

TP0310K

27 dBm CW 0.03-3.8 GHz GaAs Power LNA

Application Note: TP0310K EVB C

Application Note

3300 MHz~3800 MHz

5.0 V, 140 mA

Rev-2.1

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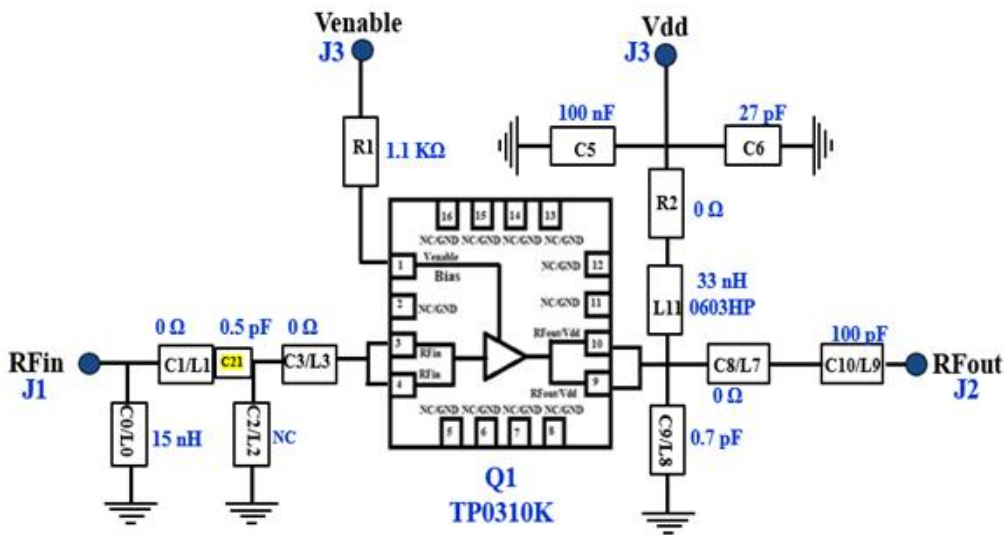
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1. General Description

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-C is an evaluation board specially tuned for frequency range of 3300MHz~3800MHz 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-C Board Details



An external series cut has been made between M1 and M2 in the EVB board to incorporate an extra series capacitance 0.5 pF (named as C21) at the input side match.

