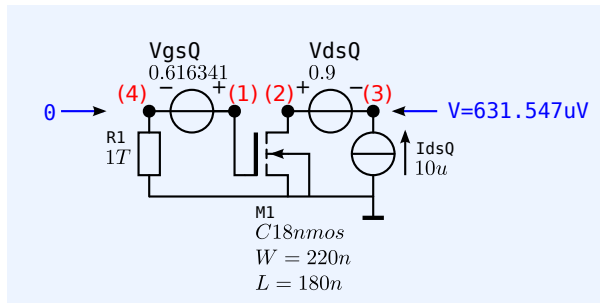


Structured Electronic Design

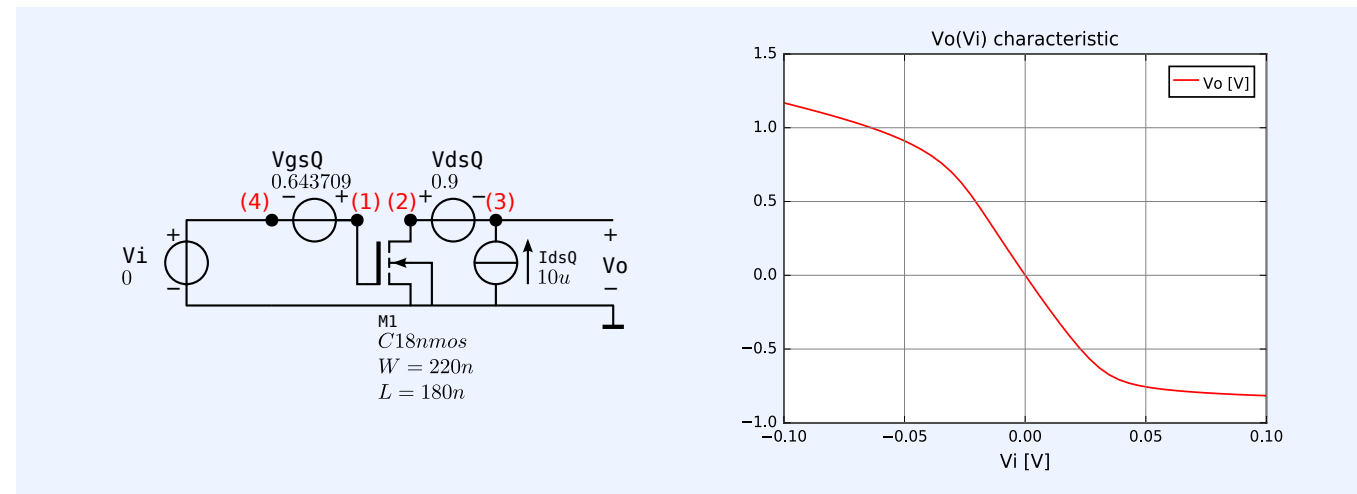
CS stage
Introduction

Anton J.M. Montagne

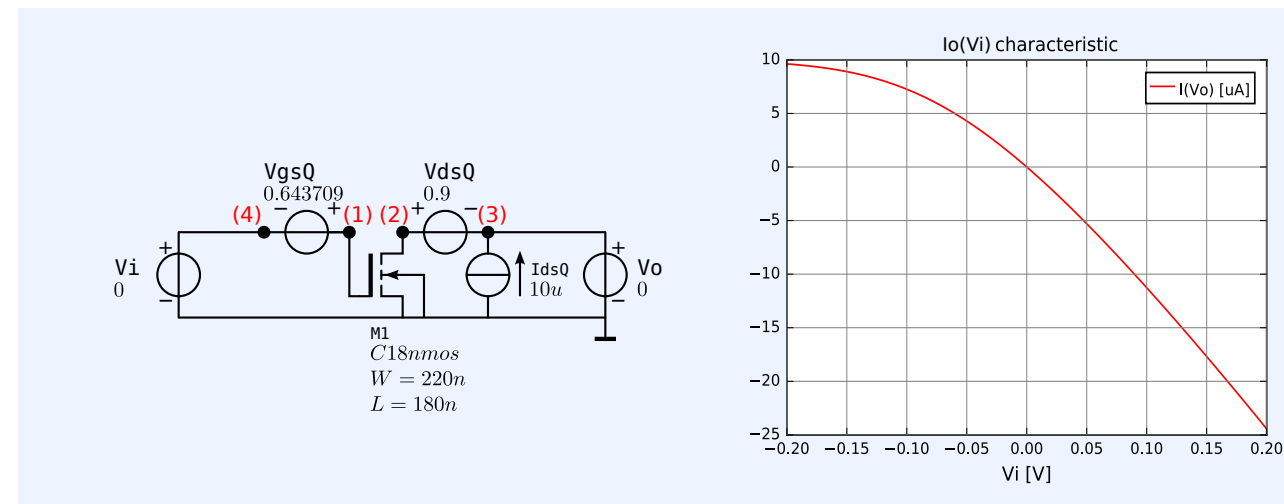
CS stage static and dynamic behavior



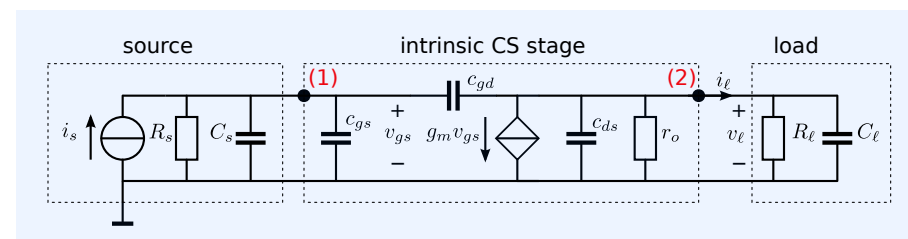
biased stage



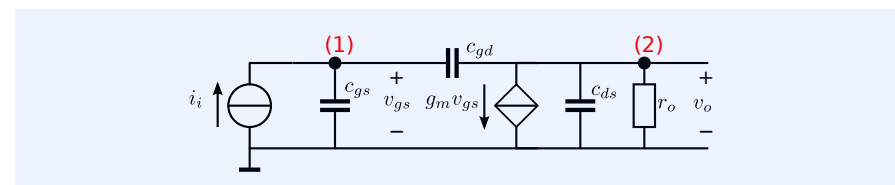
static voltage drive capability



static current drive capability



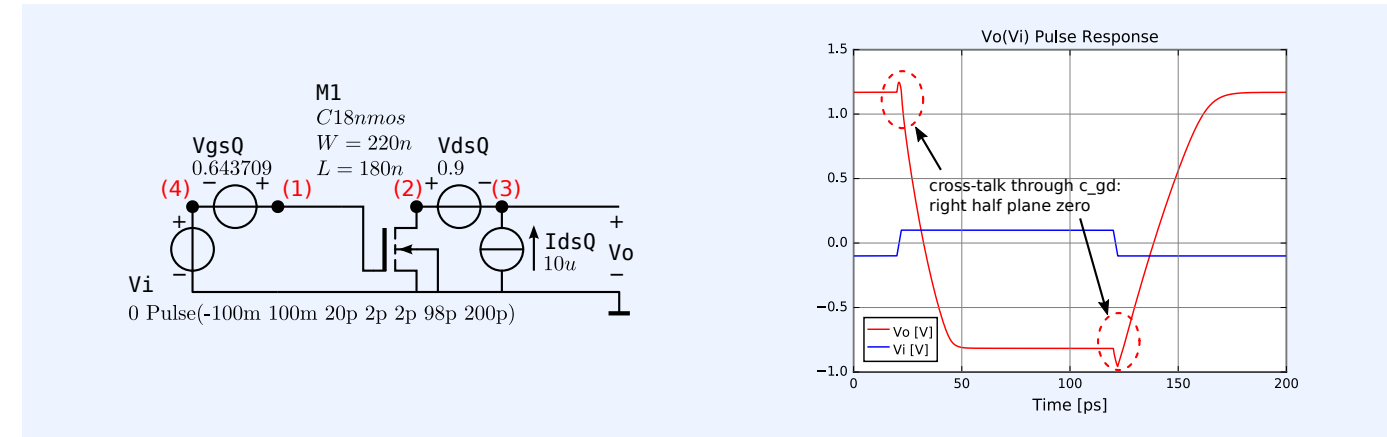
small-signal source-to-load transfer



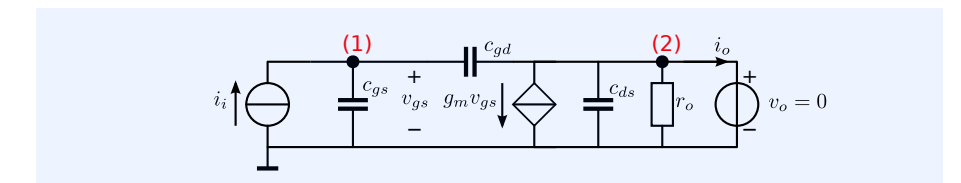
small-signal transimpedance

Study behavior

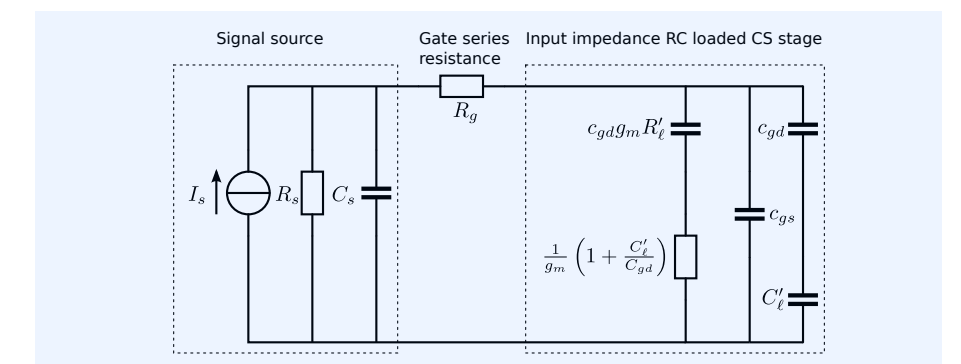
Find design parameters for performance aspects



