Structured Electronic Design

Application of the MOS EKV model

Anton J.M. Montagne

MOS EKV model

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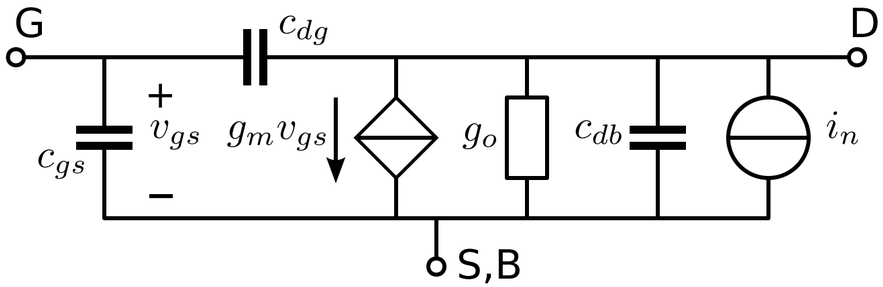

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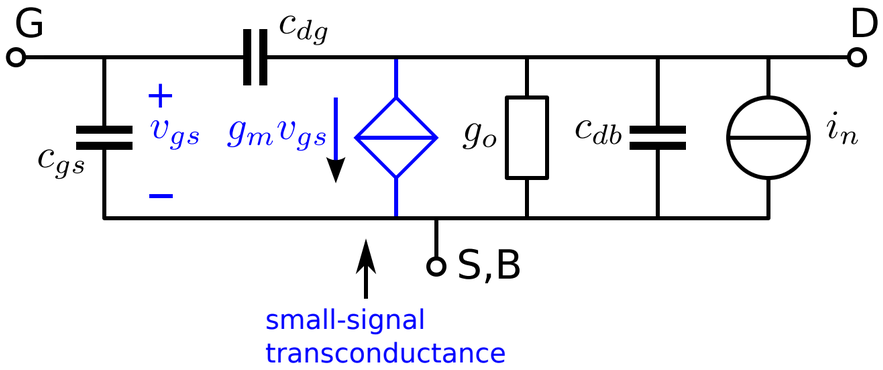

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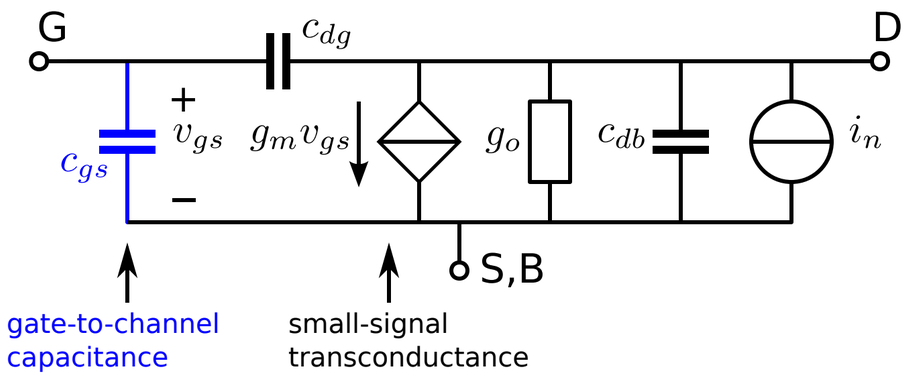

