

TA9410E

25 W CW 0.02 – 3.0 GHz GaN Power Transistor

Application Note: TA9410E EVB D

Application Note

30 MHz~800 MHz

50 V, 100 mA

Rev-2.1

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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 Dual Flat No lead (DFN) 5 x 6 x 0.75 mm, 8 leads plastic package.

TA9410E-EVB-D is an evaluation board specially tuned for frequency range of 30~800 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-D Board Details

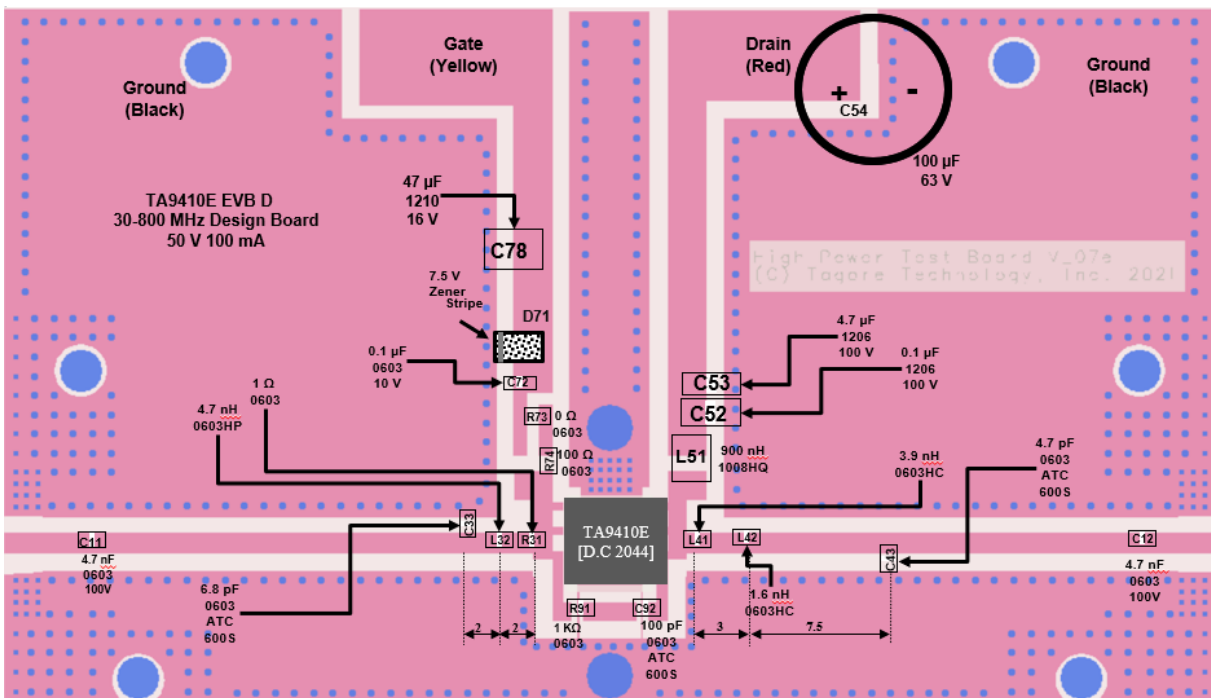
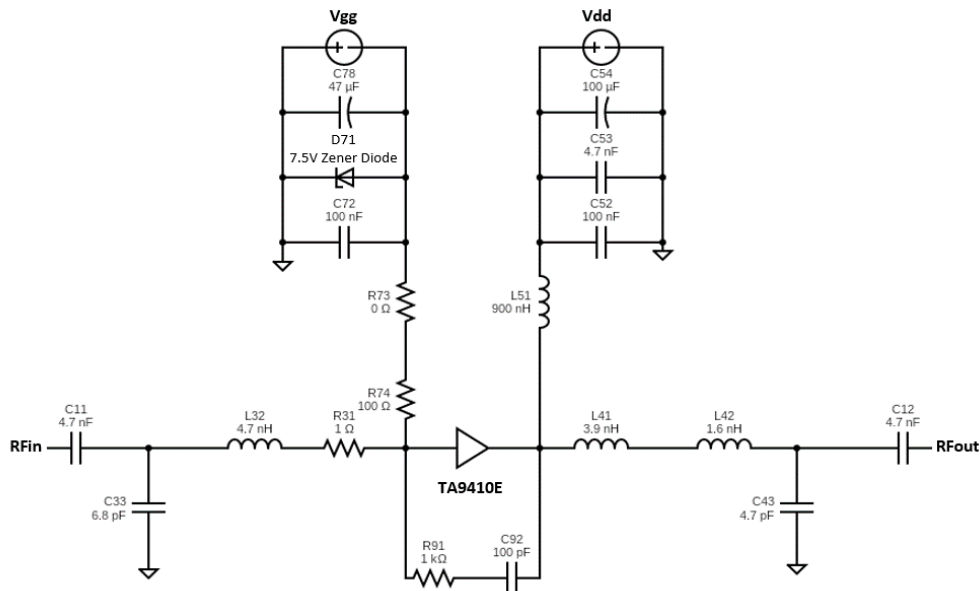


