Tagore Technology

TL0374J

0.03 – 3.0 GHz GaAs Ultra Low Noise Amplifier

Application Note: TL0374J EVB D1

Application Note

30MHz~2600MHz

3.3V 30mA

Rev-1.2

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1. General Description

The TL0374J is a broadband, ultra-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 LTE (small cells and infrastructure) and any other applications requiring low noise, high gain, and linearity. For >3GHz frequency band, TL0375J can be considered. The TL0374J is packaged in a compact, low-cost Dual Flat No Lead (DFN) 2x2x0.75mm, 8 pin plastic package.
TL0374J-EVB-D1 is an evaluation board specially tuned for 3.3V 30mA for frequency range of 30MHz~2600MHz applications. Its high gain, low noise performance makes it suitable.

2. TL0374J-EVB-D1 Board Details

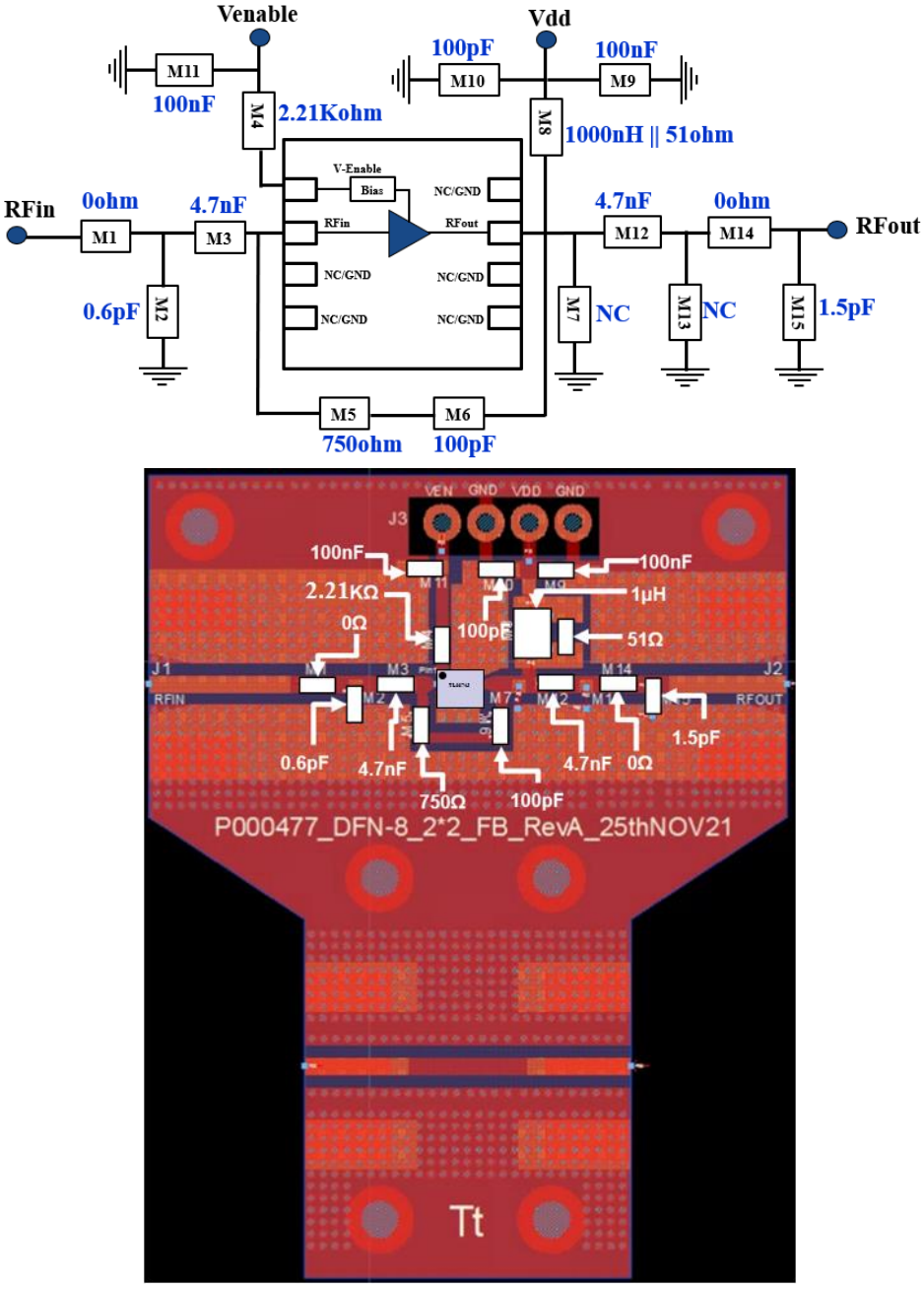


Figure 2.1 TL0374J-EVB-D1 30MHz ~ 2600MHz Schematic and EVB Layout

3. TL0374J-EVB-D1 Bill of Material

Component ID	Value	Manufacturer	Recommended Part Number
M1, M14	0Ω	Panasonic	ERJ-2GE0R00X
M2	0.6pF	Murata	GJM1555C1HR60BB01D
M3, M12	4.7nF, 50V	Murata	GRM1885C1H472JA01D
M4	2.21KΩ	Panasonic	ERJ-2RKF2211X
