TA9410E

25 W CW 0.02 – 3.0 GHz GaN Power Transistor

Application Note: TA9410E EVB J

Application Note

130 MHz~860 MHz

55 V, 100 mA

Rev-2.1

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

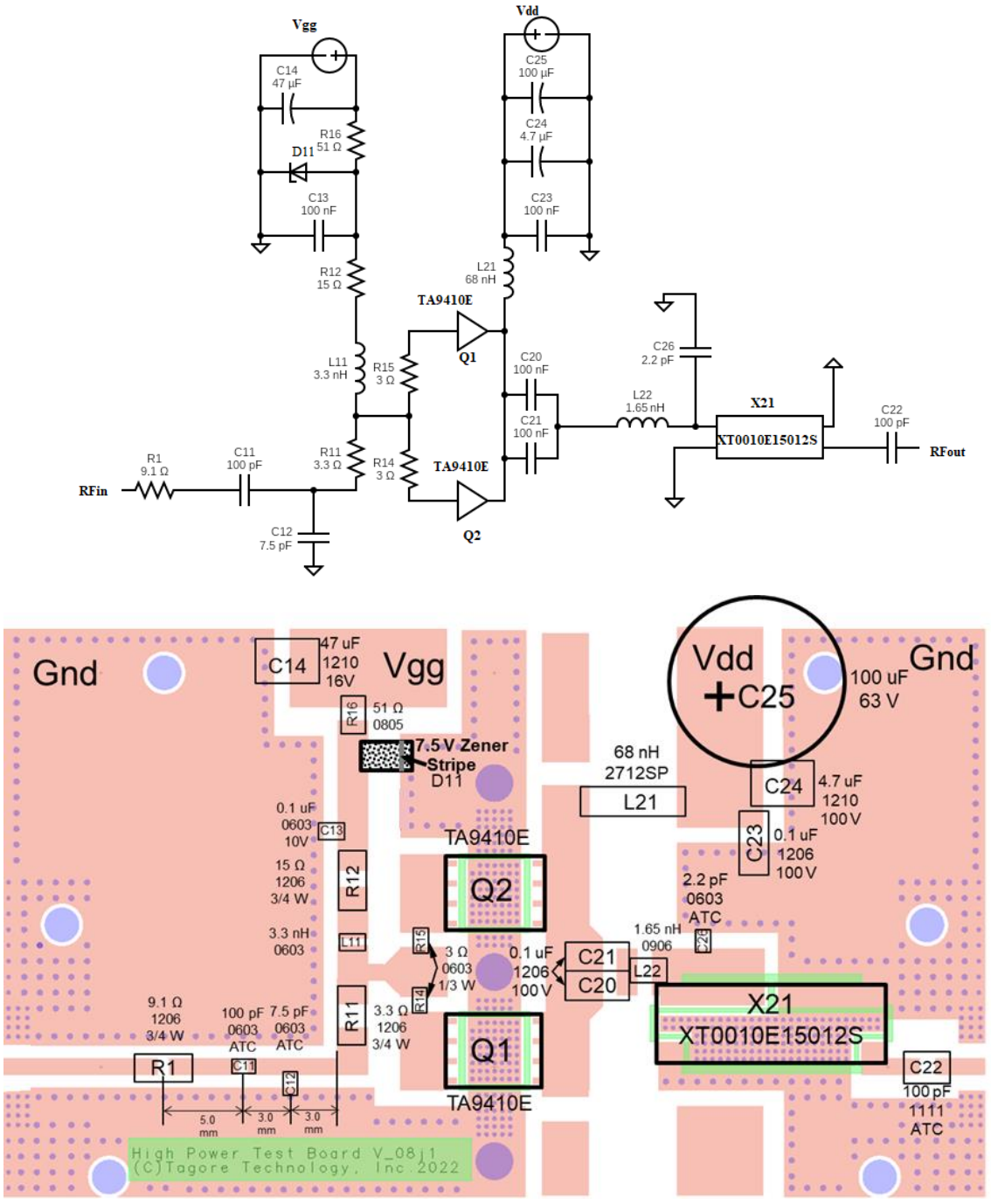

Figure 2.1 TA9410E-EVB-J 130 MHz ~ 860 MHz Schematic and EVB Layout

3. TA9410E-EVB-J Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
R1	9.1 Ω	Vishay	CRCW12069R10FKEAHP
C11	100 pF	AVX	600S101GT250XT
C12	7.5 pF	AVX	600S7R5CT250XT
R11	3.3 Ω	Vishay	CRCW12063R30FKEAHP
R12	15 Ω	Vishay	CRCW120615R0FKEAHP
L11	3.3 nH	Coil craft	0603HP-3N3XG
R14, R15	3.0 Ω	Vishay	CRCW06033R00JNEAHP
R16	51 Ω	Panasonic	ERJ-P06J510V
D11	7.5 V Zener	On Semiconductor	SZMMSZ5236BT1G
C13	0.1 µF, 10 V	AVX	0603ZC104K4T2A
C14	47 µF, 16 V	Murata	GRM32EC81C476KE15L
C20, C21, C23	0.1 µF, 100 V	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 µF, 100 V	Murata	GCM32DC72A475KE02L
C25	100 µF, 63 V	Nichicon	UPW1J101MPD1TD
X21	Transformer	TTM Technologies	XT0010E15012S
Q1, Q2	25-Watt GaN Transistor	Tagore Tech	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 -5 V 2. Set V_D to +55 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-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	-1.4	48.4	53	Peak power 47.5-48.5 dBm for CW 47.8-49.3 dBm for TDMA Case temp variation: 105-86 °C for CW 60-50 °C for TDMA
330	20.2	-7.4	-3.7	48.3	53	
530	18.3	-6.0	-5.9	48.6	52	
730	17.5	-7.3	-6.2	48.0	51	
860	18.0	-12.2	-8.7	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

