

Generate a Lower Power Low Noise Amplifier for a Home IoT Application in SMIC 40nm Technology

A 15% power reduction was obtained for this circuit and improvements on the rest of the specifications

Specification	Requirement		Customer Design	Thalia Solution
	Minimum	Maximum		
Supply Voltage	1.08 V	1.32 V	1.2 V	1.2 V
Component Area	-	-	16966 μm^2	16616 μm^2
Temperature	-	-	27°	27°
Operating Current	-	5 mA	4.2 mA	3.5 mA
Differential Voltage Gain	18 db	23 db	20.6 db	22.4 db
Spot Noise Figure	-	5.5 db	4.9 db	5.5 db
3rd Order Intermodulation product Input -40dBm	-	-10 db	-14.9 db	-19.3 db
3rd Order Intermodulation product Input -35dBm	-	-10 db	-14.9 db	-18.9 db
3rd Order Intermodulation product Input -30dBm	-	-10 db	-15.1 db	17.7 db
3rd Order Intermodulation product Input -20dBm	-	-10 db	-8 db	-12.6 db
3rd Order Intermodulation product Input -10dBm	-	-10 db	-4.3 db	-5.6 db
Input Impedance	5-24j Ω	15+24j Ω	12.2-23.7j Ω	9.9-17.2j Ω
Loop Gain (Feedback loop 1)	0 db	-	3.5 db	16.8 db
Phase Margin (Feedback loop 1)	60°	100°	100.2°	68.4°
Loop Gain (Feedback loop 2)	0 db	-	-	-
Phase Margin (Feedback loop 2)	-45°	100°	52.1°	101.1°
Transient Step Response (Input)	-	200 μV	-27 μV	48.5 μV
Transient Step Response (Supply)	-	200 μV	-44.8 μV	11.6 μV
Solutions Evaluated*	-	-	-	
*Average number of simulated solutions required to reach the first optimised solution				
**Simulation time for each solution is approxmetly 1 minute. The total time using four simulators in parallel is about 7 hours				