dynamic voltage drive capability

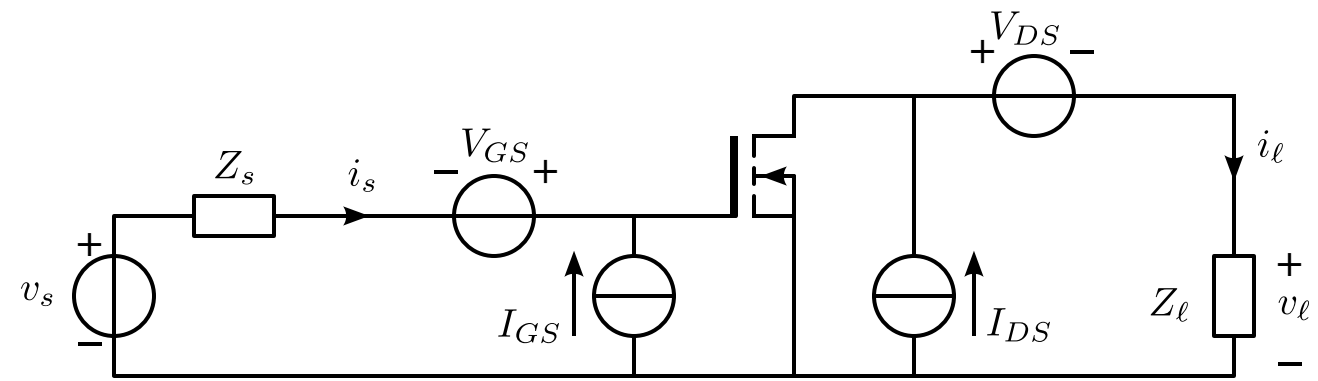


small-signal current gain

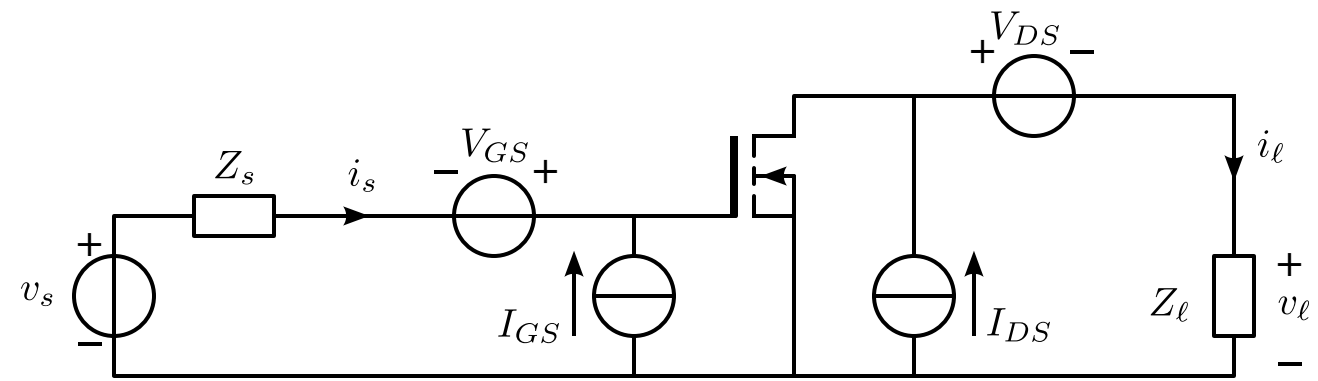


small-signal voltage driven

CS introduction

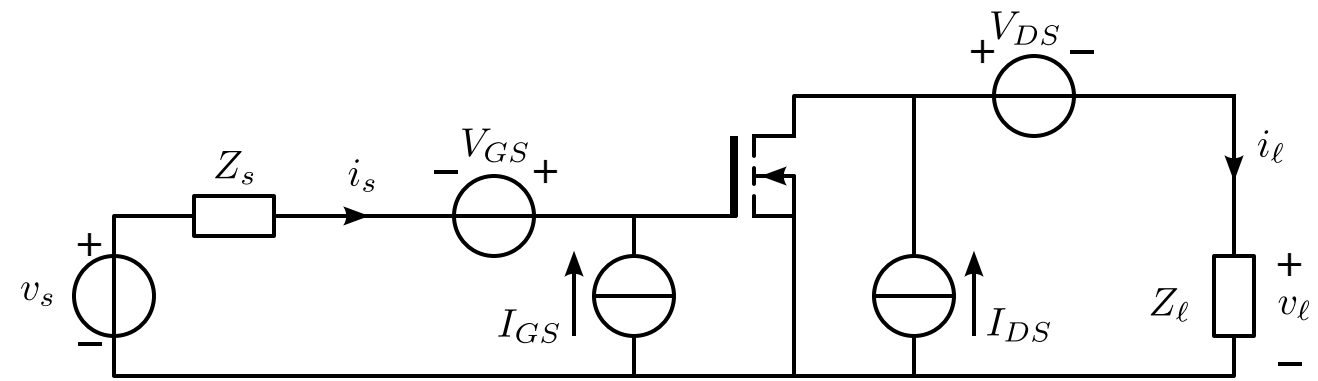


CS introduction



No bias currents flow through the source and the load

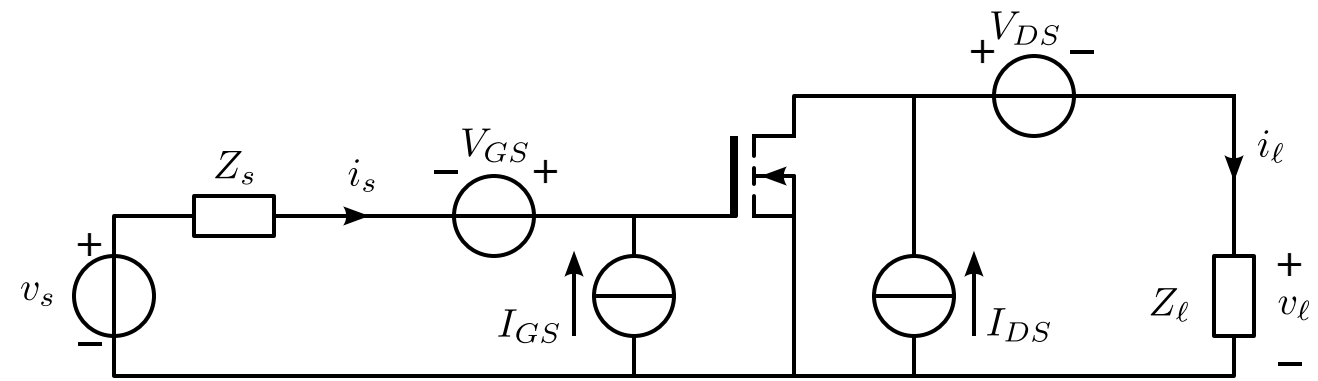
CS introduction



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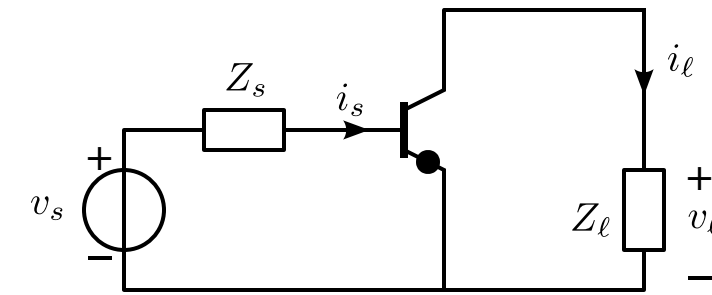
(v_s, v_l) , (v_s, i_l) , (i_s, v_l) , (i_s, i_l) characteristics pass through the origin

