Laborator nr. 4 FM2:

BJT lab 3 → partea a (tabel) — destefi U_{BE} peste 0.7 V. OK

I_B (μA)
1
2
⋮
10
20
30
⋮
50 ..

Tranzistorul cu efect de câmp: (TEC)

BJT (TB) → I_C controlat de I_B ($I_C \simeq \beta I_B$)

Field-Effect Transistor (FET)

FET (TEC) → I_D controlat de V_G (curent controlat de o tensiune)

- dispozitiv controlat în tensiune

FET
- JFET (TEC cu joncțiune, TEC-J)
- MOSFET (TEC de tip MOS)
  - cu canal inițial → „depletion mode" „în regim de sărăcire"
  - cu canal indus → „enhancement-mode" „în regim de îmbogățire"

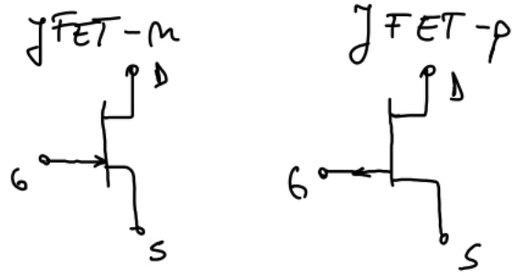
  (canal n sau canal p)

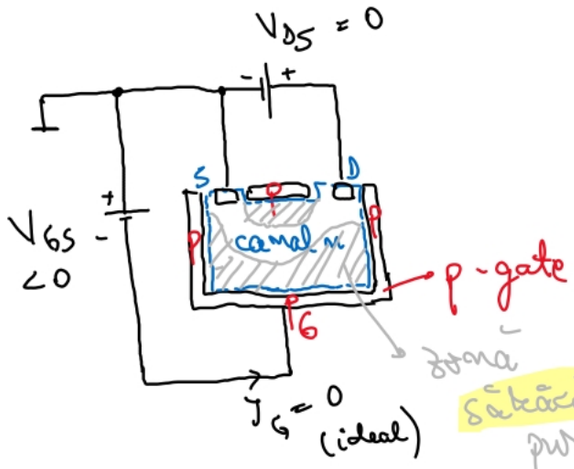
MOS = metal-oxide-semiconductor

Tranzistoare cu efect de câmp cu joncțiune (JFET)

JFET cu canal n

simboluri





zona sărăcită de purtători de sarcină

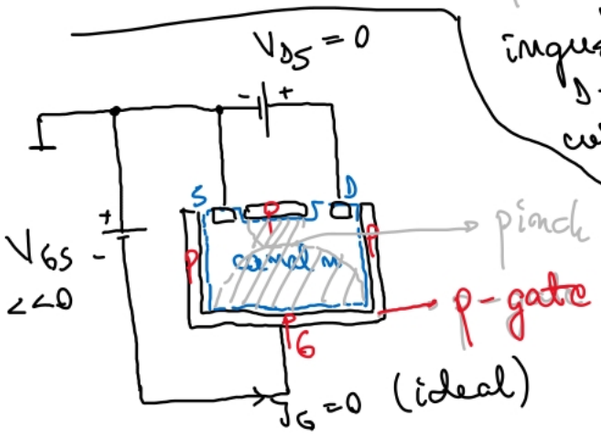
⇓

îngustarea canalului D-S ⇒ limitare a curentului maxim (I_D)

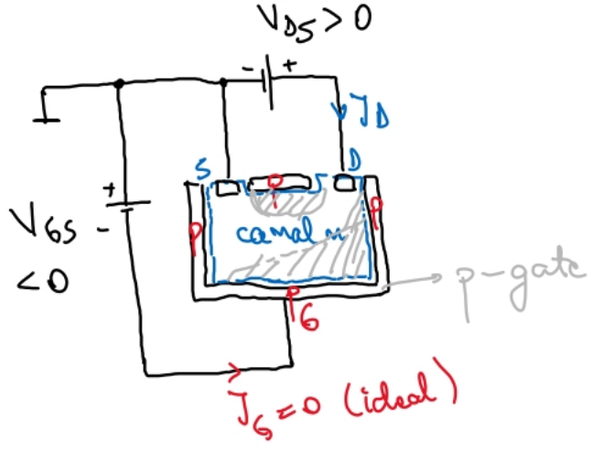
S – sursă (n source) (de electroni)

D – dreină (n drain) (de electroni)

G – gate (grilă)



⇒ pinch-off voltage (V_T) (V_P).

