

# MOTOROLA

## MAXIMUM RATINGS

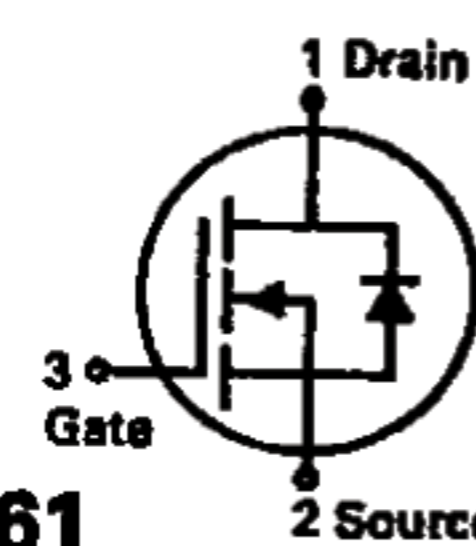
Rating	Symbol	2N6659 MPF6659	2N6660 MPF6660	2N6661 MPF6661	Unit
Drain-Source Voltage	$V_{DS}$	35	60	90	Vdc
Drain-Gate Voltage	$V_{DG}$	35	60	90	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 30$			Vdc
Drain Current — Continuous (1) Pulsed (2)	$I_D$ $I_{DM}$	2.0 3.0			Adc
		2N6659 2N6660 2N6661	MPF6659 MPF6660 MPF6661		
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	6.25 50	2.5 20		Watts mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	— —	1.0 8.0		Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150			$^\circ\text{C}$

(1) The Power Dissipation of the package may result in a lower continuous drain current.

(2) Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

## 2N6659 thru 2N6661 MPF6659 thru MPF6661

2N6659,60,61  
CASE 79-04, STYLE 6  
TO-39 (TO-205AD)



MPF6659,60,61  
CASE 29-03, STYLE 22  
TO-92 (TO-226AE)



### TMOS SWITCHING FET TRANSISTORS

N-CHANNEL — ENHANCEMENT

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Zero-Gate-Voltage Drain Current ( $V_{DS} = \text{Maximum Rating}, V_{GS} = 0$ )	$I_{DSS}$	—	—	10	$\mu\text{Adc}$
Gate-Body Leakage Current ( $V_{GS} = 15 \text{ V}, V_{DS} = 0$ )	$I_{GSS}$	—	—	100	nAdc
Drain-Source Breakdown Voltage ( $V_{GS} = 0, I_D = 10 \mu\text{A}$ )	$V_{(BR)DSX}$	35 60 90	— — —	— — —	Vdc
		2N6659, MPF6659 2N6660, MPF6660 2N6661, MPF6661			
<b>ON CHARACTERISTICS(1)</b>					
Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1.0 \text{ mA}$ )	$V_{GS(Th)}$	0.8	1.4	2.0	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10 \text{ V}, I_D = 1.0 \text{ A}$ )	$V_{DS(on)}$	— — —	— — —	1.8 3.0 4.0	Vdc
		2N6659, MPF6659 2N6660, MPF6660 2N6661, MPF6661			
( $V_{GS} = 5.0 \text{ V}, I_D = 0.3 \text{ A}$ )		— — —	0.8 0.9 0.9	1.5 1.5 1.6	
Static Drain-Source On Resistance ( $V_{GS} = 10 \text{ Vdc}, I_D = 1.0 \text{ Adc}$ )	$r_{DS(on)}$	— — —	— — —	1.8 3.0 4.0	Ohms
		2N6659, MPF6659 2N6660, MPF6660 2N6661, MPF6661			
On-State Drain Current ( $V_{DS} = 25 \text{ V}, V_{GS} = 10 \text{ V}$ )	$I_{D(on)}$	1.0	2.0	—	Amps
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Input Capacitance ( $V_{DS} = 25 \text{ V}, V_{GS} = 0, f = 1.0 \text{ MHz}$ )	$C_{iss}$	—	30	50	pF
Reverse Transfer Capacitance ( $V_{DS} = 25 \text{ V}, V_{GS} = 0, f = 1.0 \text{ MHz}$ )	$C_{rss}$	—	3.6	10	pF
Output Capacitance ( $V_{DS} = 25 \text{ V}, V_{GS} = 0, f = 1.0 \text{ MHz}$ )	$C_{oss}$	—	20	40	pF
Forward Transconductance ( $V_{DS} = 25 \text{ V}, I_D = 0.5 \text{ A}$ )	$g_{fs}$	170	—	—	mmhos

