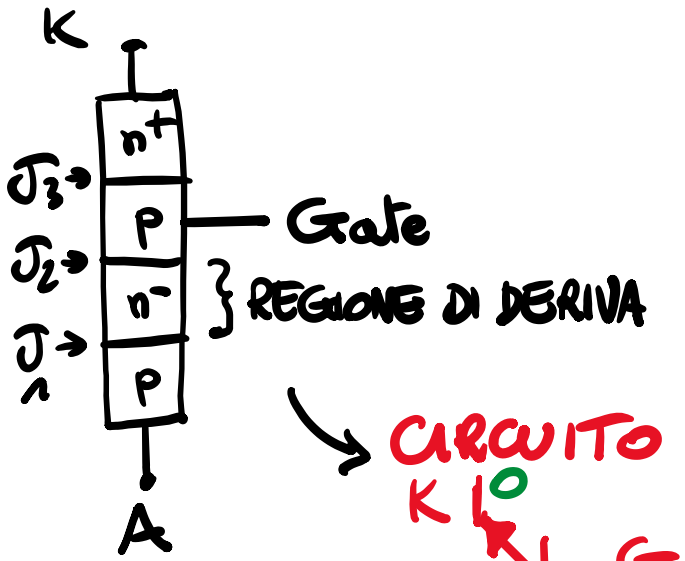
TIRISTORE - SCR [Silicon Controlled Rectifier]

TIRISTORE IDEALE



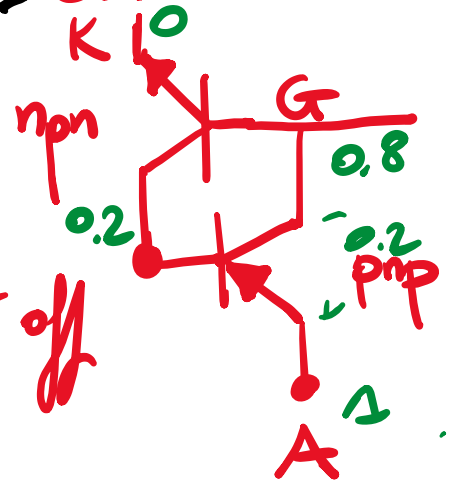
Forward Blocking

$V_{AK} > 0$ — J_2 sostiene V_{AK} (regione di deriva)

Reverse Blocking

$V_{AK} < 0$ — J_1 sostiene V_{AK} (regione di deriva)

CIRCUITO EQUIVALENTE



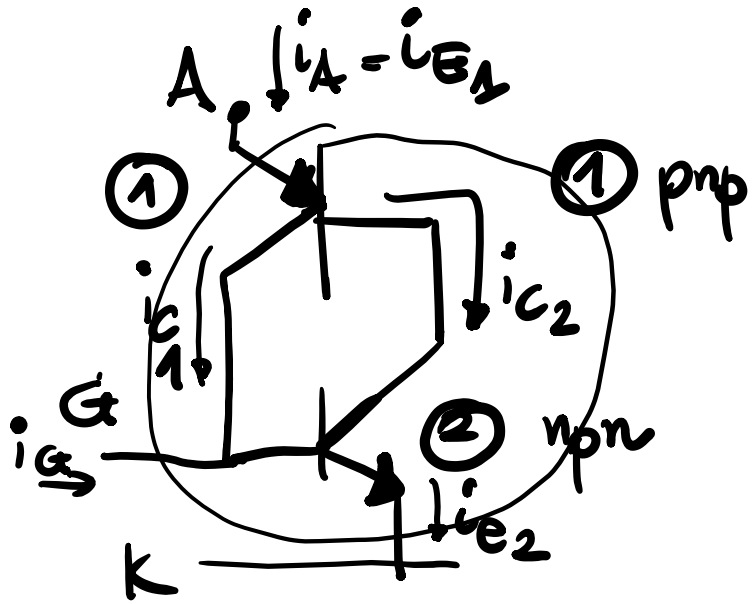
$\alpha_{pnp} \simeq 0.05 \div 0.1$ ← [la base è la regione di deriva]

