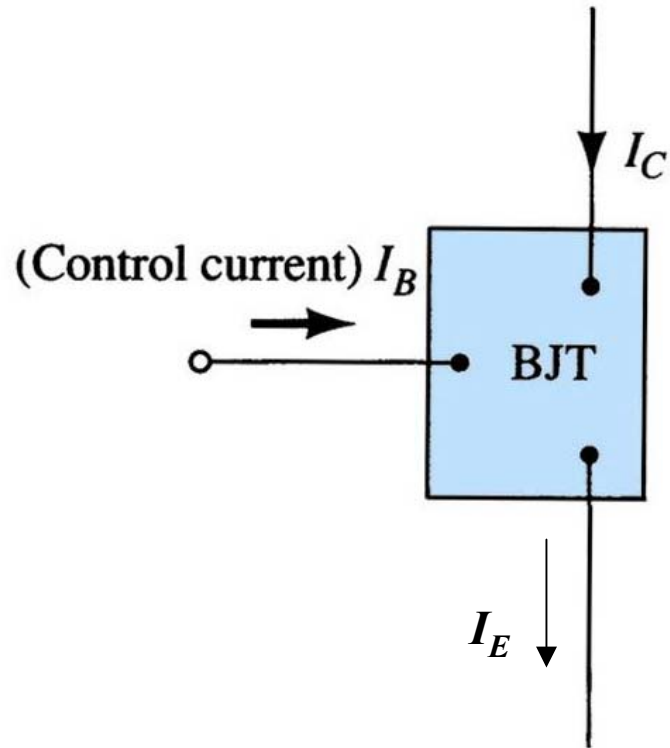


# **Aula 02**

# **Curva Característica de Transferência do JFET**

**(pág. 179 a 186)**

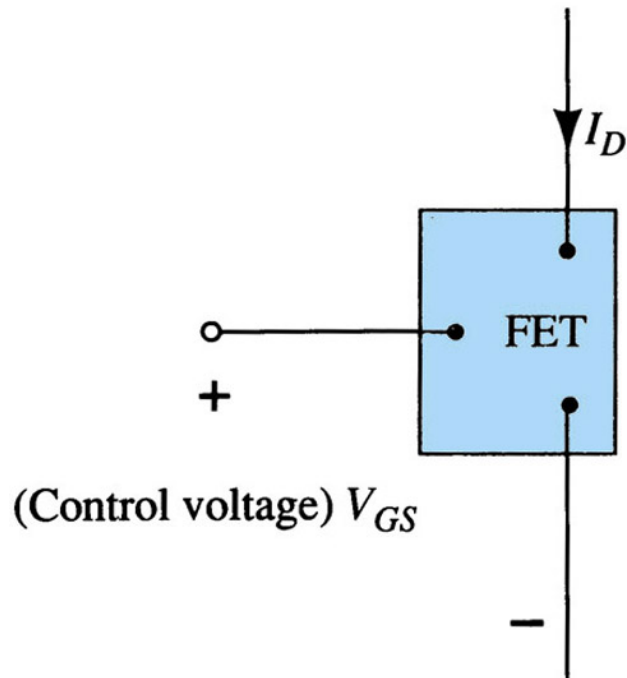
# Curva de Transferência do JFET



- TBJ: controlado por corrente.

$$I_C = \beta \cdot I_B \quad [5.2]$$

## Slide 2



- JFET: controlado por tensão.

