

2N7008

Small-Signal Field Effect Transistor

N-Channel Enhancement Mode Silicon Gate TMOS

...are designed for high voltage, high speed applications such as switching regulators, converters, solenoid, and relay drivers.

- Silicon Gate for Fast Switching Speeds
- Relay Driver
- Telecommunication Switch
- Automatic Insertable
- Available in Ammo Pack
- Available on Radial Tape and Reel
- N-Channel, Small Signal, TMOS FET

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	60	Vdc
Drain-to-Gate Voltage ($R_{GS} = 1 \text{ m}\Omega$)	V_{DGR}	60	Vdc
Gate-to-Source Voltage	V_{GS}	40	Vdc
Drain Current Continuous Pulsed	I_D I_{DM}	150 1000	mAdc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	400 3.2	mW mW/ $^\circ\text{C}$
Operating and Storage temperature Range	T_J, T_{stg}	-5.5 to $+150$	$^\circ\text{C}$

THERMAL CHARACTERISTIC

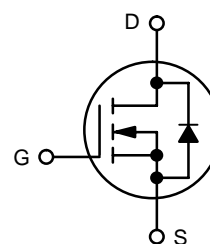
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	312.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/16 in from Case for 10 Seconds	T_L	300	$^\circ\text{C}$



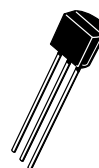
ON Semiconductor®

<http://onsemi.com>

**N-CHANNEL SMALL SIGNAL
TMOS FET, $R_{DS(ON)} = 7.5 \Omega$, 60 V**



MARKING DIAGRAM



TO-92 (TO-226)
CASE 29



2N7008

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

Characteristics	Symbol	Min	Max	Unit
-----------------	--------	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 100\ \mu\text{A}$)	$V_{(BR)DSS}$	60	–	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 50\ \text{V}$, $V_{GS} = 0$) ($V_{DS} = 50\ \text{V}$, $V_{GS} = 0$, $T_J = 125^\circ\text{C}$)	I_{DSS}	– –	1.0 500	μAdc
Gate-to-Body Leakage Current, Forward ($V_{GSF} = 30\ \text{Vdc}$, $V_{DS} = 0$)	I_{GSSF}	–	–100	nAdc

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \text{mA}$)	$V_{GS(th)}$	–	–	Vdc
Static Drain-to-Source On-Resistance ($V_{GS} = 5\ \text{Vdc}$, $I_D = 50\ \text{mAdc}$) ($V_{GS} = 10\ \text{Vdc}$, $I_D = 500\ \text{mA}$, $T_C = 125^\circ\text{C}$)	$R_{DS(ON)}$	– –	7.5 13.5	Ω
Drain-to-Source On-Voltage ($V_{GS} = 5\ \text{V}$, $I_D = 50\ \text{mA}$) ($V_{GS} = 10\ \text{V}$, $I_D = 500\ \text{mA}$)	$V_{DS(ON)}$	– –	1.5 3.75	Vdc
On-State Drain Current ($V_{GS} = 10\ \text{V}$, $V_{DS} \geq 2\ V_{DS(ON)}$)	$I_{D(ON)}$	500	–	mA
Forward Transconductance ($V_{DS} \geq 2\ V_{DS(ON)}$, $I_D = 200\ \text{mA}$)	g_{FS}	80	–	μmhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$V_{DS} = 25\ \text{V}$, $V_{GS} = 0$ $f = 1\ \text{MHz}$	C_{ISS}	–	50	pF
Output Capacitance		C_{OSS}	–	25	
Reverse Transfer Capacitance		C_{RSS}	–	5	

SWITCHING CHARACTERISTICS (Note 1)

Turn-on Delay Time	$V_{DD} = 30\ \text{V}$, $I_D = 200\ \text{mA}$ $R_{GEN} = 25\ \Omega$, $R_L = 150\ \Omega$	t_{ON}	–	20	ns
Turn-off Delay Time		t_{OFF}	–	20	