CS introduction



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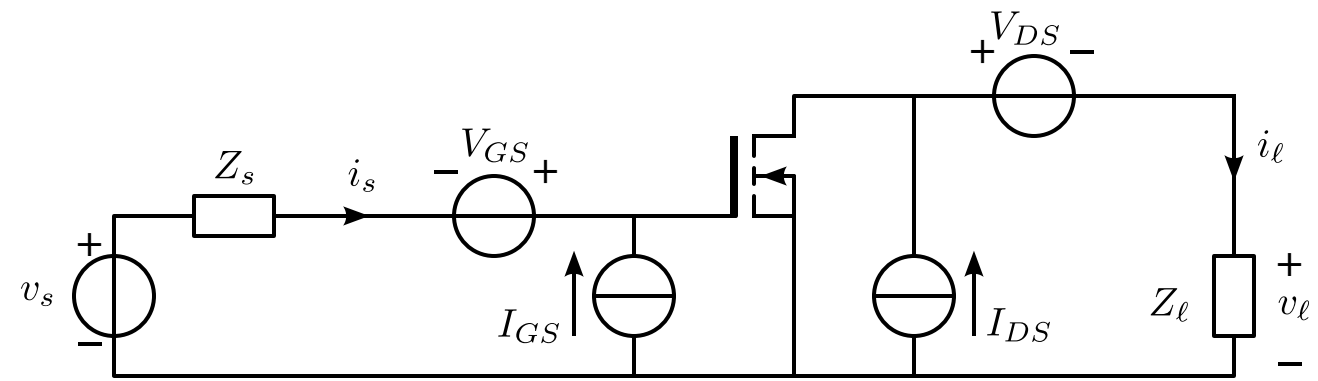


Biased CS (MOST, JFET), CE (BJT) or CC (triode, pentode) stage

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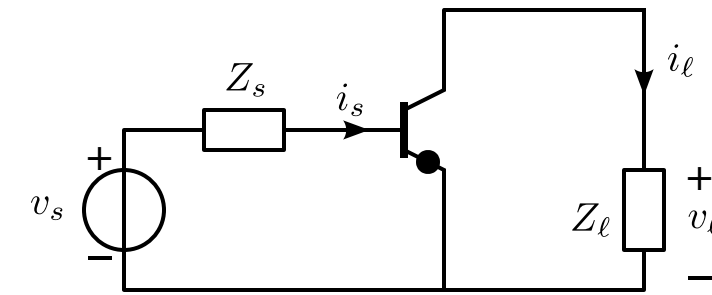
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CS introduction



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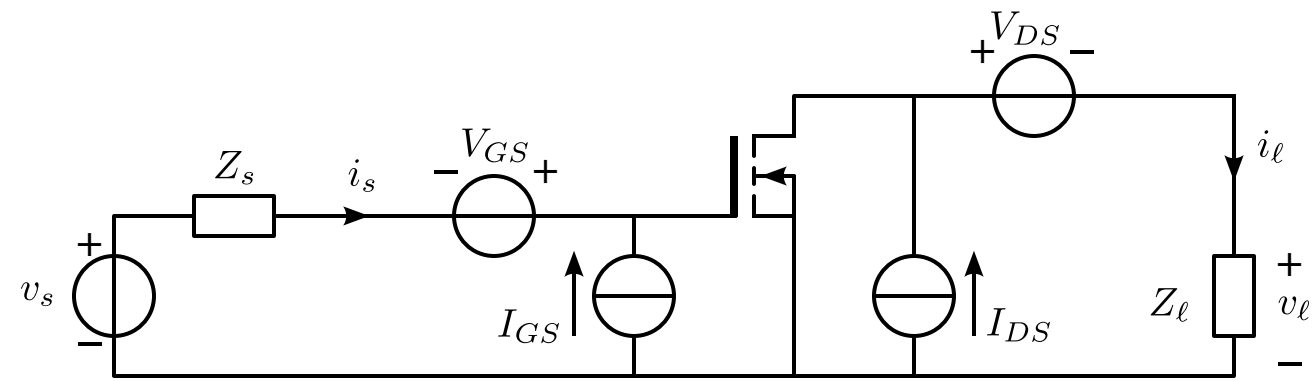
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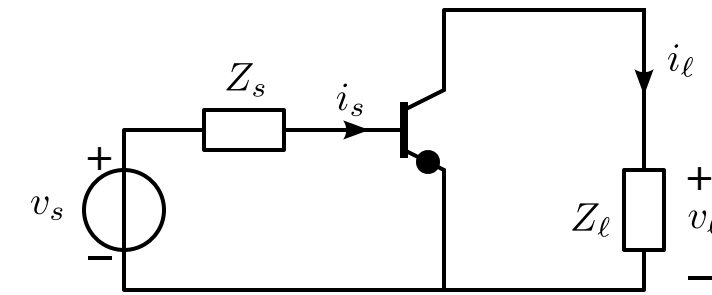
common-source (MOST, JFET)

