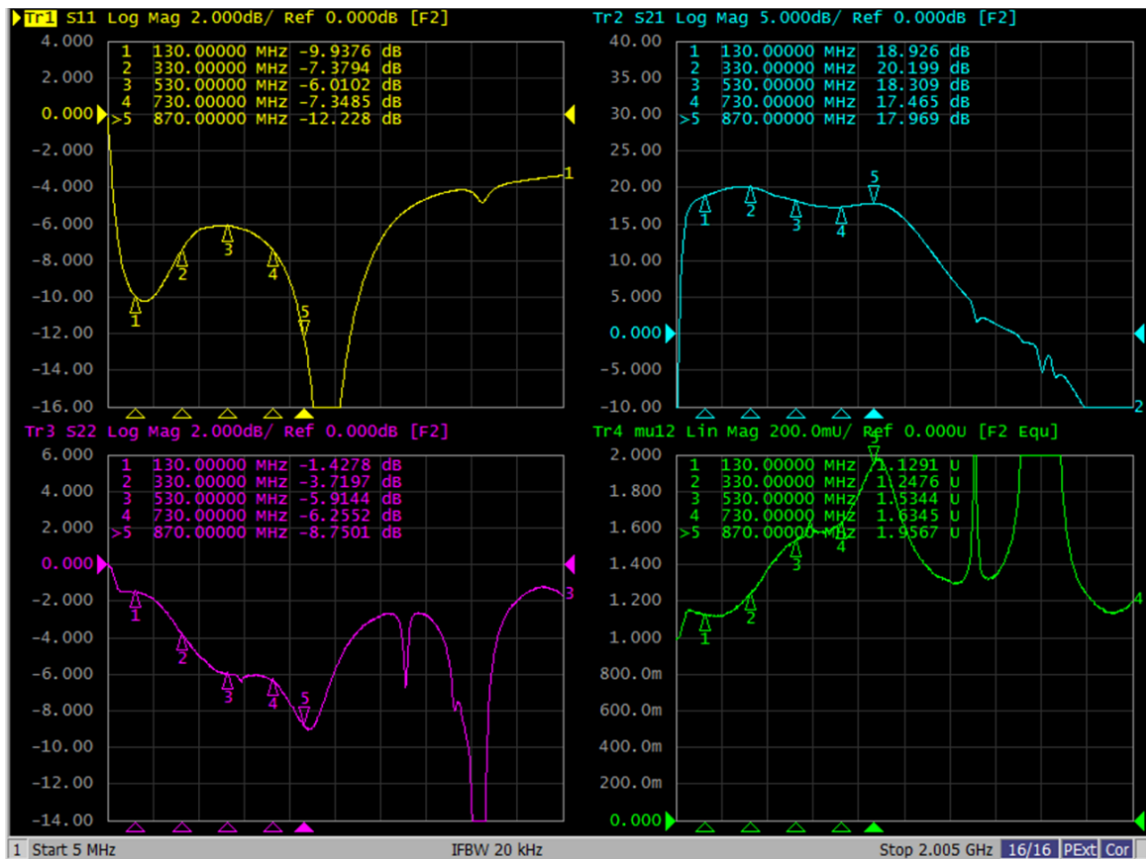
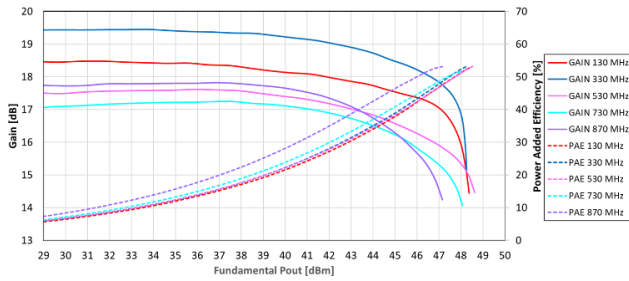
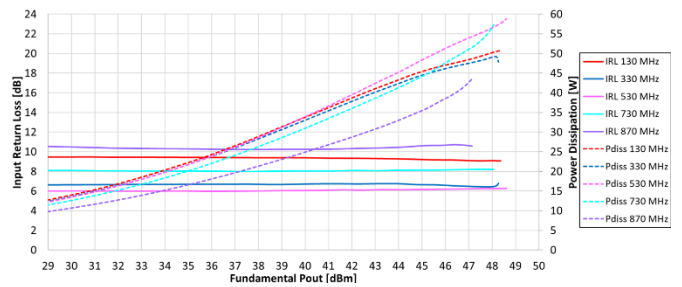


