

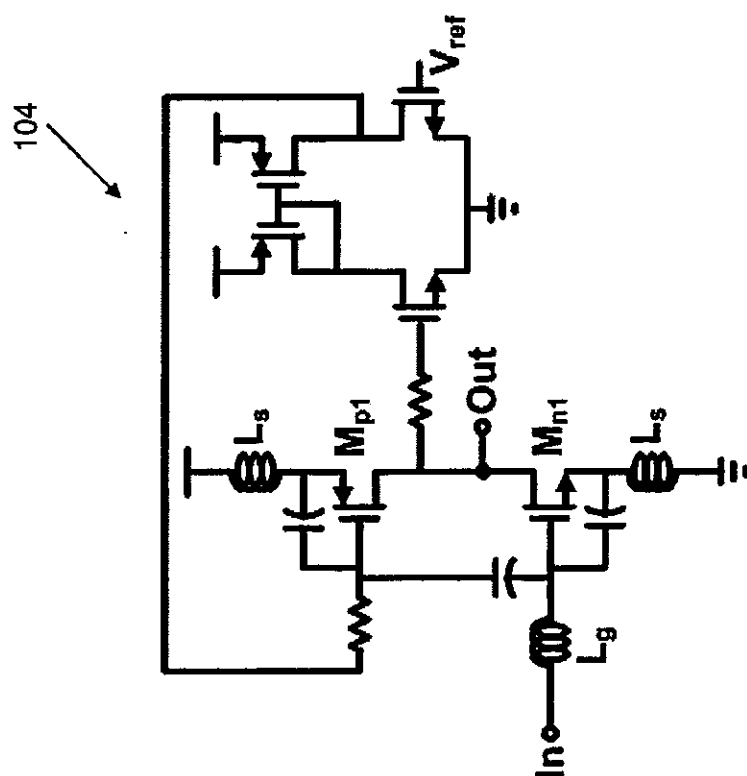


Figure 1b

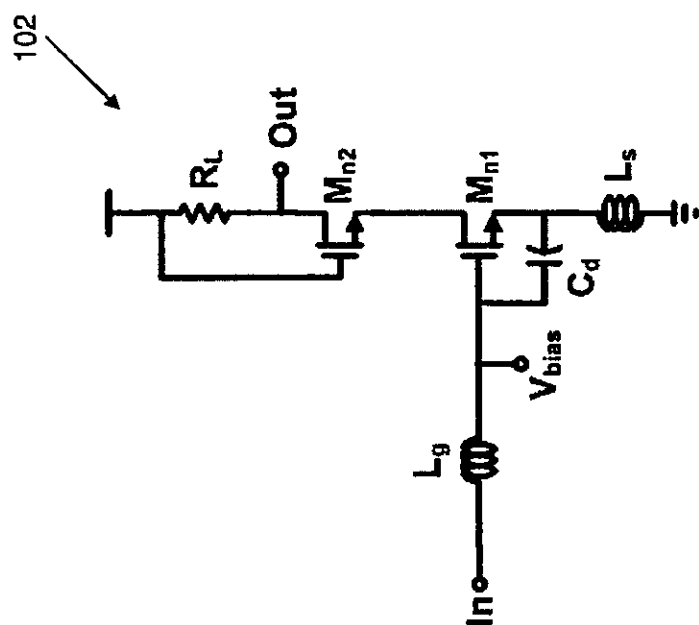


Figure 1a

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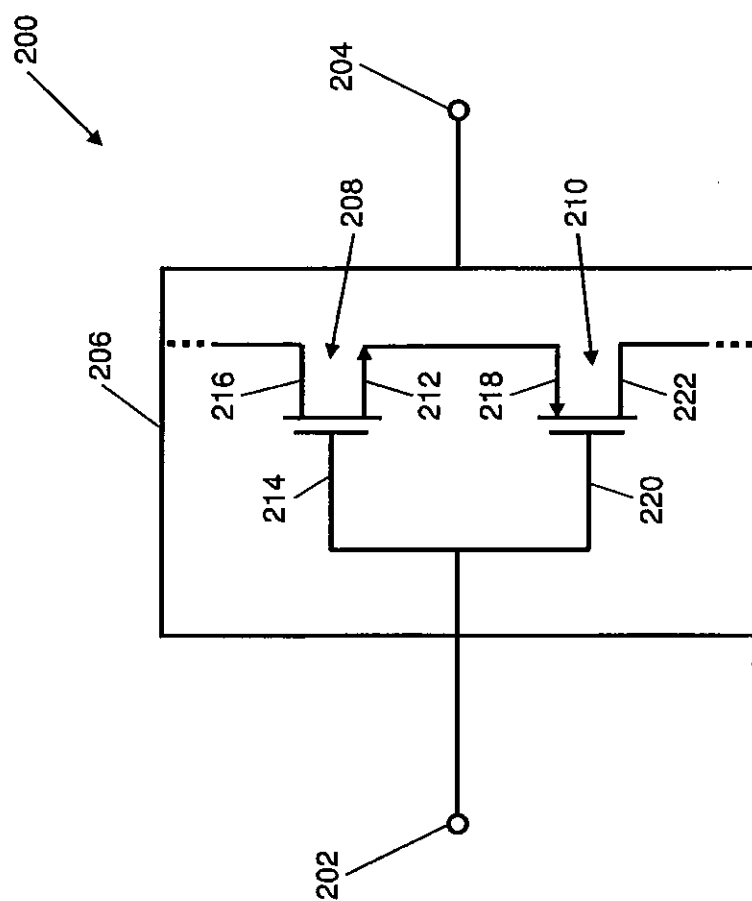