$\alpha_{npn} \simeq 0.9$

2 STATI STABILI →

① OFF 2 BJT in cut off

① ON 2 BJT in SAT



$$i_A = i_{C_1} + i_{C_2}$$

$$i_A = \alpha_{pnp}\, i_{E_1} + I_{CO_1} + \alpha_{npn}\, i_{E_2} + I_{CO_2}$$

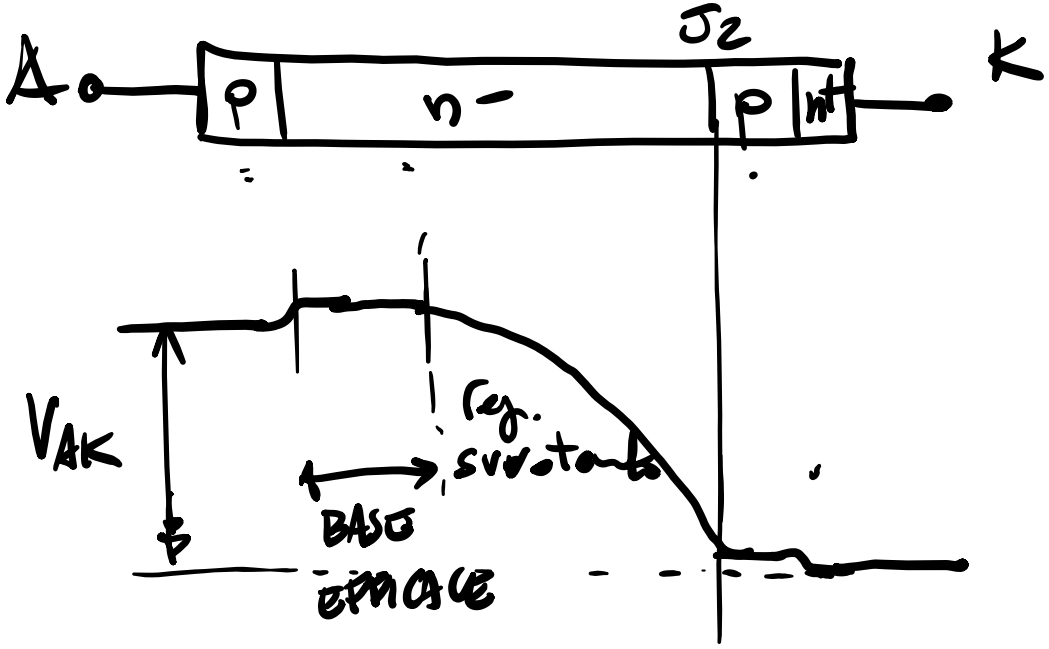
$i_{E_1} = i_A$; $i_{E_2} = i_A + i_G$

$$i_A\left[1 - \alpha_{pnp} - \alpha_{npn}\right] = \alpha_{npn}\, i_G + I_{CO_1} + I_{CO_2}$$

$$i_A = \frac{\alpha_{npn}\, i_G + I_{CO_1} + I_{CO_2}}{1 - \alpha_{pnp} - \alpha_{npn}}$$