Figure 6.1.1. S parameters of TA9410E-EVB-J

## 6.2. Large Signal Test Results

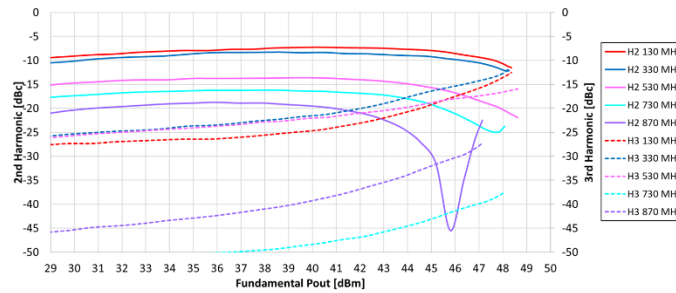


**Figure 6.2.1. Gain and PAE vs  $P_{OUT}$  of TA9410E-EVB-J**



**Figure 6.2.2. IRL and  $P_{diss}$  vs  $P_{OUT}$  of TA9410E-EVB-J**

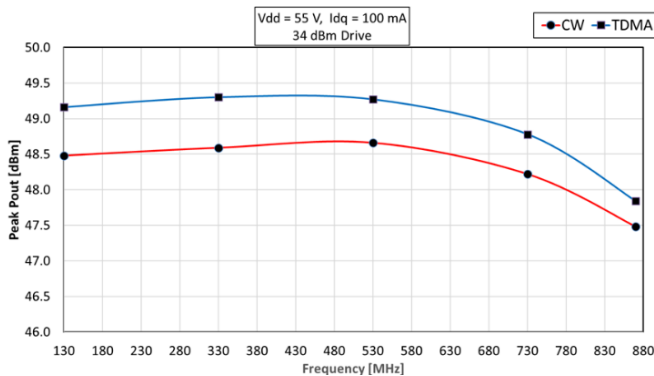
### Second and Third harmonics levels in dBc



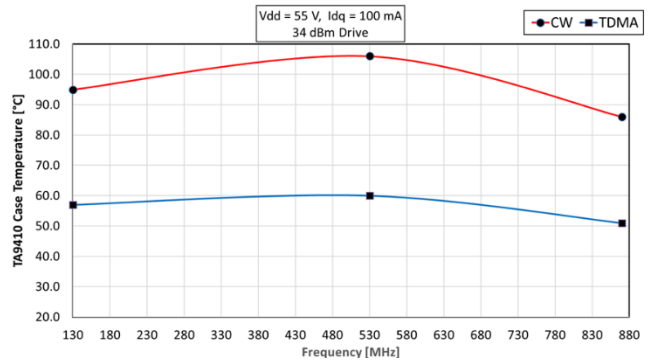
**Figure 6.2.3.  $D2HdBc$  and  $D3HdBc$  vs  $P_{OUT}$  of TA9410E-EVB-J**

## 6.3. Peak power and case temperature test Results

TA9410E EVB-J  $V_{dd}=55V$ ,  $I_{dq}=100mA$  +34 dBm at Board Input: TDMA 60ms Period, 50% Duty



**Figure 6.3.1. Peak  $P_{OUT}$  vs Freq of TA9410E-EVB-J**



**Figure 6.3.2. TA9410D case temperature vs Freq of TA9410E-EVB-J**

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