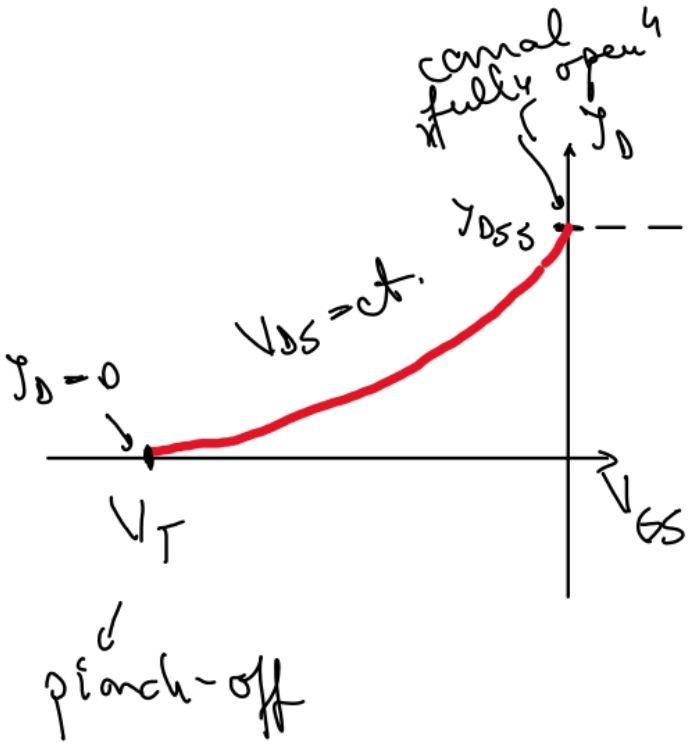


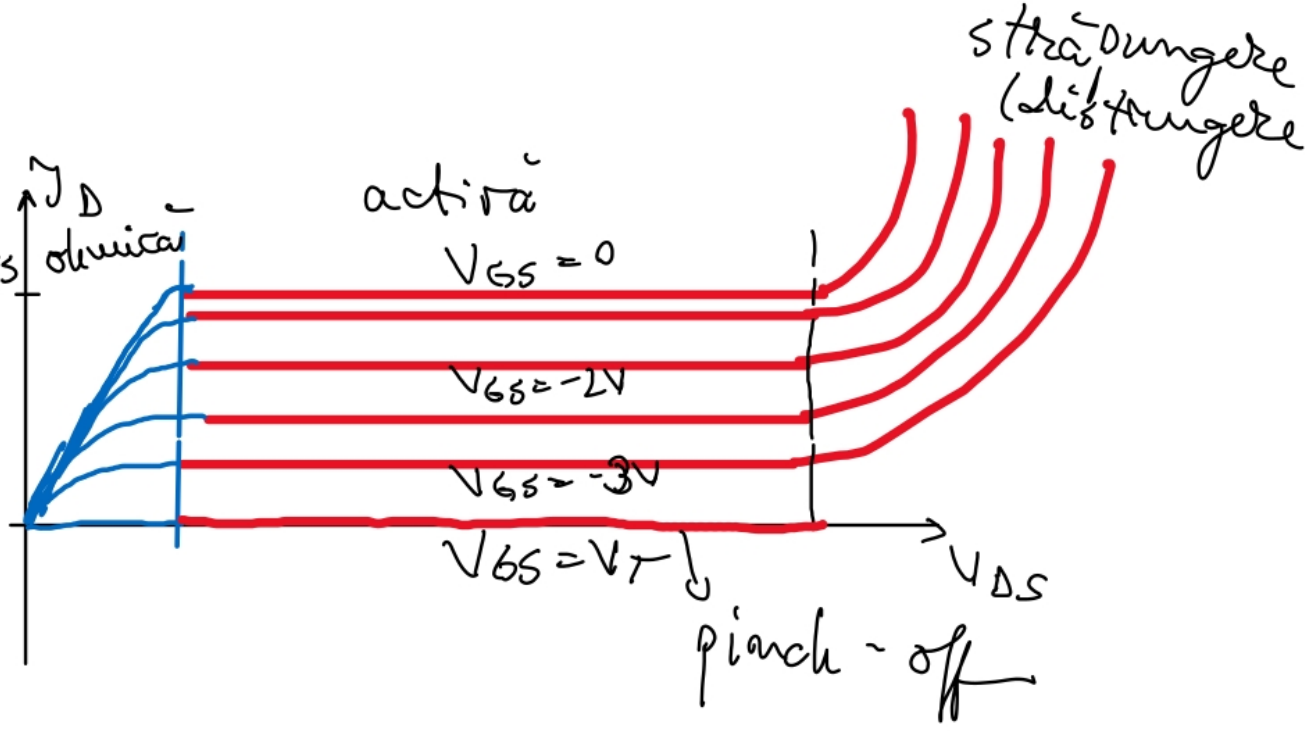
$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_T}\right)^2 = f(V_{GS})$$

