

TP0310K

27 dBm CW 0.03-3.8 GHz GaAs Power LNA

Application Note: TP0310K EVB E

Application Note

30 MHz~525 MHz

5.0V, 140 mA

Rev-2.0

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1. General Description

The TP0310K is a power Low Noise Amplifier (LNA) providing high gain and linearity. With a simple input and output match, this LNA can be tuned for different frequency bands targeting low noise, high power, and high linearity over 0.03-3.8 GHz frequency band. At 1.85 GHz, the amplifier typically provides 16.5 dB gain, 27.5 dBm OP1, +39 dBm OIP3, and a 1.0 dB noise figure, while drawing 140-160 mA current from a +5 V supply.

TP0310K-EVB-E is an evaluation board specially tuned for frequency range of 30 MHz~512 MHz applications. Its application in the areas of Wireless infrastructure, smart cells, cellular repeaters, SDARs Mil/comm radios etc. The TP0310K is packaged in a compact, low-cost Dual Flat No Lead (QFN) 3 x 3 x 0.8 mm, 16 pin plastic package.

2. TP0310K-EVB-E Board Details

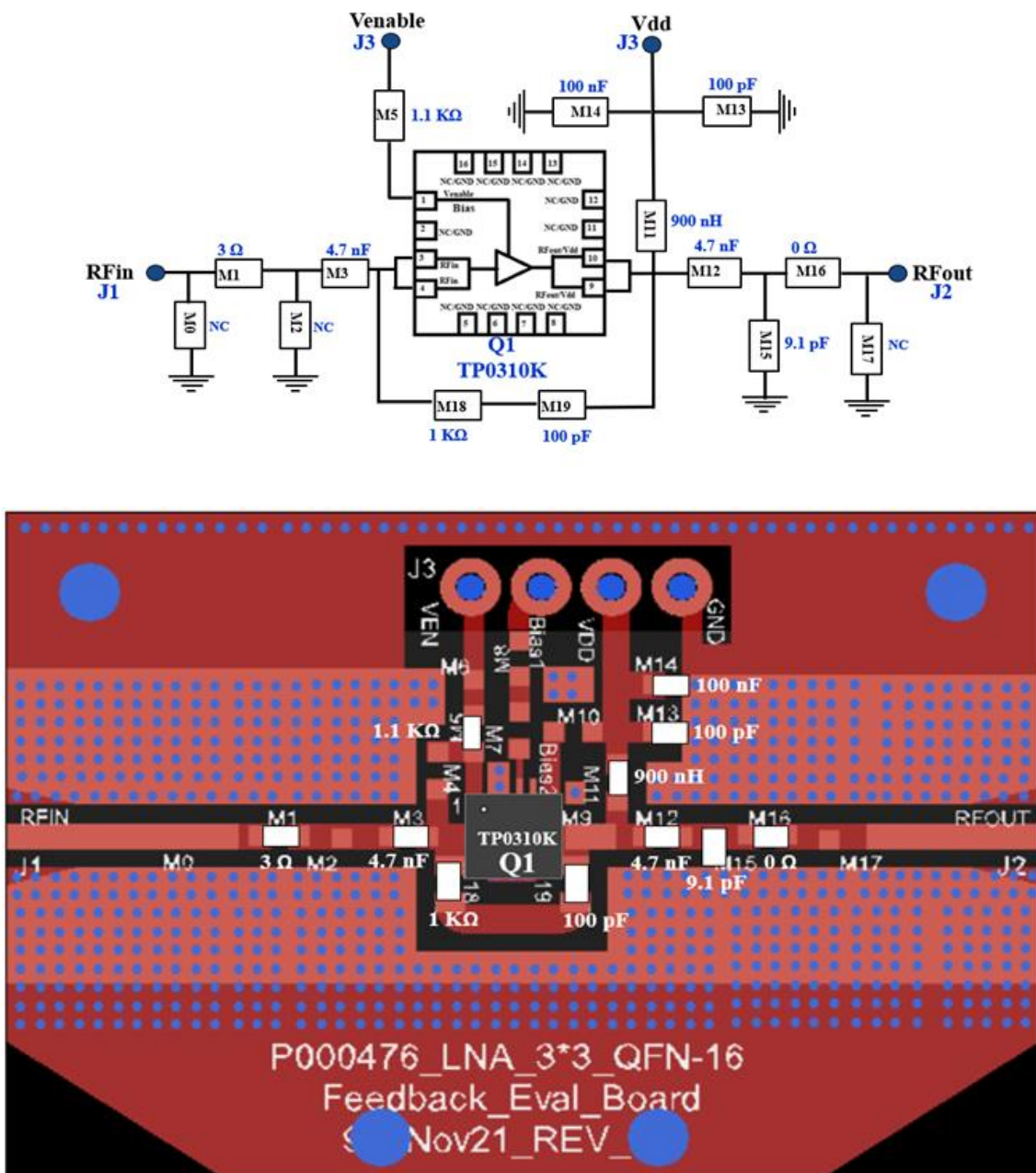


Figure 2.1 TP0310K-EVB-E 30 MHz ~ 525 MHz Schematic and EVB Layout

3. TP0310K-EVB-E Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
M1	3 Ω	Panasonic	ERJ-U02F3R00X