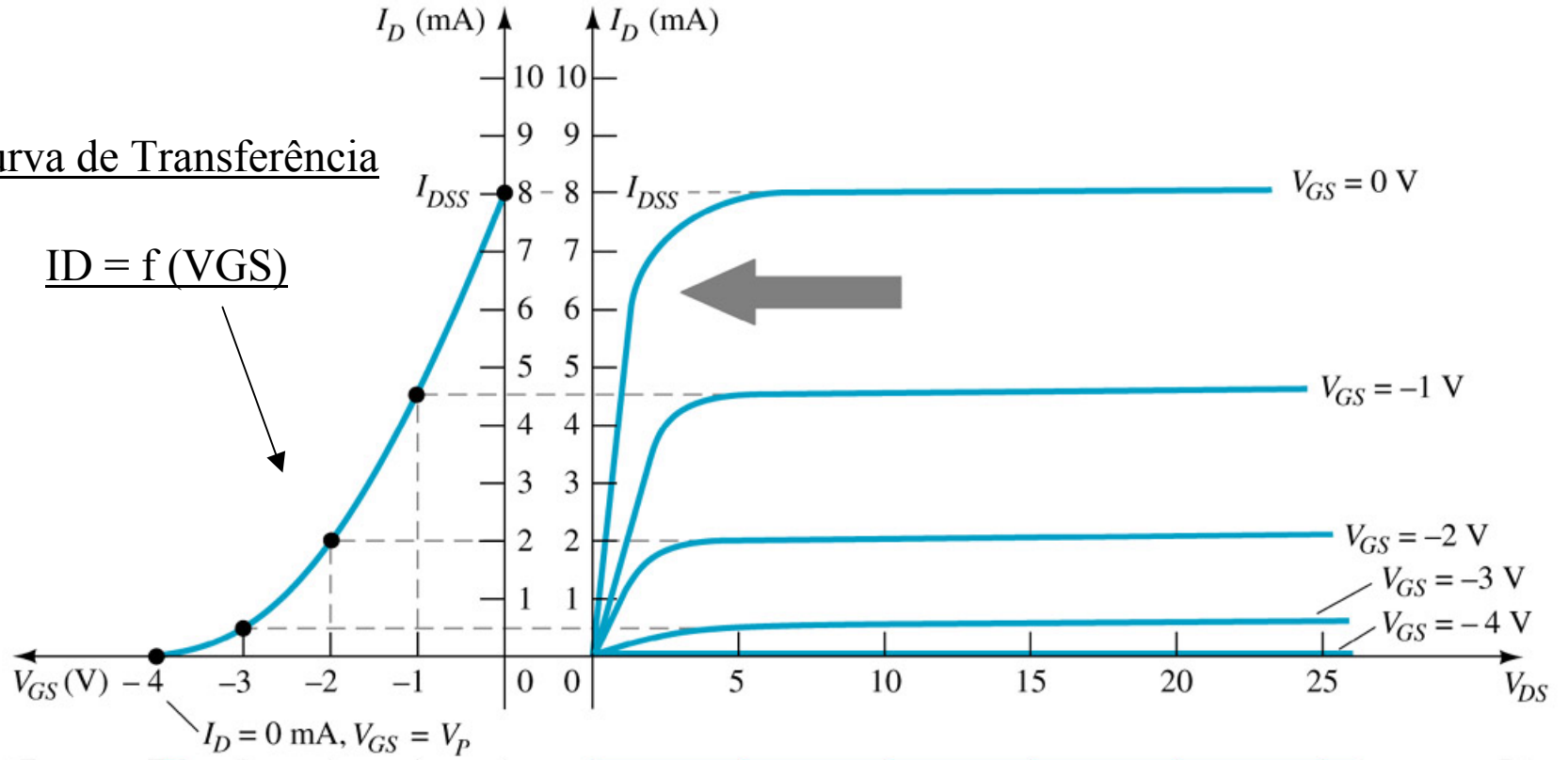
$$I_D = I_{DSS} \left(1 - \frac{V_{GS}}{V_P}\right)^2 \quad [5.3]$$

Equação de Shockley

# Curva de Transferência

Curva de Transferência

$I_D = f(V_{GS})$



## Aplicação da Equação de Shockley

Equação 5.3

Originar figura de transferência

↑  
IDSS, Vp (folha de dados do fabricante)

- Para  $V_{GS} = 0 \text{ V}$  →  $ID = IDSS \left(1 - \frac{0}{V_P}\right)^2$  →  $ID = IDSS$
- Para  $V_{GS} = V_p \text{ V}$  →  $ID = IDSS \left(1 - \frac{V_P}{V_P}\right)^2$  →  $ID = 0 \text{ A}$
- Para  $V_{GS}$  de 0 a  $V_p \text{ V}$  →  $ID = IDSS \left(1 - \frac{V_P}{V_P}\right)^2$

$$ID = IDSS \left(1 - \frac{V_P}{V_P}\right)^2$$

$$V_{GS} = V_p \left(1 - \sqrt{\frac{I_D}{I_{DSS}}}\right)$$

[5.6]