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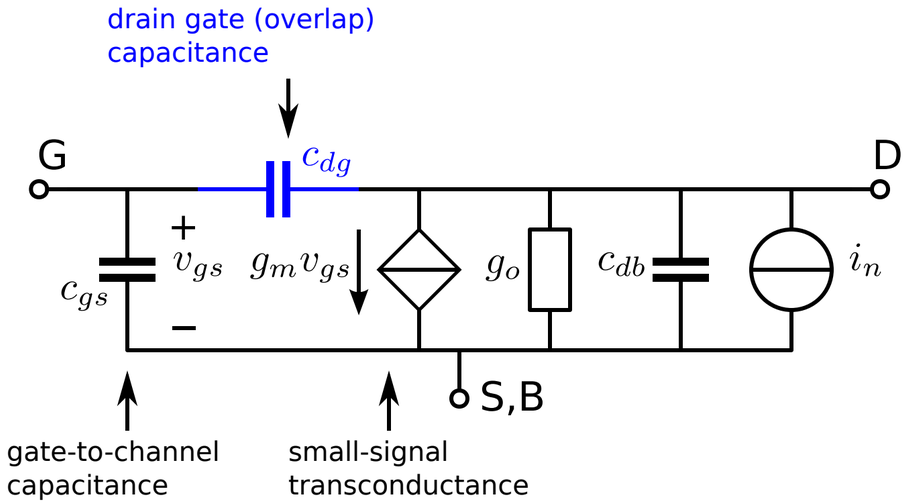

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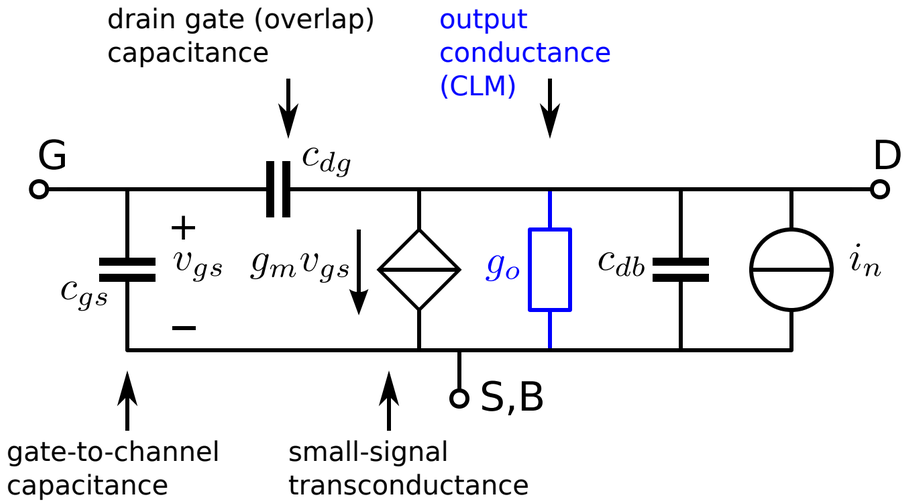

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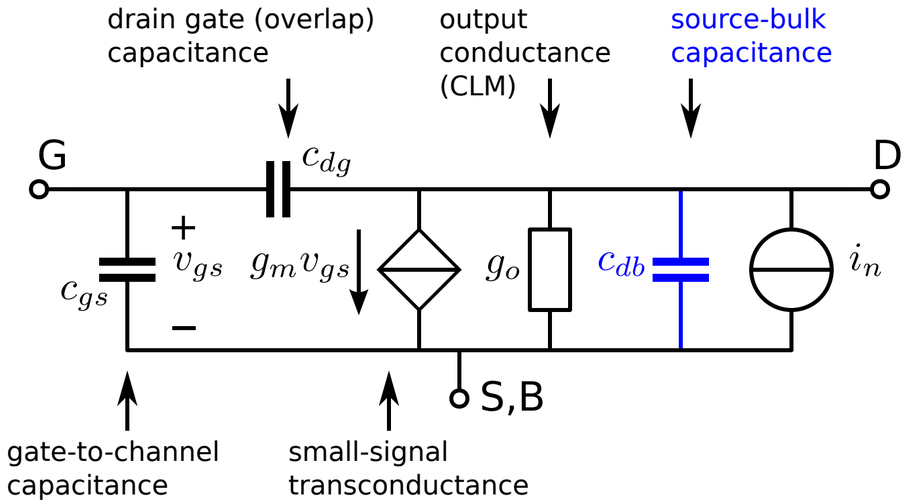