M3,M12	4.7 nF	Murata	GRM1885C1H472JA01D
M5	1.1 K Ω	Panasonic	ERJ-2RKF1101X
M11	900 nH	Coil craft	1008AF-901XJLC
M13, M19	100 pF	AVX	04025A101JAT4A
M14	100 nF	TDK	C1005X7R1H104K050BE
M15	9.1 pF	Murata	GJM1555C1H9R1BB01
M16	0 Ω	Panasonic	ERJ-2GE0R00X
M18	1.0 K Ω	Panasonic	ERJ-2RKF1001X
Q1	GaAs Power LNA	Tagore Tech	TP0310K
PCB		Rogers RO4350B, 20 mils, 1 oz copper	

Table 3.1 TP0310K-EVB-E BOM

4. TP0310K-EVB-E Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set Venable to +5 V 2. Set V_{DD} to +5 V 3. Device will draw required I_{DQ} current 4. Apply RF power	1. Turn RF power off 2. Turn off V_{DD} 3. Turn off Venable

Table 4.1 TP0310K-EVB-E Bias and Sequencing

5. TP0310K-EVB-E Board Measurement Summary

Frequency (MHz)	EVB Noise figure (dB)	Gain(dB)	OP1 (dBm)	OIP3(dBm) 1 MHz tone spacing & 16 dBm power per tone	S11(dB)	S22(dB)	Mu1
30	2.3	24.2	25.0	39.2	-8.1	-3.6	1.1
100	1.9	23.9	25.5	39.4	-8.0	-3.8	1.1
200	1.7	23.4	25.5	39.7	-7.6	-3.9	1.1
300	1.8	22.7	25.6	38.1	-7.3	-4.3	1.1
400	1.8	21.9	25.6	39.4	-7.3	-4.7	1.1
525	1.8	21.1	26.4	36.6	-7.8	-5.8	1.1

Table 5.1 TP0310K-EVB-E 5 V 140 mA Electrical Characteristics Summary

6. TP0310K-EVB-E Test Results

All the tests are carried out at room temperature.