M5	750Ω	KOA Speer	RK73H1ERTTP7500F
M6, M10	100pF	AVX	04025A101JAT4A
M8	1µH	Coil craft	PFL2512-102MEC
M8	51Ω	R0HM Semiconductor	ESR03EZPJ510
M9, M11	100nF	TDK	C1005X7R1H104K050BE
M15	1.5pF	Murata	GJM1555C1H1R5BB01J
Q1	GaAs LNA	Tagore Technology	TL0374J
PCB		Rogers RO4350B, 20 mils, 1 oz copper	

Table 3.1 TL0374J-EVB-D1 BOM

4. TL0374J-EVB-D1 Biasing Sequence

Turn ON Device	Turn OFF Device
1. Set Venable to +5V 2. Set V_{DD} to +5V 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 TL0374J-EVB-D1 Bias and Sequencing

5. TL0374J-EVB-D1 Board Measurement Summary

Frequency (MHz)	De-embedded Noise figure (dB)	Gain(dB)	OP1 (dBm)	OIP3(dBm) Fspacing:1MHz 0dBm Pout/tone	S11(dB)	S22(dB)	Mu1
30	1.0	20.3	12.2	23.4	-13.0	-7.4	1.1
100	0.7	20.4	13.6	23.2	-14.8	-7.9	1.4
250	0.7	20.1	13.6	23.5	-14.5	-8.9	1.2
500	0.8	19.2	13.1	22.7	-12.8	-12.5	1.4
750	0.7	17.9	12.6	22.6	-11.2	-17.7	1.9
1000	0.7	16.6	12.1	22.8	-9.9	-16.2	2.2
1500	0.8	14.2	13.8	24.1	-8.3	-9.4	2.0
2000	0.9	13.0	14.5	26.6	-8.3	-7.9	1.7
2600	0.9	13.6	14.7	29.1	-16.0	-19.3	2.2

Table 5.1 TL0374J-EVB-D1 Electrical Characteristics Summary

6. TL0374J-EVB-D1 Test Results

All the tests are carried out at room temperature.