Figure 2

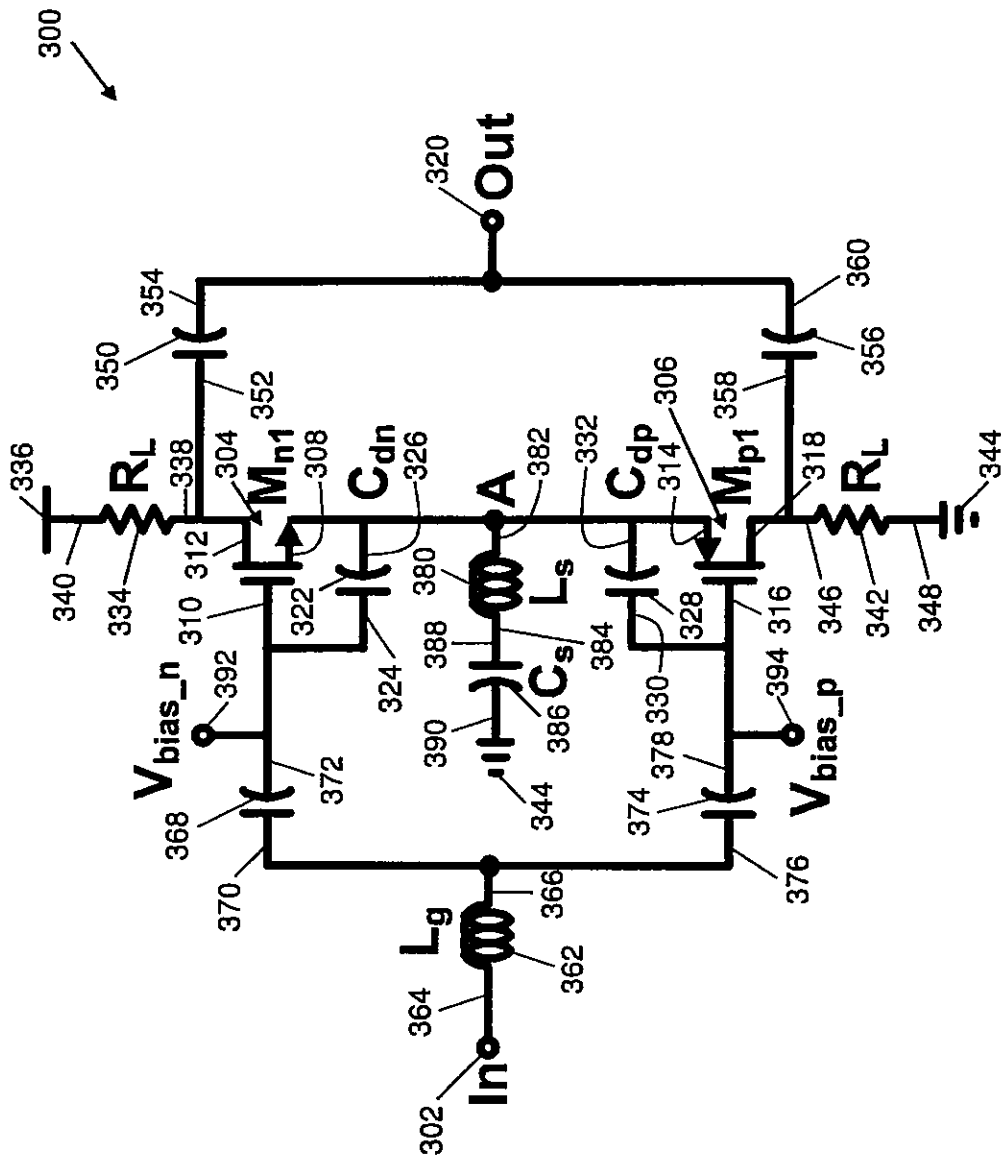


Figure 3

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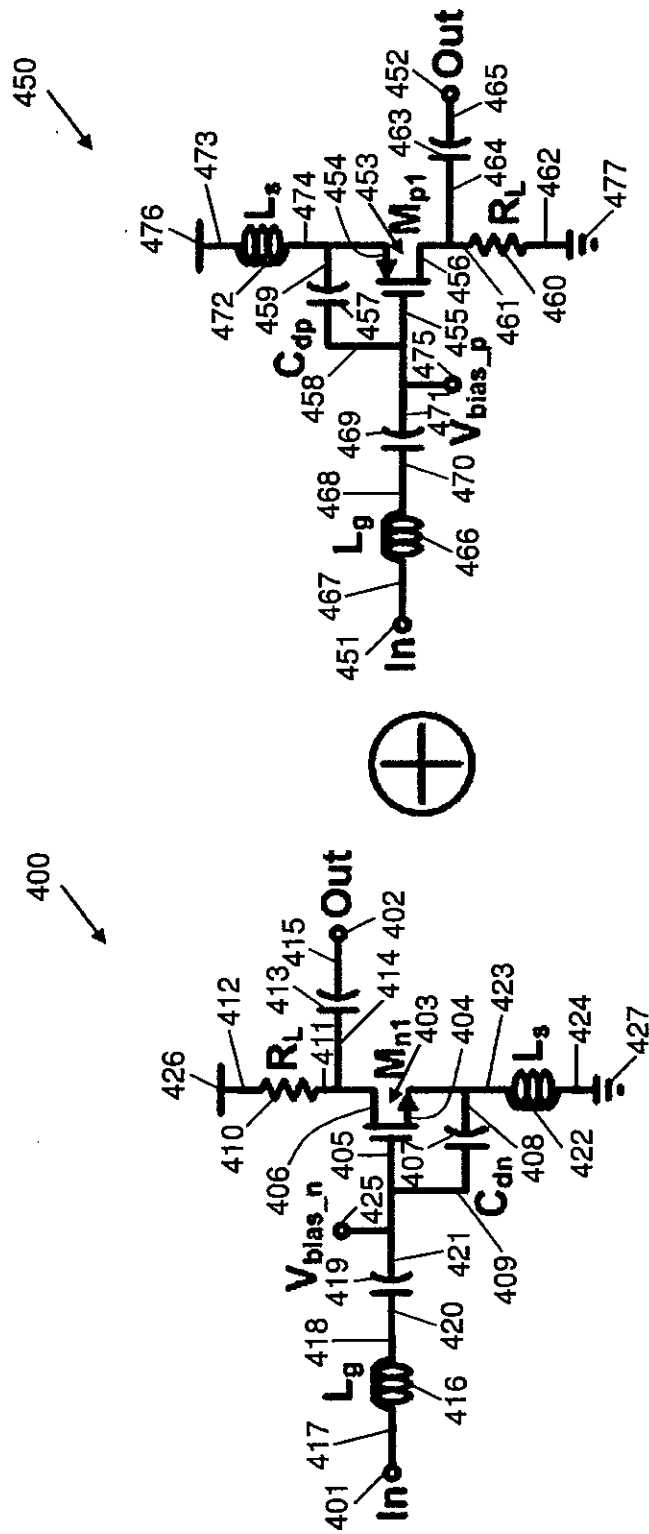


