

TA9310E

20W CW 0.5 – 4.0 GHz GaN Power Transistor

Application Note: TA9310E EVB J

Application Note

30MHz~512MHz

18V 80mA

18V, 50mA+30mA each PA

Rev-1.1

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1. General Description

The TA9310E is a broadband GaN power transistor capable of delivering 20W CW from 500MHz to 4.0GHz frequency band. The transistor can be used at lower frequencies with reduced output power. The input and output can be matched for best power and efficiency for the desired band. The TA9310E is packaged in a compact, low-cost Quad Flat No lead (QFN) 5x6x0.8mm, 8 leads plastic package. TA9310E-EVB-J is tuned from 30MHz to 512MHz as push-pull configurations using appropriate baluns.

2. TA9310E-EVB-J Board Details

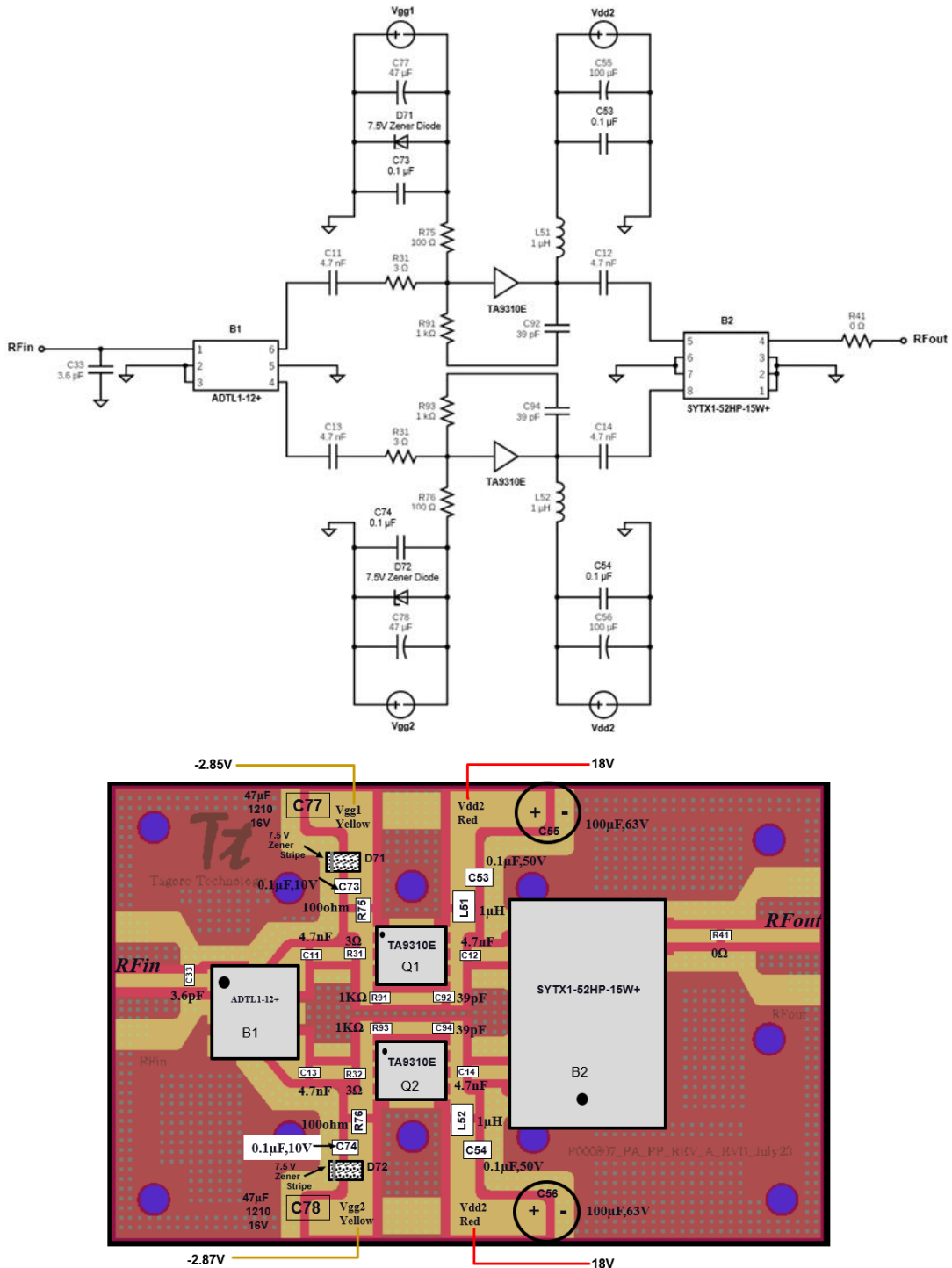


Figure 2.1 TA9310E-EVB-J 30MHz ~ 512MHz Schematic and EVB Layout

3. TA9310E-EVB-J Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
C11, C12	4.7nF, 50V	Murata	GRM1885C1H472JA01D
R31, R32	3Ω	Vishay	RCS06033R00FKEA
C33	3.6pF	AVX	600S3R6AT250XT
R41	0Ω	Vishay	CRCW08050000Z0EAC
L51, L52	1μH	Coil craft	PFL2512-102MEB
C53, C54	0.1μF, 50V	Murata	GRM31C5C1H104JA01L
C55, C56	100μF,63V	Nichicon	UPW1J101MPD1TD
D71, D72	7.5 V Zener	On Semiconductor	MMSZ5236BT1G
C73, C74	0.1μF, 10V	AVX	0603ZC104K4T2A
R75, R76	100Ω	Vishay	CRCW0603100RFKEAHP
C77, C78	47μF, 16V	Murata	GRM32ER61C476ME15L
R91, R93	1KΩ,1.5W	Vishay	RCP0603W1K00GE
