

Brief Article

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1 Circuit A - Current Mirror

Find R_{out} , V_{min} (V_{ov})

$$V_{min} = V_{ov} = \sqrt{\frac{2 \cdot 100 \mu\text{A}}{\frac{100 \mu\text{m}}{1 \mu\text{m}} \cdot 200 \mu\text{A}/\text{V}^2}} = 100 \text{ mV}$$
$$R_{out} = \frac{20 \text{ V}}{100 \mu\text{A}} = 200 \text{ k}\Omega$$

2 Circuit B - Cascode current mirror

Find $R_{out} = r_o \cdot A_o$, $V_{min} = 2V_{tn} + 2V_{ov}$

$$V_{min} = 2 * 0.7 \text{ V} + 2 * 0.1 \text{ V} = 1.6 \text{ volt}$$

$$R_{out} = \frac{20 \text{ V}}{100 \mu\text{A}} \cdot \frac{2 * 20 \text{ V}}{0.1 \text{ V}} = 80 \text{ M}\Omega$$

3 Circuit C - Wide-Swing, low voltage cascode current mirror

Find $R_{out} = r_o \cdot A_o$, $V_{min} = 2V_{ov}$, $V_{bias} = V_{tn} + 2V_{ov}$

$$V_{min} = 2 * 0.1 \text{ V} = 0.2 \text{ volt}$$

$$R_{out} = \frac{20 \text{ V}}{100 \mu\text{A}} \cdot \frac{2 * 20 \text{ V}}{0.1 \text{ V}} = 80 \text{ M}\Omega$$

$$V_{bias} = 0.7 \text{ V} + 2 * 0.1 \text{ V} = 0.9 \text{ volt}$$

3.1 A subsection

More text.