Figure 4

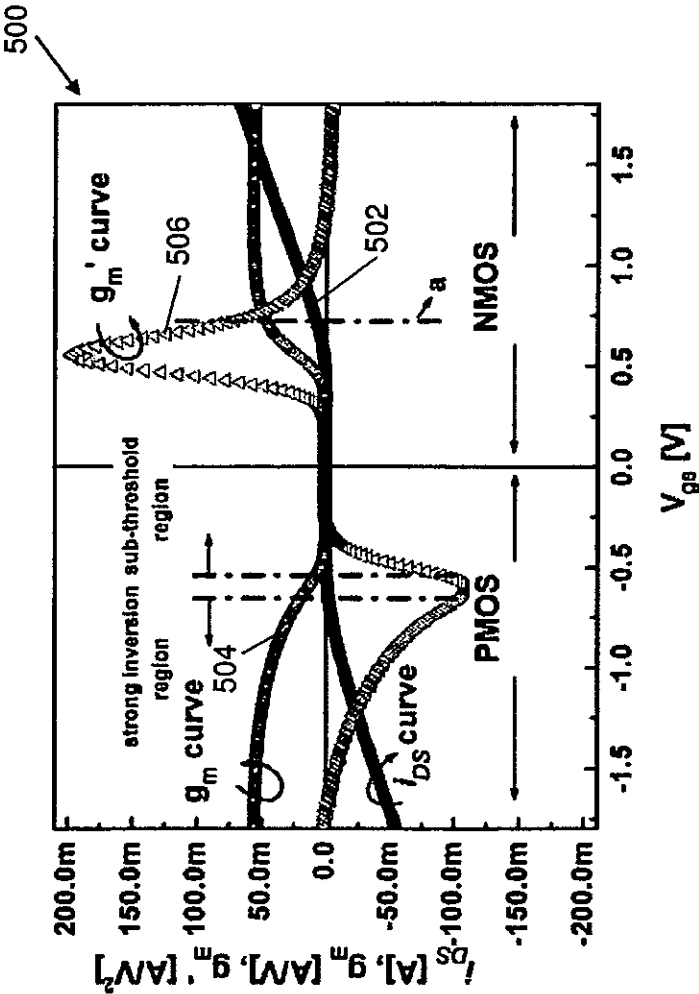


Figure 5

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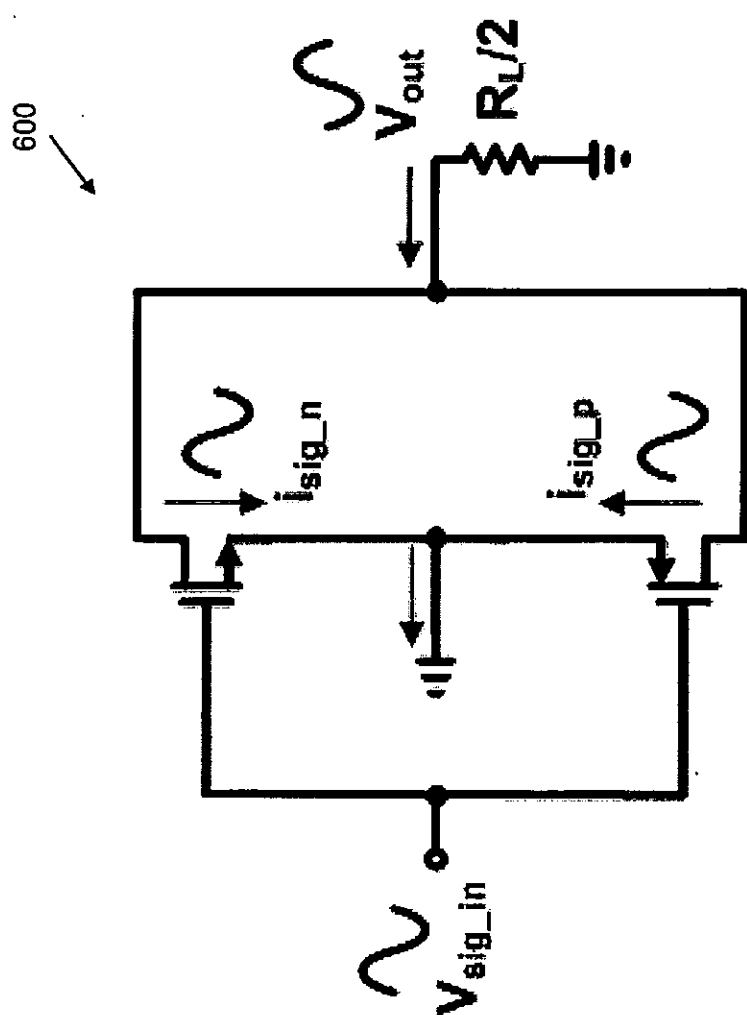
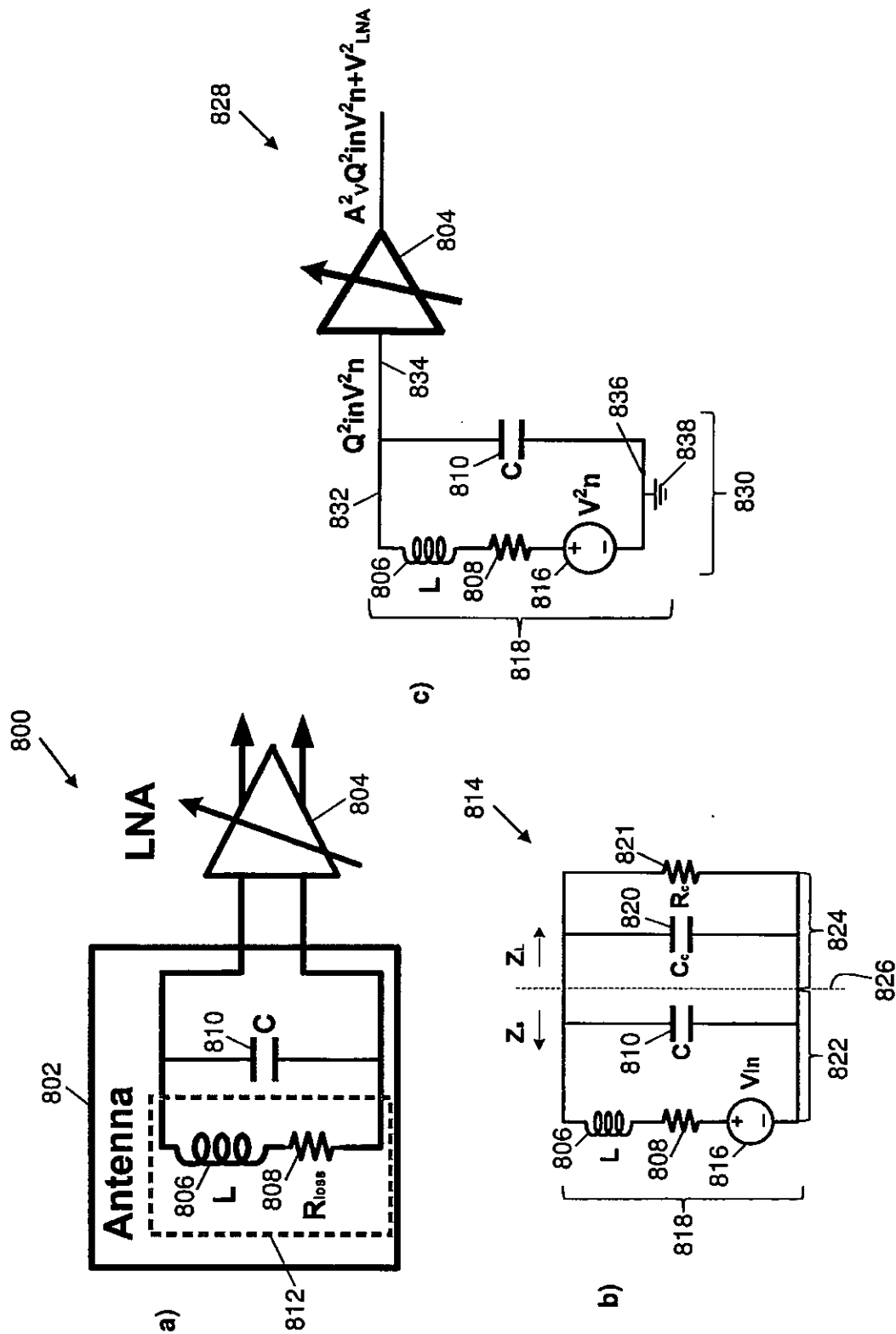