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2N6659 thru 2N6661, MPF6659 thru MPF6661

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>SWITCHING CHARACTERISTICS(1)</b>					
Rise Time	t <sub>r</sub>	—	—	5.0	ns
Fall Time	t <sub>f</sub>	—	—	5.0	ns
Turn-On Time	t <sub>on</sub>	—	—	5.0	ns
Turn-Off Time	t <sub>off</sub>	—	—	5.0	ns

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

RESISTIVE SWITCHING

FIGURE 1 — SWITCHING TEST CIRCUIT

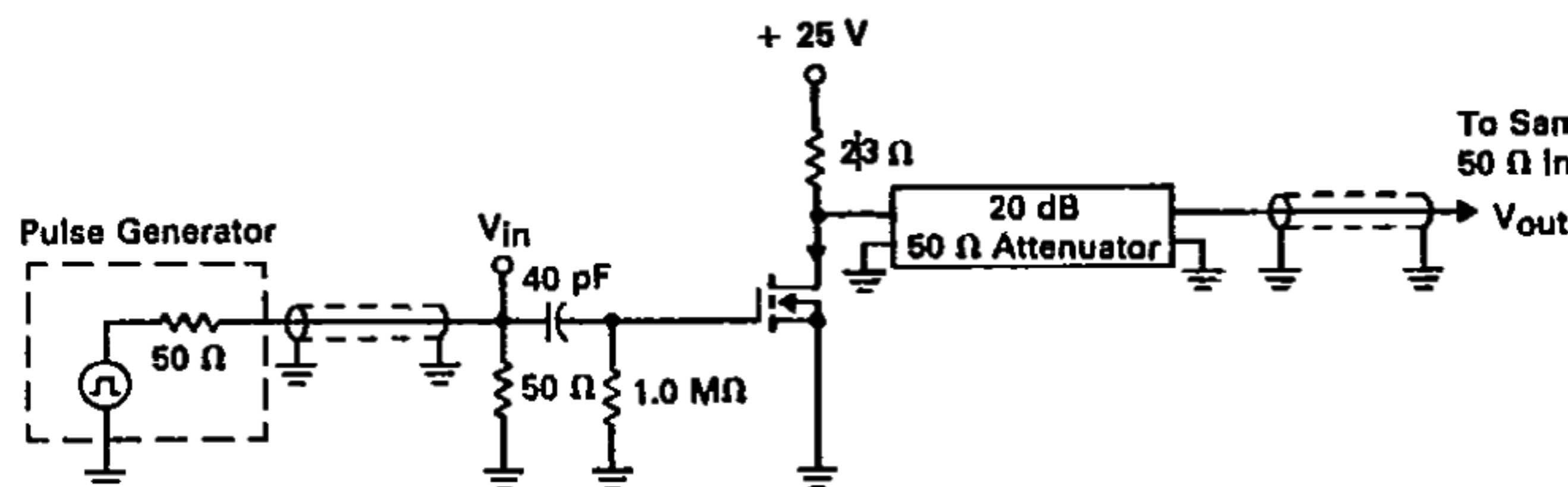


FIGURE 2 — SWITCHING WAVEFORMS