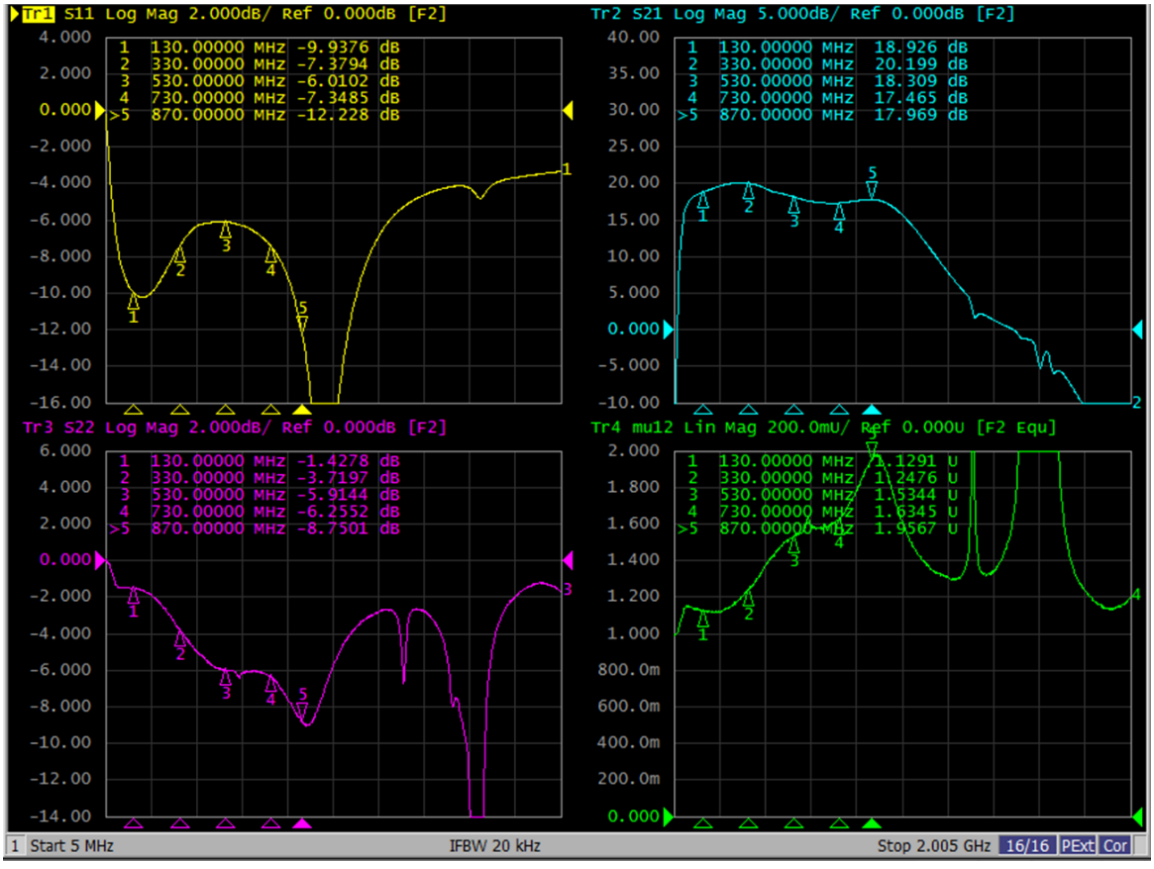

Figure 6.1.1. S parameters of TA9410E-EVB-J

6.2. Large Signal Test Results

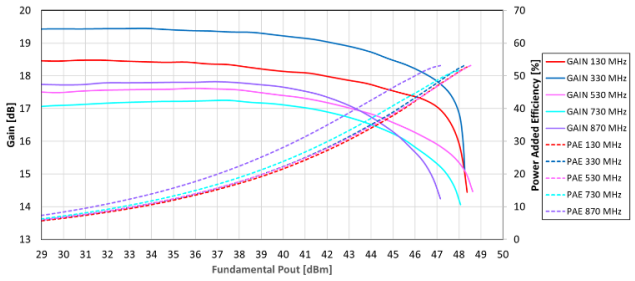

Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9410E-EVB-J

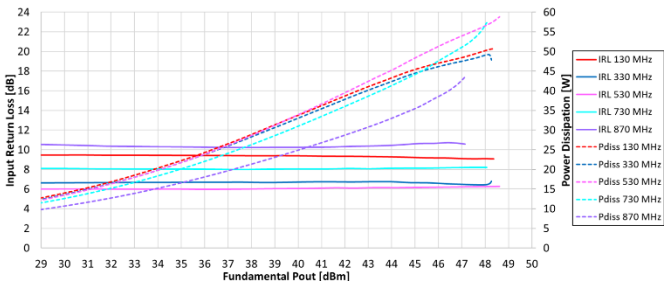

Figure 6.2.2. IRL and Pdiss vs P_{OUT} of TA9410E-EVB-J

Second and Third harmonics levels in dBc

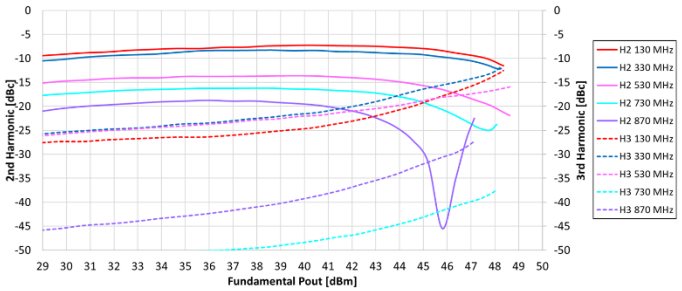