Figure 6

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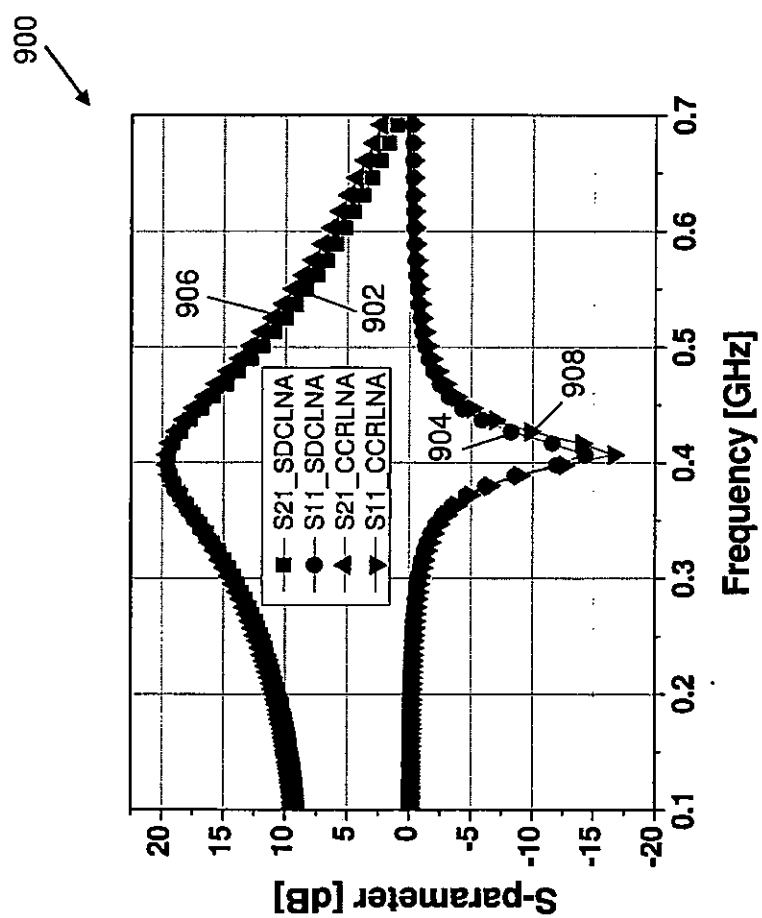


Figure 8

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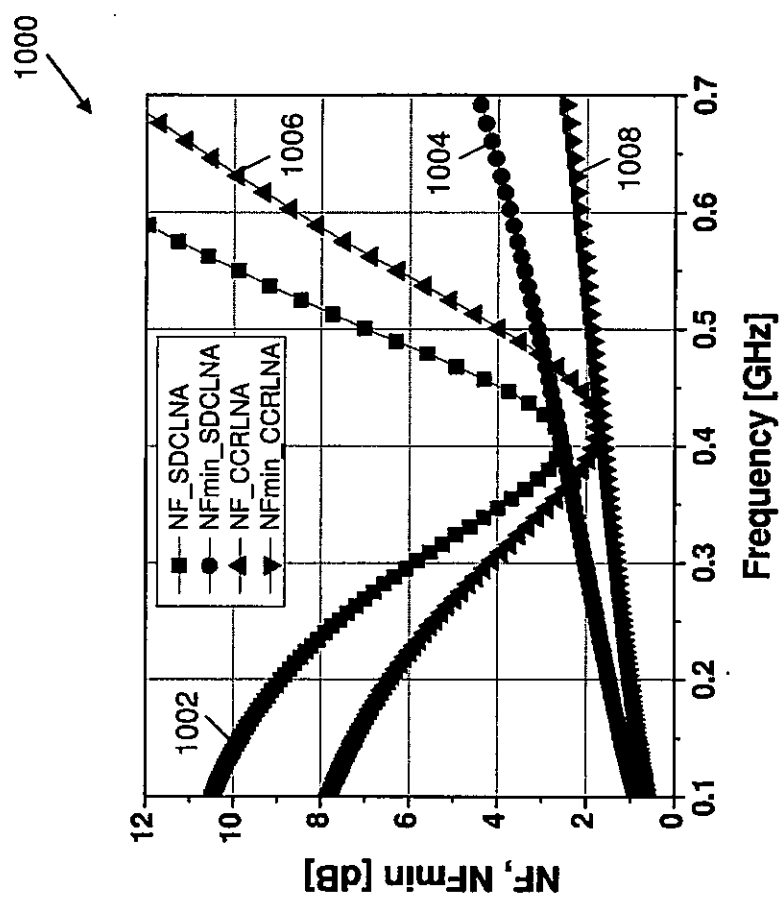


Figure 9

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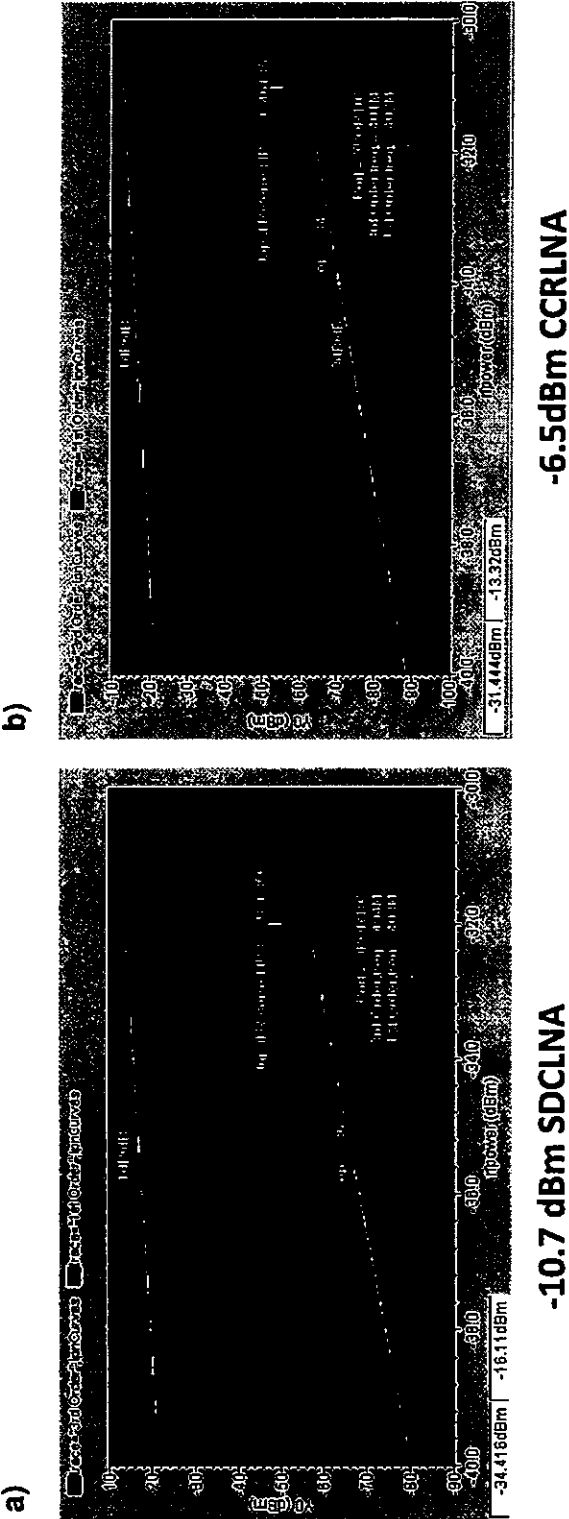


Figure 10

1200 ↗

Parameter	Target	Conventional	Proposed
Frequency	401-406 MHz	401-406 MHz	401-406 MHz
Gain	19 dB	19 dB	19 dB
S11	<-10 dB	-14 dB	-16 dB
NF	5 dB	2.6 dB	1.8 dB
IIP3	-13 dBm	-10.7 dBm	-6.5 dBm
Power	150uW @ 1V	151uW @ 1V	151uW @ 1V
Technology	0.18um CMOS	0.18um CMOS	0.18um CMOS

