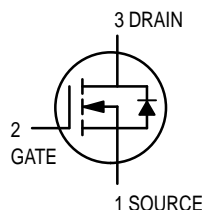


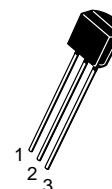
# TMOS FET Transistor

## N-Channel — Enhancement



# 2N7000

Motorola Preferred Device



CASE 29-11, STYLE 22  
TO-92 (TO-226AA)

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	Vdc
Drain-Gate Voltage ( $R_{GS} = 1.0 \text{ M}\Omega$ )	$V_{DGR}$	60	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$	Vdc
— Continuous	$V_{GSM}$	$\pm 40$	Vpk
— Non-repetitive ( $t_p \leq 50 \mu\text{s}$ )			
Drain Current			mAdc
Continuous	$I_D$	200	
Pulsed	$I_{DM}$	500	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	350	mW
Derate above $25^\circ\text{C}$		2.8	mW/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	357	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/16" from case for 10 seconds	$T_L$	300	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ( $V_{GS} = 0, I_D = 10 \mu\text{Adc}$ )	$V_{(BR)DSS}$	60	—	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 48 \text{ Vdc}, V_{GS} = 0$ ) ( $V_{DS} = 48 \text{ Vdc}, V_{GS} = 0, T_J = 125^\circ\text{C}$ )	$I_{DSS}$	—	1.0	$\mu\text{Adc}$ mAdc
Gate-Body Leakage Current, Forward ( $V_{GSF} = 15 \text{ Vdc}, V_{DS} = 0$ )	$I_{GSSF}$	—	-10	nAdc

### ON CHARACTERISTICS(1)

Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1.0 \text{ mAdc}$ )	$V_{GS(th)}$	0.8	3.0	Vdc
Static Drain-Source On-Resistance ( $V_{GS} = 10 \text{ Vdc}, I_D = 0.5 \text{ Adc}$ ) ( $V_{GS} = 4.5 \text{ Vdc}, I_D = 75 \text{ mAdc}$ )	$r_{DS(on)}$	—	5.0 6.0	Ohm
Drain-Source On-Voltage ( $V_{GS} = 10 \text{ Vdc}, I_D = 0.5 \text{ Adc}$ ) ( $V_{GS} = 4.5 \text{ Vdc}, I_D = 75 \text{ mAdc}$ )	$V_{DS(on)}$	—	2.5 0.45	Vdc

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 4

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

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1) (continued)</b>				
On-State Drain Current ( $V_{GS} = 4.5\text{ Vdc}$ , $V_{DS} = 10\text{ Vdc}$ )	$I_{d(on)}$	75	—	mAdc
Forward Transconductance ( $V_{DS} = 10\text{ Vdc}$ , $I_D = 200\text{ mAdc}$ )	$g_{fs}$	100	—	$\mu\text{mhos}$

**DYNAMIC CHARACTERISTICS**

Input Capacitance	$(V_{DS} = 25\text{ V}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$	—	60	pF
Output Capacitance		$C_{oss}$	—	25	
Reverse Transfer Capacitance		$C_{rss}$	—	5.0	

**SWITCHING CHARACTERISTICS(1)**

Turn-On Delay Time	$(V_{DD} = 15\text{ V}$ , $I_D = 500\text{ mA}$ , $R_G = 25\ \Omega$ , $R_L = 30\ \Omega$ , $V_{gen} = 10\text{ V}$ )	$t_{on}$	—	10	ns
Turn-Off Delay Time		$t_{off}$	—	10	

