Operational NMOS amplifier with NMOS differential pair

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1 Intruduction

Automatic generated report in order to showcase this amplifier characteristics.
This is a low power 5V 5 transistor OTA with an NMOS amplifier.
The amplifier instance os called 5V low power 5trans NMOS amplifier.
By changing the reference current, it will have different characteristics.

2 Current bias generation Characterization

Characterization of the current bias generation.
Fig.1 represents the minimum voltage allowed for the current reference to work.

Corner	Minimum VOUT
Nominal	0.43
Worst corner	0.51
Best corner	0.37

Figure 1: minimum voltage

Fig.2 represent the output current characteristic for nominal, worst and best case scenario.

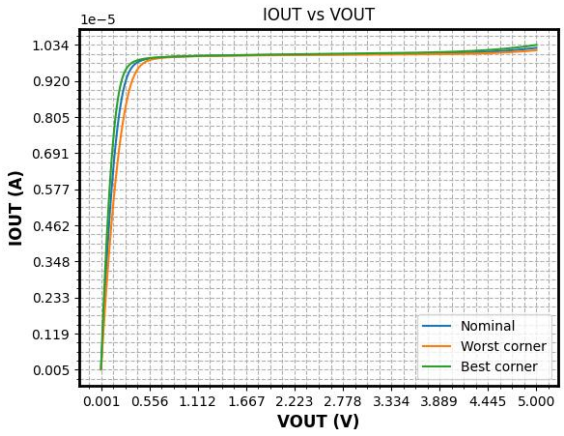

Figure 2: IOUT vs VOUT

Fig.3 represent the output impedance characteristic for nominal, worst and best case scenario.

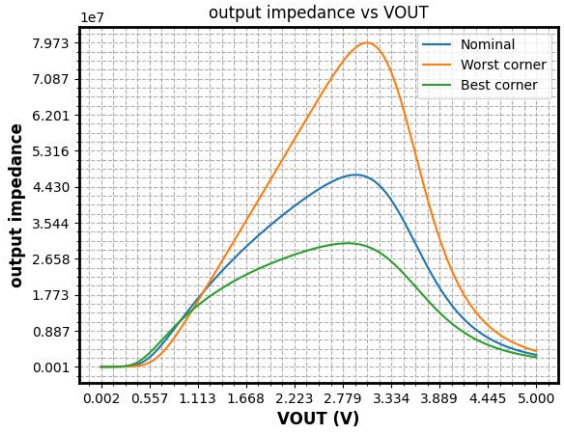

Figure 3: output impedance

Fig.4 represent the current variation face an ac signal for nominal, worst and best case scenario.

Corner	Maximum IOUT variation
Nominal	3.529843528582433e-08
Worst corner	2.929382780791912e-08
Best corner	4.521654961564536e-08

Figure 4: ac variation

Fig.5 represent the current variation at vout = VDD/2 with 200 runs.

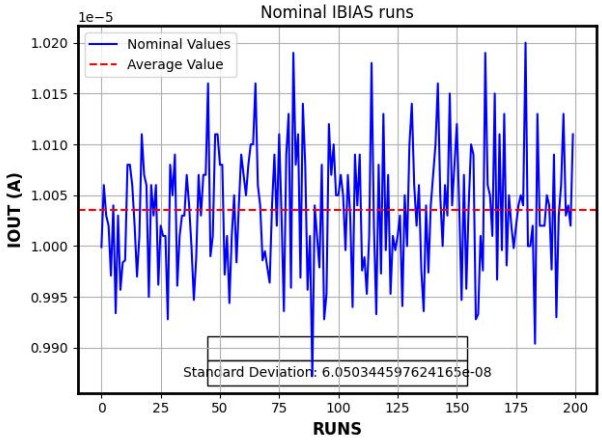

Figure 5: Monte carclo variations

Fig.6 represent the histogram.

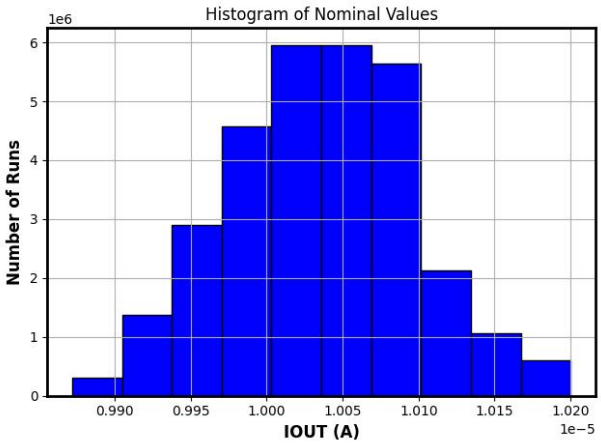

Figure 6: Monte carclo variations

3 PMOS load characteristics

It is the relation of VOUT and temperature. Its important to note that the load was sized so when the current is equal in each size $V_{OUT} = V_{DD}/2$

Fig.7 is the most important load characteristic. Its basicly the relation between the current and VOUT. Its important in order to define the VOUT DC and the effective swing.
This characteristic is used so the user can adapt to diferent scenarios with the a change of IREF.