1202 ↗ 1204 ↗ 1206 ↗

Figure 11

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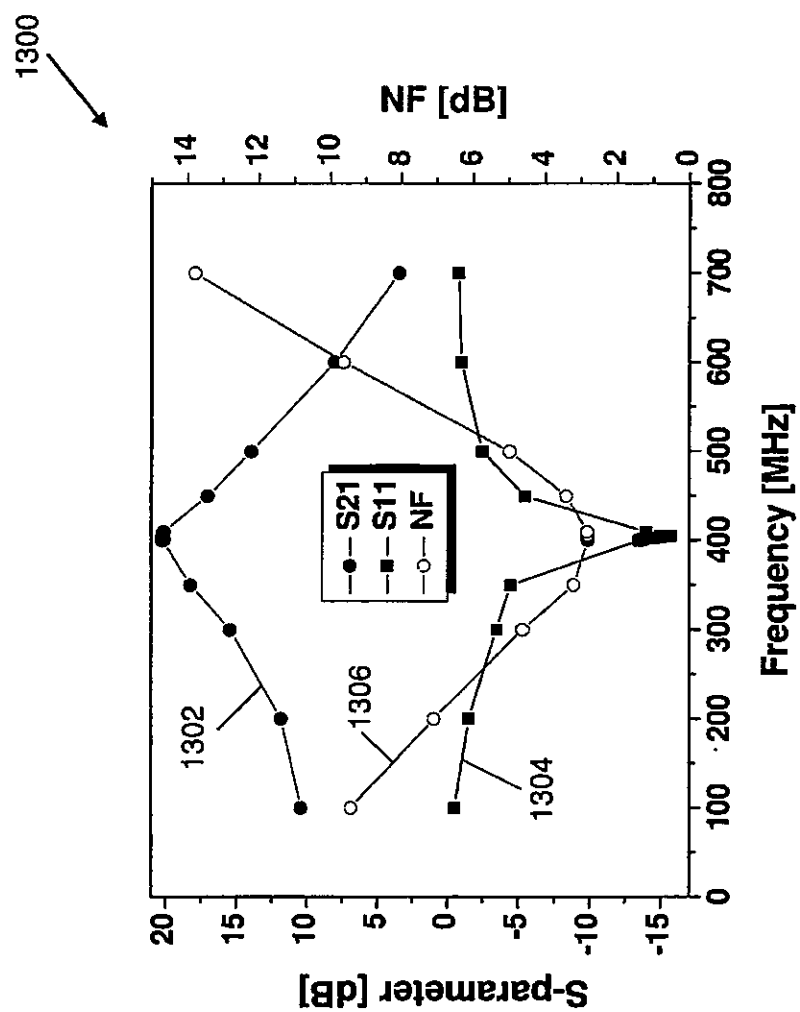


Figure 12

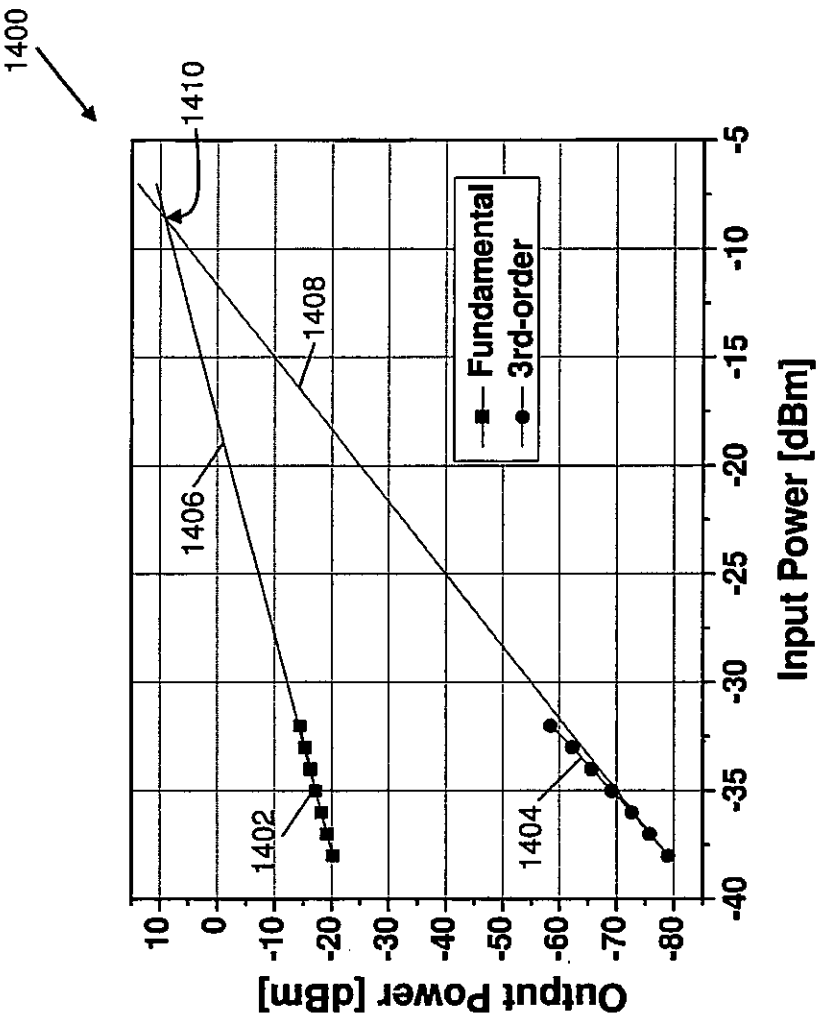


Figure 13

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Parameter	1502 [2]JSSC08	1504 [3]RFIC06	1506 [4]JMTT08	1508 [5]ESSCIRC06	1510 Preliminary measurements (50ohm impedance matching)	1512 Simulated (high impedance matching)
Frequency	862-870 MHz 902-928 MHz	3 GHz	2.4 GHz	1 GHz	401-406 MHz	401-406 MHz
Topology	Cascode	Cascode	Cascode	CS+FB	Complementary CS	Complementary CS
Gain	20 dB	4.5 dB (power)	21.4 dB	16.8 dB	20.2 dB	22 dB
NF	5 dB	6.3 dB	5.2 dB	3.9 dB	2.9 dB	1.5 dB
IIP3	P1dB: -18 dBm	-10.5 dBm	-11 dBm	-11.2 dBm	-8.1 dBm	-13 dBm
Power	200uW@ 1V	160uW@ 0.6V	1.1mW@ 1.8V	100uW@ 1V	150uW@ 1V	100uW@ 1V
Technology	0.13um CMOS	0.13um CMOS	0.18um CMOS	0.18um CMOS	0.18um CMOS	0.18um CMOS
F.O.M.[2]	16.2 (Assume IIP3: -8 dBm)	12.5	3.6	21.6	20	22.6

- ft is assumed 60 GHz(0.18um), 80 GHz(0.13um), 100 GHz (90nm)

$$FOM = 10 \log \left(100 \cdot \frac{\text{Gain[dB]}}{(F-1) \cdot P_{dc} [\text{mW}]} \cdot \frac{IIP3[\text{mW}]}{P_{dc} [\text{mW}]} \right) + 10 \log \left(\frac{f_o}{f_i} \right)$$