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

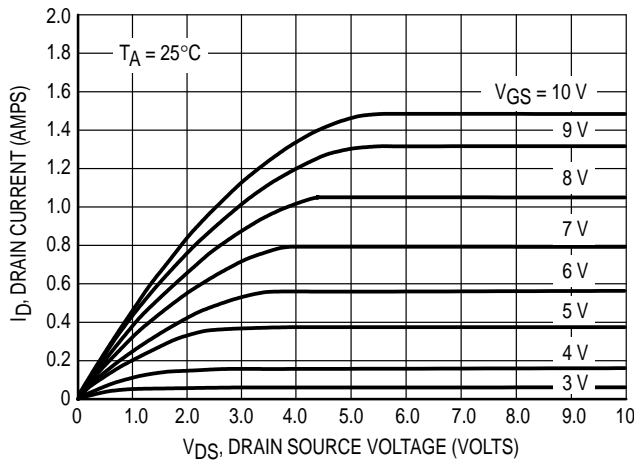


Figure 1. Ohmic Region

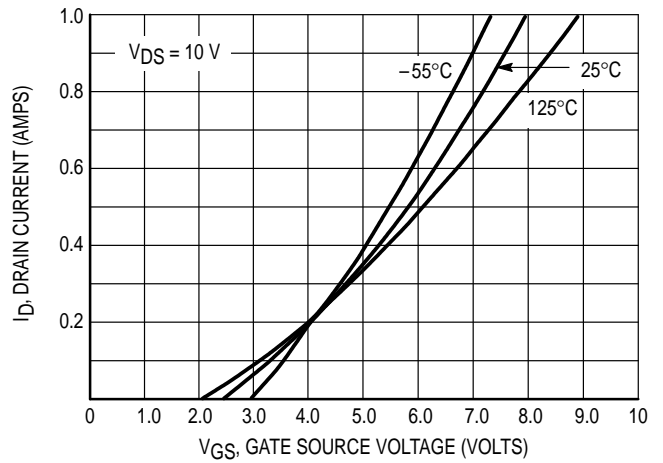


Figure 2. Transfer Characteristics

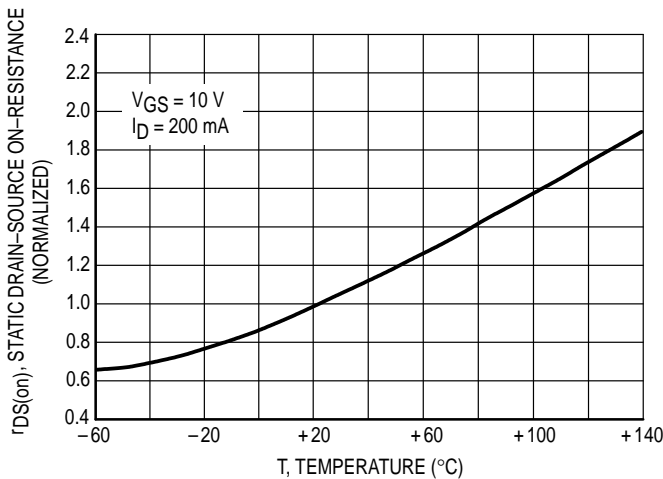


Figure 3. Temperature versus Static Drain-Source On-Resistance

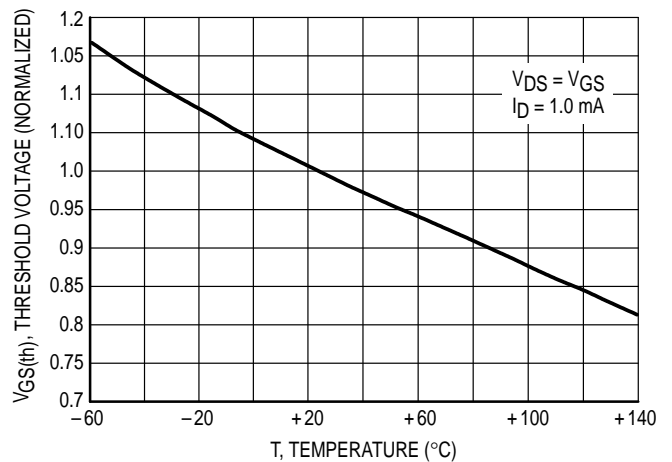
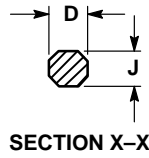
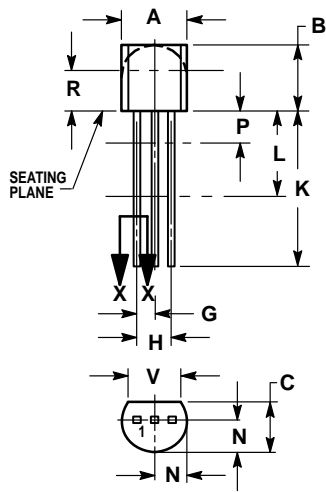


Figure 4. Temperature versus Gate Threshold Voltage

PACKAGE DIMENSIONS




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

**CASE 029-11  
(TO-226AA)  
ISSUE AJ**

STYLE 22:  
PIN 1. SOURCE  
2. GATE  
3. DRAIN

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