Método Simplificado

$V_{GS}$	$I_D$
0	$I_{DSS}$
$0,3 V_p$	$I_{DSS}/2$
$0,5 V_p$	$I_{DSS}/4$
$V_p$	0

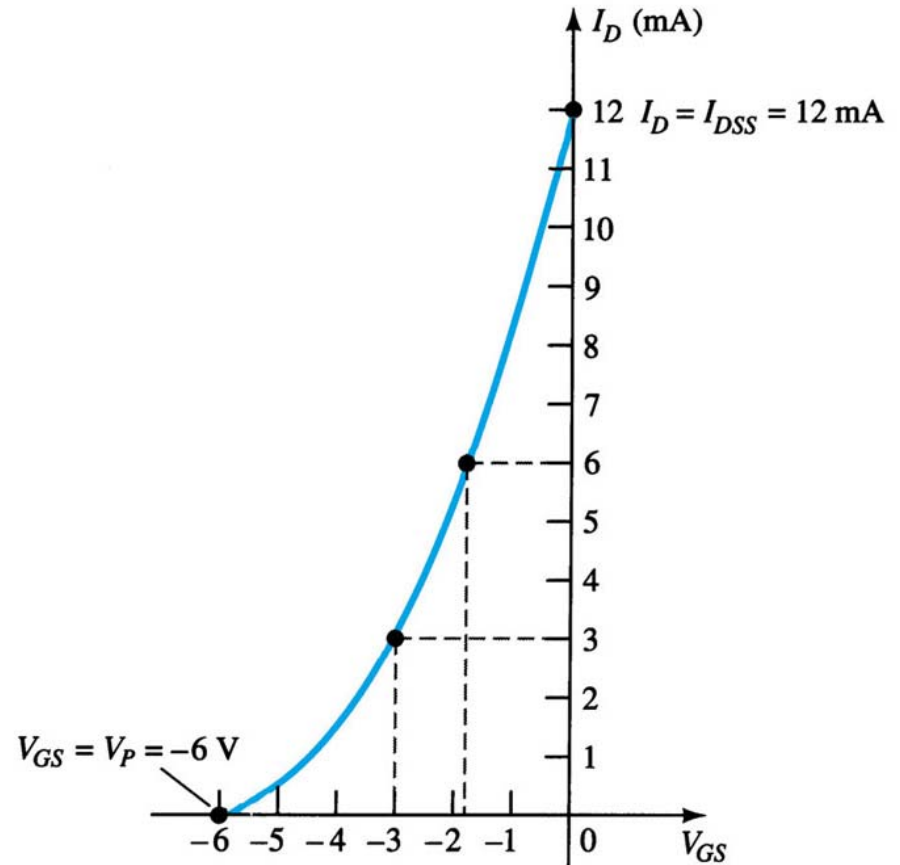
## Slide 6

**Exemplo 5.1:** Esboce a curva de transferência definida por  $I_{DSS} = 12 \text{ mA}$  e  $V_p = -6 \text{ V}$ .

## Slide 7

### Exemplo 5.1: Solução

$V_{GS}$ (V)	$I_D$ (mA)
0	12,0
-1,8	6,0
-3,0	3,0
-6,0	0



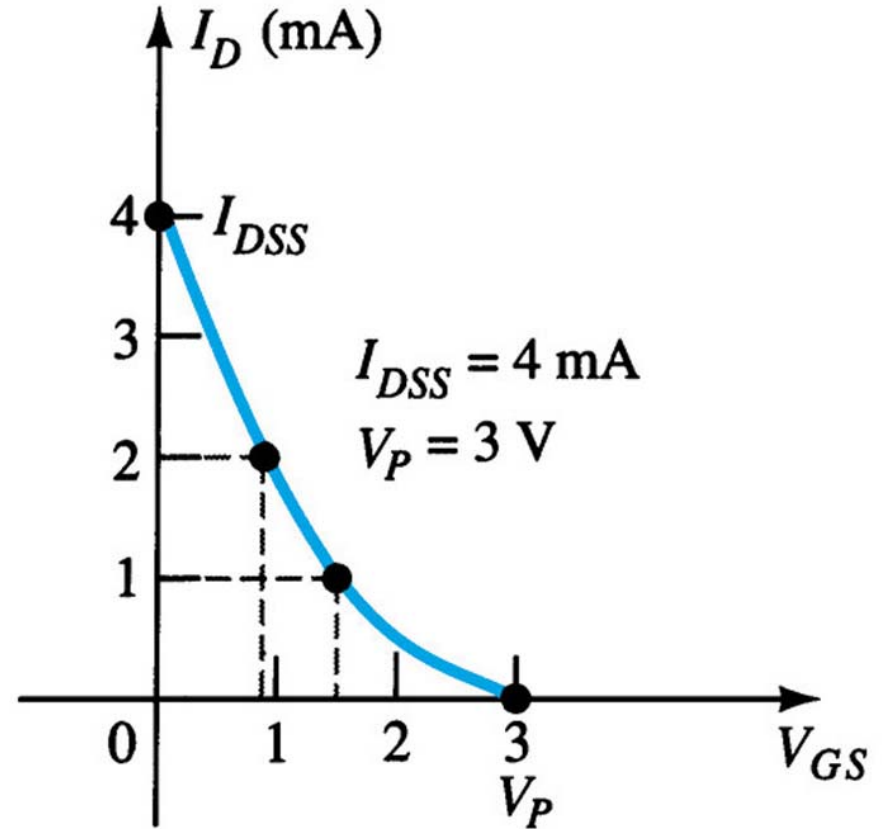
## Slide 8

**Exemplo 5.2:** Esboce a curva de transferência para um dispositivo tipo P, definida por  $I_{DSS} = 4 \text{ mA}$  e  $V_p = 3 \text{ V}$ .

## Slide 9

### Exemplo 5.2: Solução

$V_{GS}$ (V)	$I_D$ (mA)
0	4,0
0,9	2,0
1,5	1,0
3,0	0



# Folha de Dados

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	25	Vdc
Drain-Gate Voltage	$V_{DG}$	25	Vdc
Reverse Gate-Source Voltage	$V_{GSR}$	-25	Vdc
Gate Current	$I_G$	10	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	310 2.82	mW mW/°C
Junction Temperature Range	$T_J$	125	°C
Storage Channel Temperature Range	$T_{stg}$	-65 to +150	°C

**2N5457**  
CASE 29-04, STYLE 5  
TO-92 (TO-226AA)



**JFETs**  
**GENERAL PURPOSE**  
**N-CHANNEL—DEPLETION**

Refer to 2N4220 for graphs.

