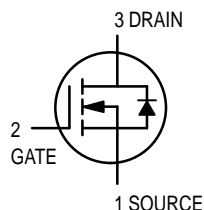


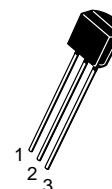
TMOS FET Transistor

N-Channel — Enhancement



2N7000

Motorola Preferred Device



CASE 29-04, 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}	± 20	Vdc
— Continuous	V_{GSM}	± 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°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
----------------	--------	-----	-----	------

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	μAdc 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 3

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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS(1) (continued)				
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	—	μmhos

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

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

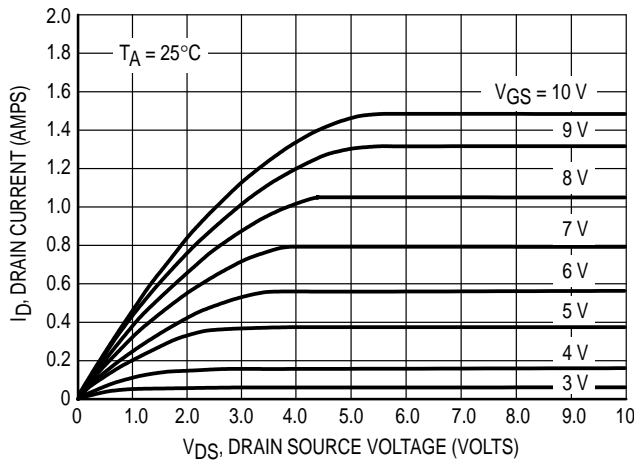


Figure 1. Ohmic Region

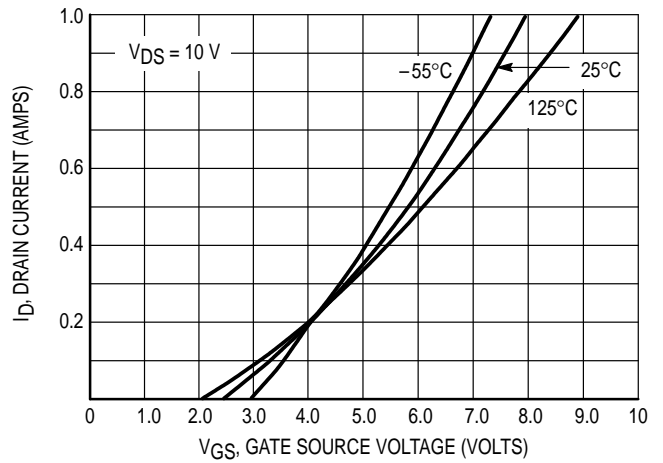


Figure 2. Transfer Characteristics

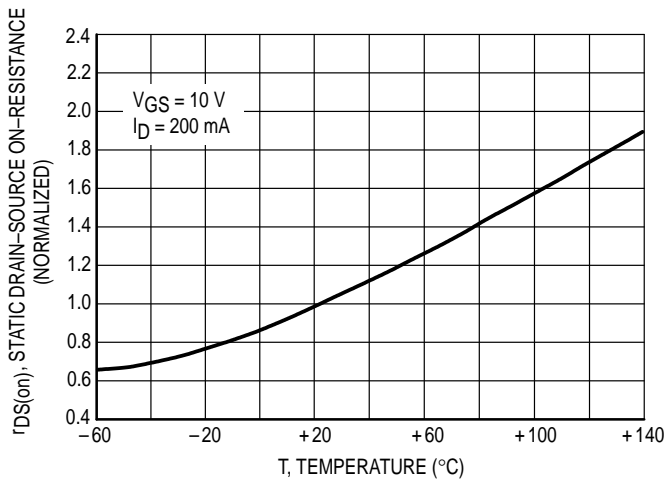


Figure 3. Temperature versus Static Drain-Source On-Resistance

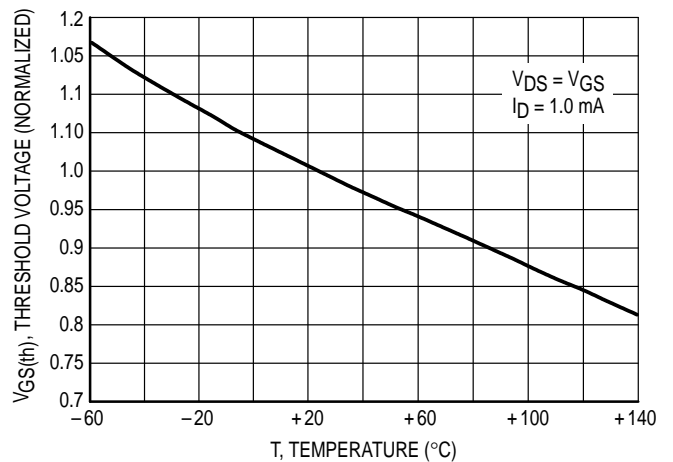
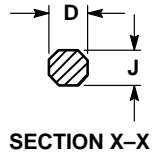
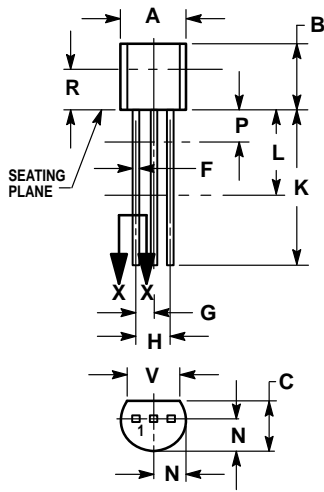


Figure 4. Temperature versus Gate Threshold Voltage

PACKAGE DIMENSIONS



SECTION X-X

**CASE 029-04
(TO-226AA)
ISSUE AD**


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K. MINIMUM 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	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
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	—

STYLE 22:

- PIN 1. SOURCE
2. GATE
3. DRAIN

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 81-3-3521-8315

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609
INTERNET: <http://Design-NET.com>

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