Figure 2.1 TA9410E-EVB-D 30 MHz ~ 800 MHz Schematic and EVB Layout

3. TA9410E-EVB-D Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7 nF, 50 V	Murata	GRM1885C1H472JA01
R31	1 Ω , 0.5 W	Panasonic	ERJ-P06J1R0V
L32	4.7 nH	Coil craft	0603HC-4N7XJLW
C33	6.8 pF	AVX	600S6R8AT250XT
L41	3.9 nH	Coil craft	0603HC-3N9XJLW
L42	1.6 nH	Coil craft	0603HC-1N6XJLW
C43	4.7 pF	AVX	600S4R7BT250XT
L51	900 nH	Coil craft	1008AF-901XJLC
C52	0.1 μ F, 50 V	Murata	GRM31C5C1H104JA01L
C53	4.7 μ F	Murata	GRM31CC72A475KE11K
C54	100 μ F, 63 V	Nichicon	UPW1J101MPD1TD
D71	7.5 V Zener	On Semiconductor	SZMMSZ5236BT 1G
C72	0.1 μ F, 10 V	AVX	0603ZC104K4T2A
R75	100 Ω	Vishay	CRCW060310R1FKEAHP
R73	0 Ω	Vishay/Dale	CRCW06030000Z0EAC
R74	100 Ω	Vishay	CRCW0603100RFKEB
C78	47 μ F, 16 V	Murata	GRM32ER61C476ME15L
R91	1 K Ω	Vishay/Dale	CRCW06031K00FKEC
C92	100 pF	AVX	600S101GT250XT
Q1	25 W GaN Transistor	Tagore Tech	TA9410E
PCB	Rogers RO4350B, 20 mils, 2 oz copper		

Table 3.1 TA9410E-EVB-D BOM

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

5. TA9410E-EVB-D Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11 (dB)	S22 (dB)	Psat (dBm)	PAE (%) @Psat
30	24.8	-10.7	-13.8	44.5	73
100	24.6	-10.1	-16.8	45.1	76
200	24.0	-8.2	-20.2	45.1	71
400	22.4	-5.4	-11.0	44.7	60
600	22.0	-4.9	-8.2	46.6	57
800	23.5	-7.6	-20.5	46.4	70

Table 5.1 TA9410E-EVB-D Electrical Characteristics Summary

6. TA9410E-EVB-D Test Results

All the tests are carried out at room temperature.

