

Lecture 40

Noise in op-amps

Recall Johnson noise



$$(\mathcal{V}_n)_{\text{rms}} = \sqrt{4k_B T R B}$$

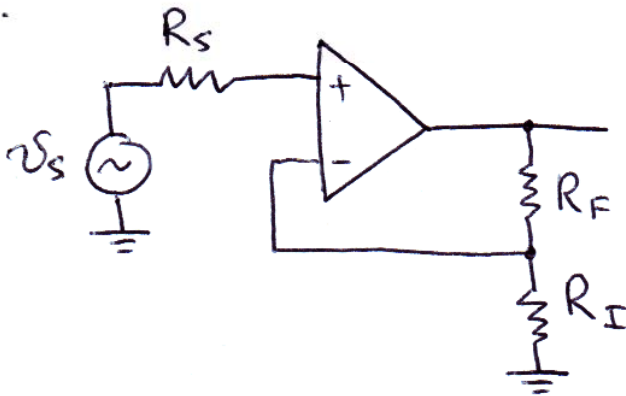
Noise terms:

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Ex.



E.g. LF356

$$e_n \sim 12 \text{ nV}/\sqrt{\text{Hz}}$$

$$i_n^\pm \sim 0.01 \text{ pA}/\sqrt{\text{Hz}}$$

$$R_I \approx 1 \text{ k}\Omega$$

$$R_F = 100 \text{ k}\Omega$$

$$R_s \approx 5 \text{ k}\Omega$$

II Interference

- noise due to sources _____ to the circuit

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Sources

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Coupling mechanisms

① Mechanical

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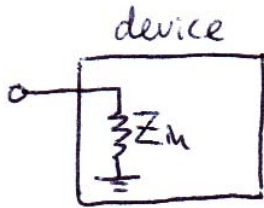
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② Capacitive coupling

- any two conductors connected by _____
have capacitance b/w them



To reduce

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