FET - 2

Confronto

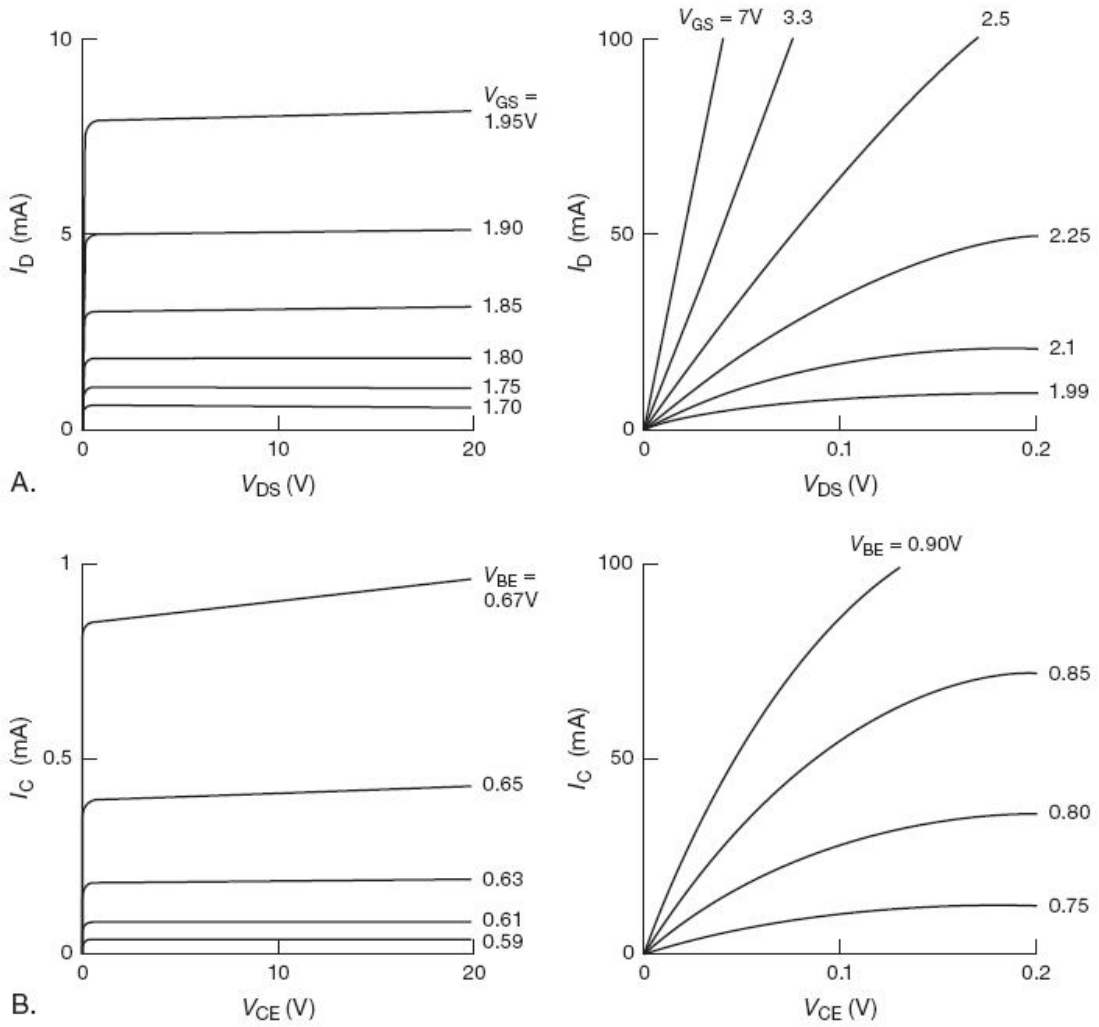


Figure 3.2. Measured MOSFET/transistor characteristic curves: A. VN0106 (similar to the popular 2N7000) n-channel MOSFET: I_D versus V_{DS} for various values of V_{GS}. B. 2N3904 npn bipolar transistor: I_C versus V_{CE} for various values of V_{BE}.