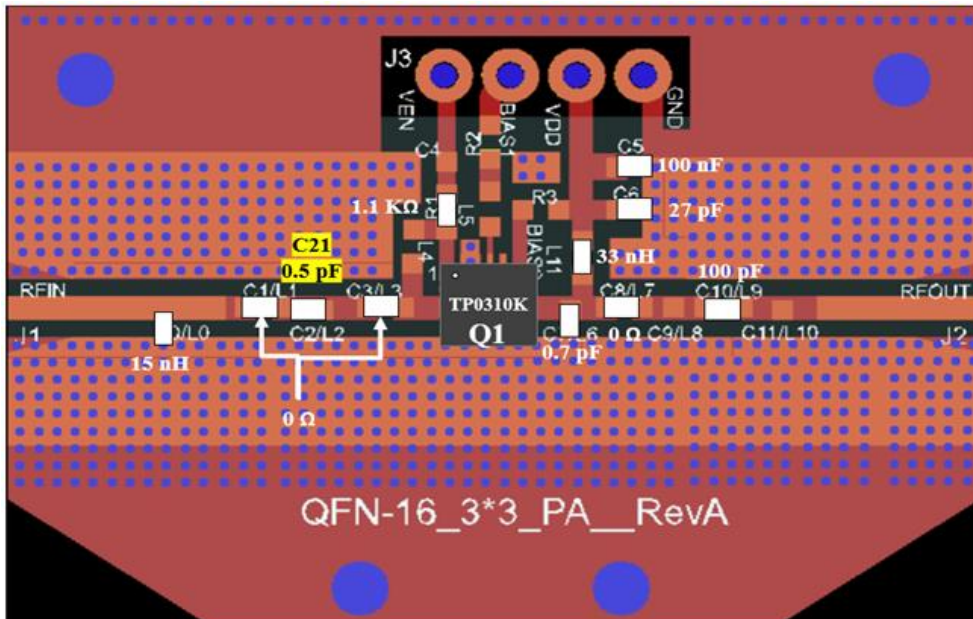


Figure 2.1 TP0310K-EVB-C 3300 MHz ~ 3800 MHz Schematic and EVB Layout

Note: An external series cut has been made between C1/L1 and C2/L2 in the EVB board to incorporate an extra series capacitance 0.5 pF (named as C21) at the input side match.

3. TP0310K-EVB-C Bill of Materials

Component ID	Value	Manufacturer	Recommended Part Number
C0/L0	15 nH	Coil craft	0402HP-15NXGRW
C21	0.5 pF	Murata	GJM1555C1HR50BB01
C1/L1, C3/L3, C8/L7 & R2	0 Ω	Panasonic	ERJ-2GE0R00X
R1	1.1 K Ω	Panasonic	ERJ-2RKF1101X
C7/L6	0.7 pF	Murata	GJM1555C1HR70BB01
C10/L9	100 pF	AVX	04025A101JAT4A
L11	33 nH	Coil craft	0402HP-33NXGRW
C5	100 nF	TDK	C1005X7R1H104K050BE
C6	27 pF	Murata	GJM1555C1H270JB01D
Q1	GaAs LNA	Tagore Tech	TP0310K
PCB		Rogers RO4350B, 20 mils, 1 oz copper	

Table 3.1 TP0310K-EVB-C BOM

4. TP0310K-EVB-C 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-C Bias and Sequencing

5. TP0310K-EVB-C Board Measurement Summary

Frequency (MHz)	EVB Noise figure (dB)	Gain(dB)	OP1 (dBm)	OIP3(dBm) 1 MHz tone spacing & 8 dBm power per tone	S11(dB)	S22(dB)	Mu1
3300	1.3	11.4	27.4	41.2	-7.3	-24.1	1.2
3400	1.2	11.5	27.6	41.5	-8.8	-21.8	1.2
3600	1.0	11.3	27.8	41.0	-10.8	-18.9	1.3
3800	1.2	10.9	27.8	42.0	-9.6	-16.8	1.3

Table 5.1 TP0310K-EVB-C Electrical Characteristics Summary

6. TP0310K-EVB-C Test Results

All the tests are carried out at room temperature.