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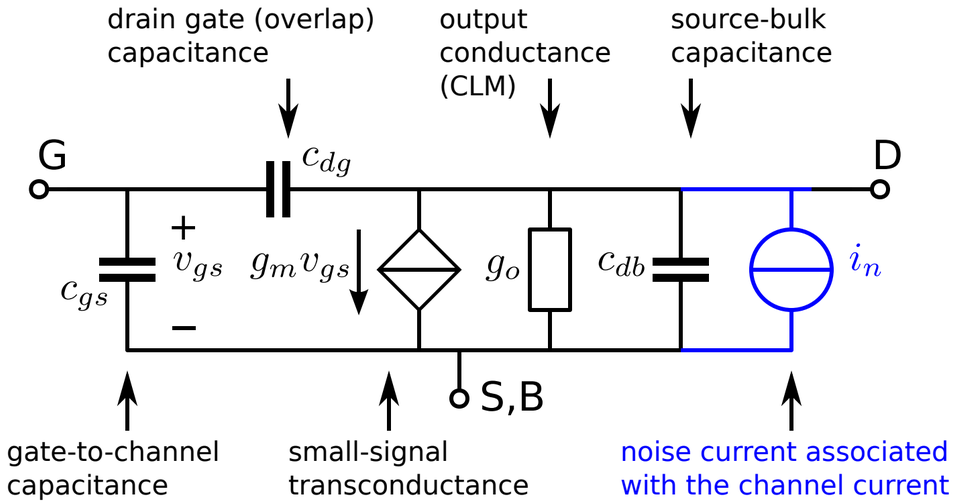

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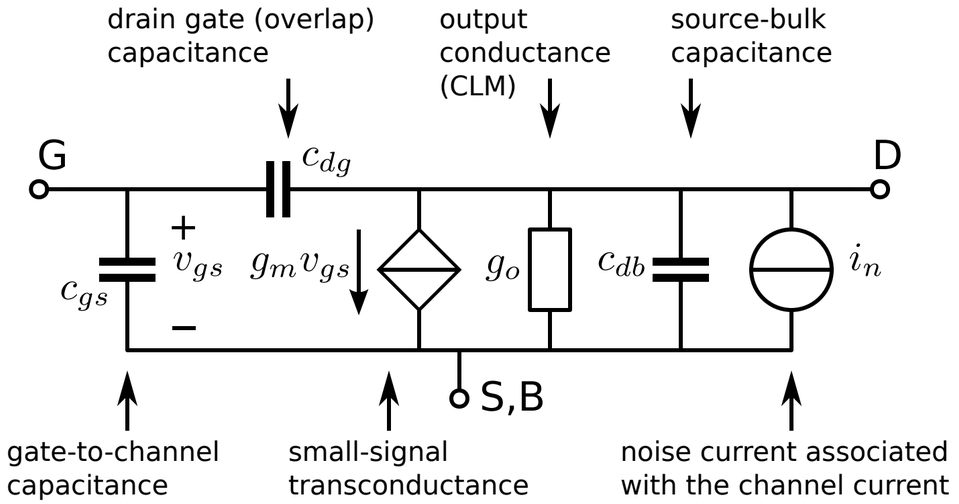

How do these model parameters depend on the device geometry and the operating conditions?

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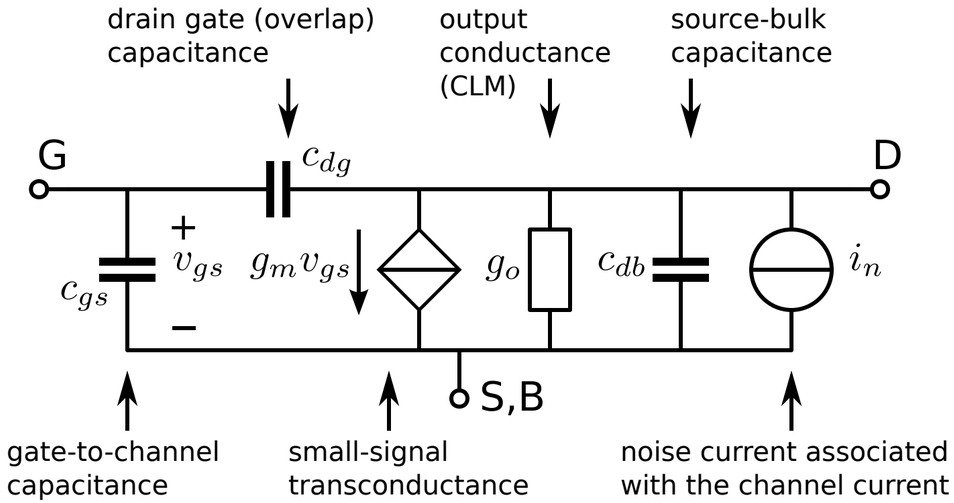