Dacă $V_{GS} = 0 \Rightarrow I_D = I_{DSS}$

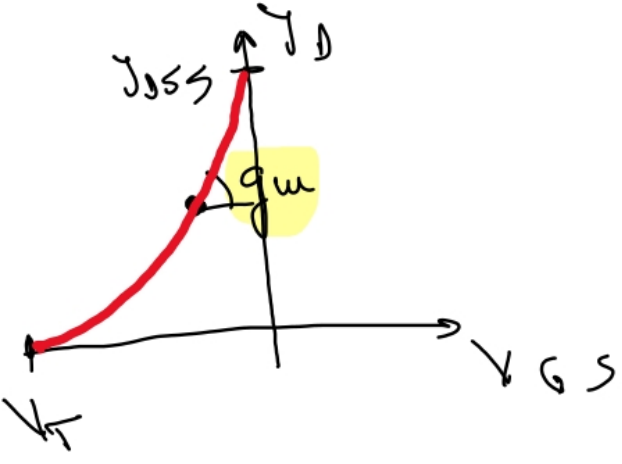
$V_{GS} = V_T \Rightarrow I_D = 0$

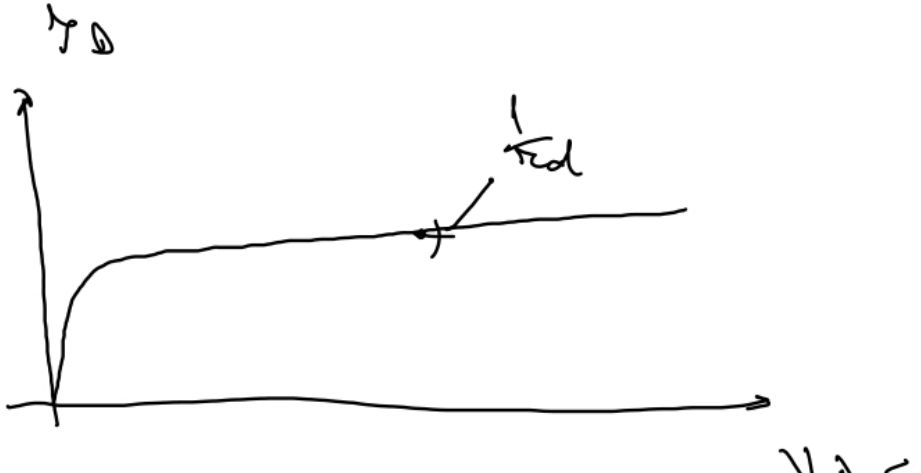
V_T, I_{DSS} – catalogate (datasheet)





