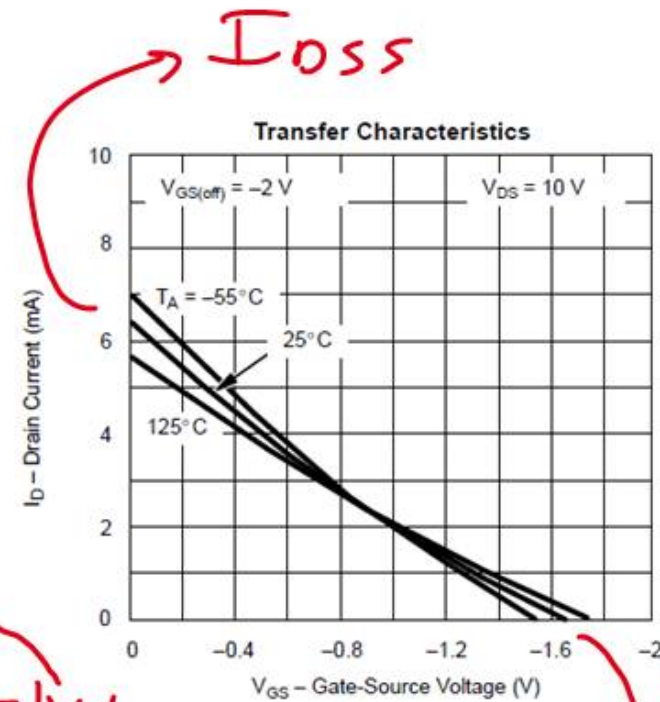
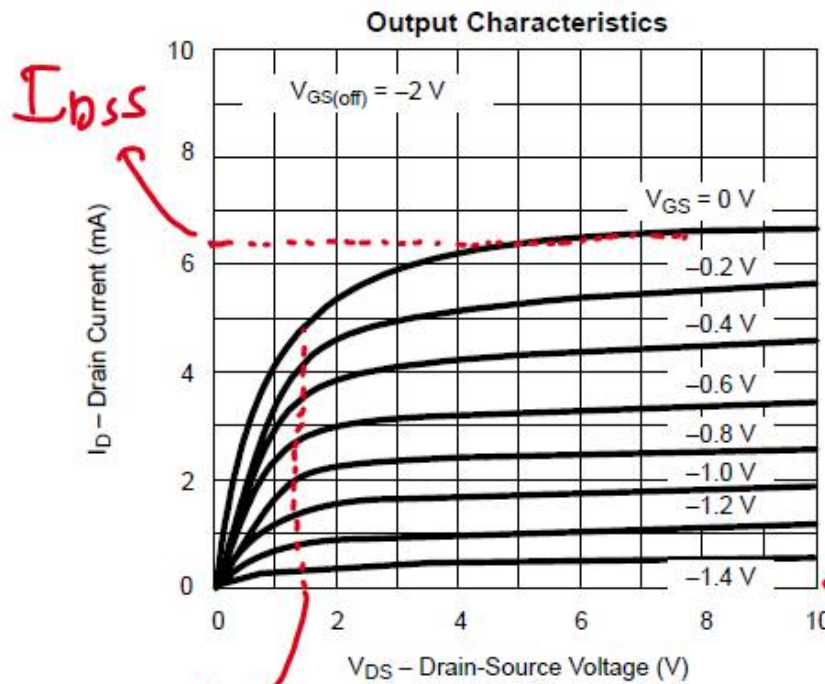


# N-Channel JFET

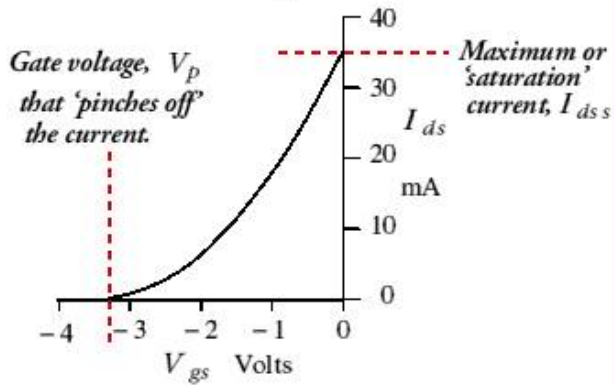
PRODUCT SUMMARY			
$V_{GS(off)}$ (V)	$V_{(BR)GSS}$ Min (V)	$g_{fs}$ Min (mS)	$I_{DSS}$ Min (mA)
$\leq -8$	-25	2	2