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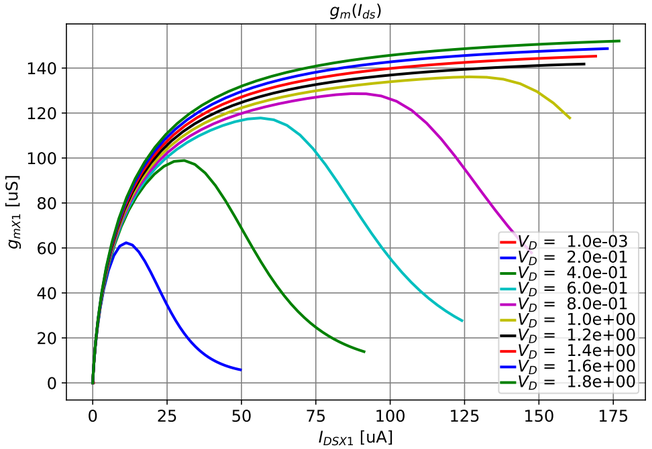

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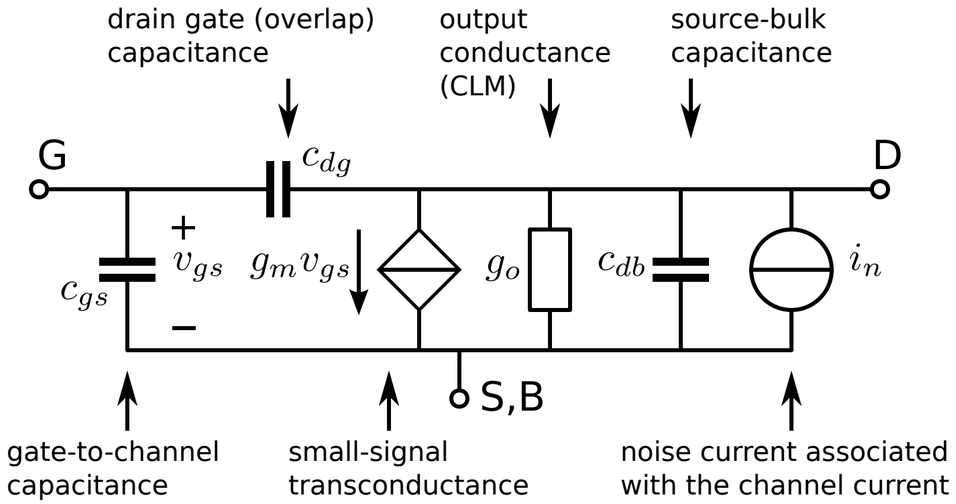

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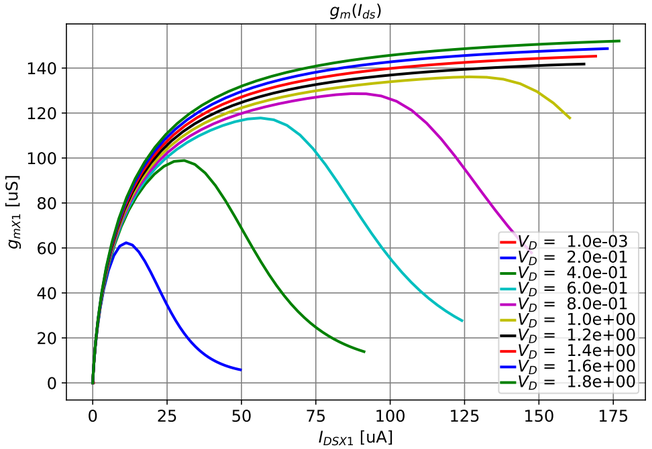

