



# 類比積體電路導論

## Introduction to U18 Library

「授課教師」：林群祐 教授 (Prof. Chun-Yu Lin)  
「課程助教」：梁振宇 (Chen-Yu Liang)

---

Nanoelectronics and Gigascale Systems Lab.  
Institute of Electronics  
National Yang Ming Chiao Tung University  
Sep. 05, 2024



# HSPICE TAs

---

- 如果遇到問題，請於討論區發問，或同時於E3平台寄信給四位**HSPICE**助教

黃友奕 黃煒翔 黃鈺婷 陳冠穎



# **MOSFETs**



# Twin-Well 1.8-V Devices

## MOSFET w/ regular $V_{TH}$ (Most Commonly-Used)

---

- Library File
  - It includes parameters changing with different corners: TT/SS/FF/ $S_nF_p/F_nS_p$ .
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_reg18\_v124.lib
- Model Card
  - It contains an n-MOSFET and a p-MOSFET.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_reg18\_v124.mdl



# Twin-Well 1.8-V Devices

## MOSFET w/ Low $V_{TH}$

---

- Model Card
  - It contains low  $V_{TH}$ -MOSFETs in different corners: TT/SS/FF/ $S_nF_p$ / $F_nS_p$ .
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_lvt18\_v113.mdl



# Twin-Well 1.8-V Devices

## MOSFET w/ Zero $V_{TH}$

---

- Library File
  - It includes parameters changing with different corners: TT/SS/FF/ $S_nF_p/F_nS_p$ .
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_zvt18\_v121.lib
- Model Card
  - It contains a zero- $V_{TH}$  MOSFET.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_zvt18\_v121.mdl



# Triple-Well 1.8-V Devices

## MOSFET w/ Deep N-well

---

- Library File
  - It includes parameters changing with different corners:  $TT/SS/FF/S_nF_p/F_nS_p$ .
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_reg18bpw\_v124.lib
- Model Card
  - It contains an NMOS with a Deep N-well.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_reg18bpw\_v124.mdl



# **PNP Transistors**





# Vertical PNP Transistors

---

- Library File
  - It includes parameters changing with different corners: TT/SS/FF.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_bjt\_v121.lib
- Model Card
  - It contains PNP Transistors with different emitter areas.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_bjt\_v121.mdl



# Diodes



# Diodes

---

- Model Card
  - It contains n+/pwell diodes, p+/nwell diodes, and nwell/psub diodes.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_diode\_v113.mdl



# Capacitors



# MIMCAPs

---

- Library File
  - It includes parameters changing with different corners.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_mimcap\_v101.lib
- Model Card
  - It contains Metal-Insulator-Metal CAPacitors.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_mimcap\_v101.mdl



# Resistors



# Poly Resistors

---

- Library File
  - It includes parameters changing with different corners: TT/FF/SS.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_res\_v142.lib
- Model Card
  - It contains non-silicide N+/P+/HR poly resistors.
  - U18\_2023/PDK/UM180FDKMFC\_C05\_PB/Models/Hspice/mm180\_res\_v142.mdl



Thank you