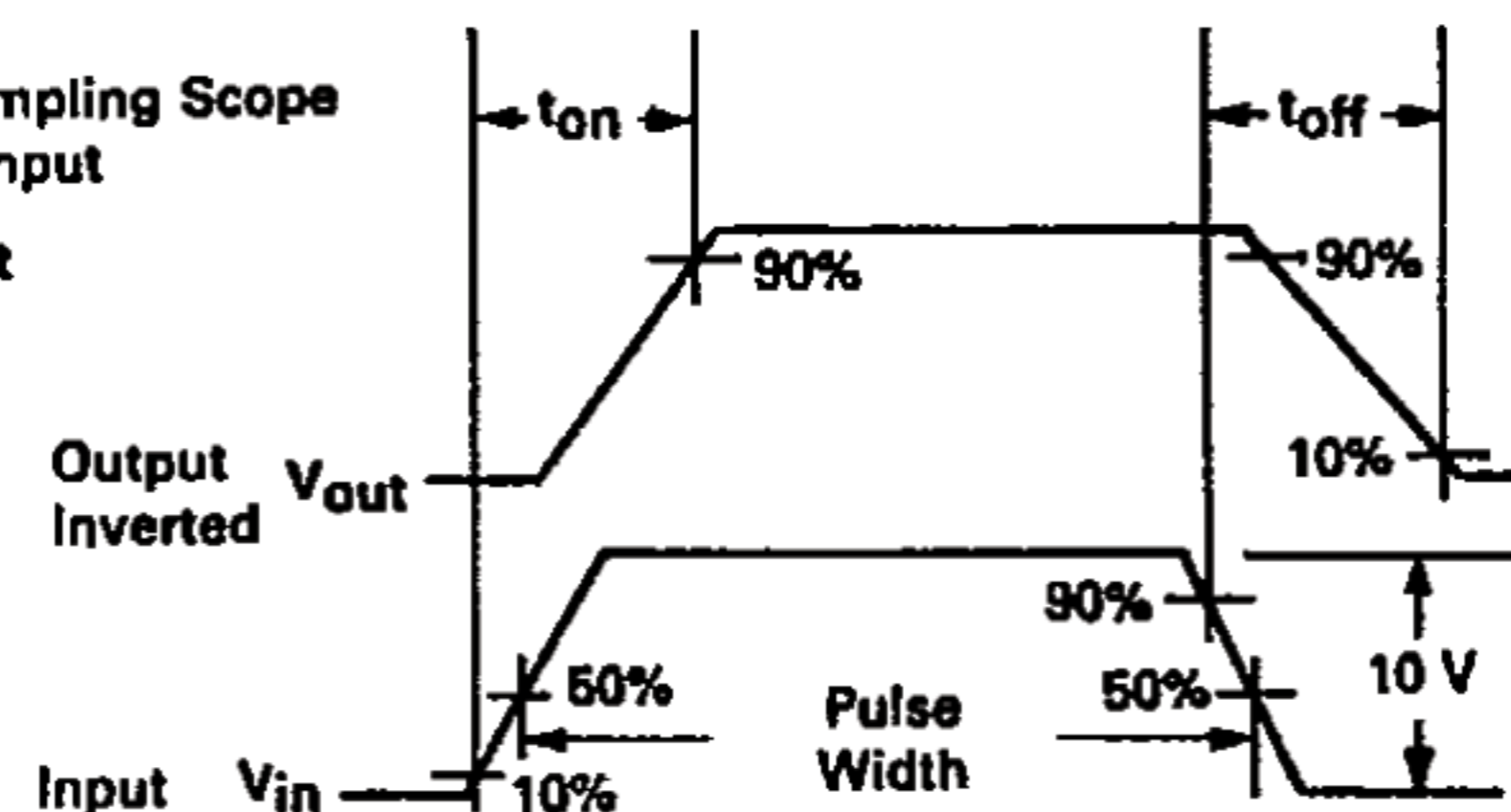


FIGURE 3 — V<sub>GS(th)</sub> NORMALIZED versus TEMPERATURE

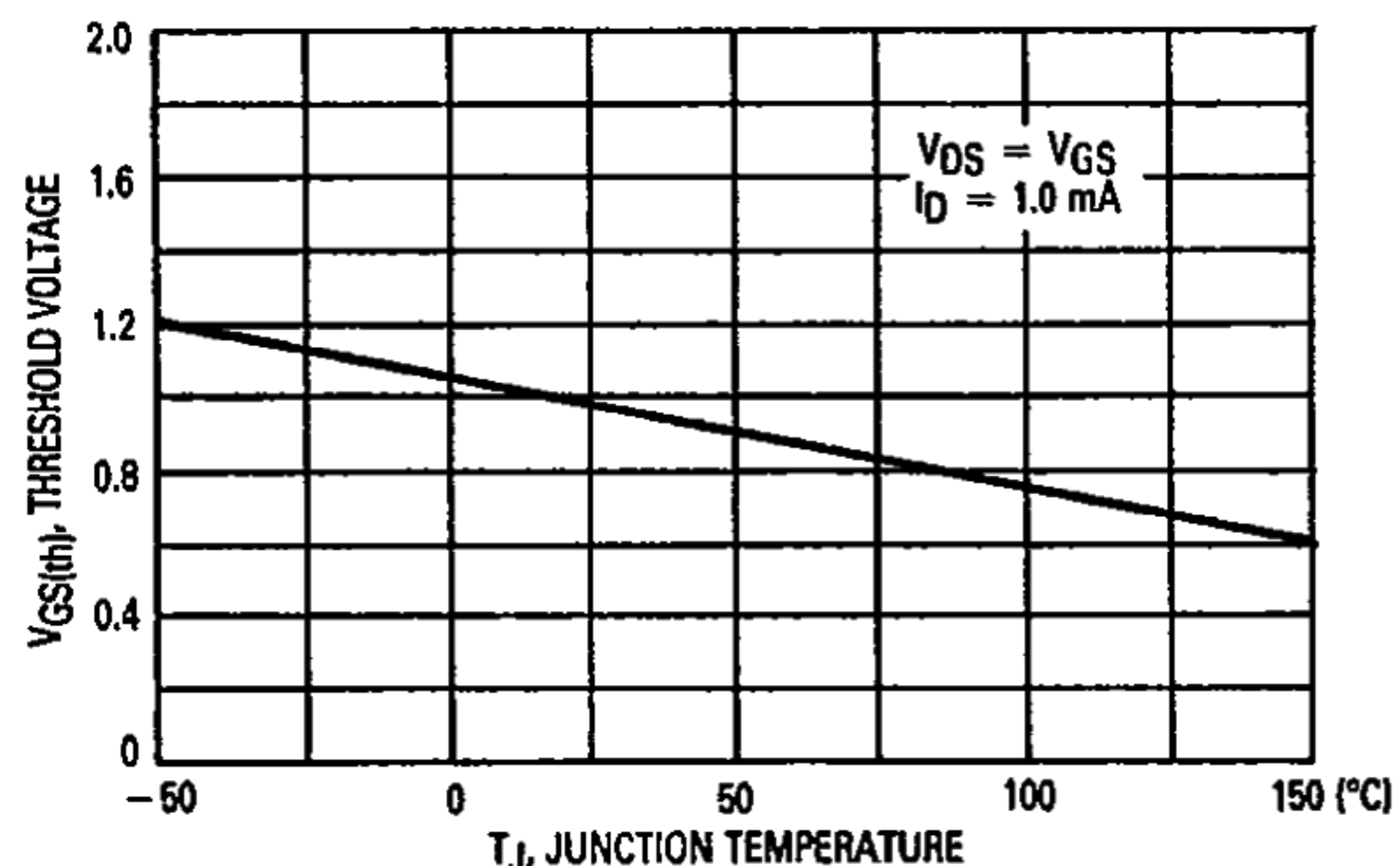