*Handwritten:*  $V_{GS(off)} \approx -1.4\text{ V}$   
 $I_{DSS} \approx 6.5\text{ mA}$

*Handwritten:*  $-|V_p|$

Simplified characteristic curve for any drain-source voltage above a few volts.



JFET as a

constant current source

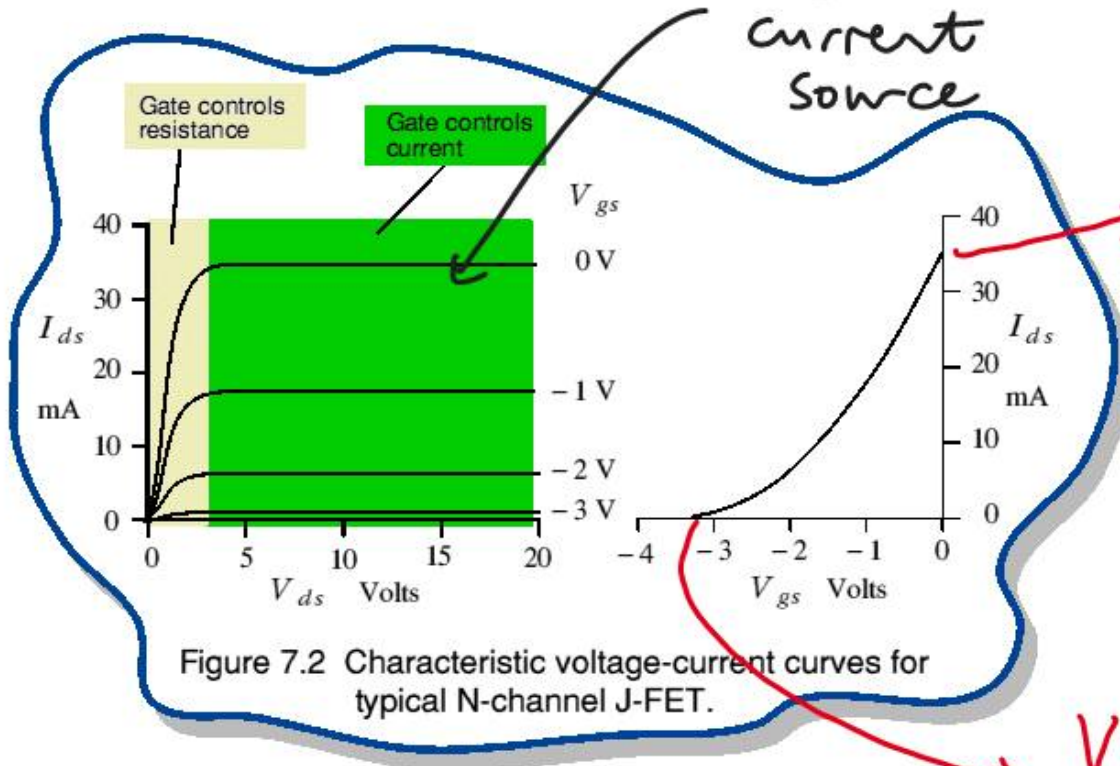


Figure 7.2 Characteristic voltage-current curves for typical N-channel J-FET.

$I_{DSS}$  at  $V_{GS} = 0V$ .

