

Evaluation Design Exercise

A folded cascode OTA needs to be designed, with differential input and single-ended output. The requirements to be accomplished are the following:

- Power consumption lower than 1 mW (all the branches included).
- Gain (v_{out}/v_{id}) higher than 120 V/V, v_{out} is single-ended, v_{id} is differential.
- GBW higher than $(120 \cdot 9 \cdot X)$ MHz.
- Slew-rate higher than $(70 \cdot 7 \cdot X)$ V/ μ s.
- Phase margin higher than $(60 + 2.5 \cdot X)$ degrees.
- ICMR between 0.35 and 0.60 V.
- $V_{out,min} = 300$ mV, $V_{out,max} = 800$ mV.
- $V_{DD} = 1$ V.
- $C_L = (10 \cdot X)$ pF.

A 50-nm node will be used, whose feature parameters are the following:

$$K_P = 22.5 \mu\text{A}/\text{V}^2, \lambda_P = 0.3 \text{ V}^{-1}, V_{thp} = -0.28 \text{ V}, K_N = 45 \mu\text{A}/\text{V}^2, \lambda_N = 0.6 \text{ V}^{-1}, V_{thn} = 0.28 \text{ V}$$

To measure the experimental slew-rate, $V_{out,min}$, and $V_{out,max}$ it is recommended to set the opamp in an unitary gain mode:

- Slew-rate: a square digital signal between 0.55V and 0.45V will be connected to the input signal with a frequency of 10 kHz.

Use the template evaluation_design1.asc.

Note: X represents the last number of your ID card.