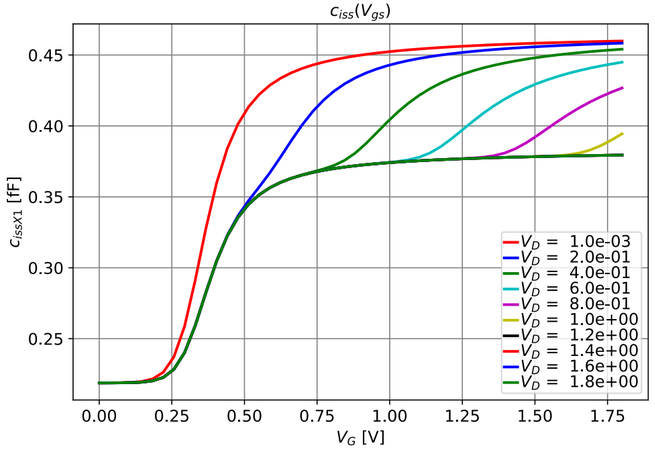

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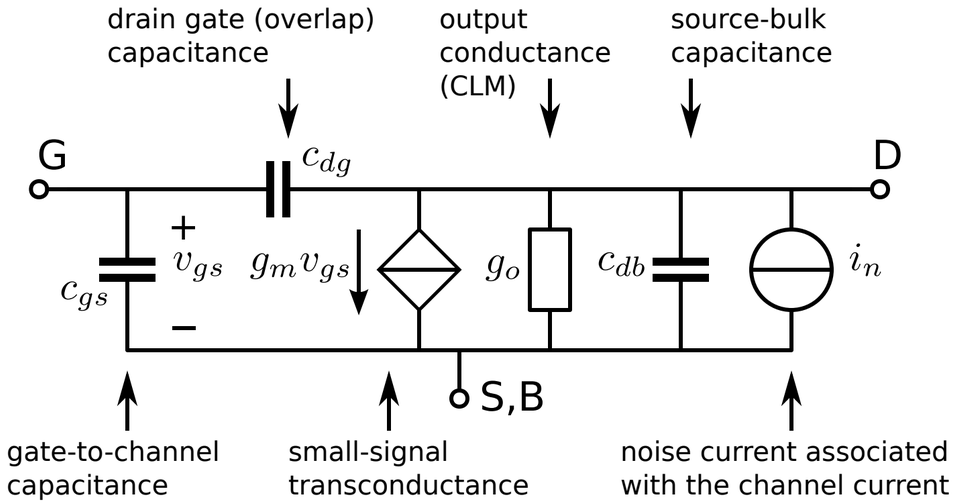

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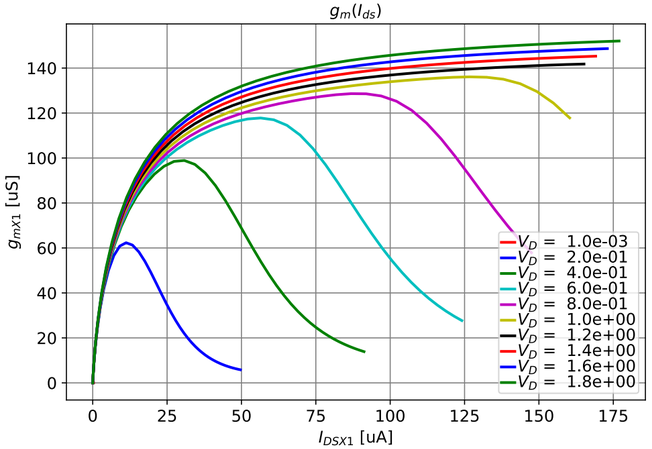