6.1. S parameters

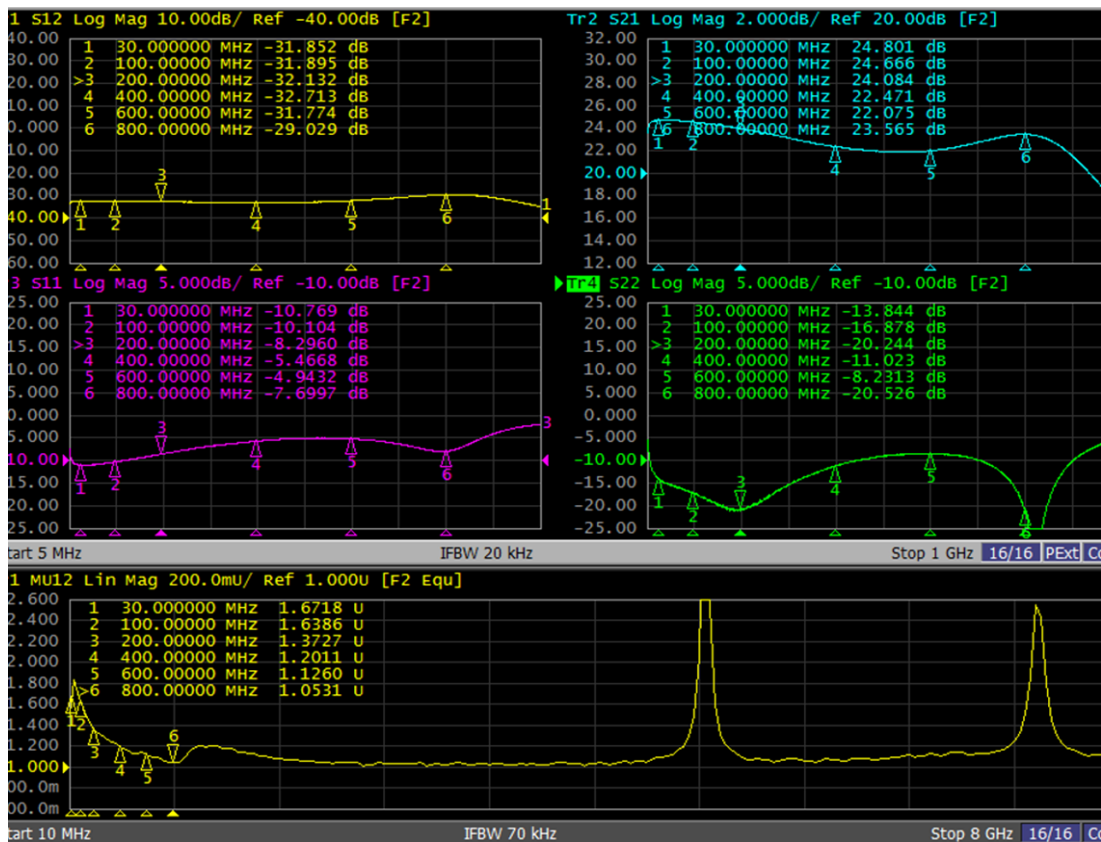


Figure 6.1.1. S parameters of TA9410E-EVB-D

6.2. Large Signal Test Results

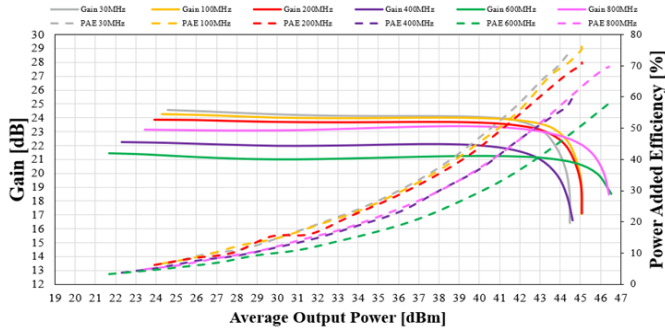


Figure 6.2.1. Gain Vs Pout of TA9410E-EVB-D with 1% Pulsed Setup

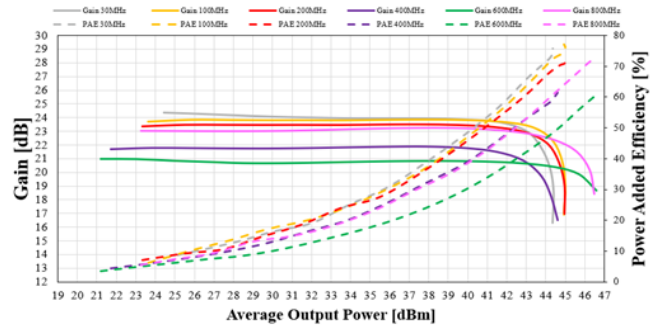


Figure 6.2.2. Gain Vs Pout of TA9410E-EVB-D with 20% Pulsed

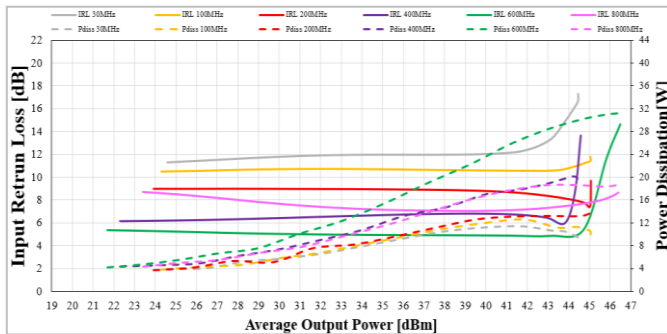


Figure 6.2.3. IRL and Pdiss Vs Pout of TA9410E-EVB-D with 1% Pulsed Setup

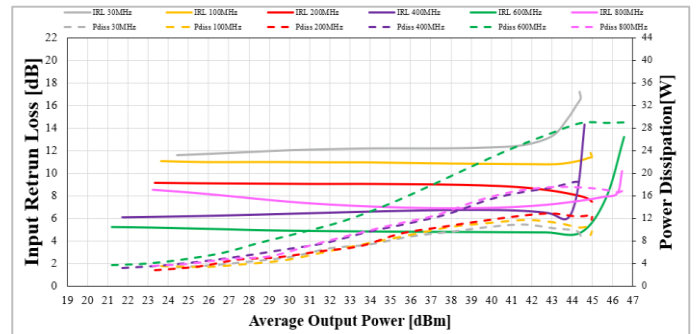