Figure 14

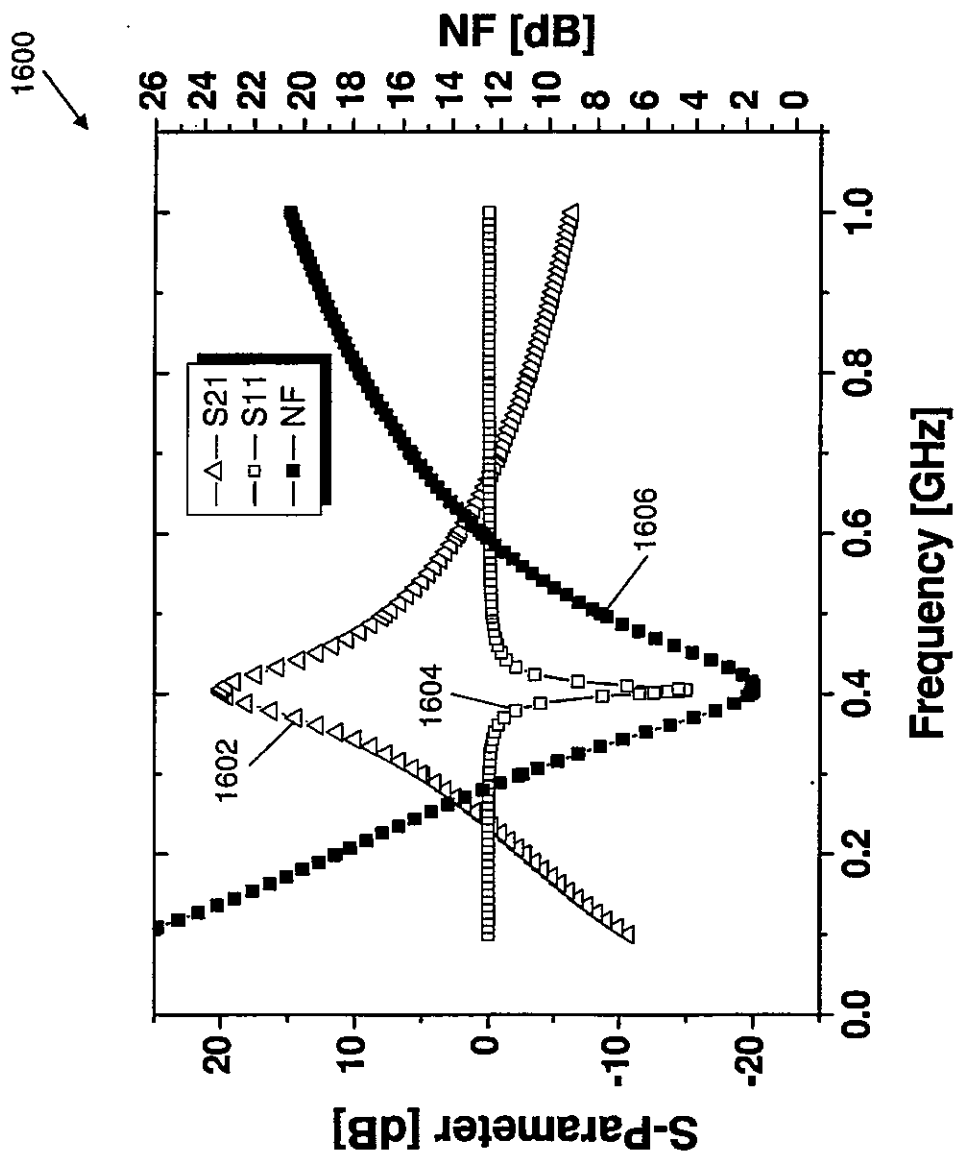


Figure 15

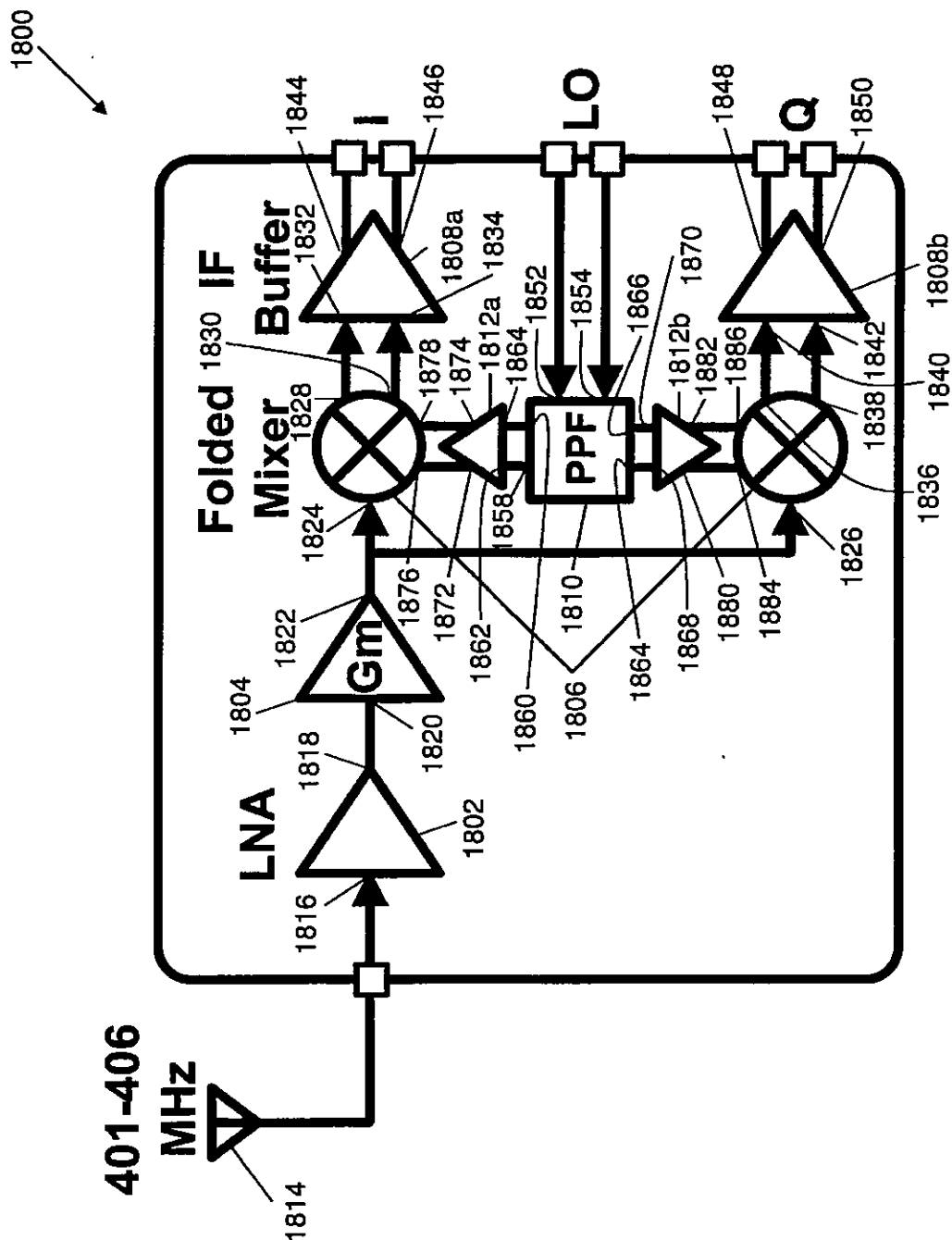
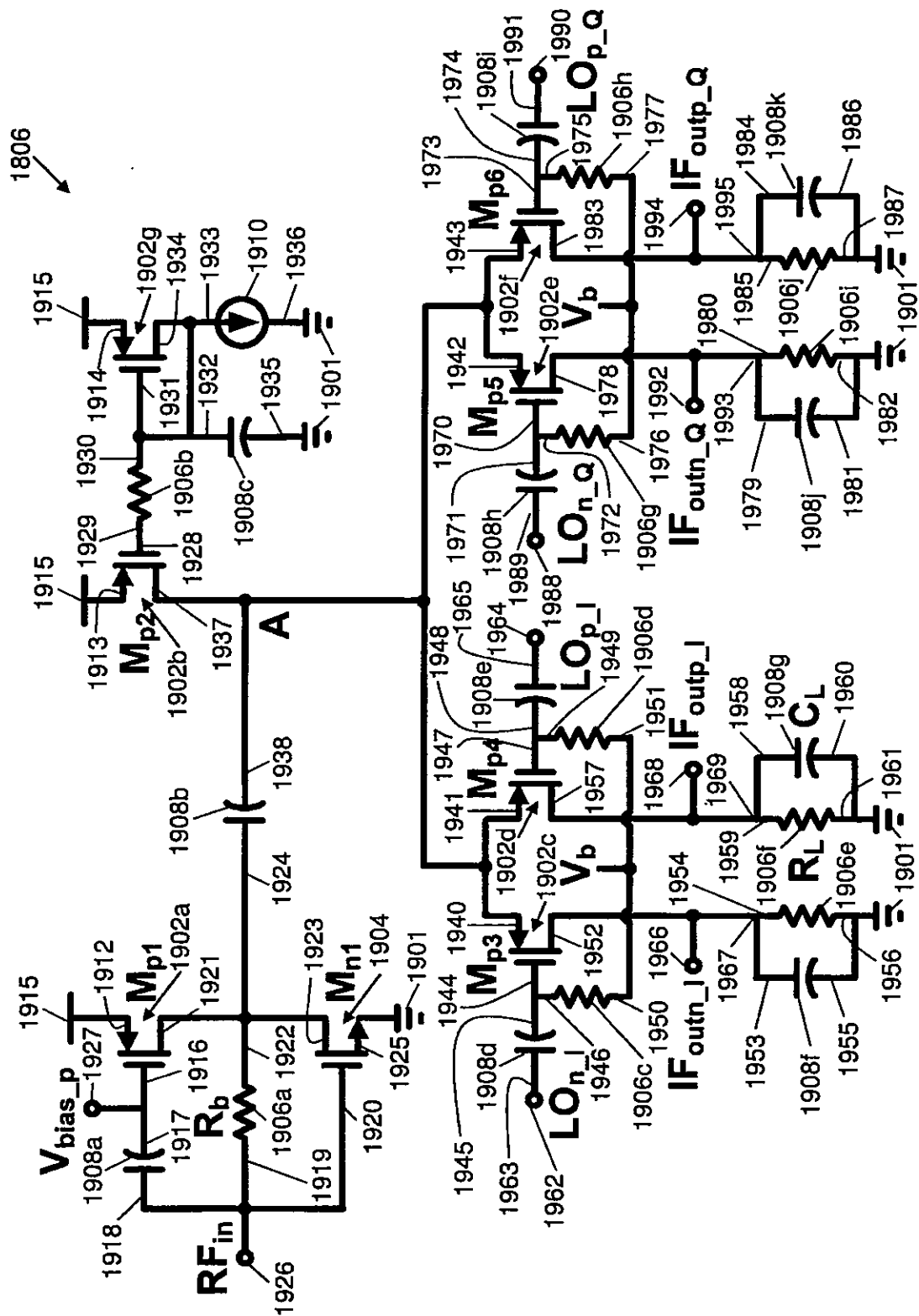