↗ se $1 - \alpha_{npn} - \alpha_{pnp} > 0$ → l'SCR è OFF

↗ se $1 - \alpha_{npn} - \alpha_{pnp} = 0$ → l'SCR si porta in conduzione

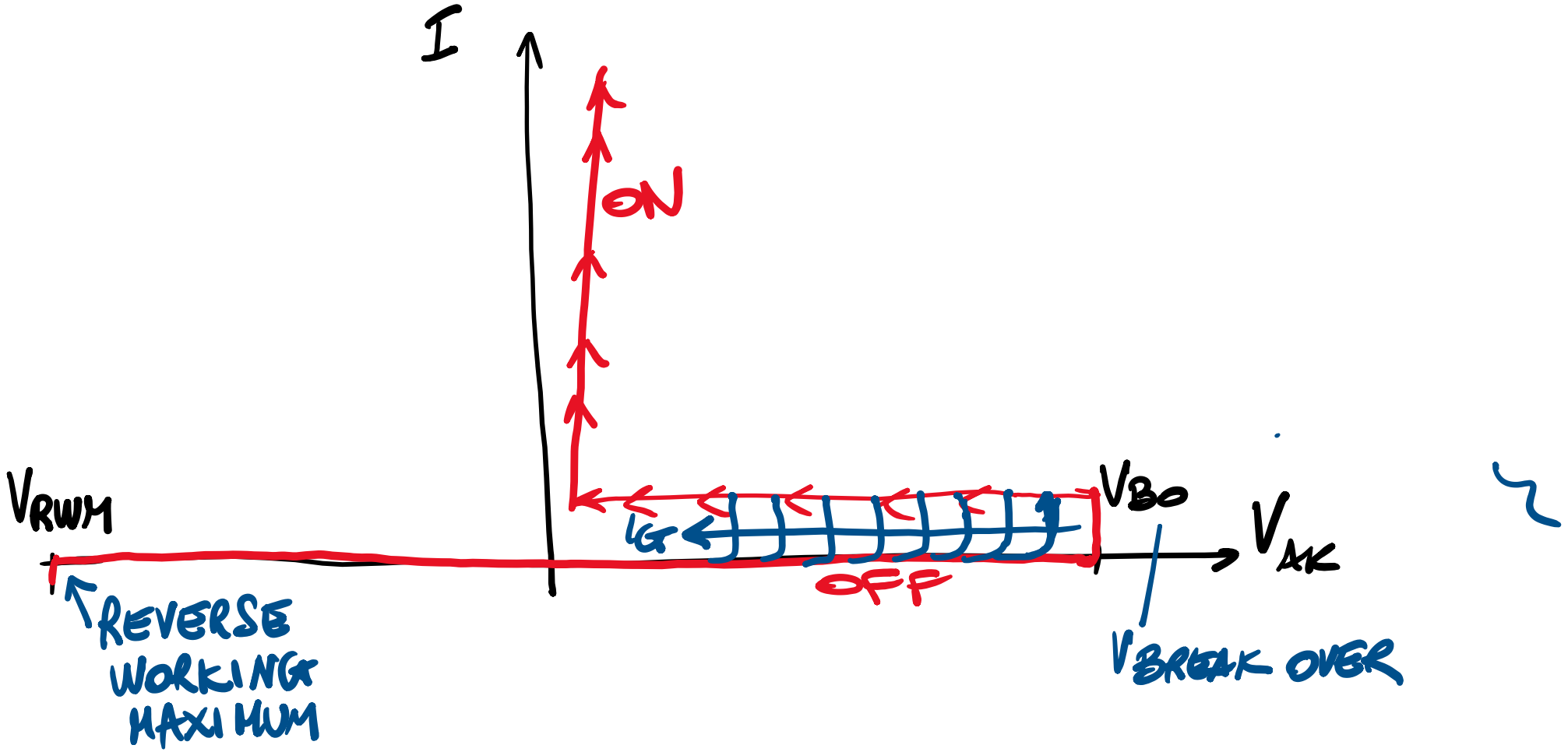