Figure 6.2.4. IRL and Pdiss Vs Pout of TA9410E-EVB-D with 20% Pulsed Setup

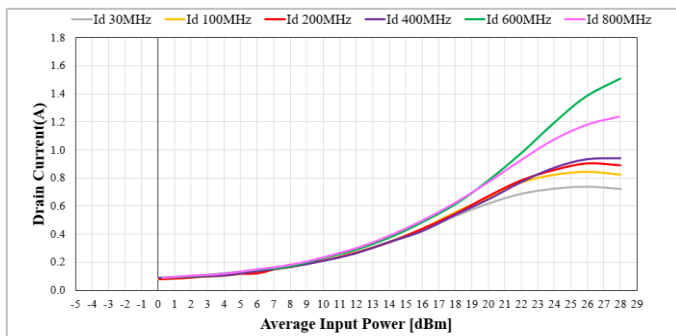


Figure 6.2.5. Drain Current Vs Pin of TA9410E-EVB-D with 1% Pulsed Setup

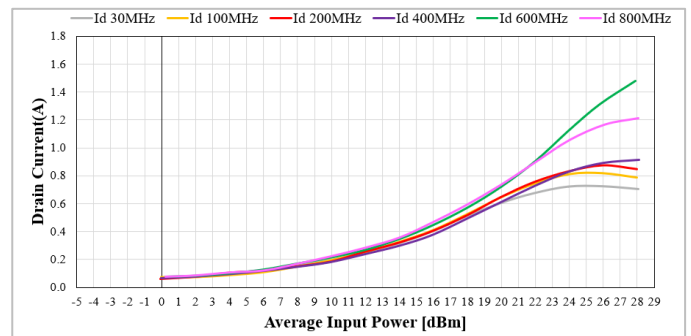


Figure 6.2.6. Drain Current Vs Pin of TA9410E-EVB-D with 20% Pulsed Setup

6.3. ACPR & AACPR Results

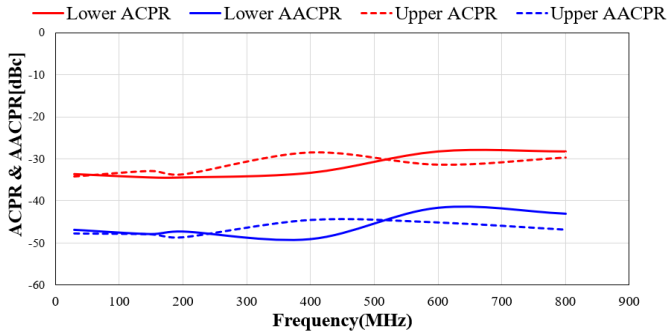


Figure 6.3.1. ACPR & AACPR Measurements: 8 dB PAPR 16 QAM 5 MHz/4.515 Integrated BW/Uplink [50 V, 100 mA Pin:12 dBm]