6.1. S parameters

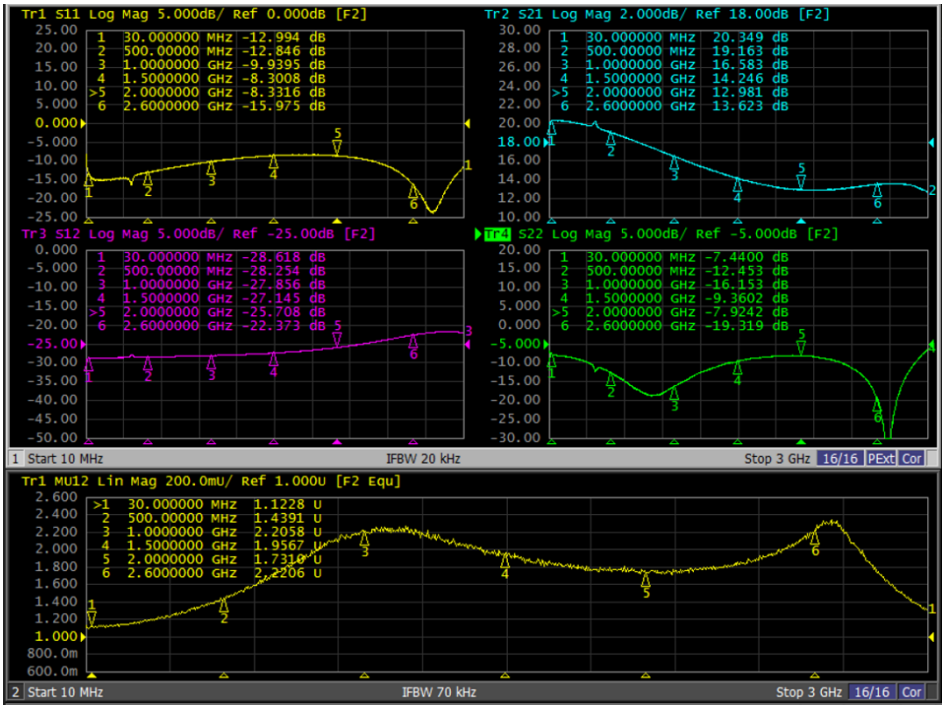
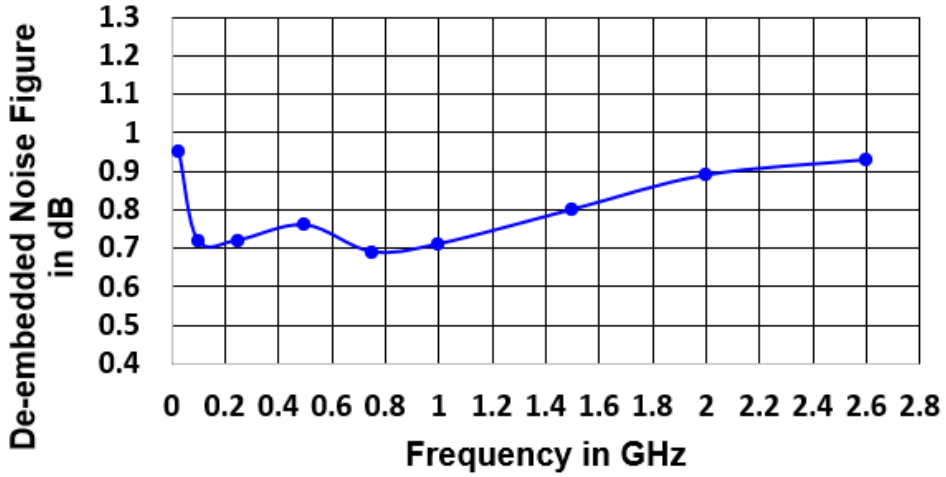


Figure 6.1.1. S parameters of TL0374J-EVB-D1

6.2. De-embedded Noise Figure



**** Note:** Trace loss is around 0.02-0.06dB. So SMA-SMA NF will lie between 0.7dB to 1.0dB.

Figure 6.2.1. De-embedded Noise Figure of TL0374J-EVB-D1

6.3. Large Signal Test Results

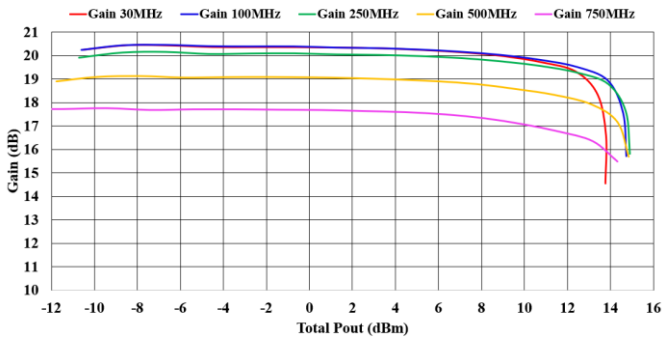


Figure 6.3.1. Gain Vs Pout of TL0374J-EVB-D1[30M-750MHz]