$V_{GS\ off}$  or  $-|V_p|$  when  $I_D = 0$

# Universal JFET input Characteristics

$I_{DSS} = 6 \text{ mA}$   
 $6 \text{ mA} \leftarrow$

$4.8 \text{ mA} \leftarrow$

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

$2.4 \text{ mA} \leftarrow$

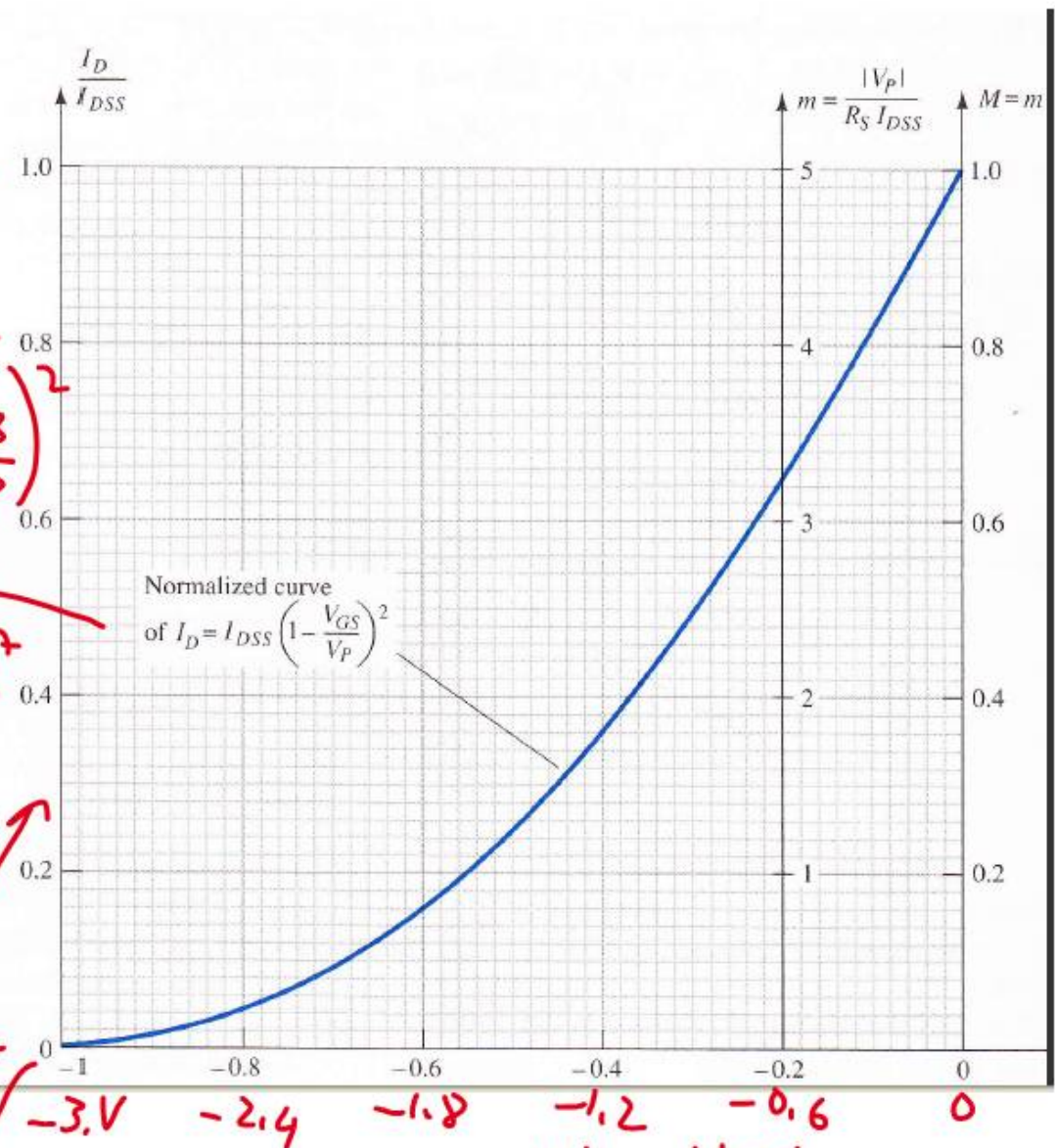
Shockley's  
Equation

If  $I_{DSS} = 6 \text{ mA}$

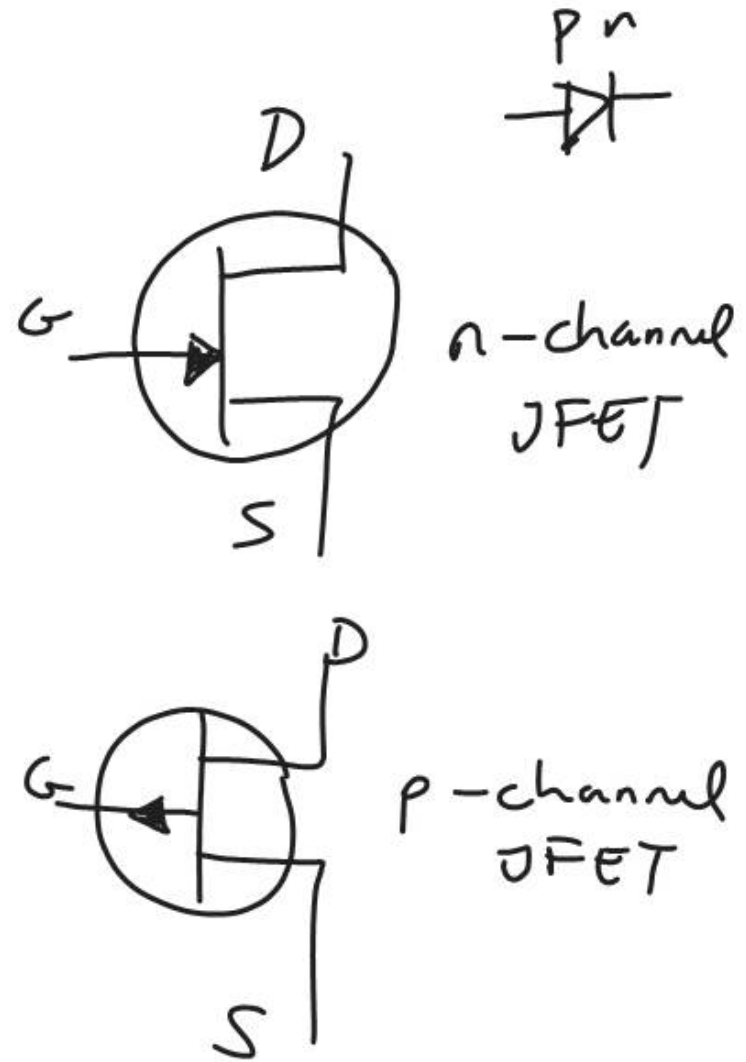
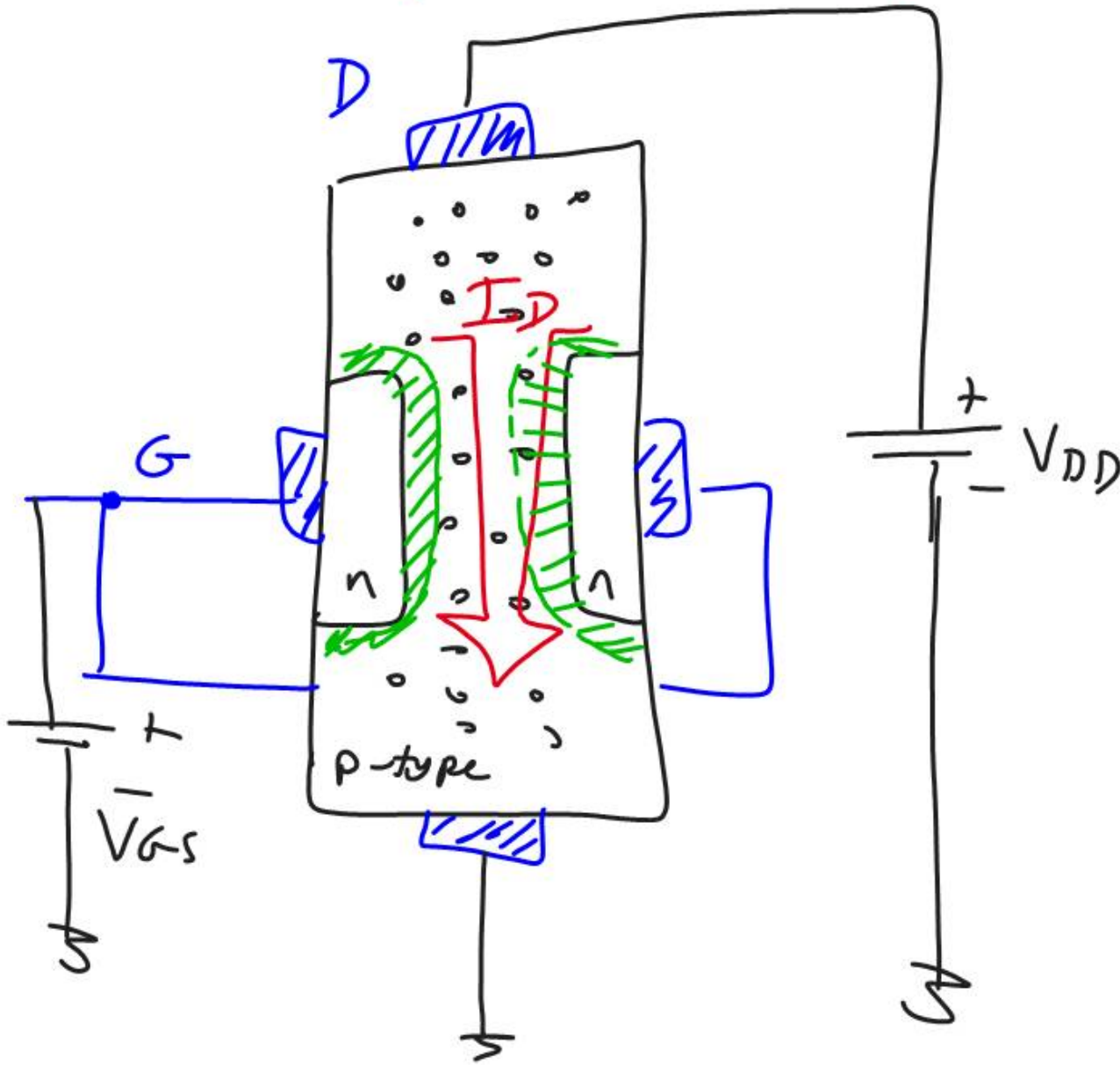
$\frac{V_{GS}}{-|V_P|} \leftarrow$