6.1. S parameters

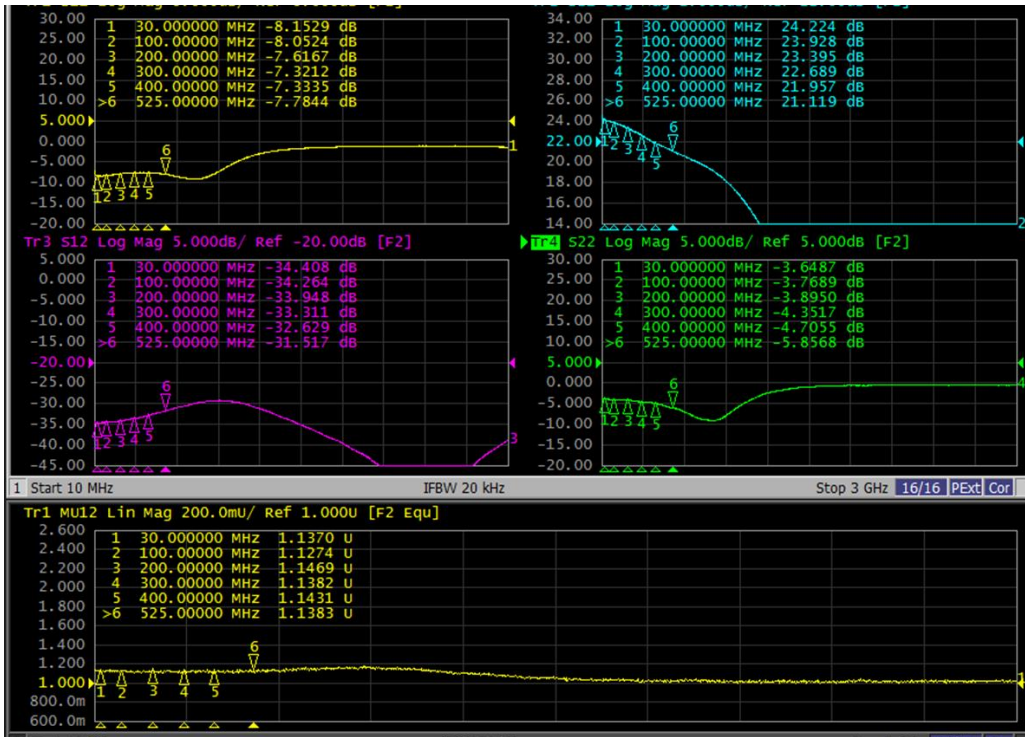


Figure 6.1.1. S parameters of TP0310K-EVB-E for 5 V 140 mA

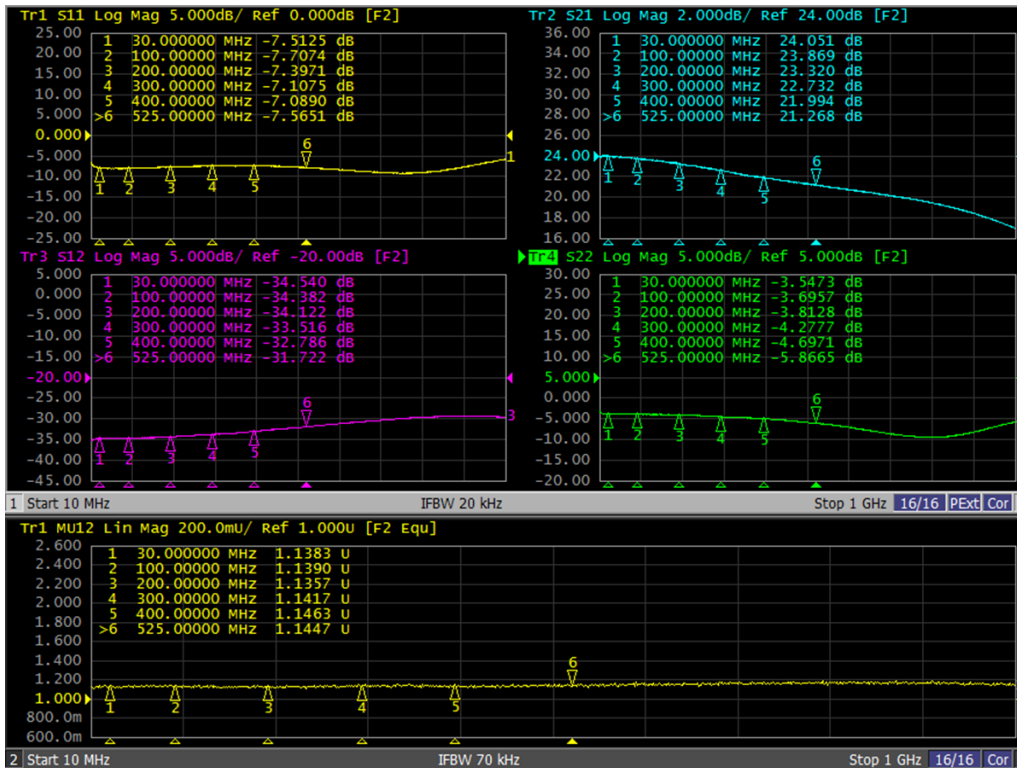


Figure 6.1.2. S parameters of TP0310K-EVB-E for 6 V 155 mA

6.2. Noise Figure [SMA-SMA]

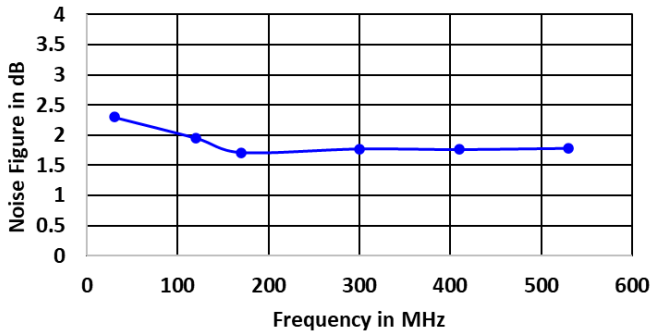


Figure 6.2.1. Noise Figure of TP0310K-EVB-E for 5 V 140 mA

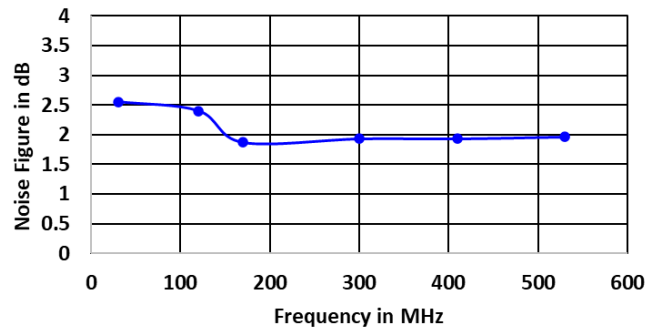


Figure 6.2.2. Noise Figure of TP0310K-EVB-E for 6 V 155 mA