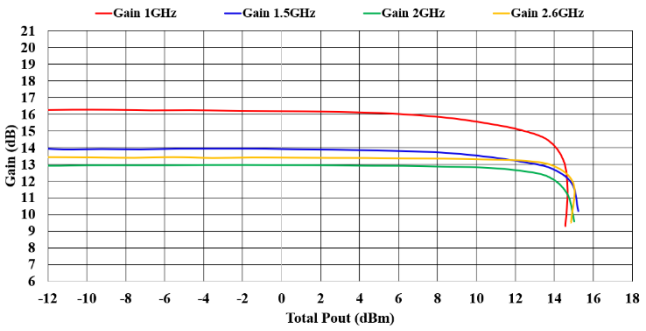


Figure 6.3.2. Gain Vs Pout of TL0374J-EVB-D1[1G-2.6GHz]

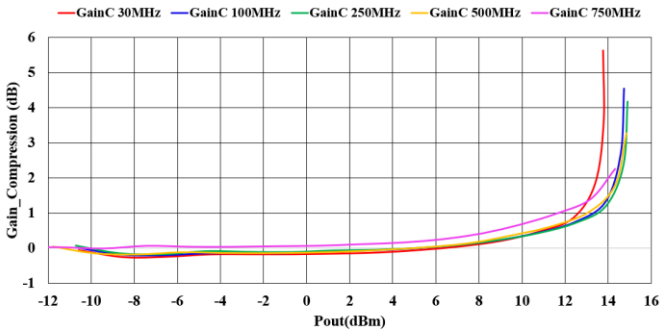


Figure 6.3.3. Gain compression Vs Pout of TL0374J-EVB-D1[30M-750MHz]

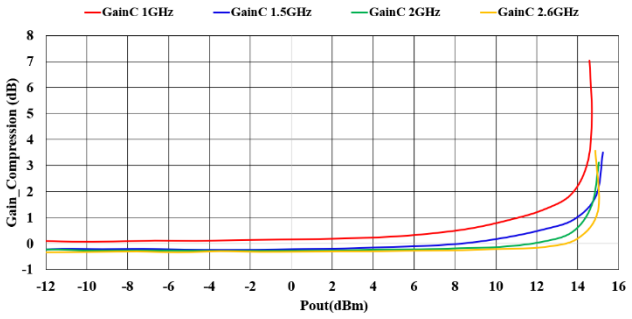


Figure 6.3.4. Gain compression Vs Pout of TL0374J-EVB-D1[1G-2.6GHz]

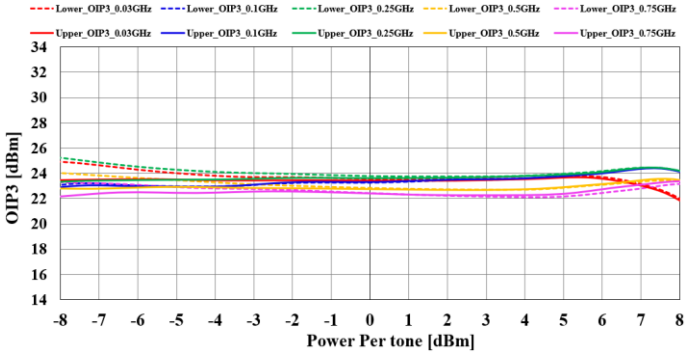


Figure 6.3.5. Output 3rd Order Intercept Point of TL0374J-EVB-D1[30M-750MHz]

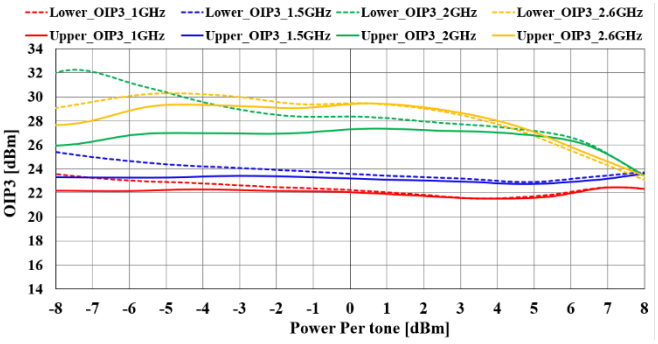


Figure 6.3.6. Output 3rd Order Intercept Point of TL0374J-EVB-D1[1G-2.6GHz]

Edition Revision 1.2 - 2024-01-23

Published by

Tagore Technology Inc.

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Arlington Heights, IL 60004, USA

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