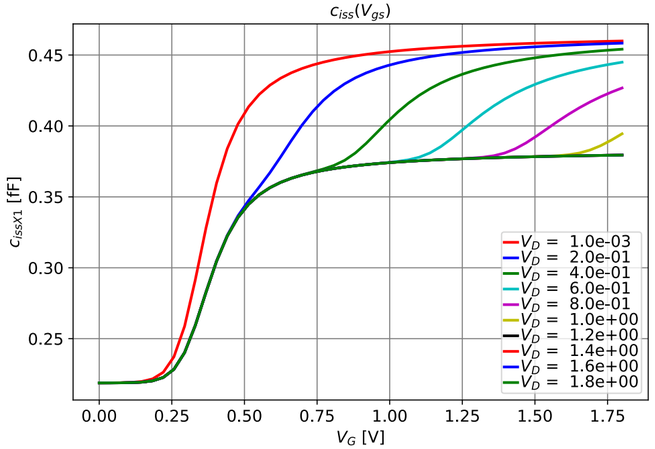

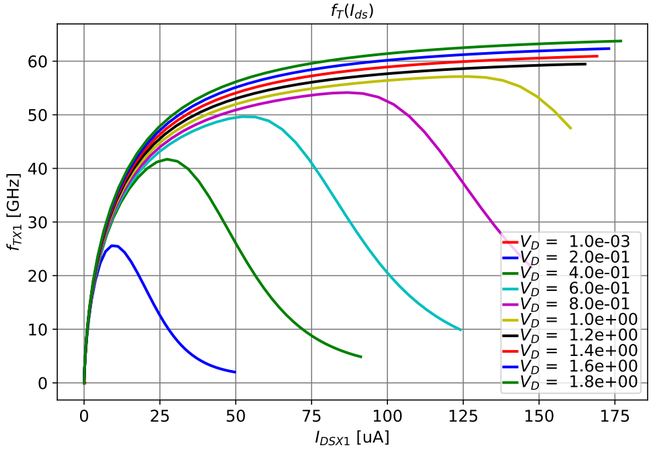

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MOS largest available power gain in forward saturation region:

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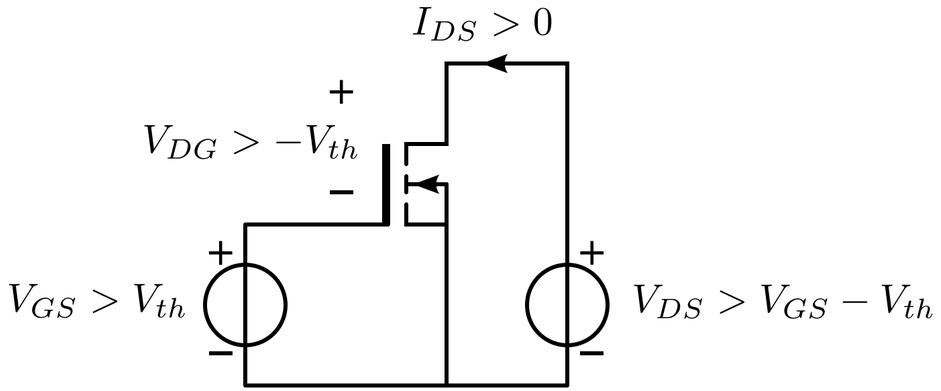

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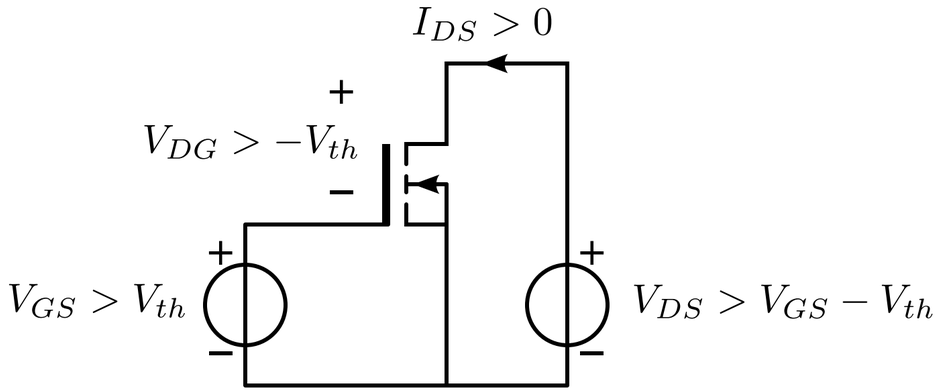