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Gate-Source Breakdown Voltage ( $I_G = -10 \mu\text{Adc}$ , $V_{DS} = 0$ )	$V_{BR(GSS)}$	-25	-	-	Vdc
Gate Reverse Current ( $V_{GS} = -15 \text{Vdc}$ , $V_{DS} = 0$ ) ( $V_{GS} = -15 \text{Vdc}$ , $V_{DS} = 0$ , $T_A = 100^\circ\text{C}$ )	$I_{GSS}$	-	-	-1.0 -200	nAdc
Gate Source Cutoff Voltage ( $V_{DS} = 15 \text{Vdc}$ , $I_D = 10 \text{nAdc}$ )	$V_{GS(off)}$	-0.5	-	-6.0	Vdc
Gate Source Voltage ( $V_{DS} = 15 \text{Vdc}$ , $I_D = 100 \mu\text{Adc}$ )	$V_{GS}$	-	-2.5	-	Vdc

**ON CHARACTERISTICS**

Zero-Gate-Voltage Drain Current* ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ )	$I_{DSS}$	1.0	3.0	5.0	mAdc
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**SMALL-SIGNAL CHARACTERISTICS**

Forward Transfer Admittance Common Source* ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 1.0 \text{kHz}$ )	$ y_{fs} $	1000	-	5000	$\mu\text{mhos}$
Output Admittance Common Source* ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 1.0 \text{kHz}$ )	$ y_{os} $	-	10	50	$\mu\text{mhos}$
Input Capacitance ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 1.0 \text{MHz}$ )	$C_{iss}$	-	4.5	7.0	pF
Reverse Transfer Capacitance ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 1.0 \text{MHz}$ )	$C_{rss}$	-	1.5	3.0	pF