C92, C94	39pF	AVX	600S390JT250XT
Q1, Q2	20W GaN Transistor	Tagore Technology	TA9310E
B1	Input Balun	Mini Circuits	ADTL1-12+
B2	Output Balun	Mini Circuits	SYTX1-52HP-15W+
PCB		Rogers RO4350B, 20 mils, 2 oz copper	

Table 3.1 TA9310E-EVB-J BOM

4. TA9310E-EVB-J Biasing Sequence

Turn ON Device	Turn OFF Device
Biasing of device *Terminate both ports with 50Ω before biasing an EVB 1. Apply V _{gg} = -5V on both devices 2. Apply V _{dd} = 18V on both devices 3. Slowly adjust V _{gg} of device1 till you draw total current of 50mA current. The V _{gg} of device1 should be around -2.85V 4. Slowly adjust V _{gg} of device2 till you draw total current of 80mA current. The V _{gg} of device2 should be around -2.87V 5. Apply RF[Keep RF input power< 24dBm]	1. Turn RF power off 2. Turn off V _D 3. Turn off V _G

Table 4.1 TA9310E-EVB-J Bias and Sequencing

5. TA9310E-EVB-J Board Measurement Summary

Frequency (MHz)	S21 Gain(dB)	S11(dB)	S22(dB)	H2dBc @40dBm	H3dBc @40dBm	OP1(dBm)	Psat (dBm)	PAE (%) @40dBm
30	22.0	-9.5	-11.0	41	12	38.6	41.2	58
100	21.6	-9.2	-10.3	39	13	40.7	42.0	55
200	20.8	-8.8	-8.8	34	14	39.5	41.5	52
300	20.0	-10.0	-8.2	36	20	40.7	41.8	50
400	19.4	-12.2	-9.3	43	23	40.3	42.0	48
512	18.1	-7.3	-13.5	42	22	39.5	41.0	52

Table 5.1 TA9310E-EVB-J 18V 80mA[50mA+30mA] Electrical Characteristics Summary

6. TA9310E-EVB-J Test Results

All the tests are carried out at room temperature.