CS introduction



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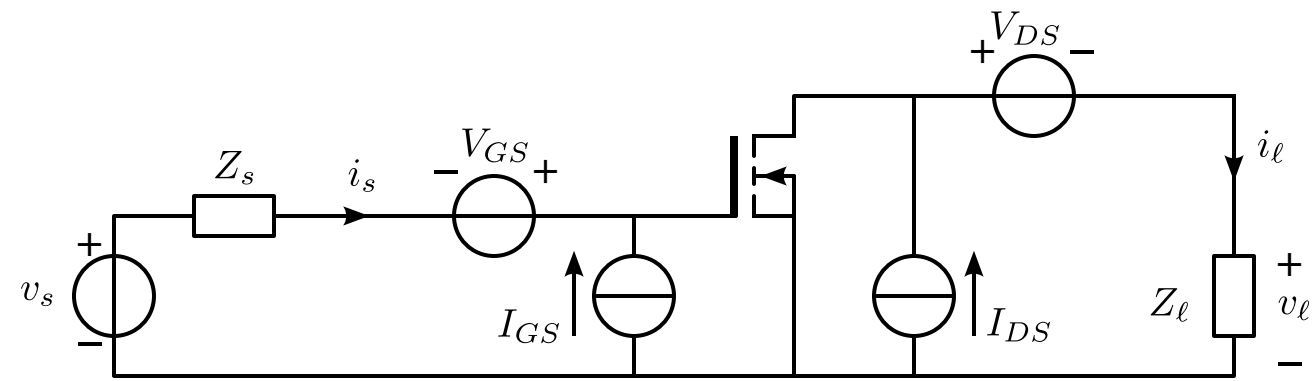
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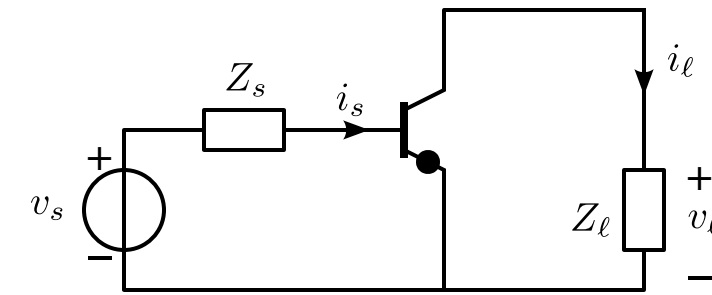
common-emitter (BJT)

CS introduction



No bias currents flow through the source and the load

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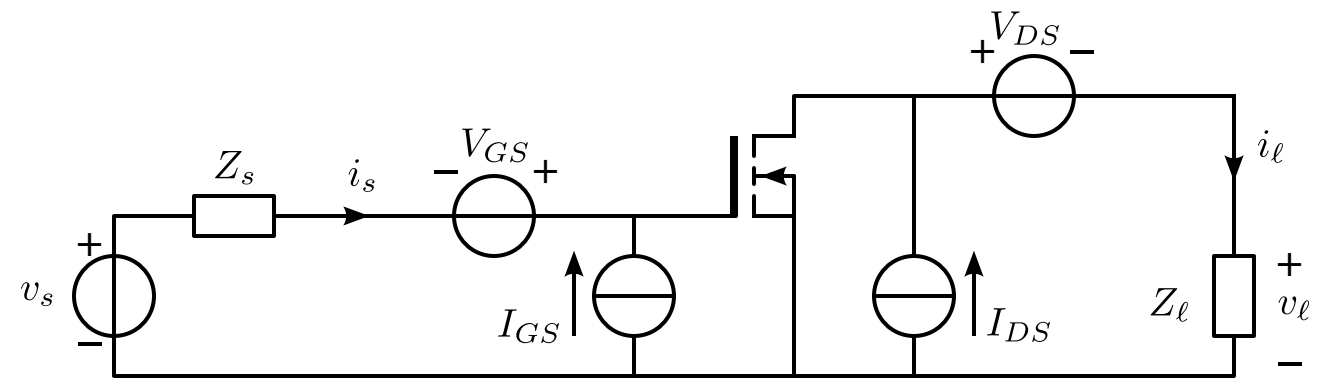
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common-source (MOST, JFET)

common-emitter (BJT)

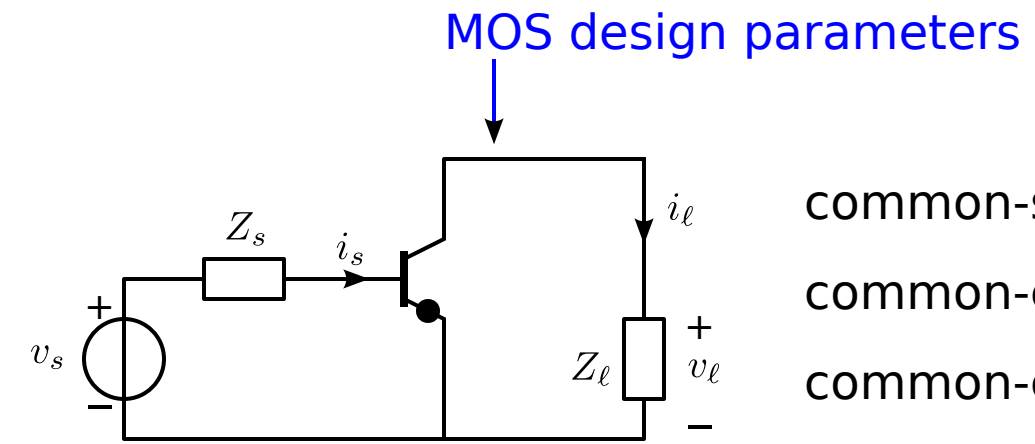
common-cathode (Vacuum tubes)

CS introduction



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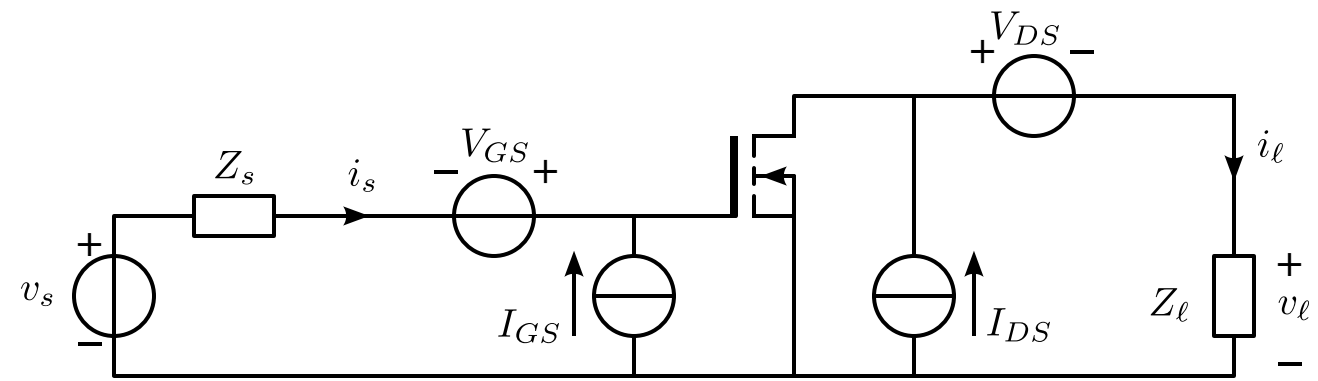
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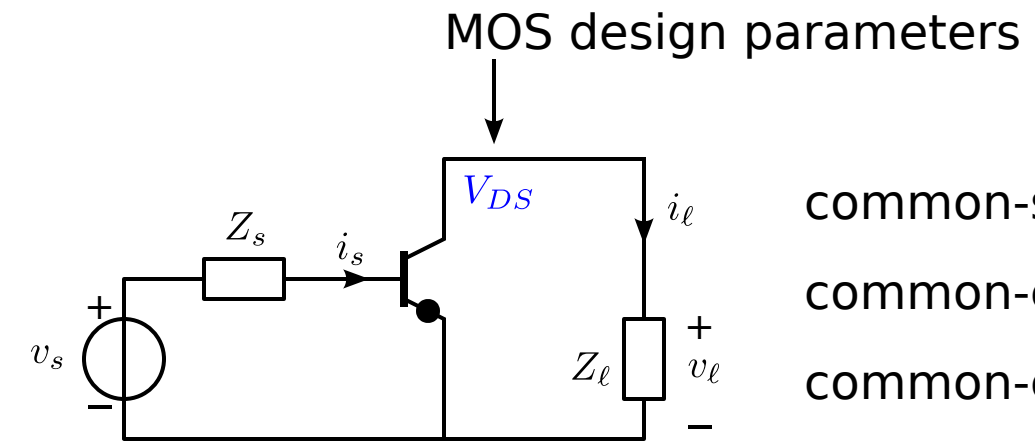
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CS introduction