FIGURE 4 — ON-REGION CHARACTERISTICS

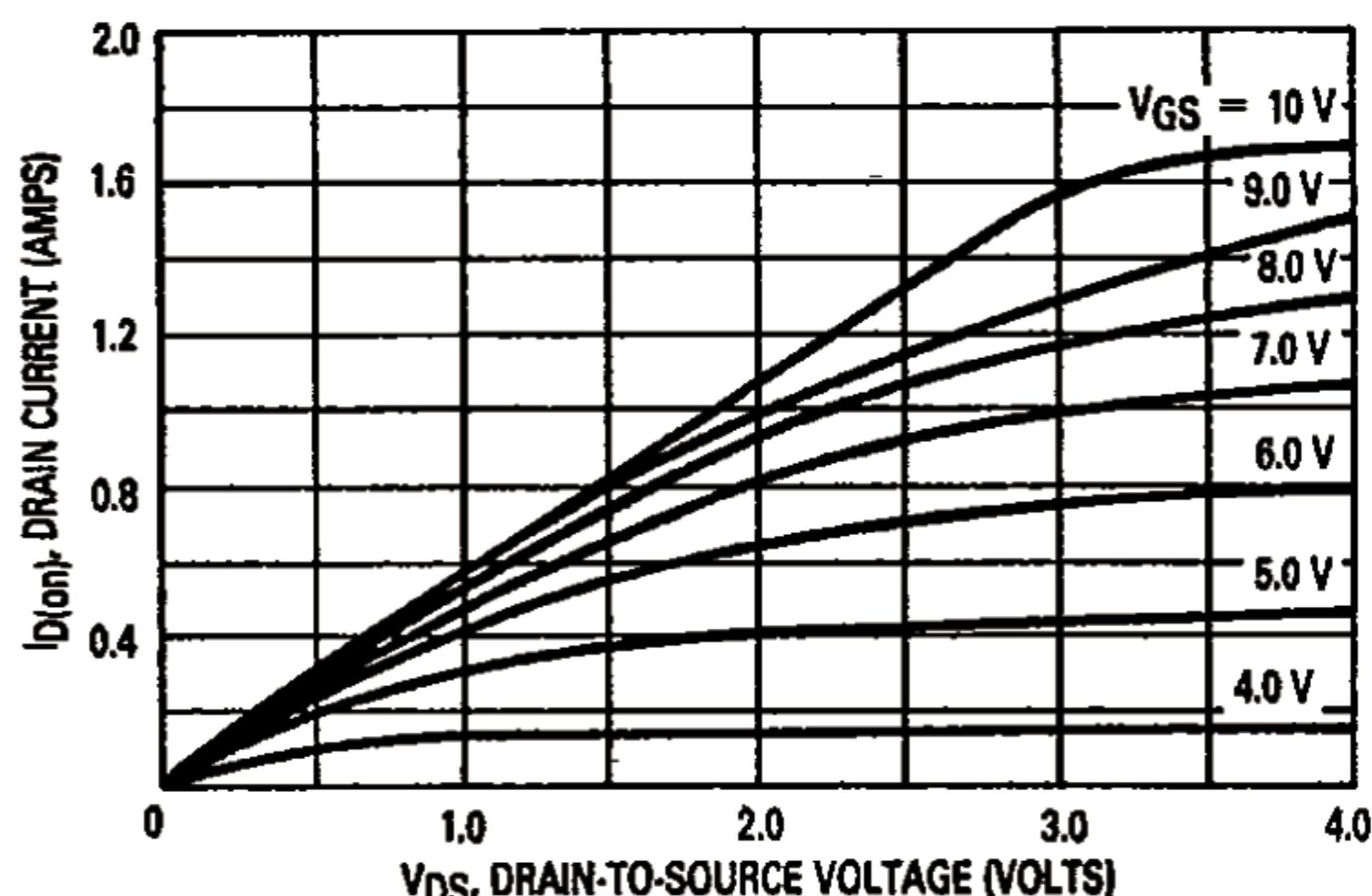


FIGURE 5 — OUTPUT CHARACTERISTICS

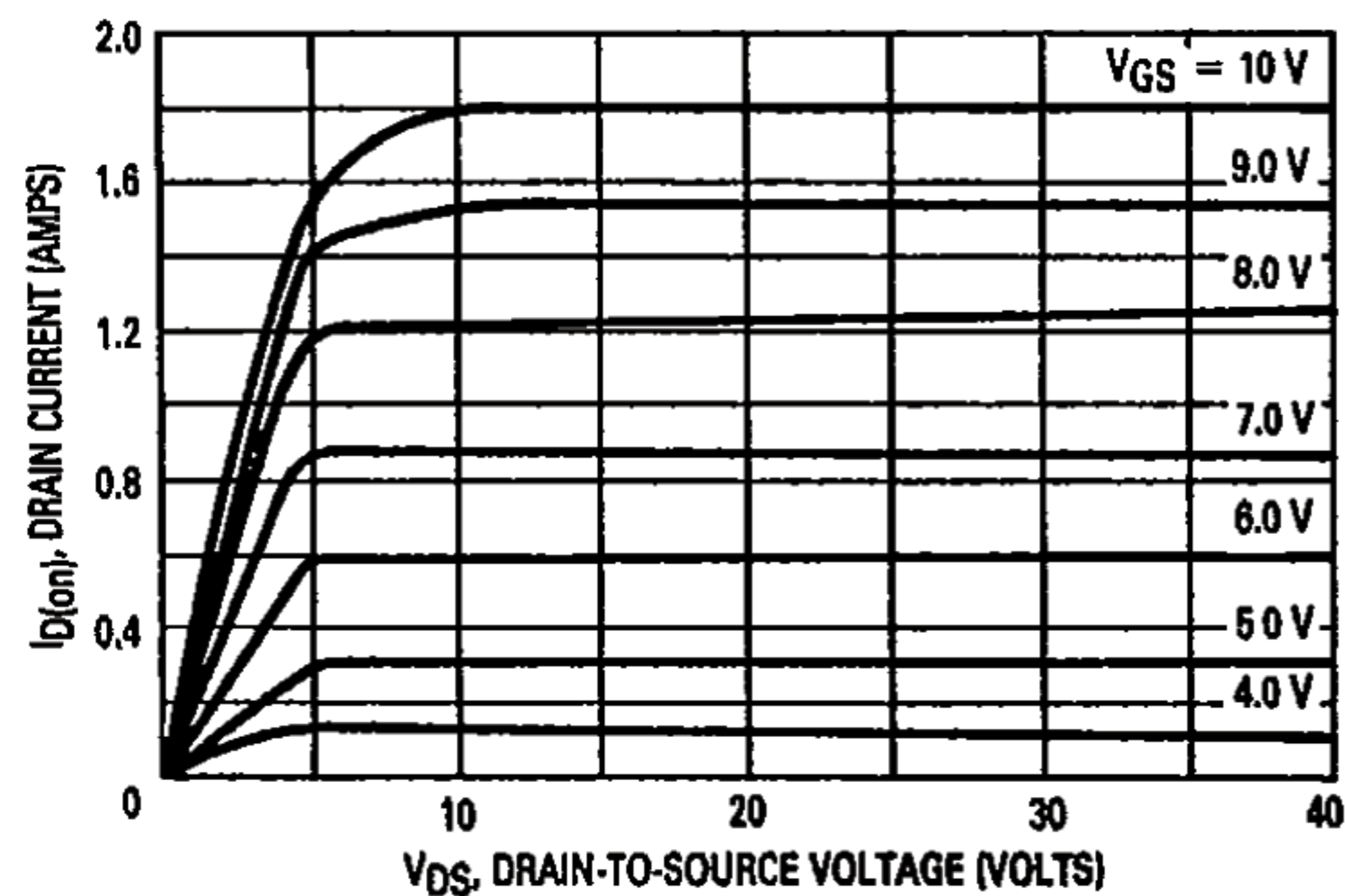
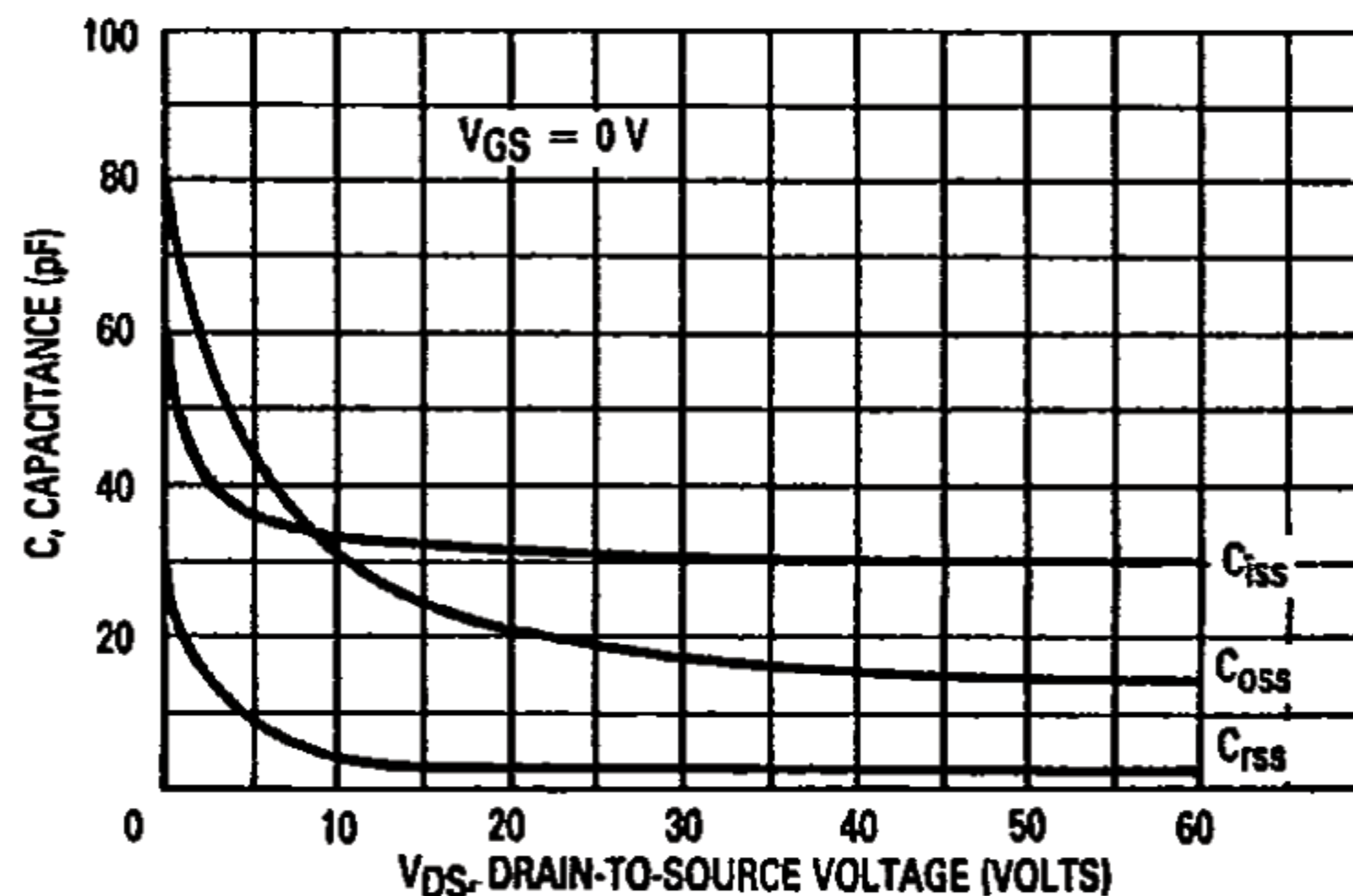


FIGURE 6 — CAPACITANCE versus DRAIN-TO-SOURCE VOLTAGE



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FIGURE 7 — ON-VOLTAGE versus TEMPERATURE