Pin	Frequency (MHz)	AACPR (-)	ACPR (-)	PoutAvg	ACPR (+)	AACPR (+)
12dBm [50V 100mA]	30	-46.9	-33.7	34.9	-34.2	-47.7
	150	-47.9	-34.5	34.9	-32.9	-47.9
	200	-47.3	-34.5	35.1	-33.7	-48.6
	400	-49.1	-33.4	32.4	-28.5	-44.5
	600	-41.7	-28.3	33.5	-31.4	-45.1
	800	-43.1	-28.3	34.9	-29.7	-46.8

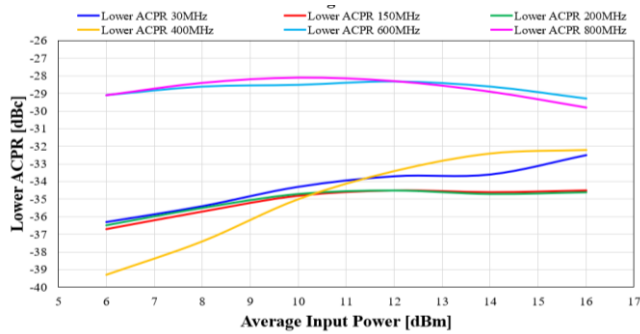


Figure 6.3.2. Lower ACPR Measurements: 8 dB PAPR 16 QAM 5 MHz/4.515 Integrated BW/Uplink

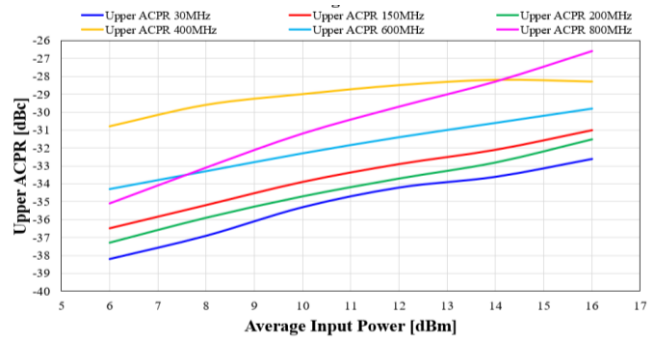


Figure 6.3.3. Upper ACPR Measurements: 8 dB PAPR 16 QAM 5 MHz/4.515 Integrated BW/Uplink

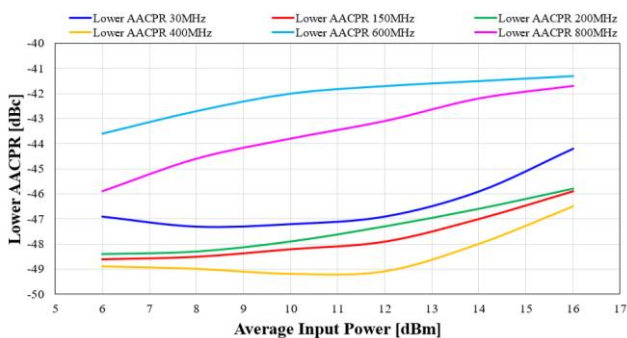


Figure 6.3.4. Lower AACPR Measurements: 8 dB PAPR 16 QAM 5 MHz/4.515 Integrated BW/Uplink

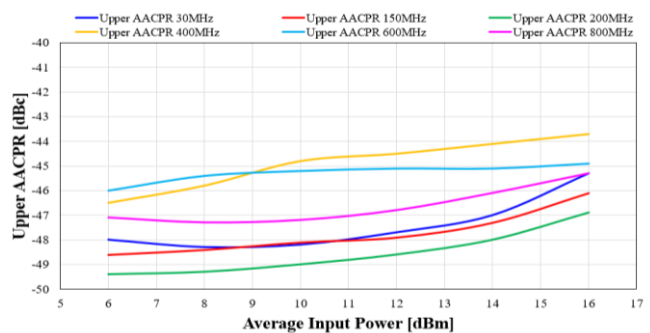


Figure 6.3.5. Upper AACPR Measurements: 8 dB PAPR 16 QAM 5 MHz/4.515 Integrated BW/Uplink

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