6.3. Large Signal Test Results

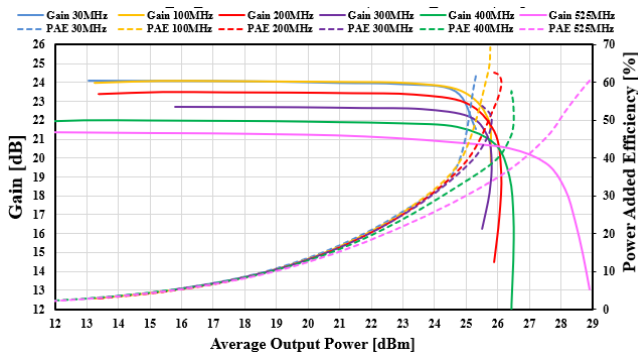


Figure 6.3.1. Gain Vs Pout of TP0310K-EVB-E for 5 V 140 mA

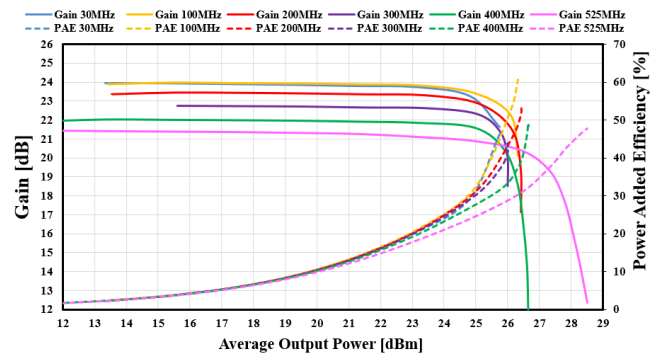


Figure 6.3.2. Gain Vs Pout of TP0310K-EVB-E for 6 V 155 mA

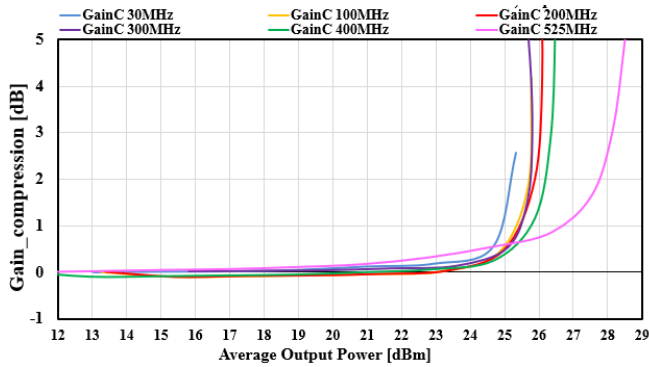


Figure 6.3.3. Gain compression Vs Pout of TP0310K-EVB-E for 5 V 140 mA

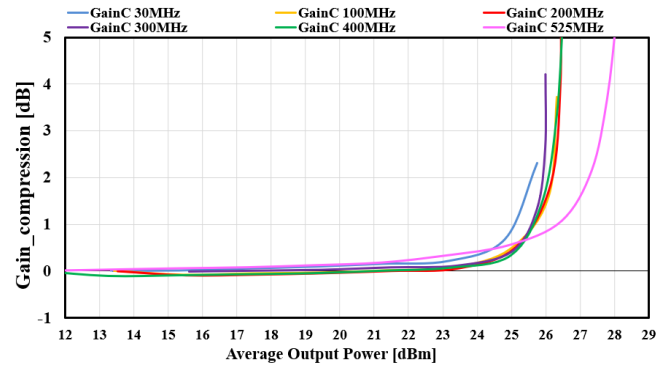