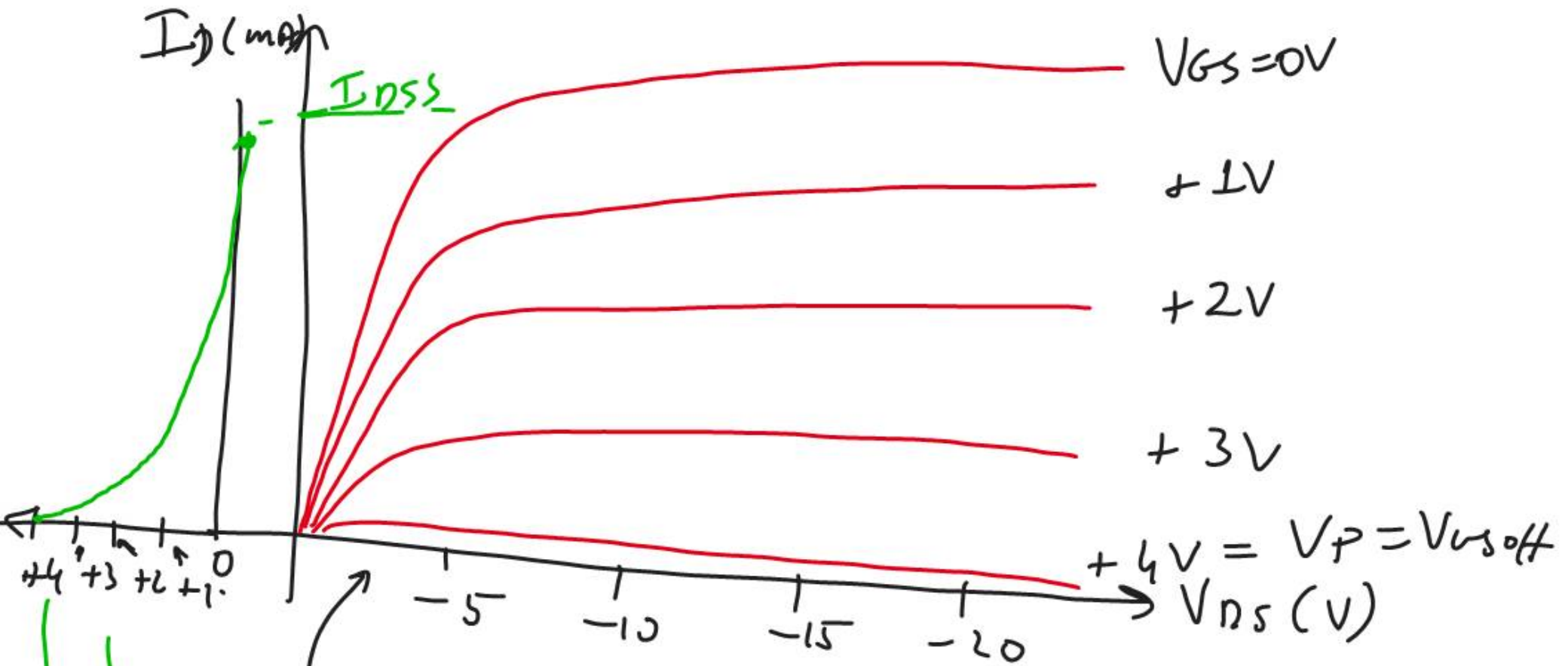
Horizontal axis is normalized by  $|V_P|$