6.1. S parameters

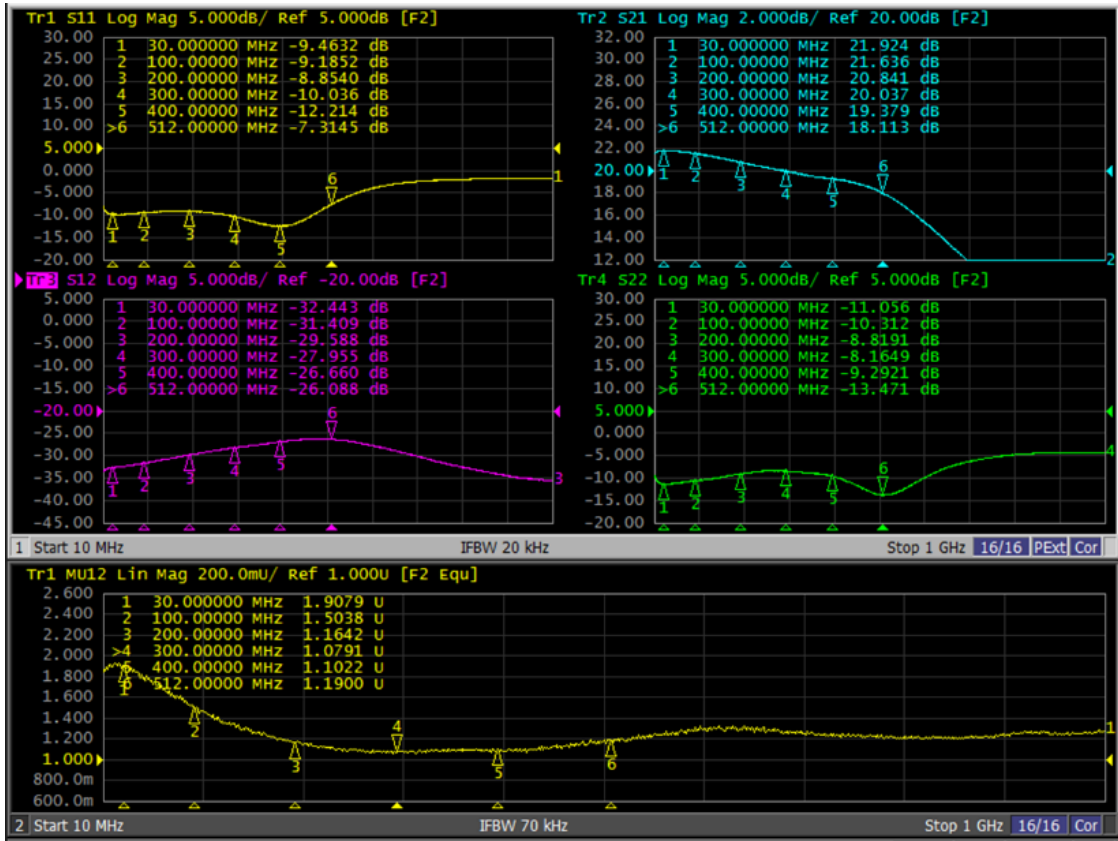


Figure 6.1.1. S parameters of TA9310E-EVB-J 18V 80mA [50mA+30mA]