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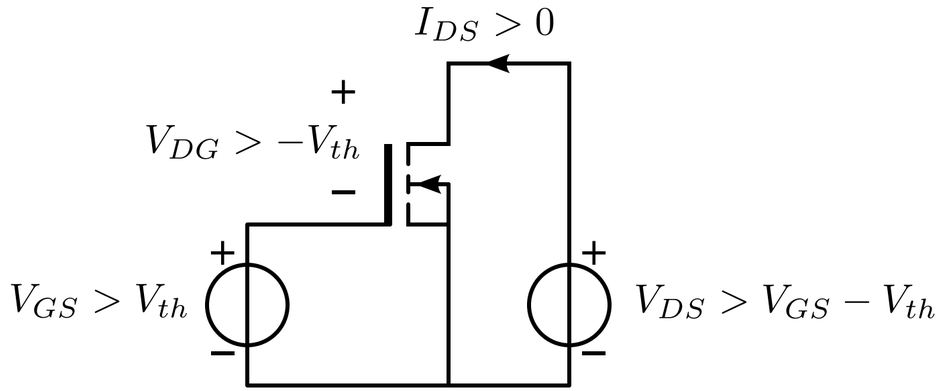

Keep it simple!

Up to critical inversion the transconductance increases with the inversion coefficient

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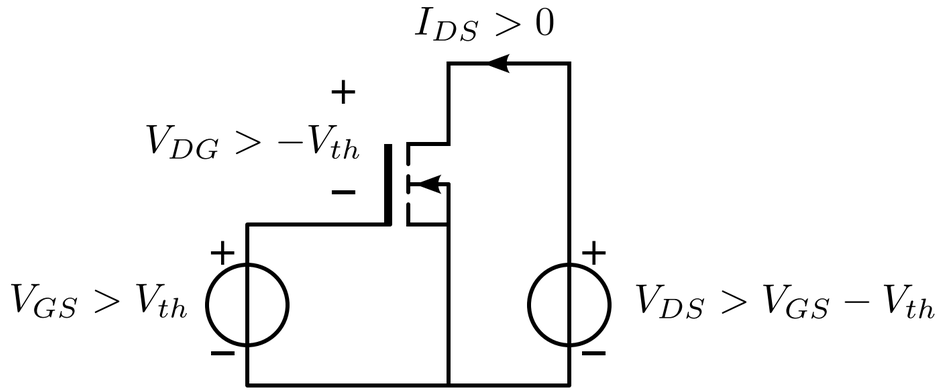

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Cut-off frequency proportional with small-signal transconductance

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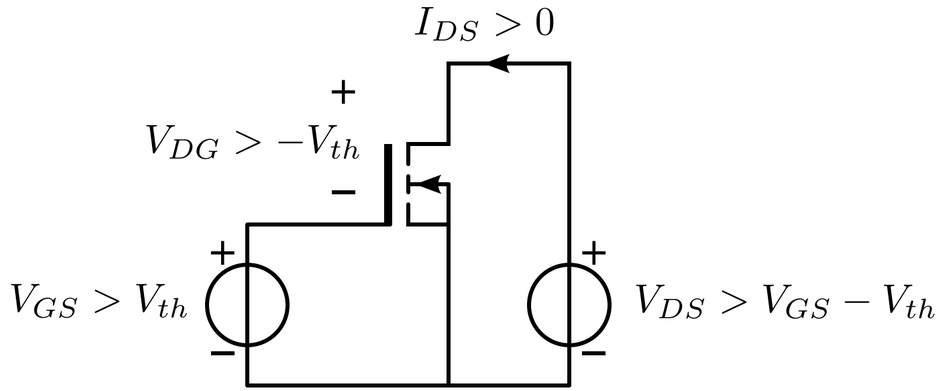