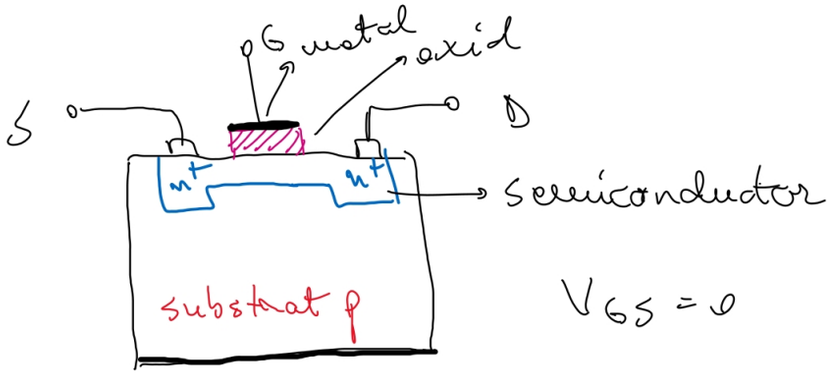
Regim dinamic

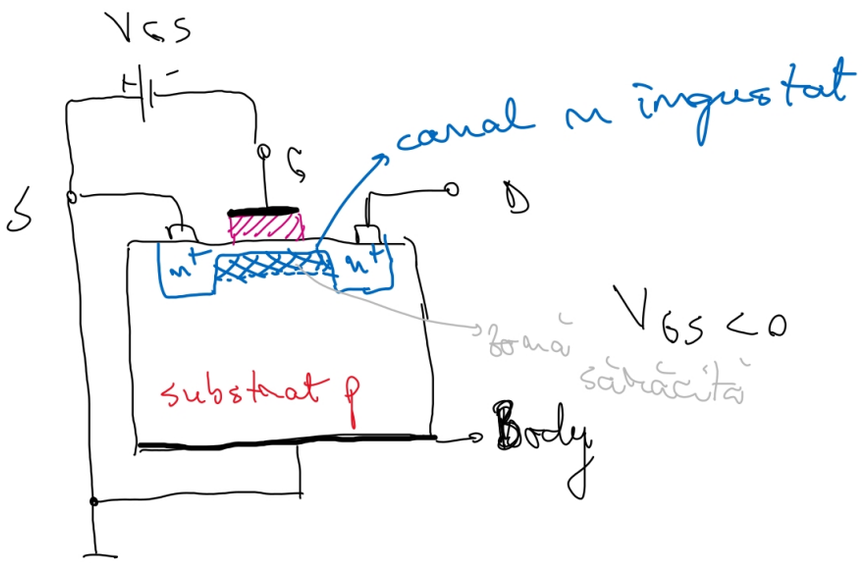




MOSFET cu canal inițial („depletion-type") → mai rar.

MOSFET: rezistența canalului – f. mică
imped. de intrare – f. mare



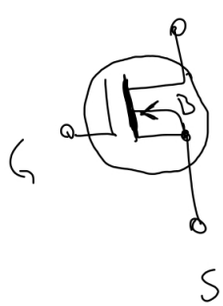


caracteristici similare cu JFET-n

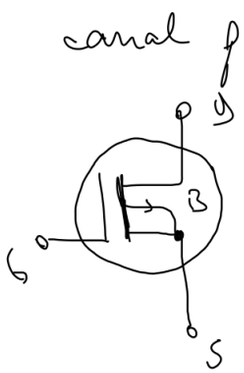
MOSFET cu canal inițial – „normally ON"
(scurt între D și S dacă $V_{GS} = 0$)

simboluri:

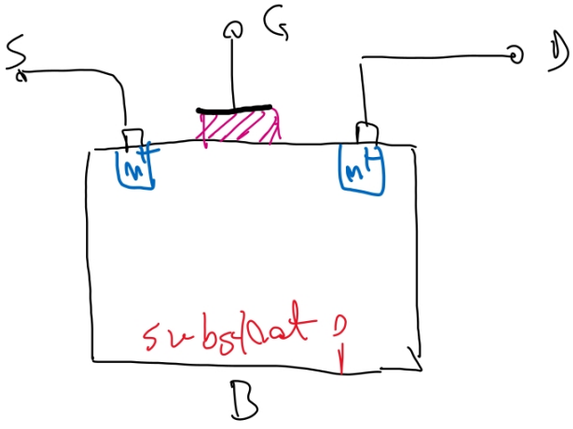
canal n



canal p

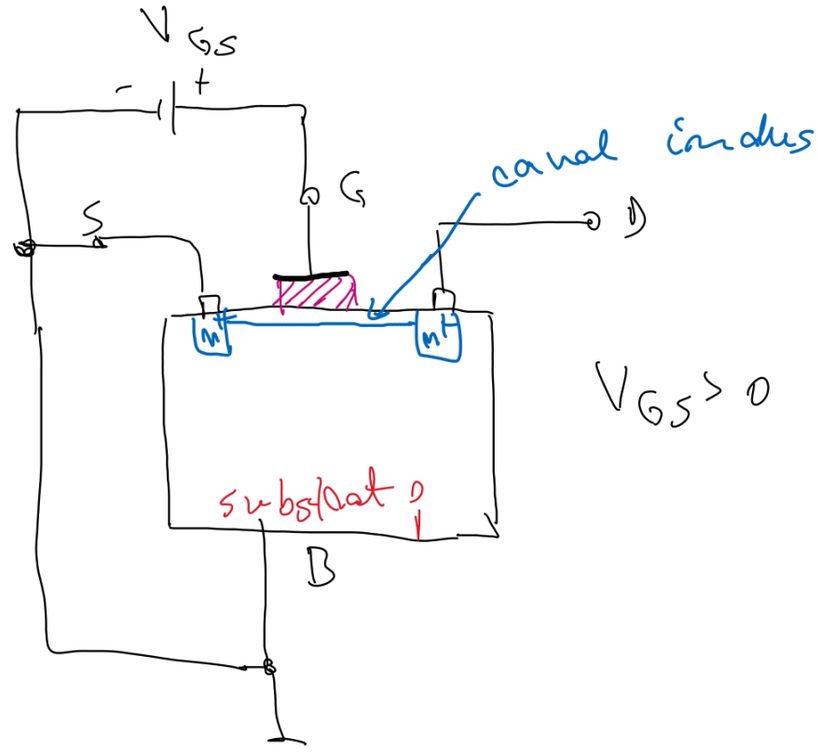


MOSFET cu canal indus
("enhancement type")



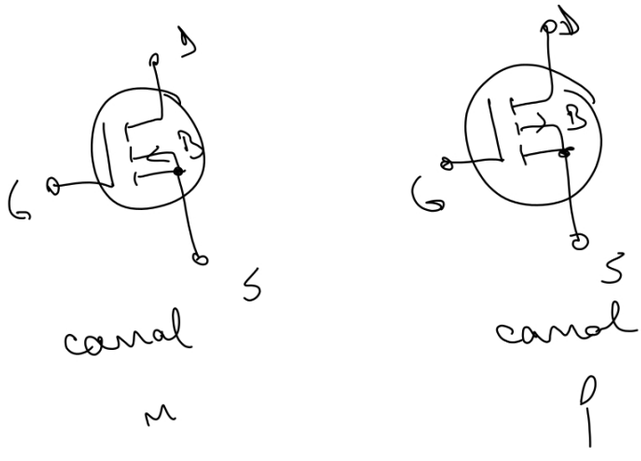
$V_{GS} = 0 \Rightarrow I_D = 0$.

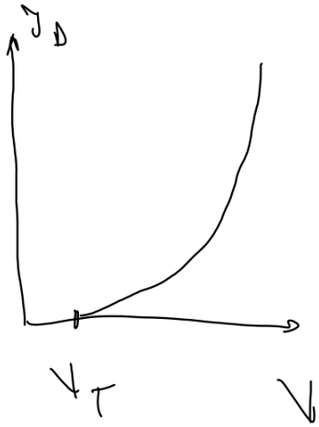
„normally OFF"

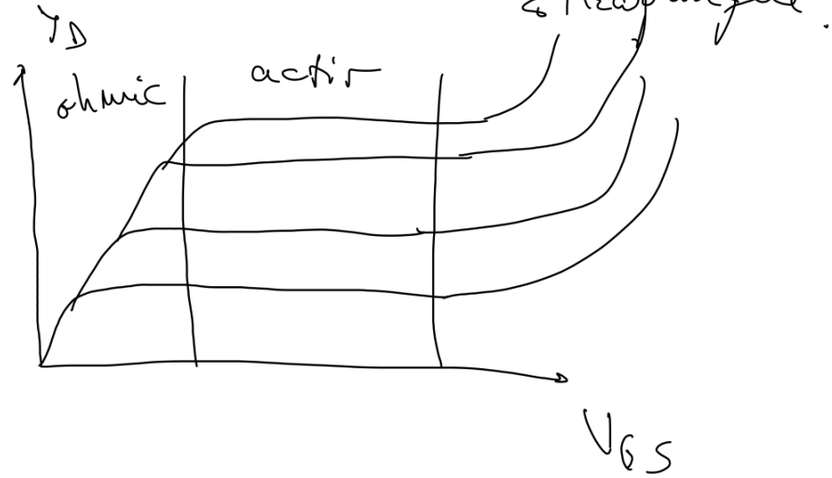


$V_{GS} > 0$

simboluri:







a) 2 curbe $I_D = f(U_{GS})$

U_{GS} (V)	$U_{DS} = 5V$ I_D (mA)	$U_{DS} = 10V$ I_D (mA)
0	11.958	11.994
-0.1	11.555	11.59
...	...	...
-2	3.963	3.983
...	...	...