Figure 6.2.3. D2HdBc and D3HdBc vs P_{OUT} of TA9410E-EVB-J

6.3. Peak power and case temperature test Results

TA9410E EVB-J Vdd=55 V, Idq=100 mA +34 dBm at Board Input: TDMA 60 ms Period, 50% Duty

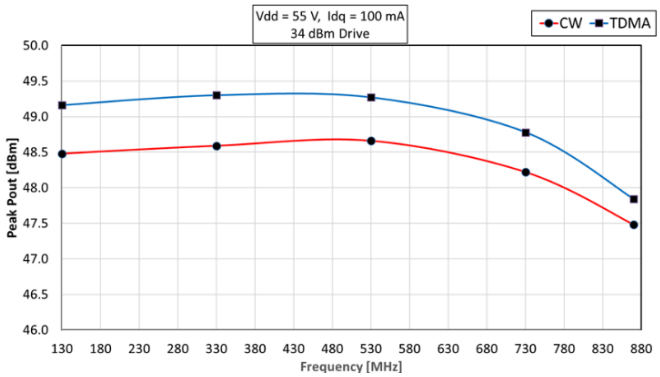

Figure 6.3.1. Peak P_{OUT} vs Freq of TA9410E-EVB-J

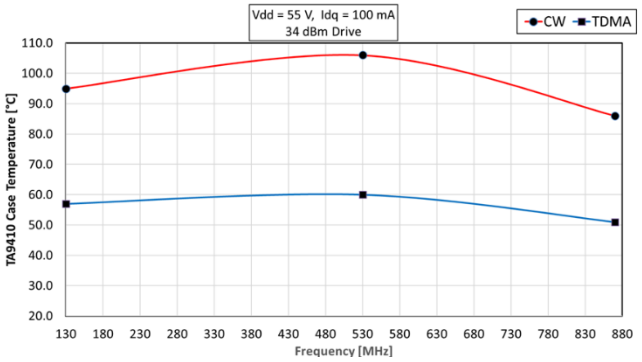

Figure 6.3.2. TA9410E case temperature vs Freq of TA9410E-EVB-J

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