Figure 16



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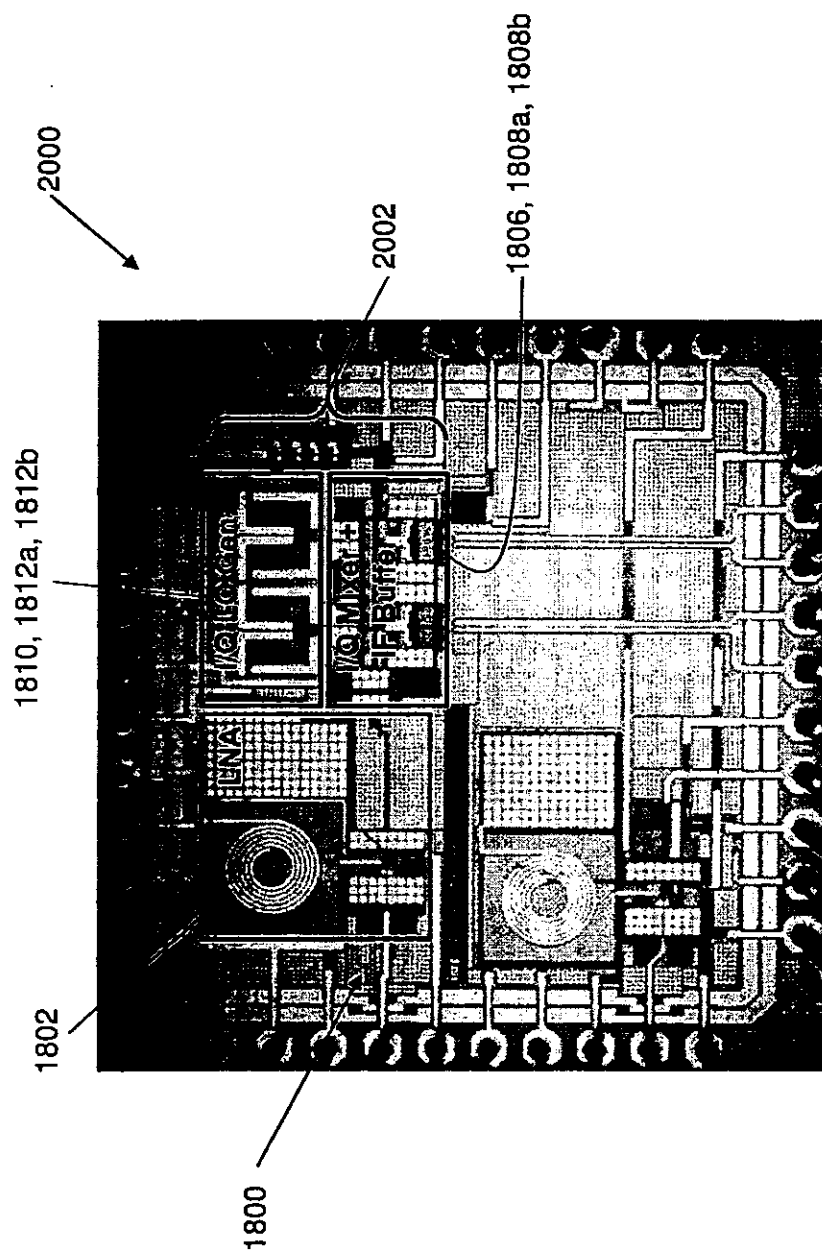