6.1. S parameters

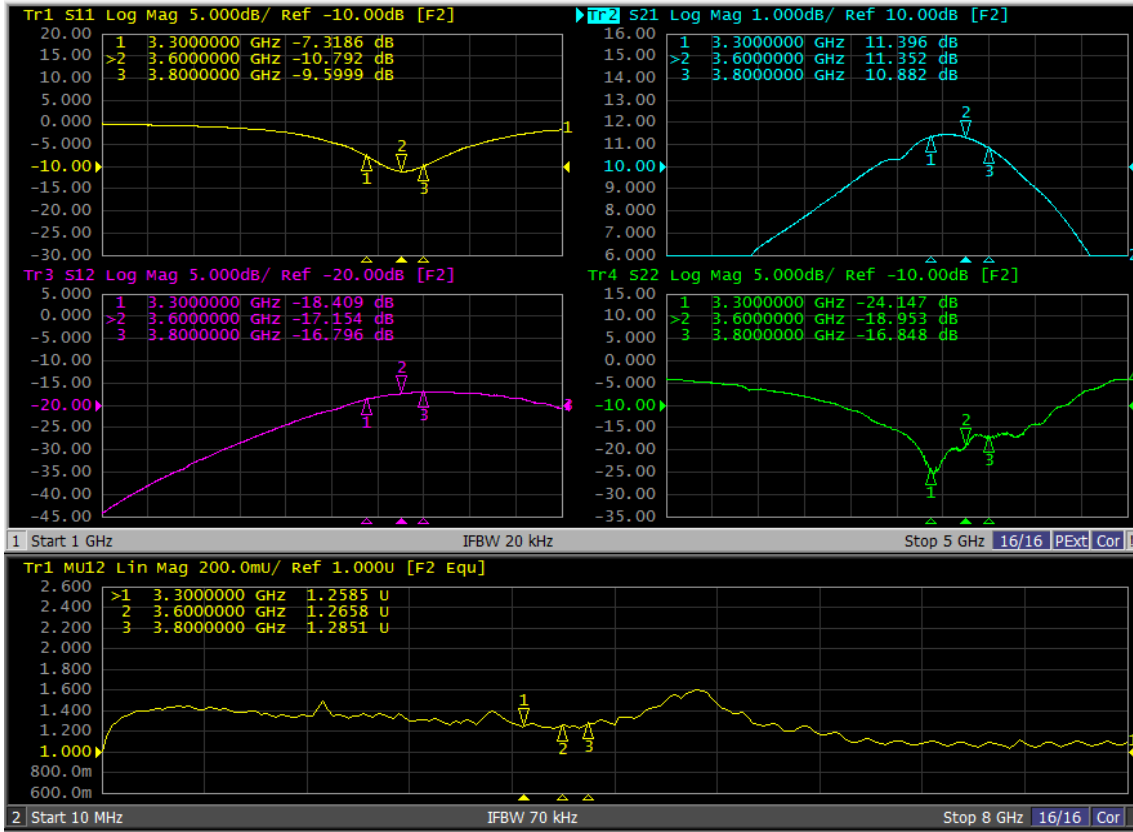


Figure 6.1.1. S parameters of TP0310K-EVB-C

6.2. SMA to SMA Noise Figure

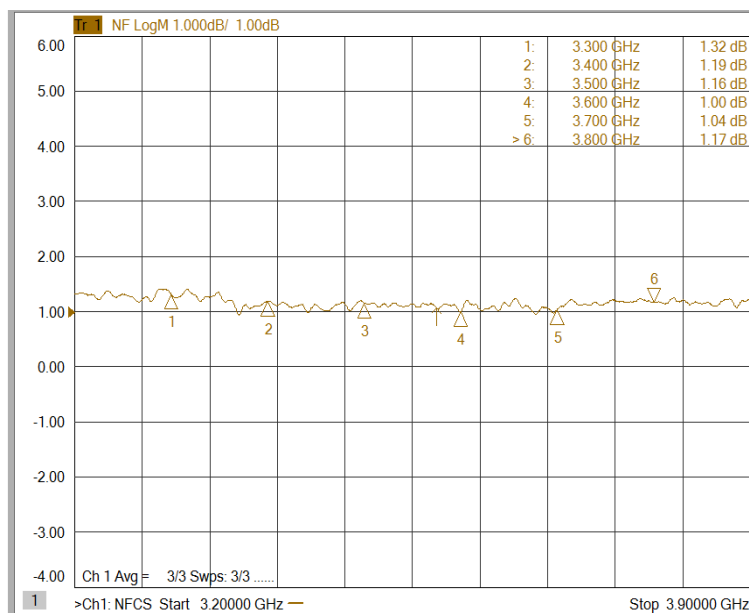


Figure 6.2.1 SMA to SMA NF of TP0310K-EVB-C

6.3. Large Signal Test Results

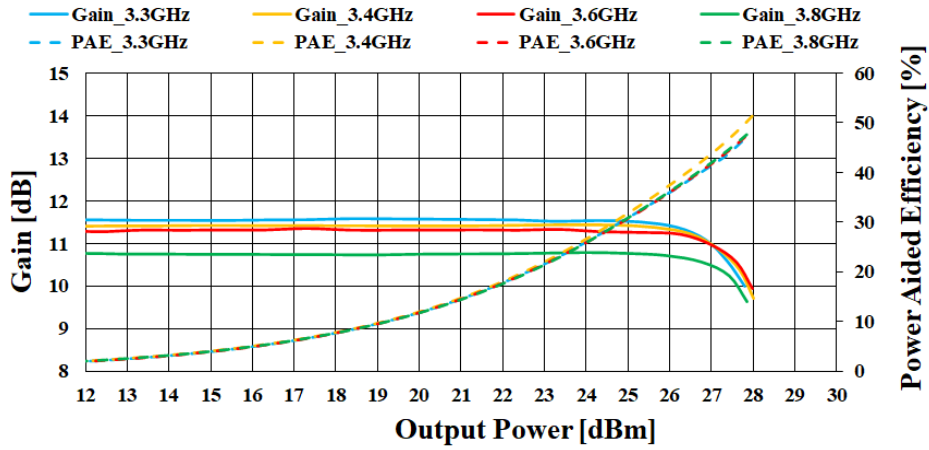