V_{AK}

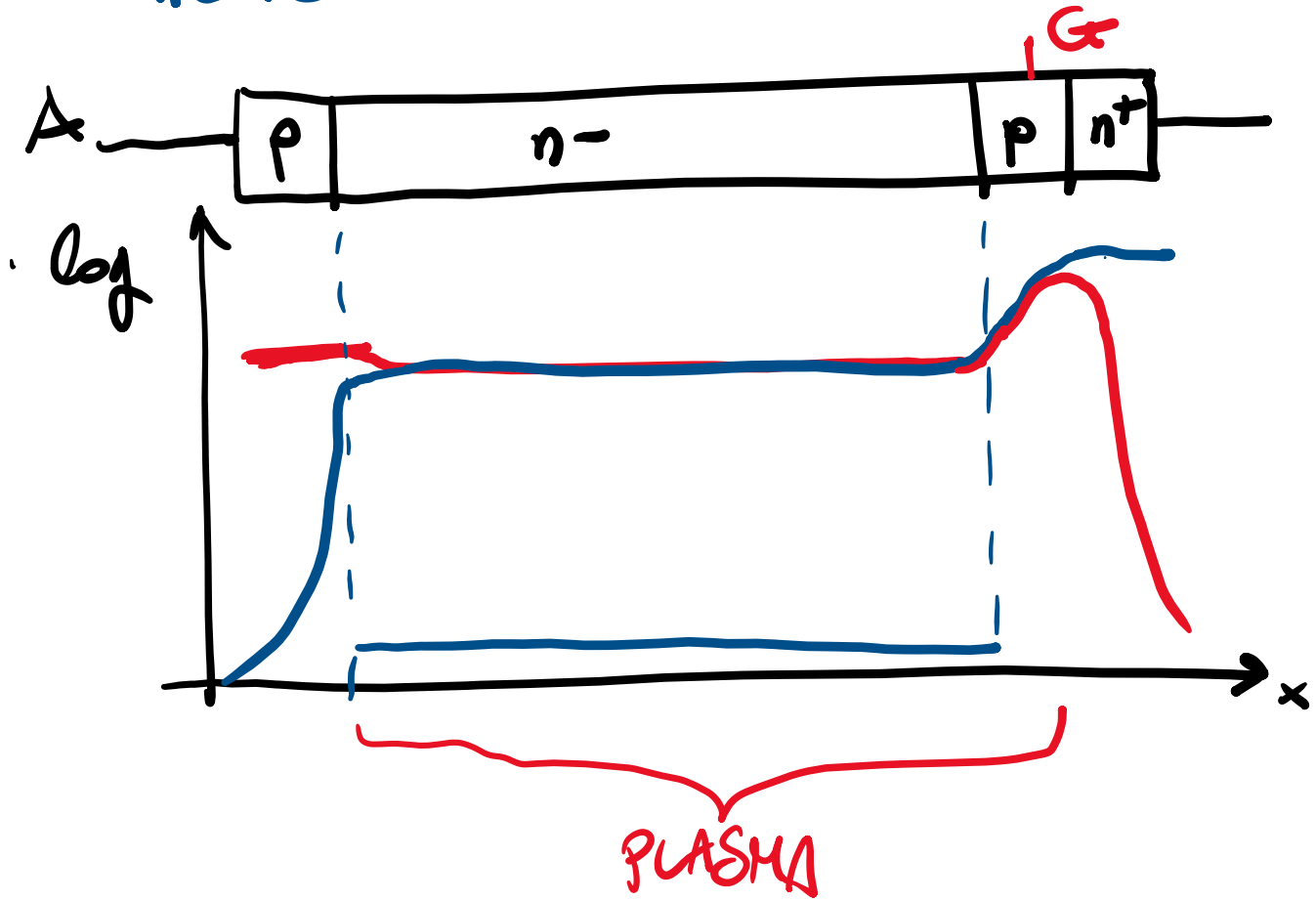
potenziale

se V_{AK} aumenta → aumenta la zona di svuotamento → si accorcia la base efficace → α_{pnp} aumenta