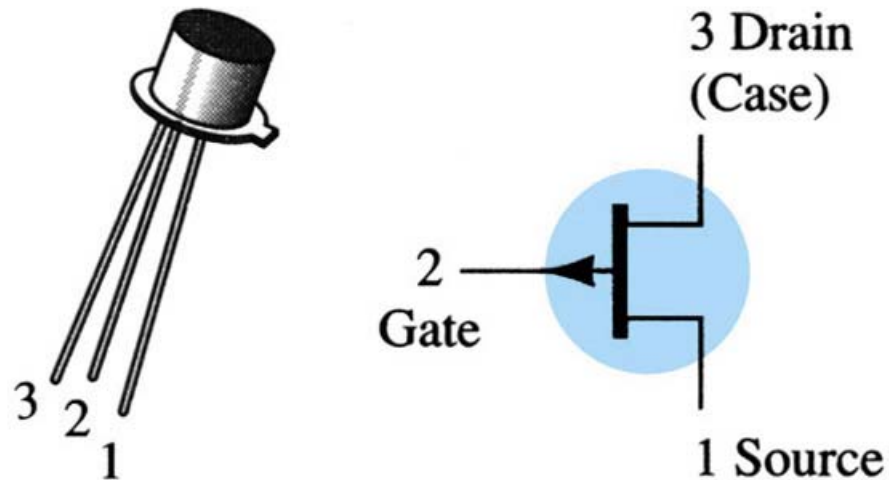
\*Pulse Test: Pulse Width  $\leq 630 \text{ms}$ ; Duty Cycle  $\leq 10\%$

## Identificação dos Terminais

# 2N2844

CASE 22-03, STYLE 12

TO-18 (TO-206AA)