6.2. Large Signal Test Results for device 1 :18V 50mA and device 2:18V 30mA

Caution: Please use input RF power below 24dBm to prevent damage to the balun

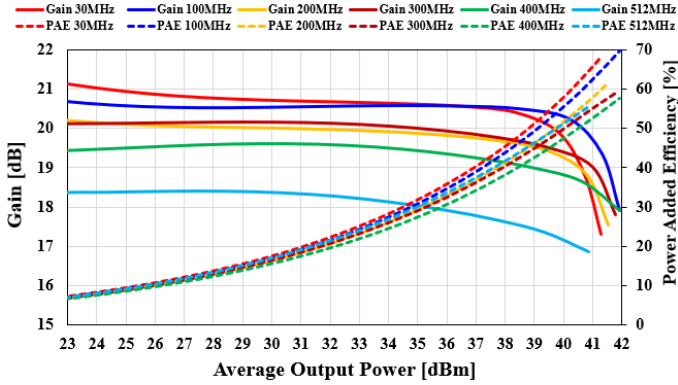


Figure 6.2.1. Gain and PAE vs P_{OUT} of TA9310E-EVB-J

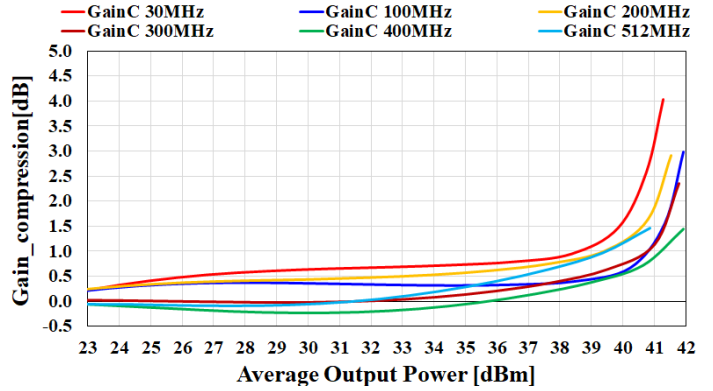


Figure 6.2.2. Gain compression vs P_{OUT} of TA9310E-EVB-J

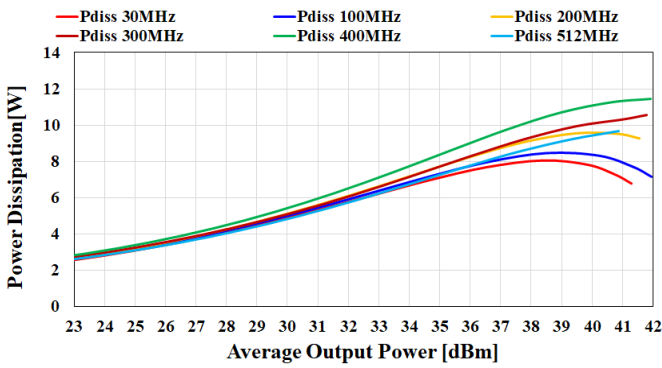


Figure 6.2.3. Pdiss vs P_{OUT} of TA9310E-EVB-J

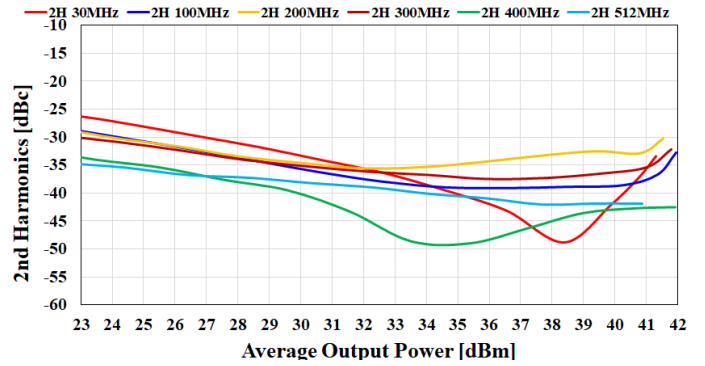


Figure 6.2.4. H2dBc vs P_{OUT} of TA9310E-EVB-J

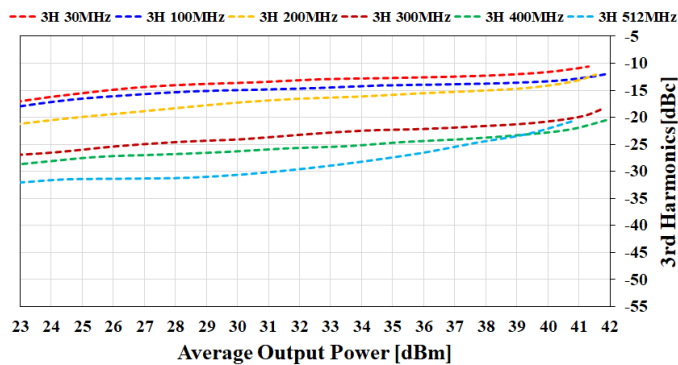


Figure 6.2.5. H3dBc vs P_{OUT} of TA9310E-EVB-J

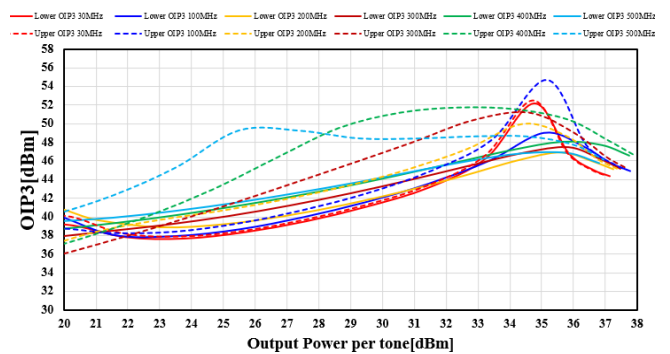


Figure 6.3.6. OIP3dBm of TA9310E-EVB-J 1MHz tone spacing

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