se I_G aumenta → aumenta I_{B2} → aumenta I_{C2} → aumenta α_{npn}

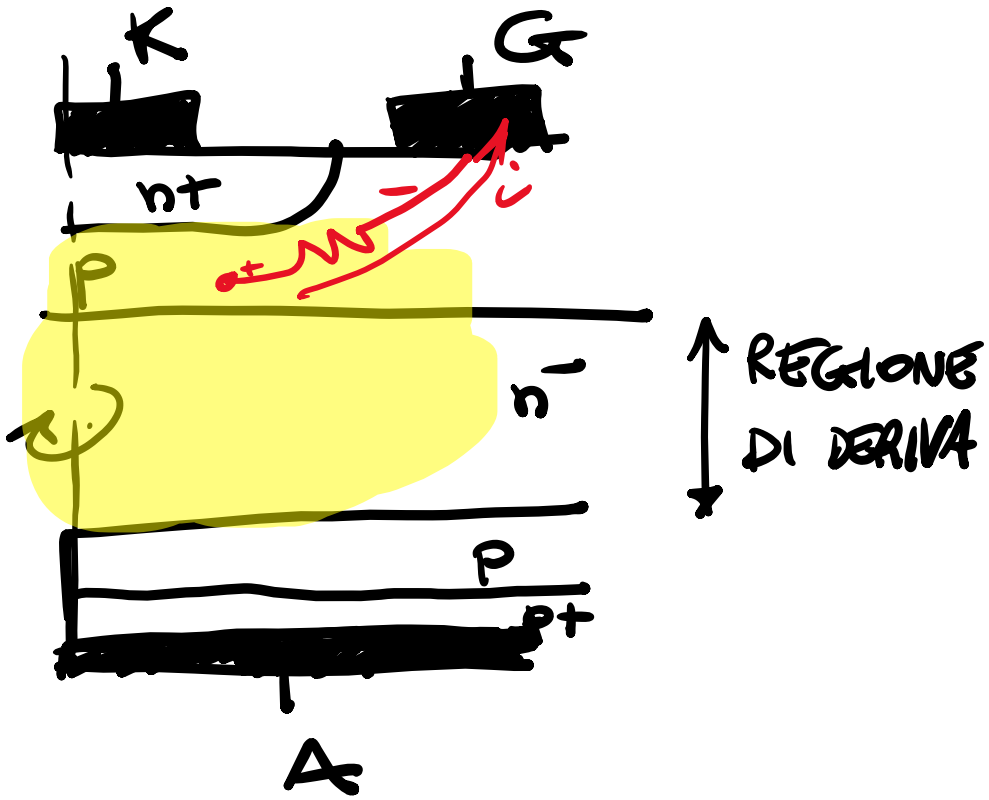

I
ON
VRWM
IG
VBO
VAK
OFF
REVERSE
WORKING
MAXIMUM
VBREAK OVER

TIRISTORE IN CONDUZIONE



$$V_{ON} = V_J + R_{ON} I$$

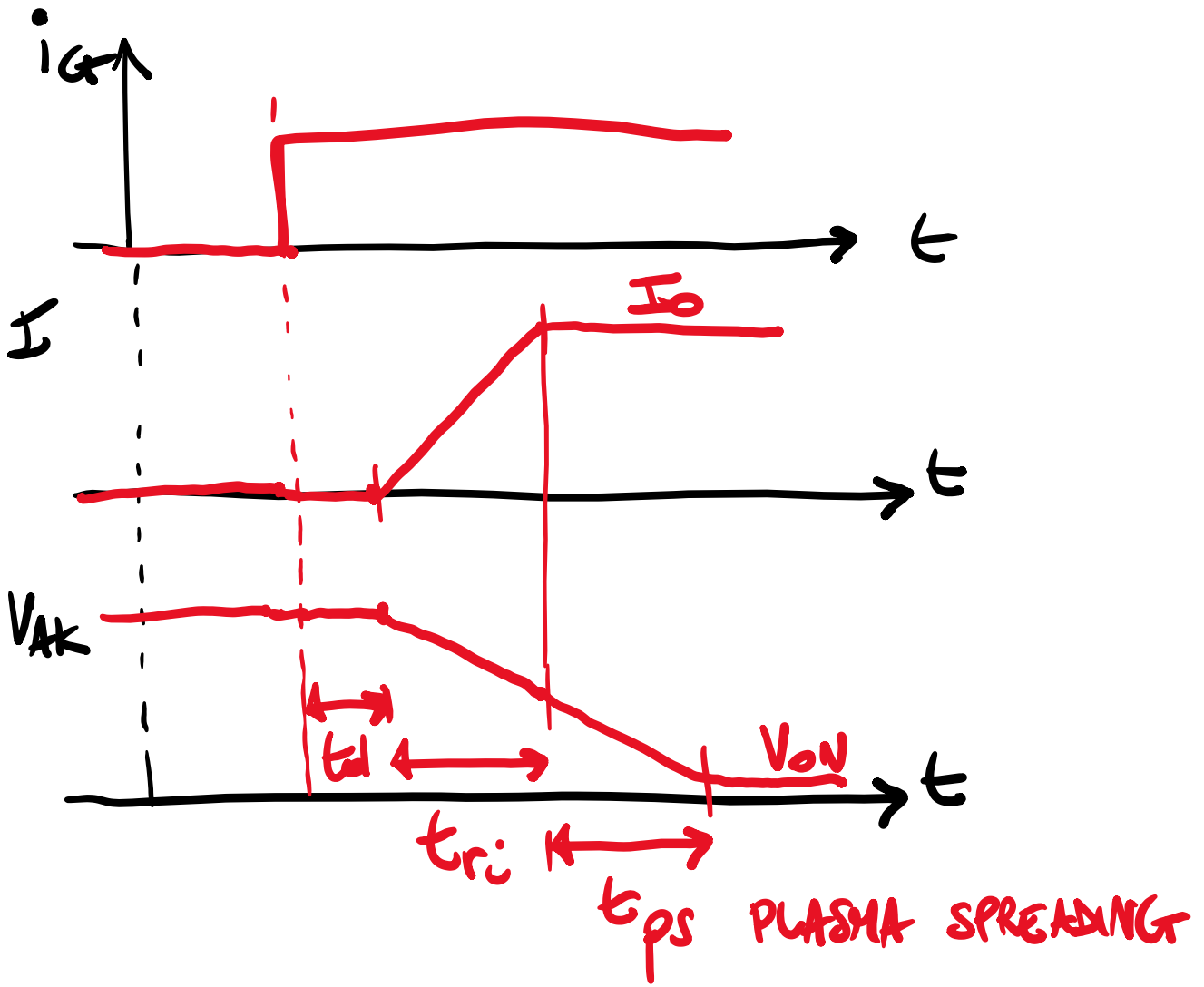
SPEGNIMENTO

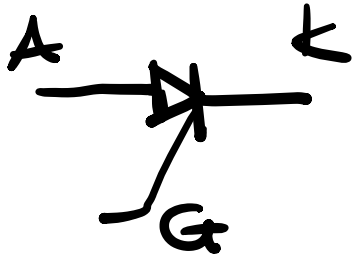


la corrente di gate
non riesce a svuotare il plasma

abbiamo bisogno di $V_{AK} < 0$

TRANSITORIO DI ACCENSIONE





$$\max \frac{dI}{dt}$$

PER EVITARE FUGHE TERMICHE