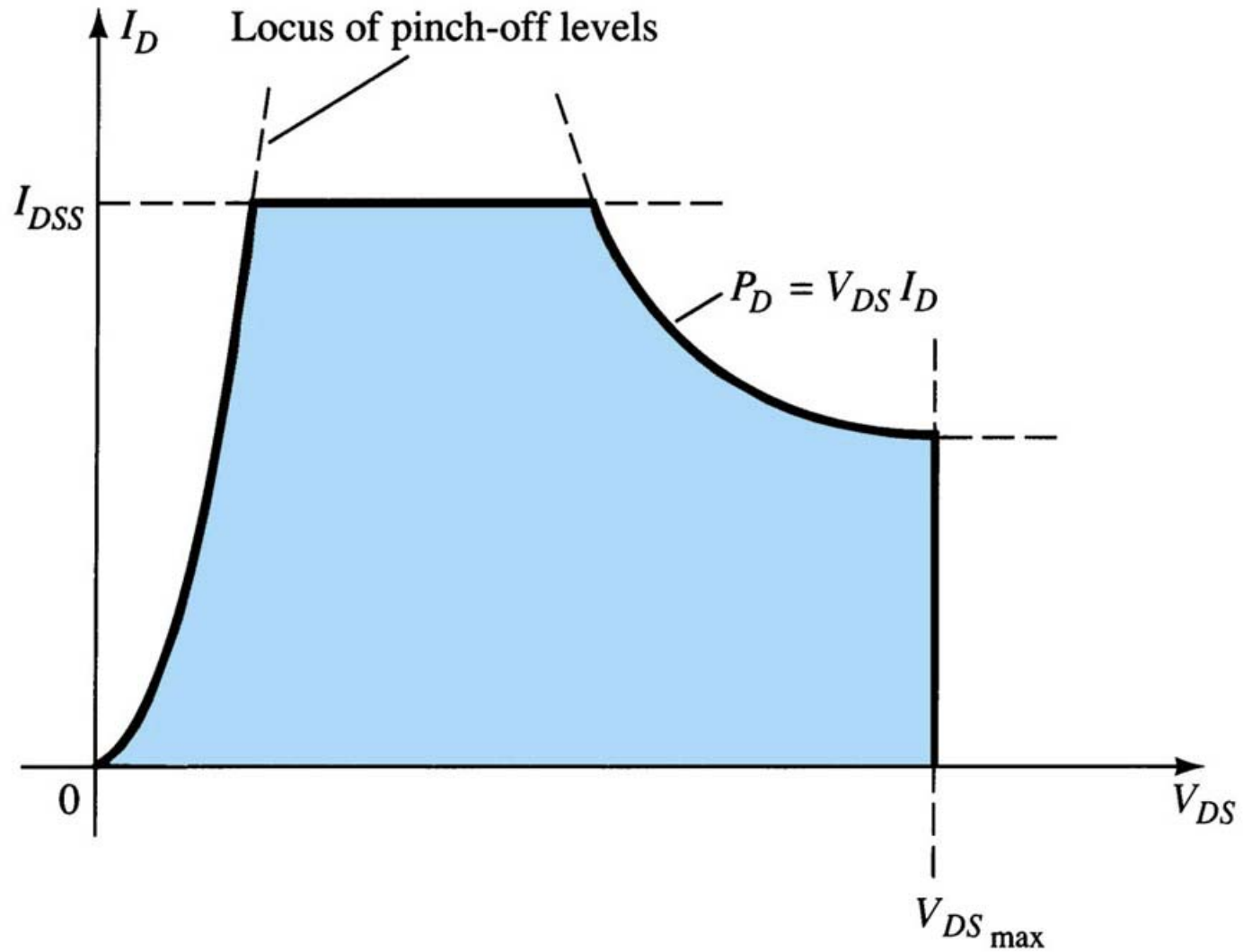


### JFETs

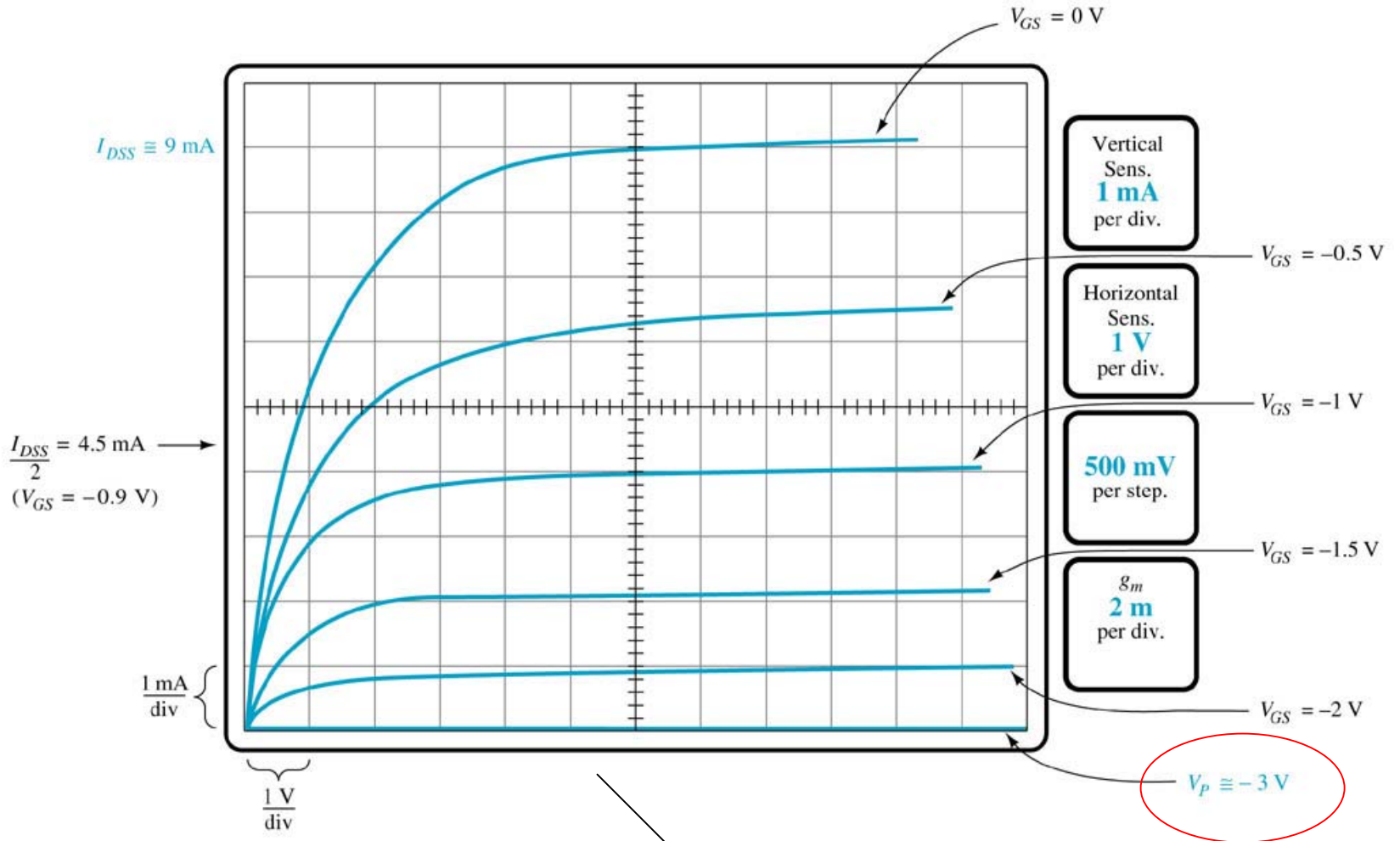
## GENERAL PURPOSE

### P-CHANNEL

## Região de Operação

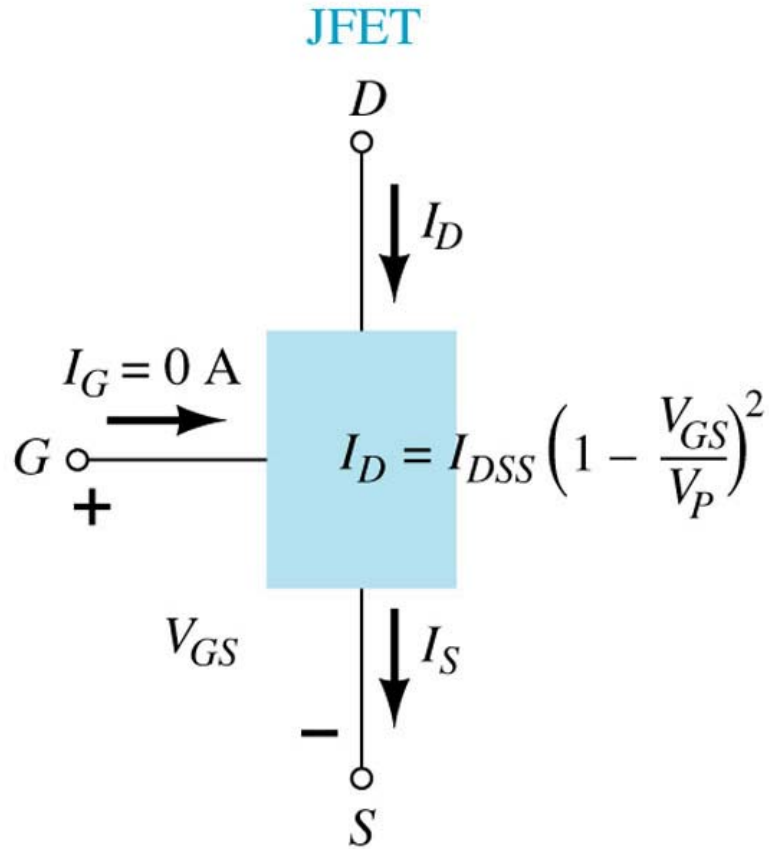