1. Pulse Test Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

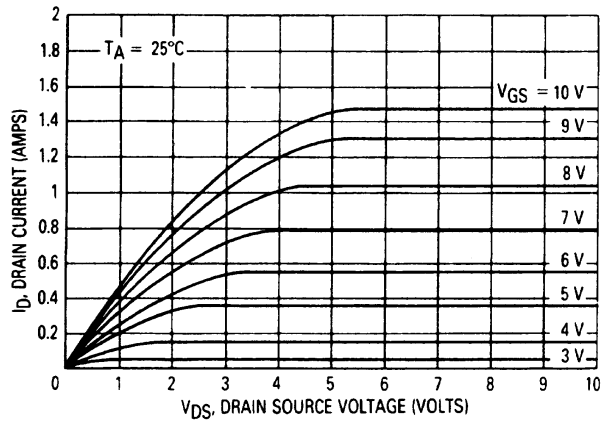


Figure 1. Ohmic Region

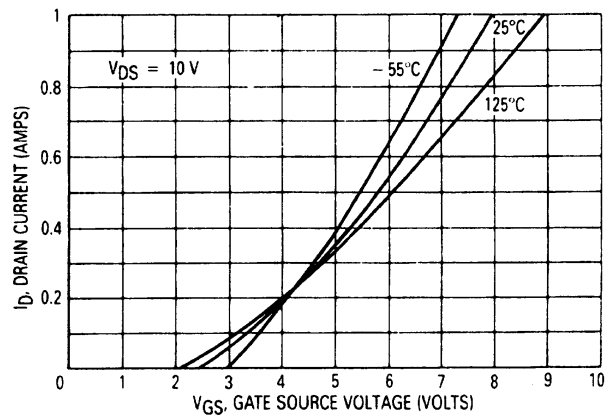


Figure 2. Transfer Characteristics

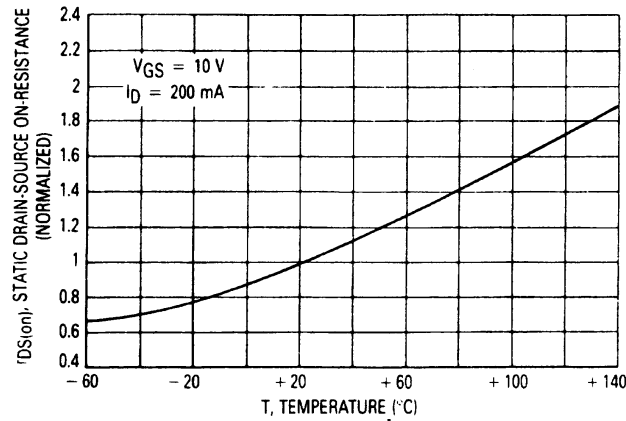


Figure 3. Temperature versus Static Drain-Source On-Resistance

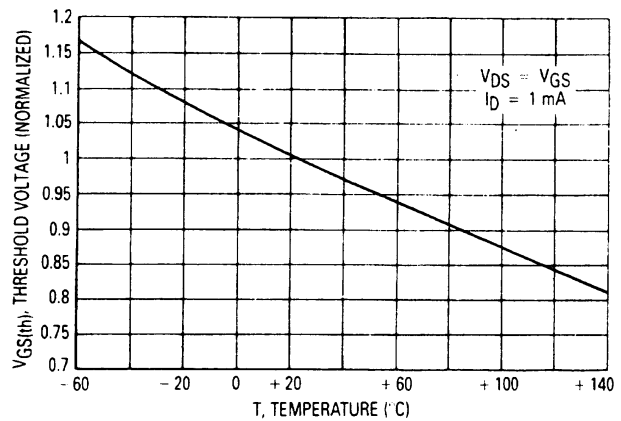
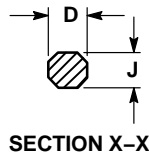
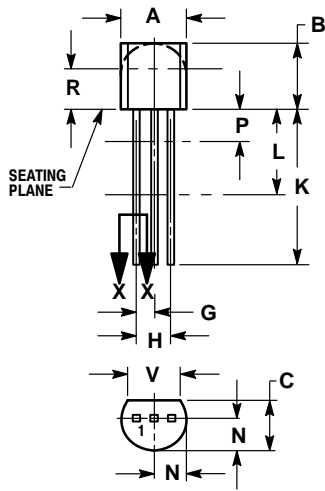


Figure 4. Temperature versus Gate Threshold Voltage

2N7008


PACKAGE DIMENSIONS

TO-92 (TO-226) CASE 29 ISSUE AL



- 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	---

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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 special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC 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 SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.