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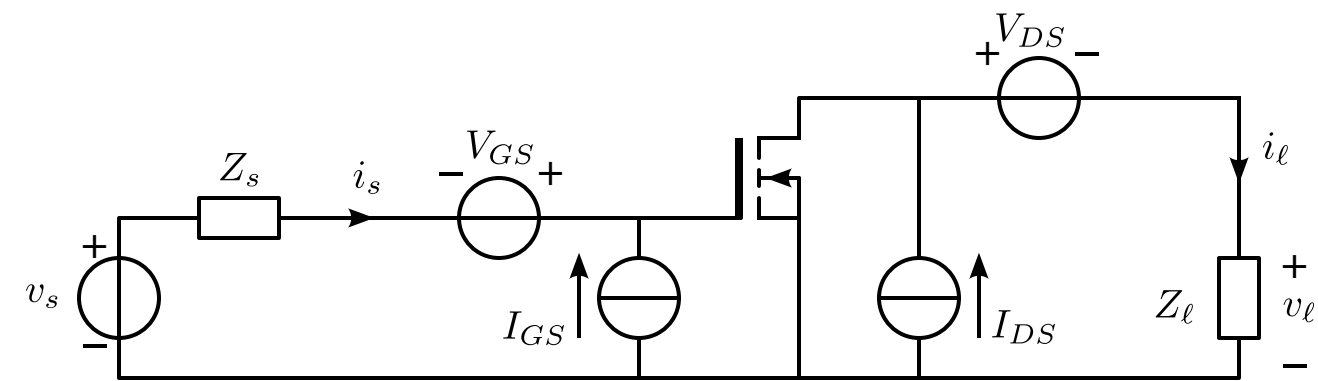
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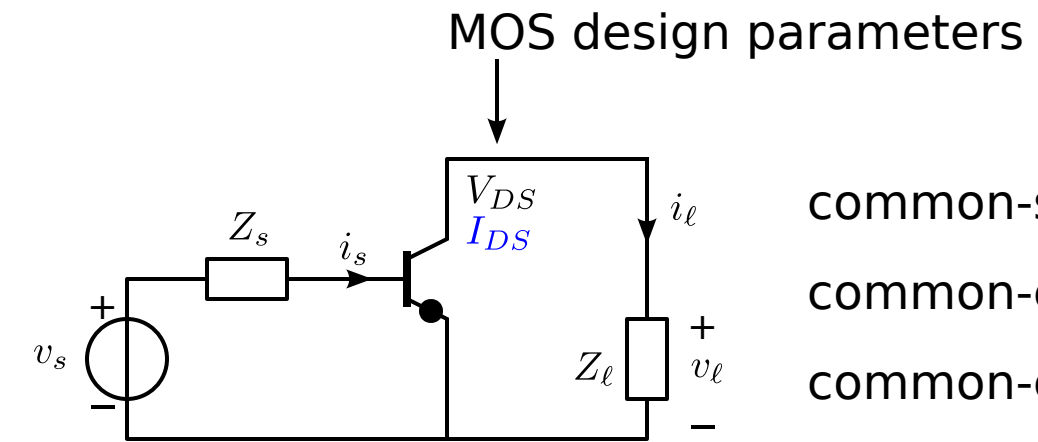
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CS introduction



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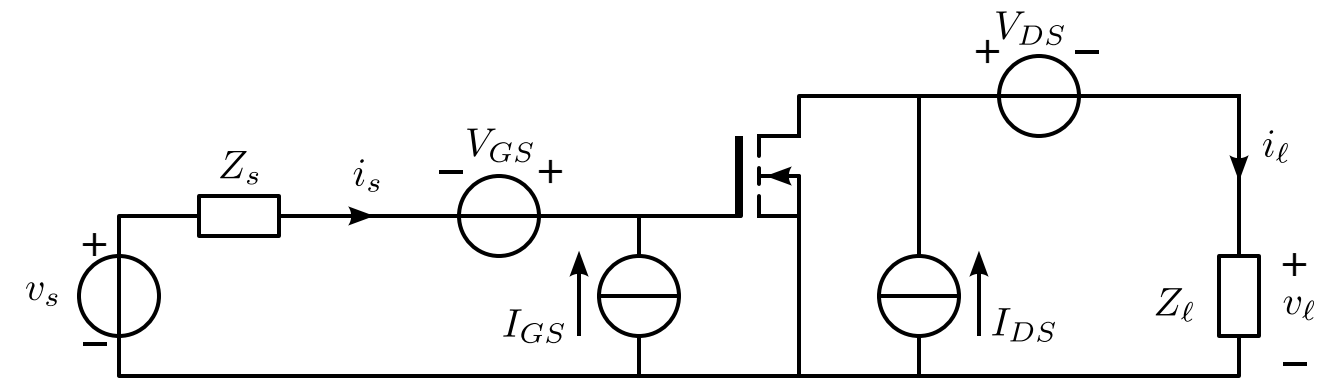
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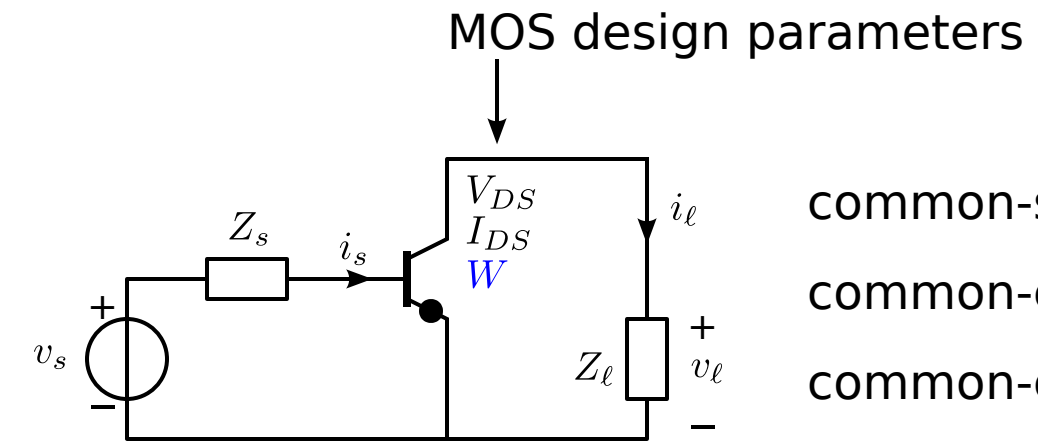
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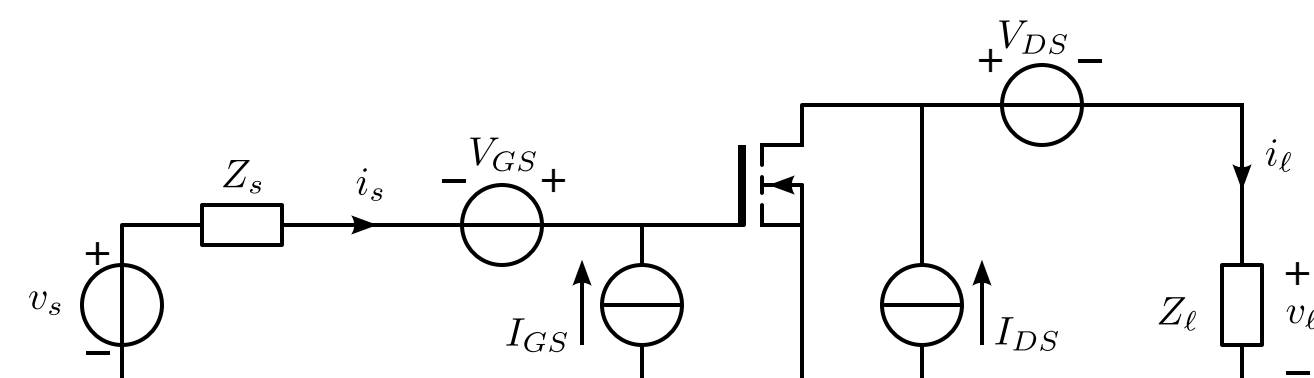
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MOS design parameters