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Channel current noise spectral density proportional with transconductance

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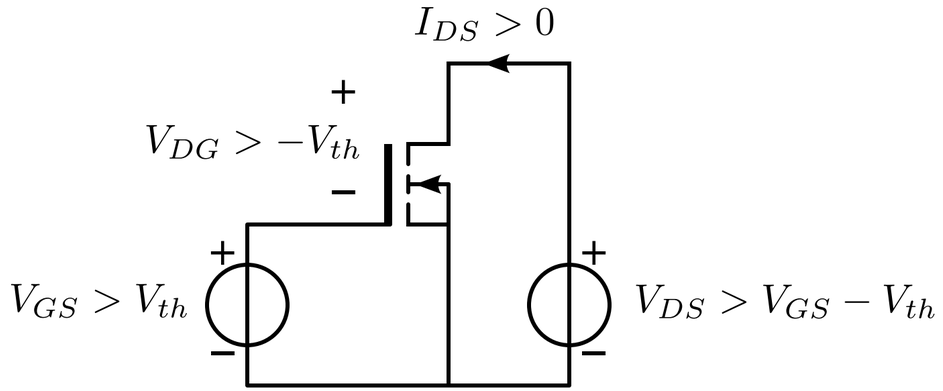

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Channel current noise spectral density proportional with transconductance

Corner frequency 1/f noise proportional with cut-off frequency

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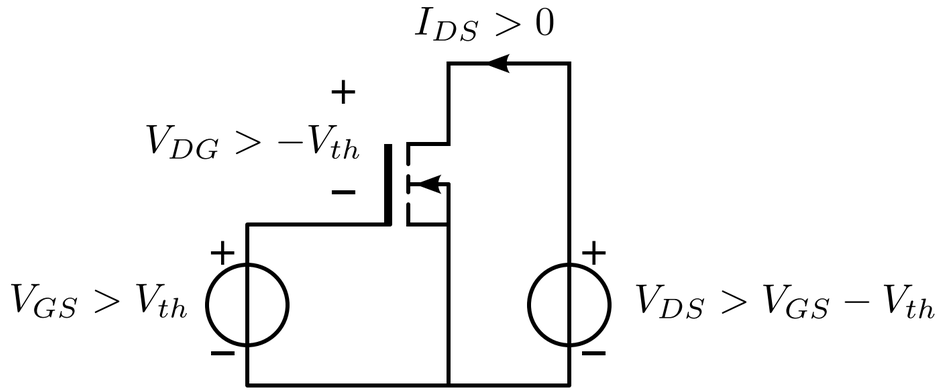

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Cut-off frequency proportional with small-signal transconductance

Channel current noise spectral density proportional with transconductance

Corner frequency 1/f noise proportional with cut-off frequency

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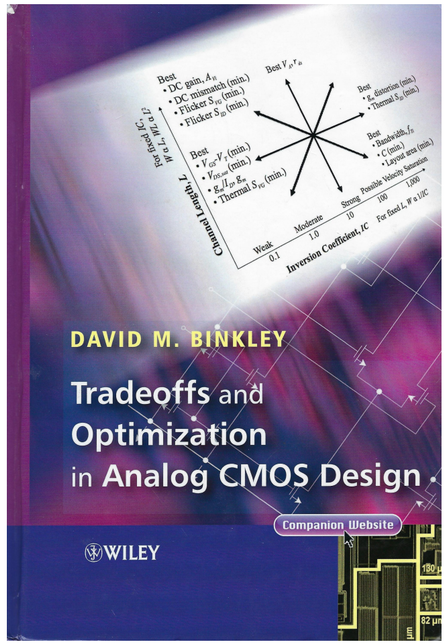
High output resistance

Increase Length maintain IC

Low 1/f noise

Low cut-off frequency



Low channel noise

High cut-off frequency

Low Area

Weak | Moderate | Strong | Possibly Velocity Saturation →

0.1 | 1 | 10 | 100 | 1000