Figure 18

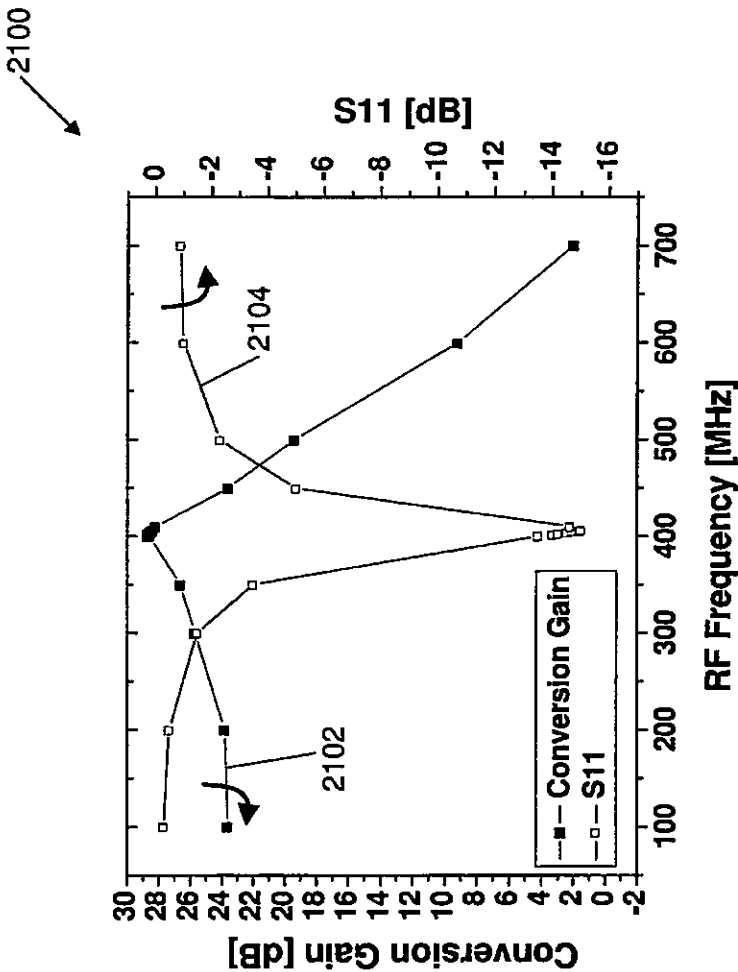


Figure 19

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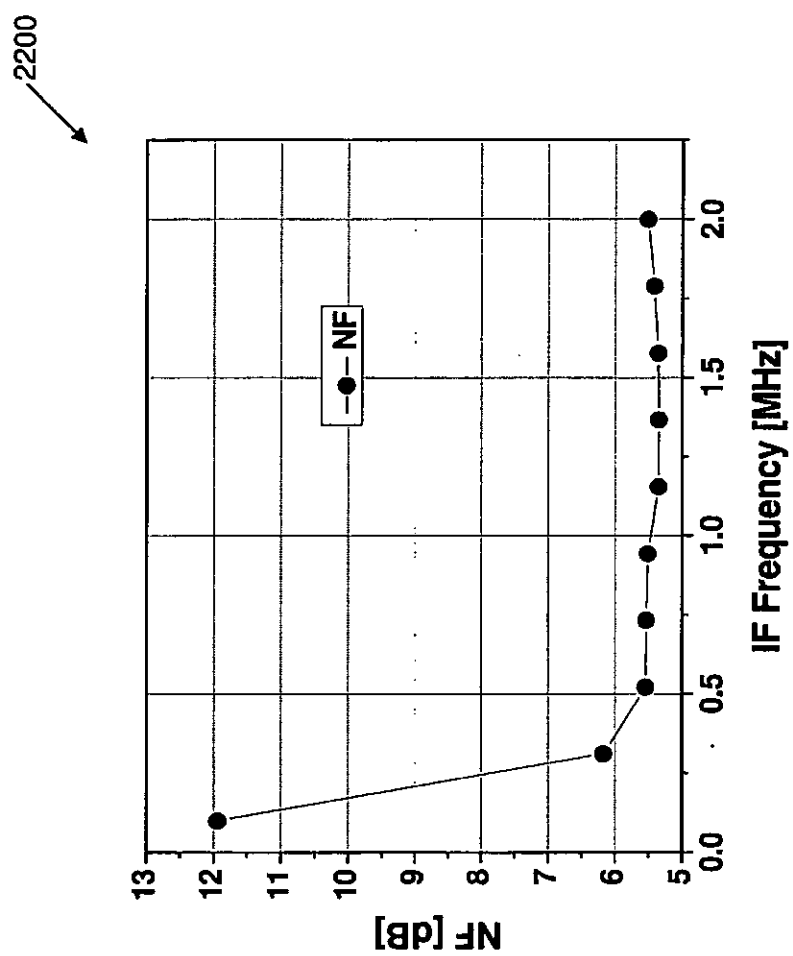


Figure 20

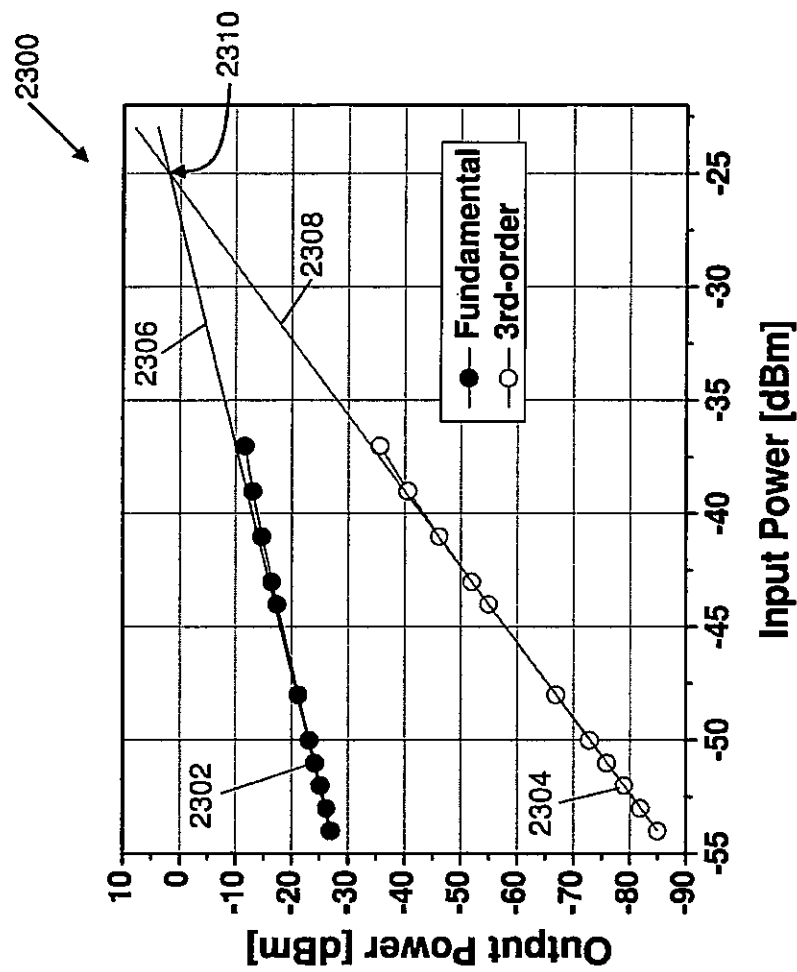


Figure 21

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Parameter	2402 [6]	2404 [7]	2406 [8]	2408 [9]	2410 This work
Frequency [GHz]	0.868/ 0.915	2.4	2	2.4	0.401- 0.406
Gain [dB]	32	43	30	37	28.7
NF [dB]	10	5	3.1	6	5.5
IIP3 [dBm]	-22	-37	-12	-12	-25
Power [mW]	1.08@ 1.2V	1.4@ 1.2V	12@ 1.5V	5.4@ 1.35V	0.49@ 1V
Technology	0.13um CMOS	0.18um CMOS	0.13um CMOS	90nm CMOS	0.18um CMOS
F.O.M.*	-16.6	-20.7	-15	-11.9	-9.9

Figure 22