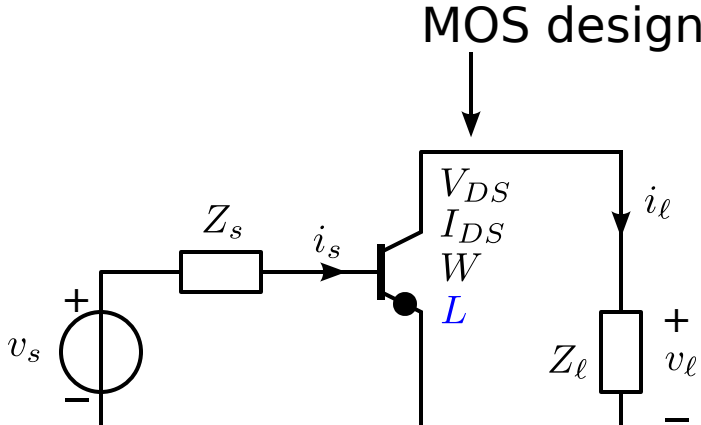
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CS introduction



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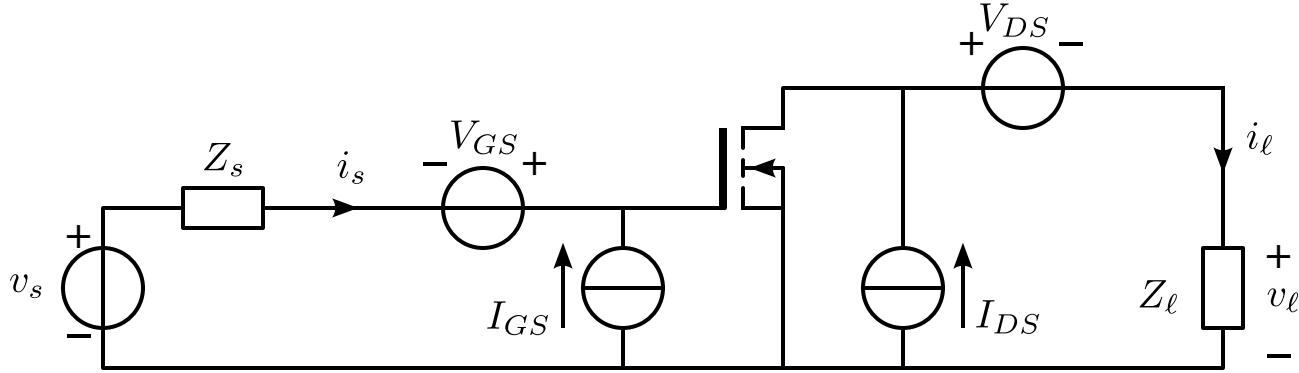
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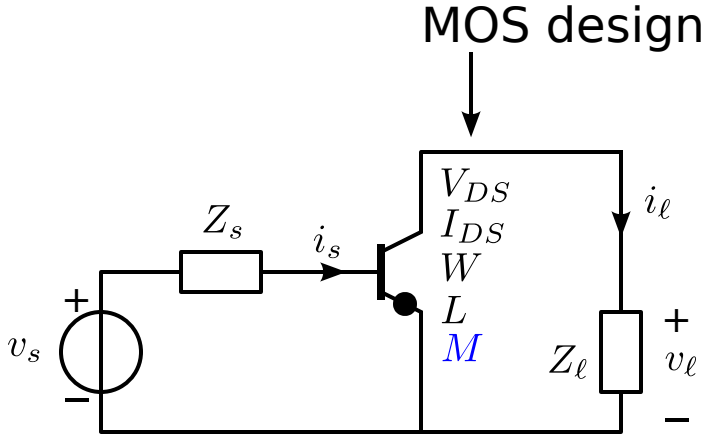
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CS introduction



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MOS design parameters

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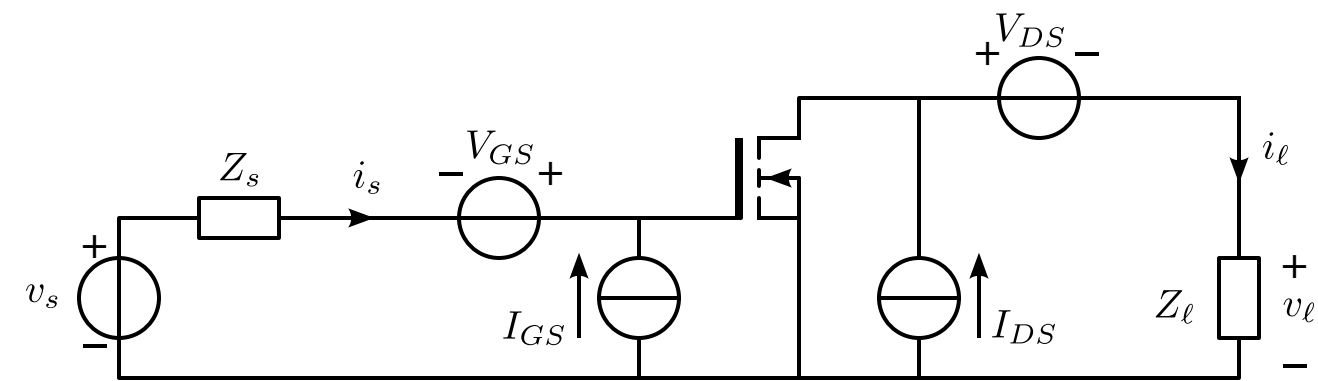
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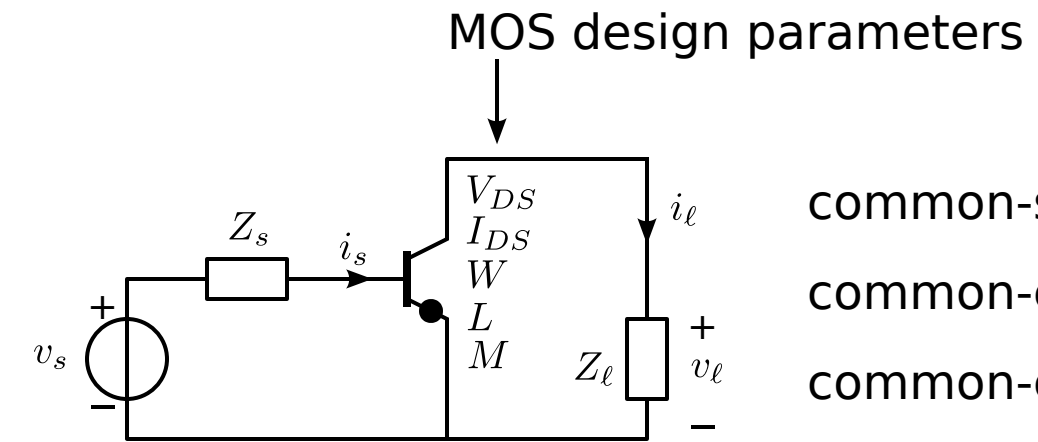
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CS introduction