Figure 6.3.1. Gain Vs Pout of TP0310K-EVB-C

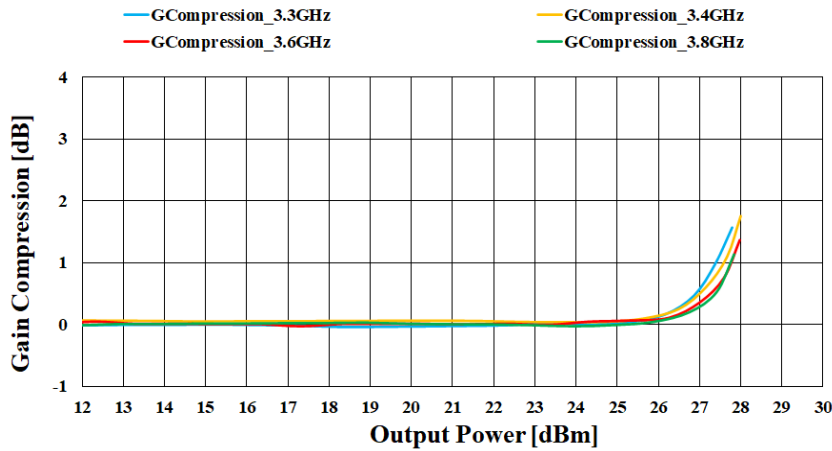


Figure 6.3.2. Gain compression Vs Pout of TP0310K-EVB-C

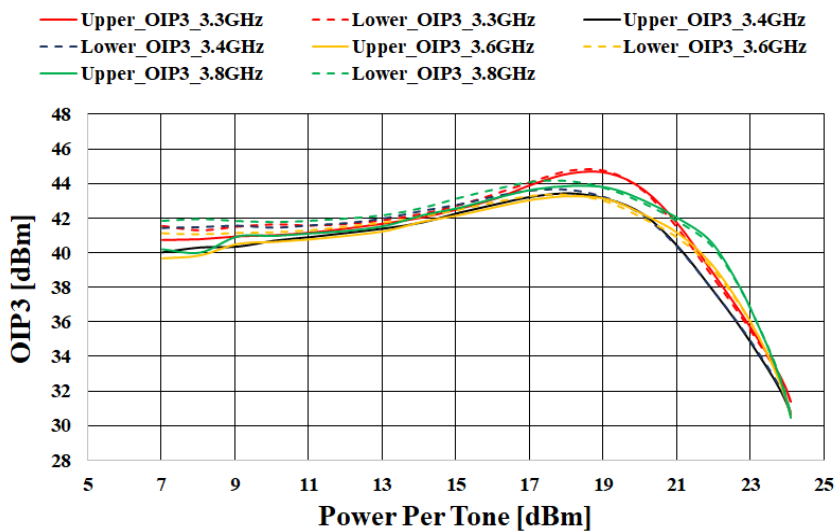


Figure 6.3.3. OIP3 Vs Pout per tone of TP0310K-EVB-C

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