Figure 6.3.4. Gain compression Vs Pout of TP0310K-EVB-E for 6 V 155 mA

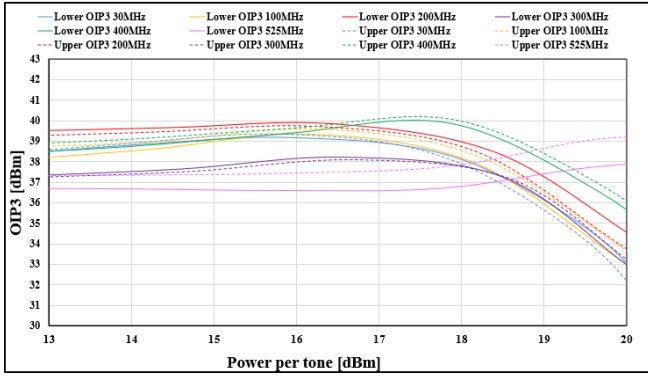


Figure 6.3.5. OIP3 Vs Pout per tone of TP0310K-EVB-E for 5 V 140 mA

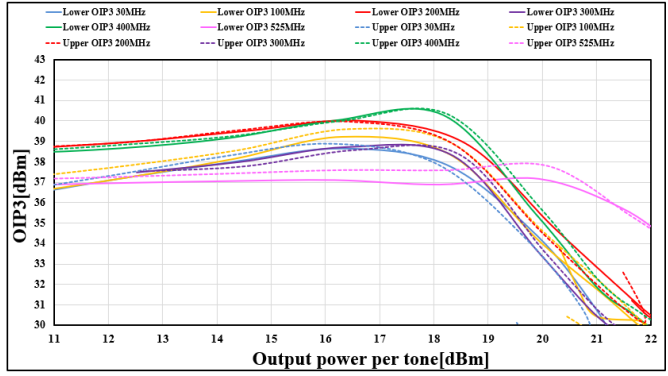


Figure 6.3.6. OIP3 Vs Pout per tone of TP0310K-EVB-E for 6 V 155 mA

Edition Revision 2.0 - 2024-07-30

Published by

Tagore Tech Inc.

601 W Campus Dr. Ste C1

Arlington Heights, IL 60004, USA

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