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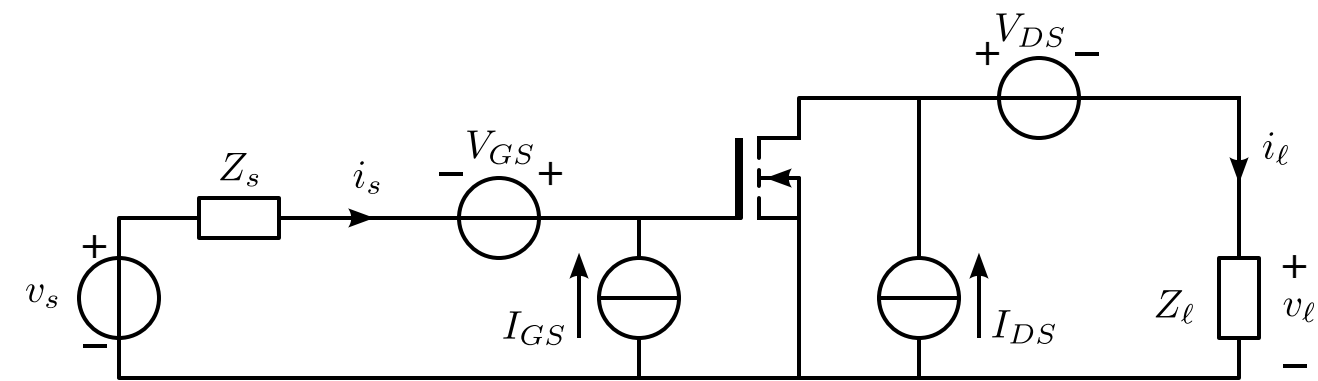
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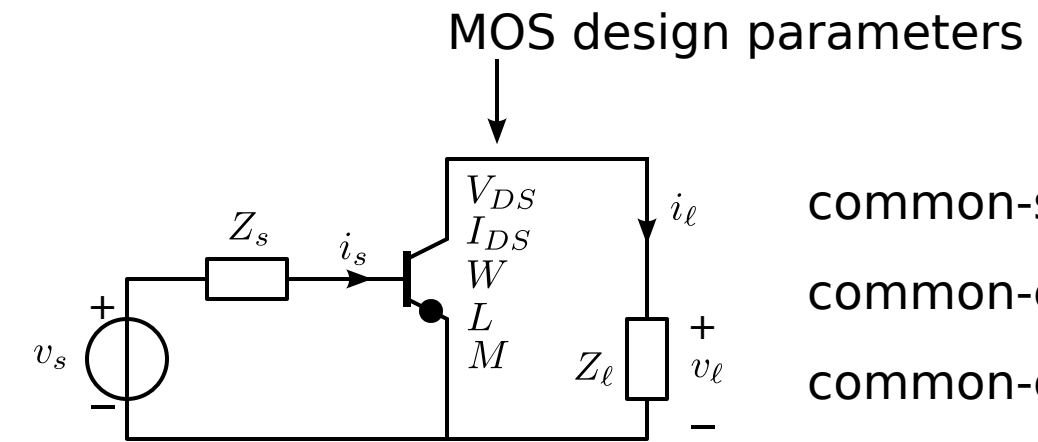
🤔 Why is the CS stage the *basic* MOS amplifier stage?

CS introduction



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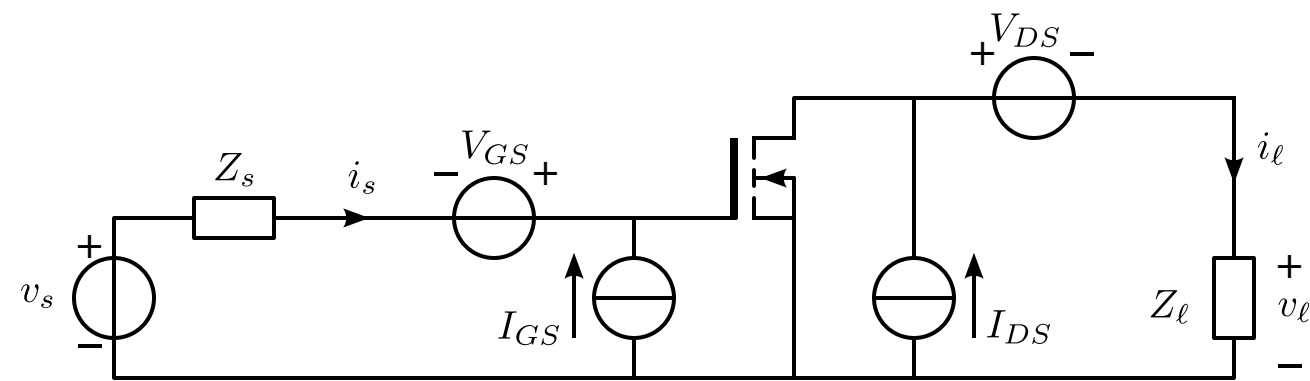
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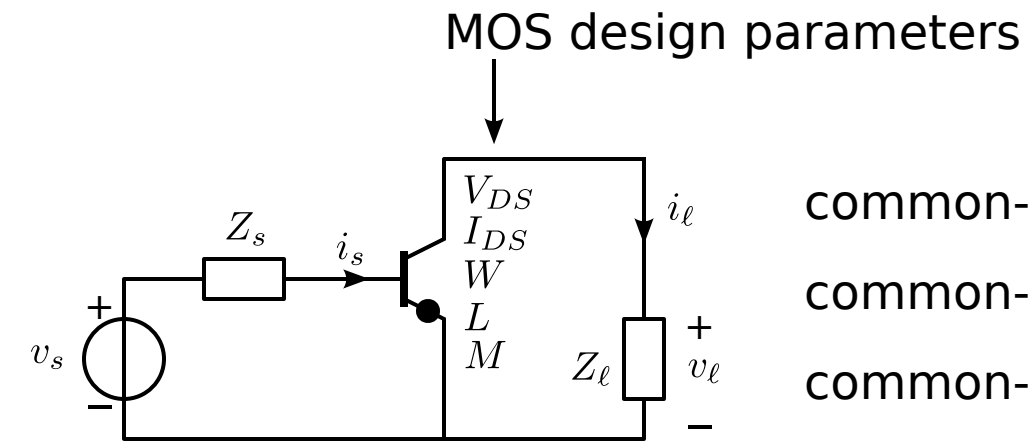
🧐 Small-signal T1 matrix parameters have their smallest values when compared to other stages, such as the CG and the CD stage

CS introduction



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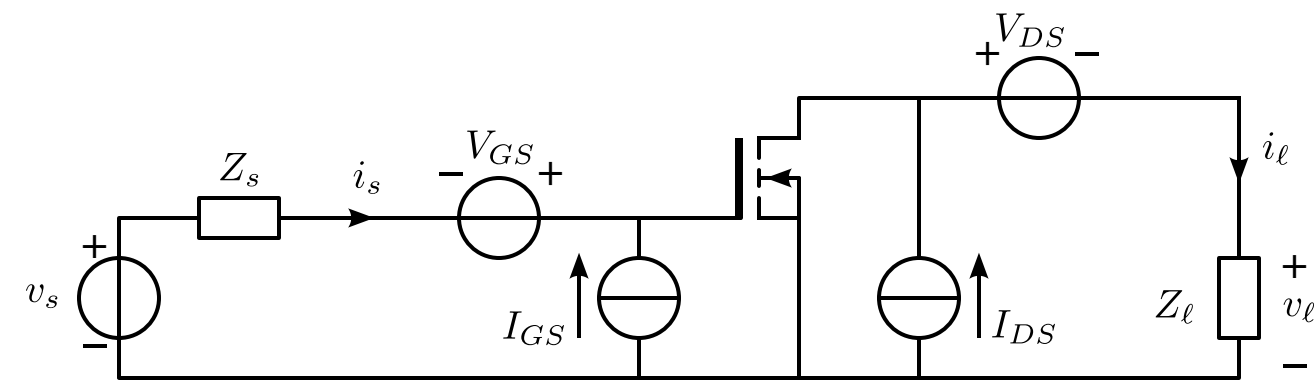