Famiglie

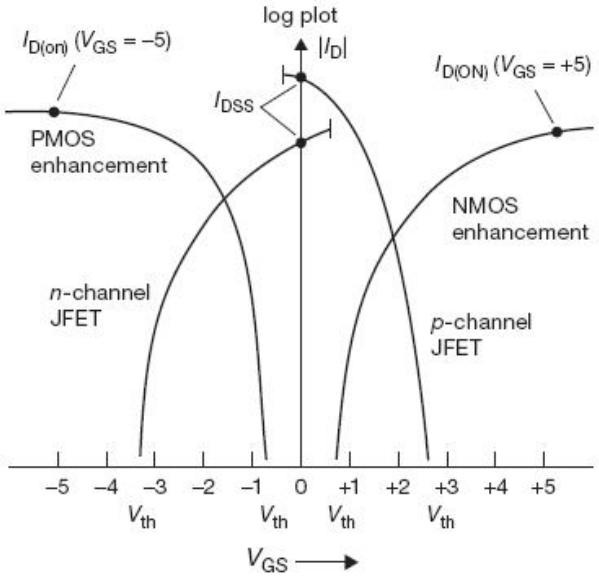
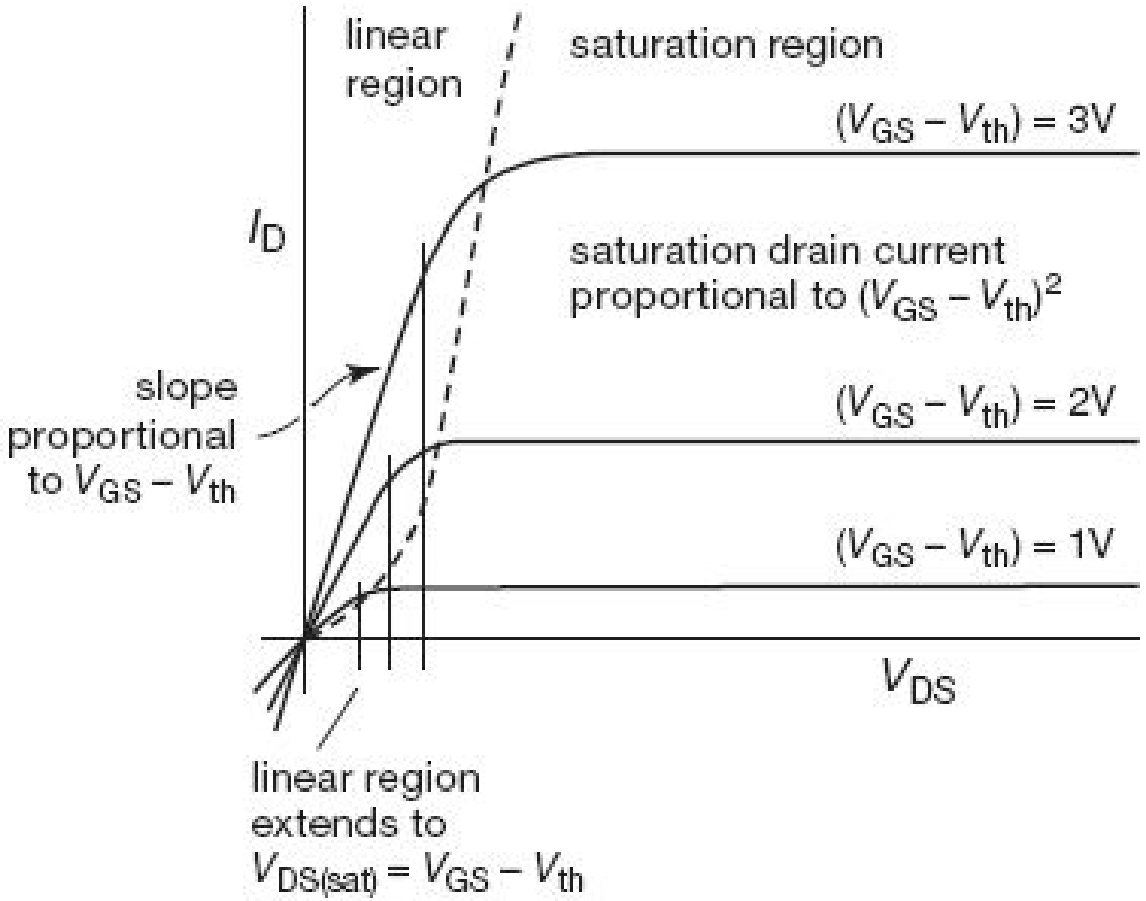