$-1 = \frac{V_P}{|3|}$  if  $V_P = -3 \text{ V}$   $|V_P| = 3$



# A p-channel JFET



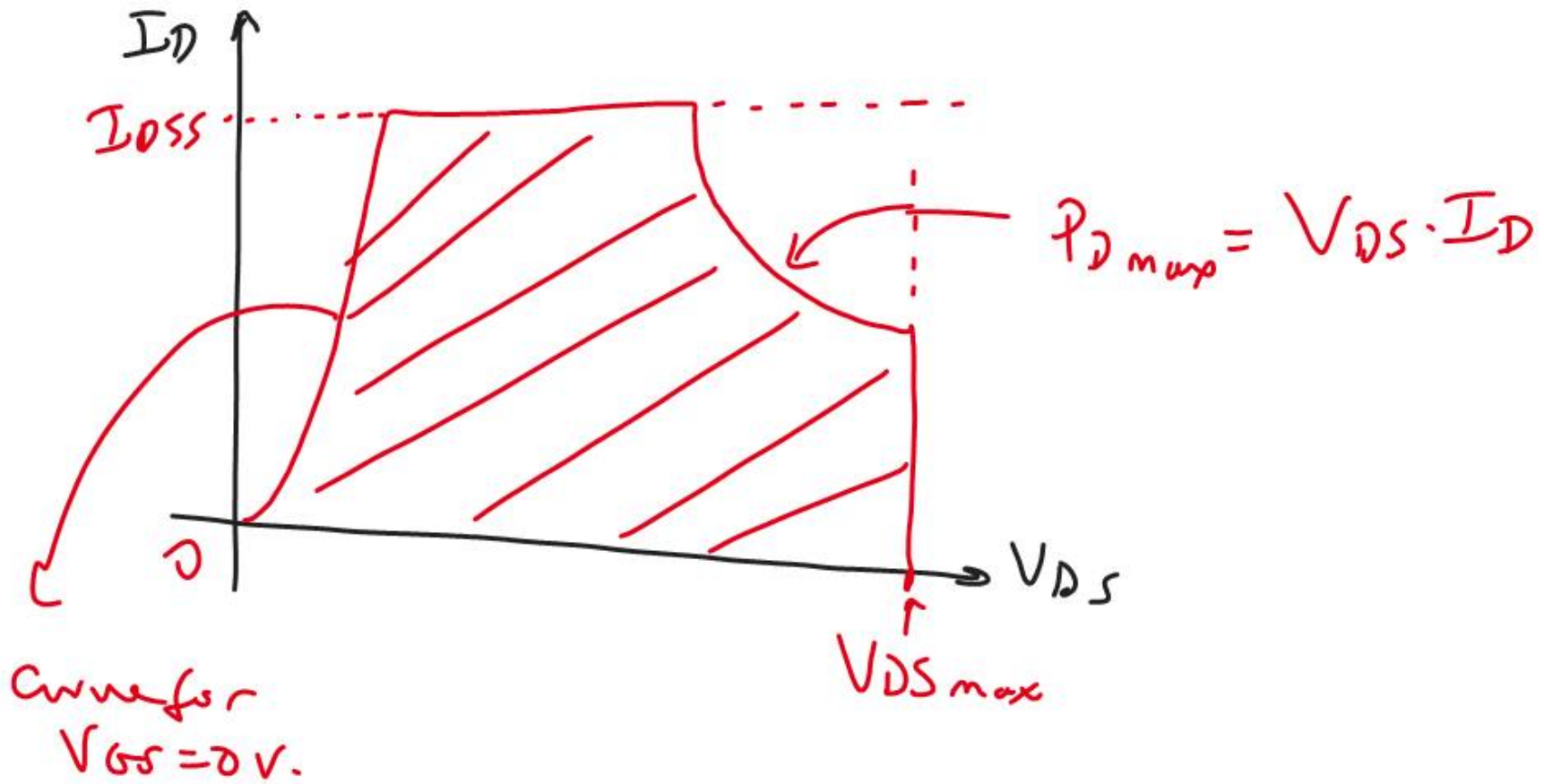