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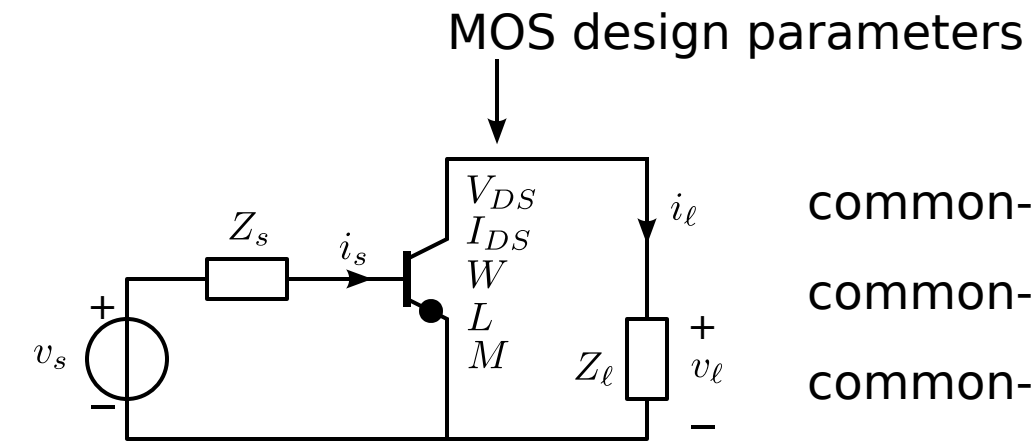
This makes it the best possible single-stage approximation of a nullor: the ideal controller for negative feedback amplifiers

CS introduction



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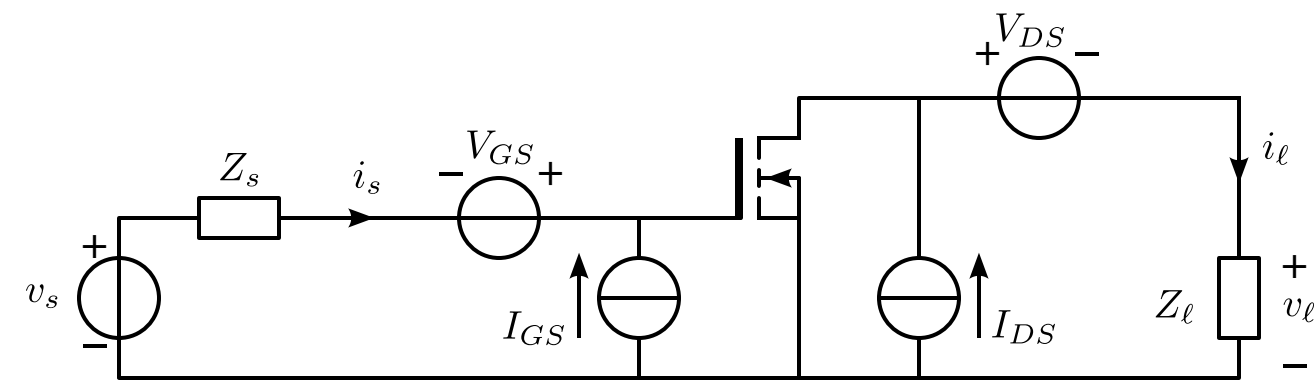
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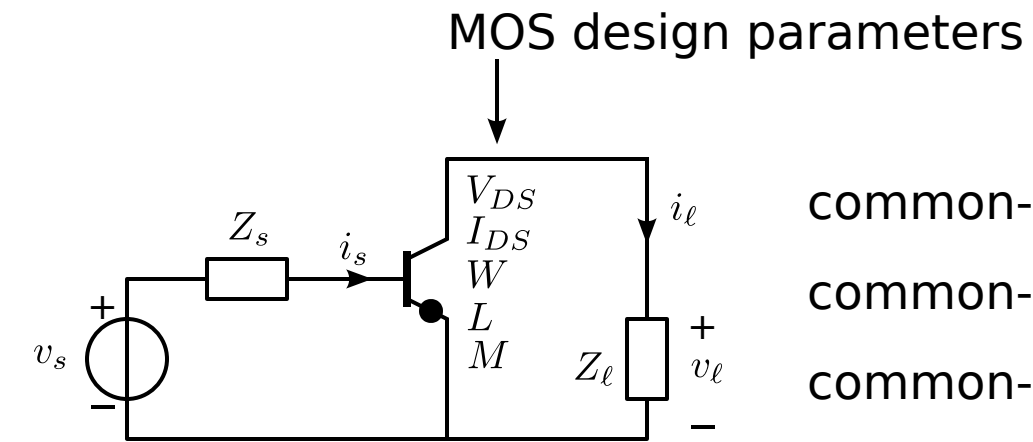
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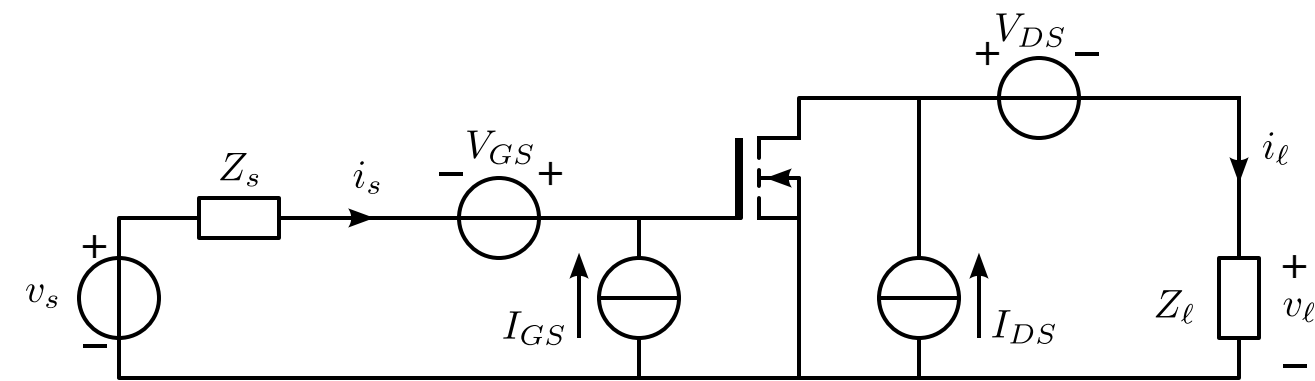
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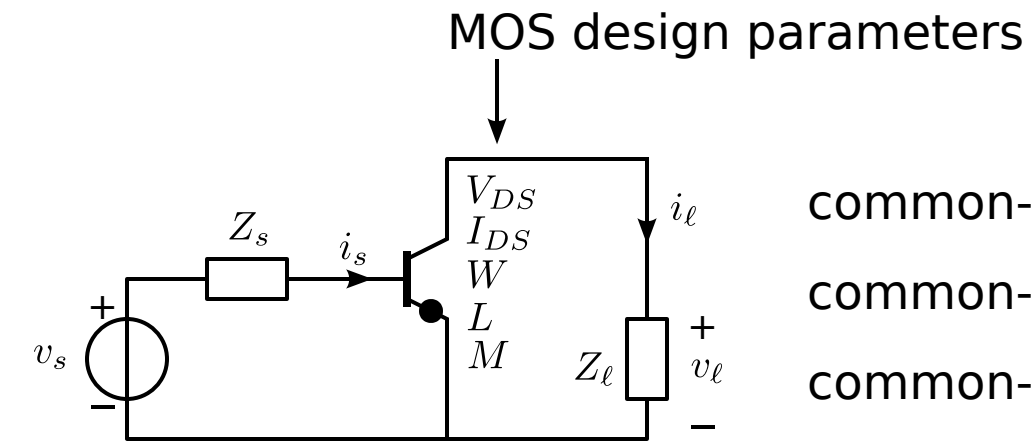
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CS introduction



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CS introduction

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CS introduction

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-
- | | |
|--|-----------------|
| 🤔 Performance? | 🤔 Design? |
| 🧐 Voltage and current drive capability | 🧐 Channel width |
| 🧐 Noise performance | |
| 🧐 Temperature dependency | |
| 🧐 Bandwidth and frequency response | |

CS introduction

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 - 🧐 We need to know in which way and to what extent its performance can be affected by design.
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