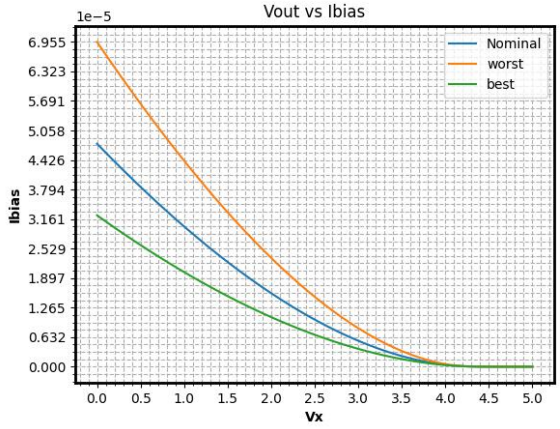

Figure 7: Load current characteristic

Load impedance with the bias generator, determines the dc value of V_{OUT}, to this case we center its value to $V_{DD}/2$ at 27 degrees at tt corner. Fig.8 shows the dispersion of VOUT at the worst corners.

Corner	VOUT at 27 celsius
Nominal	2.505
ff_corner	2.301
ss_corner	2.693

Figure 8: VOUT defenition in fucntion of the load

Fig.9 shows the variation of VOUT in fucntion of temperature.

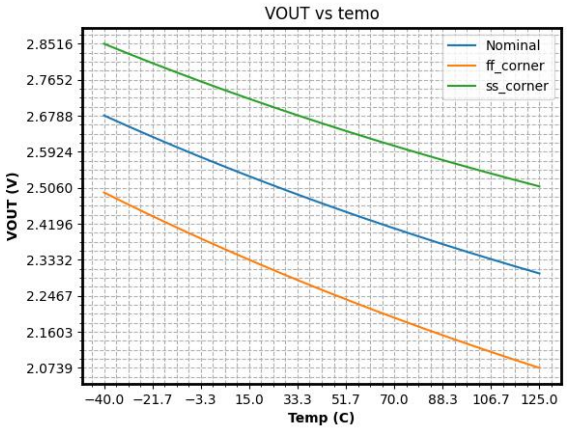

Figure 9: VOUT defenition in function of the temperature

Fig.10 shows the variation of VOUT in fucntion of a monte carlo simulation.

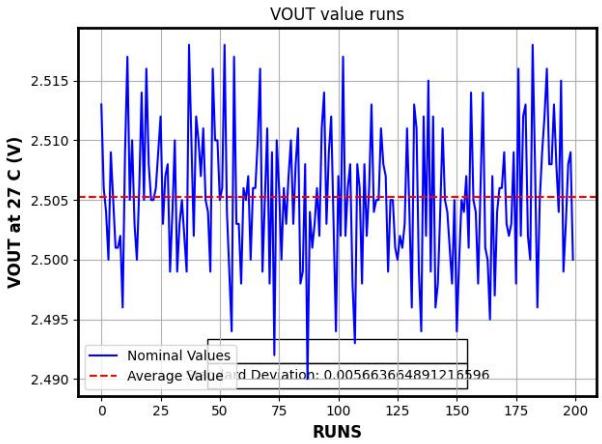

Figure 10: VOUT vs monte carlo

Fig.11 shows the variation of VOUT in fucntion of a monte carlo simulation in histogram form.

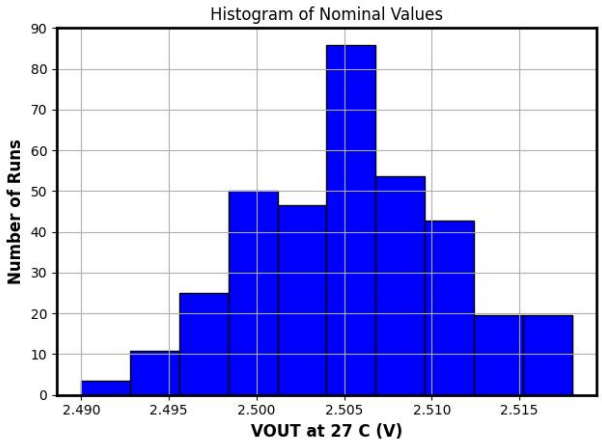

Figure 11: VOUT vs monte carlo histogram

4 Differential pair characteristics

Fig.**??**, represents the minimum allowed input voltage for the differential pair. This analysis is based on the current.

Corner	Minimum input voltage
Nominal	1.37
Worst corner	1.45
Best corner	1.3

Figure 12: Minimum input voltage table

Fig.**??**, differential pair current characteristic.

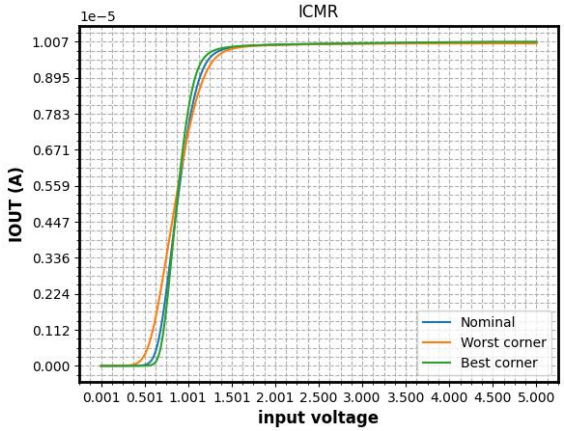

Figure 13: Minimum input voltage table