Output Characteristics for a p-channel JFET

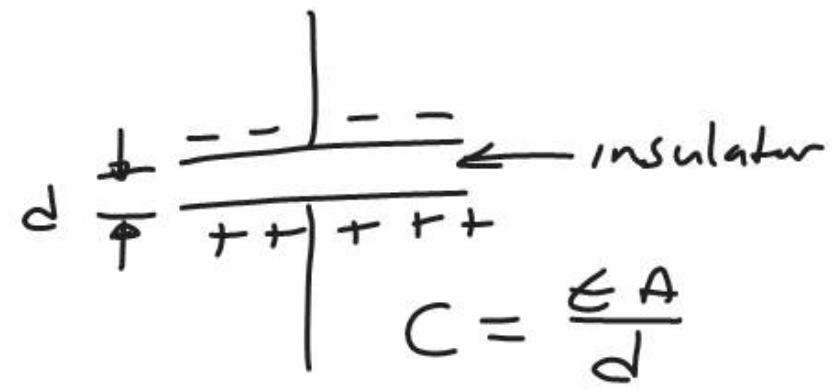
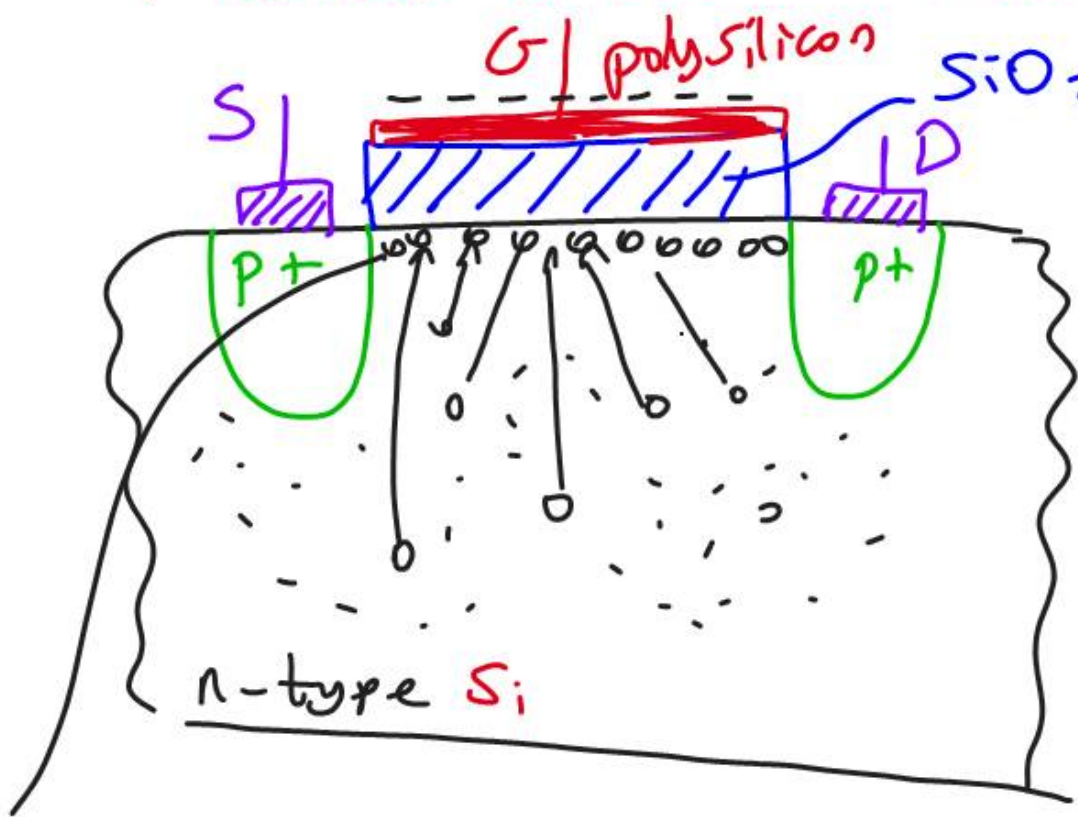
Input Characteristics