# Obtenção de $V_p$

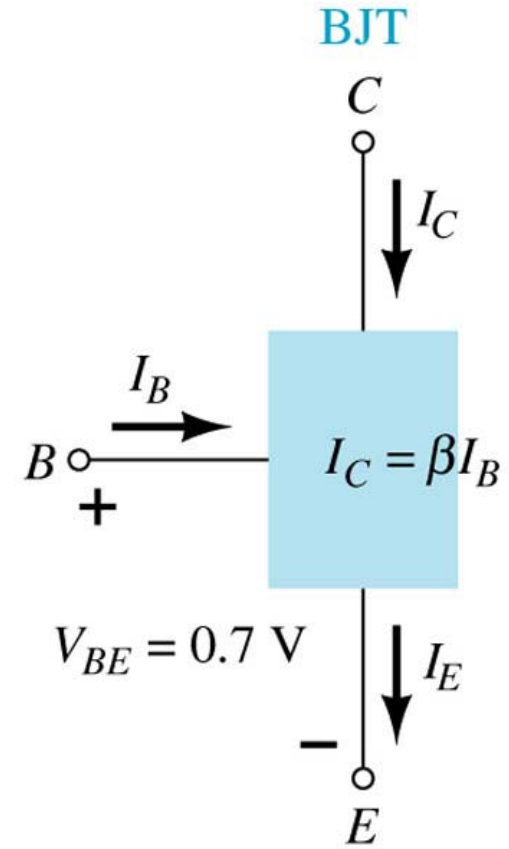


Curvas obtidas através de um Traçador

## Relações Importantes



(a)



(b)

## Slide 15

Fazer:

- Ex. 10 (pág. 202)
- Ex. 12 (pág. 202)