Figure 3.12. Important gate voltages and drain currents.

Regimi

$$I_D = 2\kappa[(V_{GS} - V_{th})V_{DS} - V_{DS}^2/2] \quad \text{(linear region)} \quad (3.1)$$

$$I_D = \kappa(V_{GS} - V_{th})^2 \quad \text{(saturation region)} \quad (3.2)$$



Regimi - 2

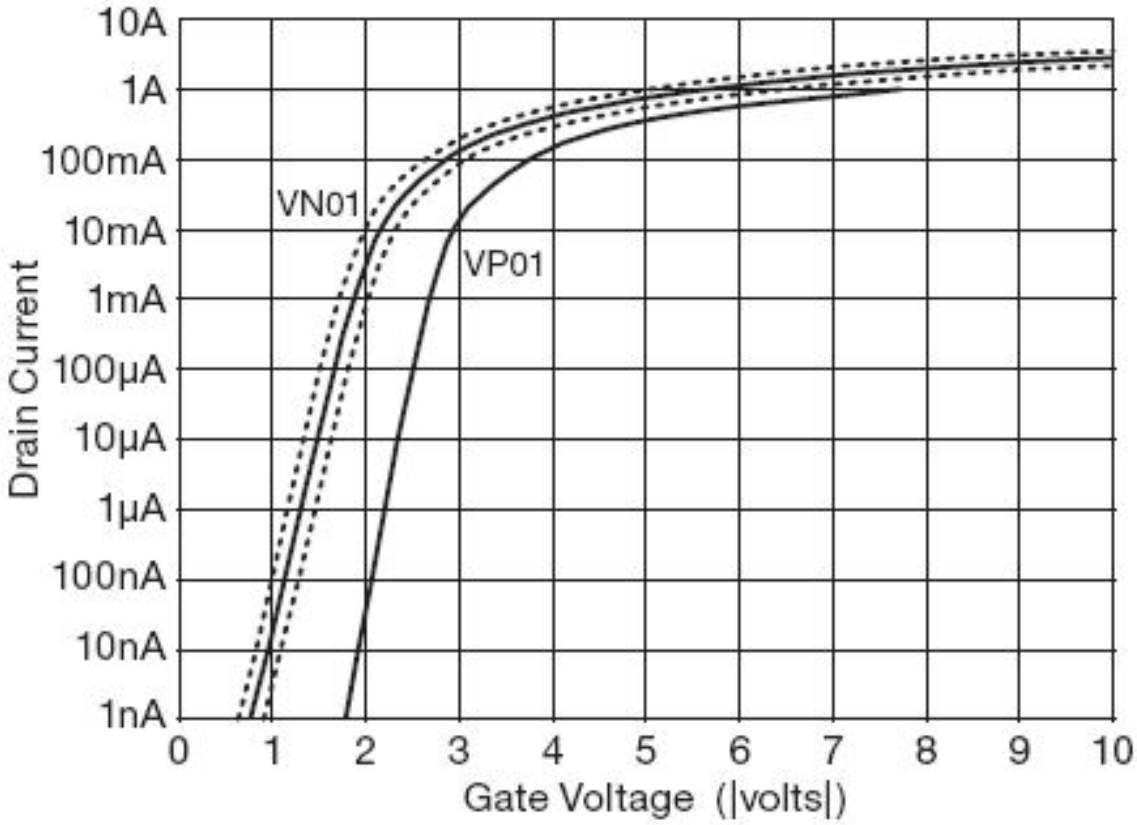


Figure 3.15. Measured MOSFET saturation drain current versus gate-source voltage. For the VN01 the dotted curves are the extreme specimens, and the solid curve is the median, from a group of 20 MOSFETs.

Threshold

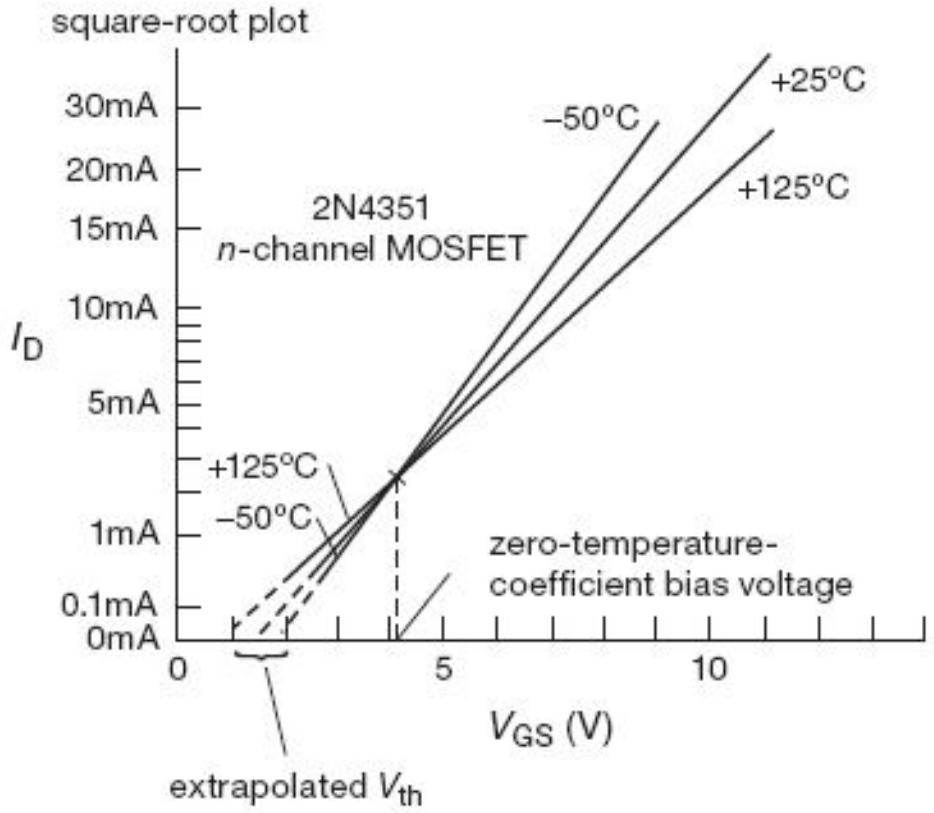


Figure 3.14. The "threshold voltage" V_{th} is found by extrapolating a square-root plot of I_D to zero drain current. The FET saturation drain current has a negative tempco in the high-current regime.

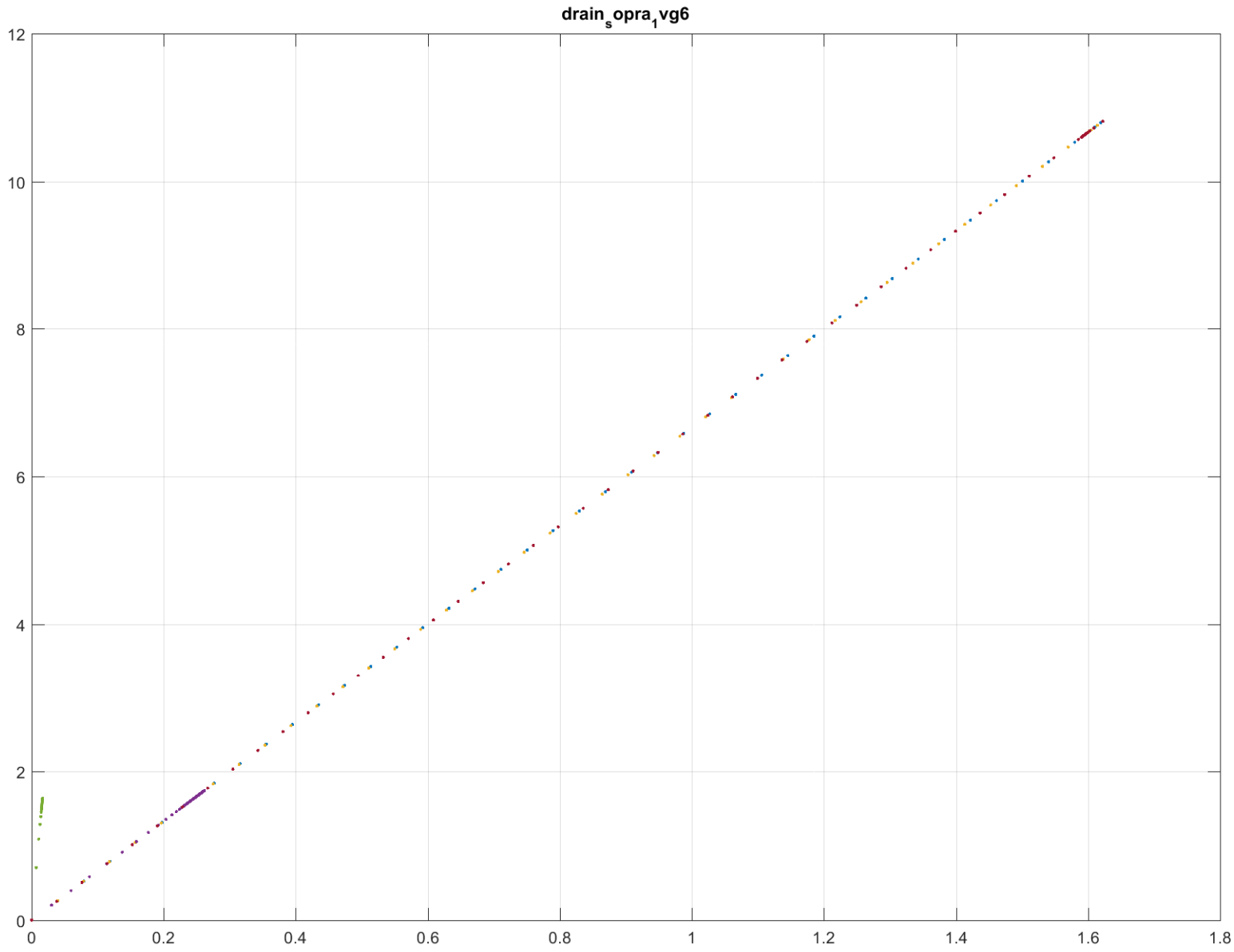
Resistenza e transconduttanza

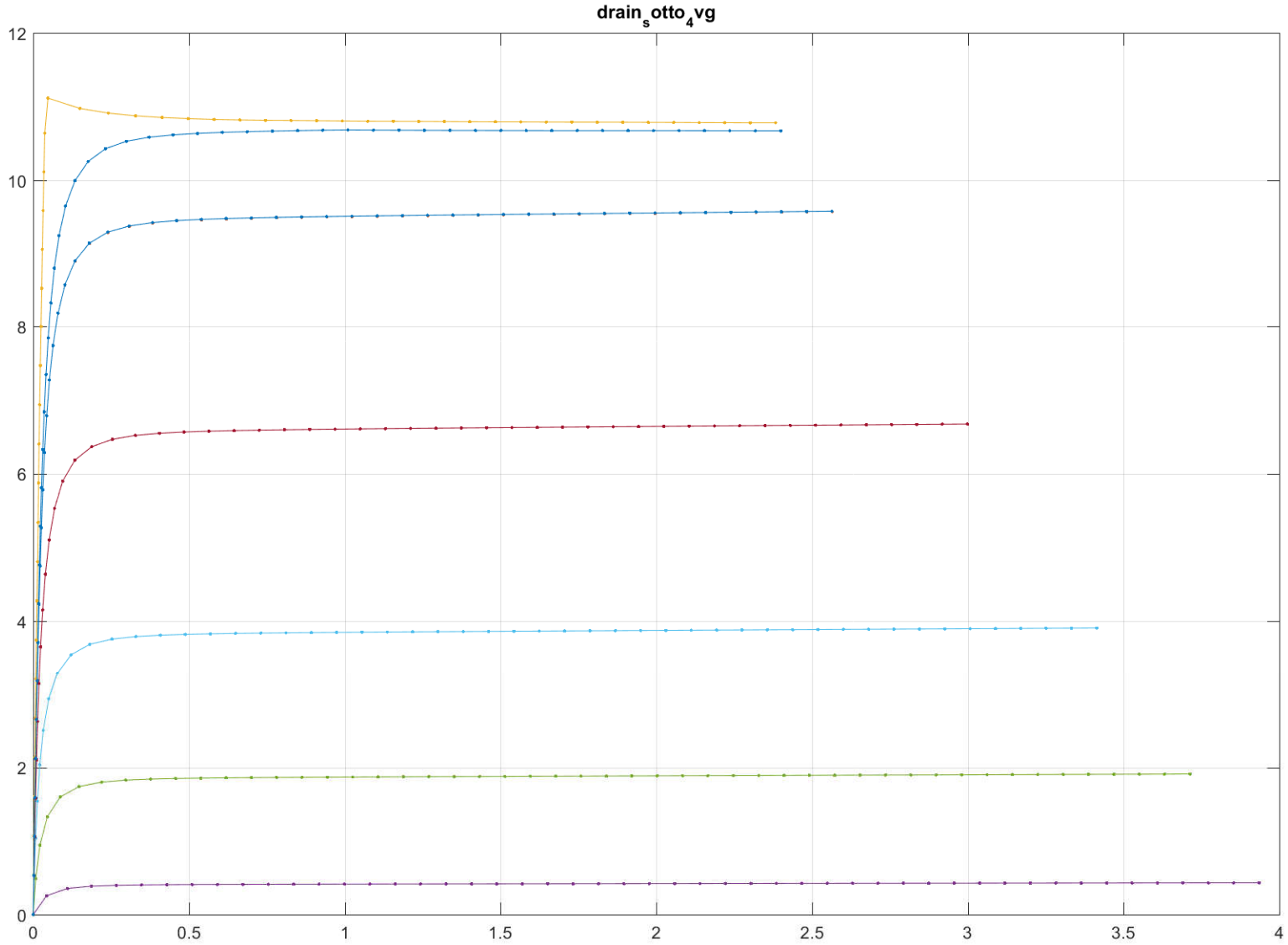
$$\frac{1}{r_{DS}} = 2\kappa \left[(V_{GS} - V_{th}) - \frac{V_{DS}}{2} \right].$$

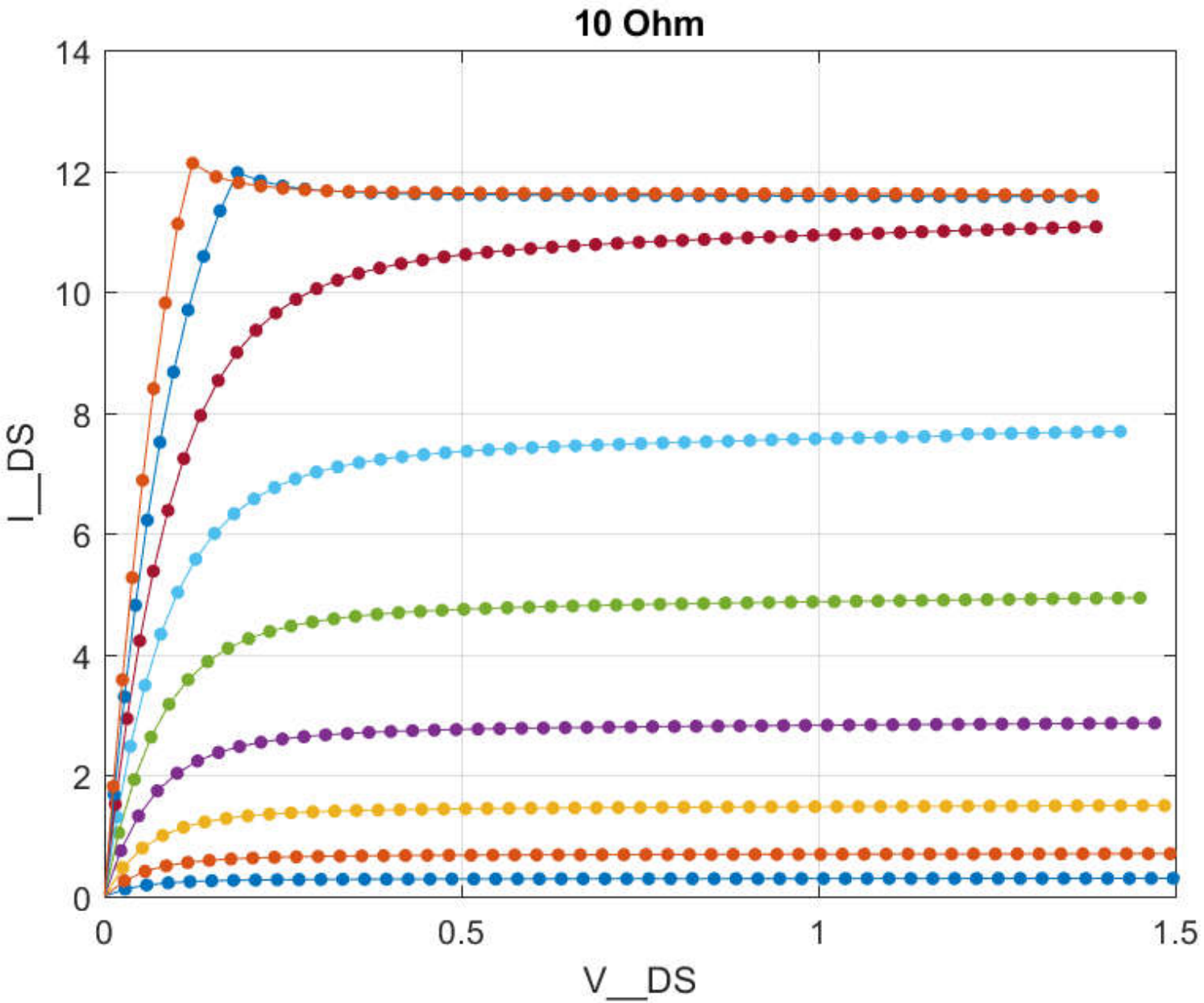
$$r_{DS} \approx 1/[2\kappa(V_{GS} - V_{th})].$$

$$g_m(I_D) = i_d / v_{gs}.$$

$$g_m = 2\kappa(V_{GS} - V_{th}) = 2\sqrt{\kappa I_D}.$$


drain_s opra_1 vg6
12
10
8
6
4
2
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8


drain_sotto_4vg
12
10
8
6
4
2
0
0
0.5
1
1.5
2
2.5
3
3.5
4


10 Ohm
14
12
10
8
6
4
2
0
I__DS
0
0.5
1
1.5
V__DS