$V_P$

# MAXIMUM RATINGS for a JFET



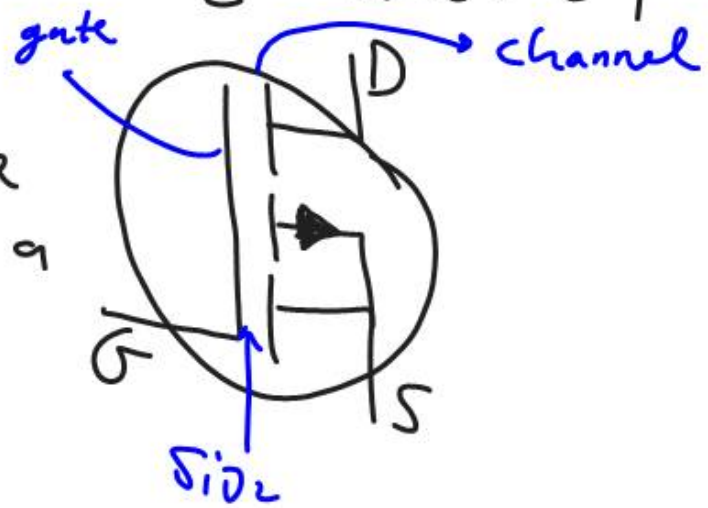
# Metal-oxide-Semiconductor (MOS) FET = MOSFET



A p-channel  
E-MOSFET

a channel is formed with  $V_{GS}$   
after the channel is formed at the  
interface, applying  $V_{DS}$  will create a  
drain current  $I_D$ .

Normally-off MOSFET  
E-MOSFET (enhancement MOSFET)



# MOSFET

Enhancement type  
E-MOSFET  
(normally OFF)

Depletion Type  
D-MOSFET  
(normally ON)



p-channel

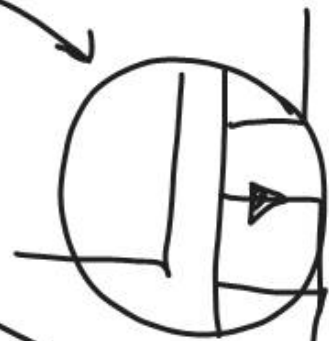
D-MOSFET

E-MOSFET

n-channel

D-MOSFET

E-MOSFET





# A-Complementary Mos (CMOS) inverter:

