**Preferred Device** 

# Small Signal MOSFET 200 mAmps, 60 Volts

N-Channel TO-92

#### **Features**

• Pb-Free Packages are Available\*

#### **MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain Source Voltage	V <sub>DSS</sub>	60	Vdc
Drain–Gate Voltage ( $R_{GS} = 1.0 \text{ M}\Omega$ )	$V_{DGR}$	60	Vdc
	V <sub>GS</sub> V <sub>GSM</sub>	±20 ±40	Vdc Vpk
Drain Current - Continuous - Pulsed	I <sub>D</sub>	200 500	mAdc
Total Power Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	350 2.8	mW mW/°C
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	357	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/16" from case for 10 seconds	T <sub>L</sub>	300	°C

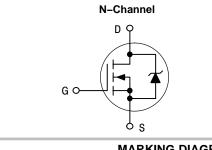


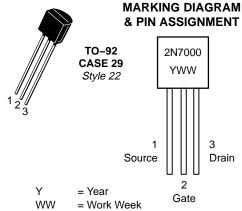
#### ON Semiconductor®

http://onsemi.com

# 200 mAMPS 60 VOLTS

 $R_{DS(on)} = 5 \Omega$ 





#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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

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

Characteristic		Symbol	Min	Max	Unit	
OFF CHARACTERISTICS						
Drain–Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 10 μAdc)		V <sub>(BR)DSS</sub>	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 <sub>DSS</sub>	_ _ _	1.0 1.0	μAdc mAdc	
Gate–Body Leakage Current, Forward (V <sub>GSF</sub> = 15 Vdc, V <sub>DS</sub> = 0)		I <sub>GSSF</sub>	_	-10	nAdc	
ON CHARACTERISTICS (N	lote 1)					
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.0 mAdc)	V <sub>GS(th)</sub>	0.8	3.0	Vdc		
Static Drain–Source On–Resis $(V_{GS} = 10 \text{ Vdc}, I_D = 0.5 \text{ Adc})$ $(V_{GS} = 4.5 \text{ Vdc}, I_D = 75 \text{ mAc})$	r <sub>DS(on)</sub>	- -	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 <sub>DS(on)</sub>	_ _	2.5 0.45	Vdc	
On–State Drain Current (V <sub>GS</sub> = 4.5 Vdc, V <sub>DS</sub> = 10 Vdc)		I <sub>d(on)</sub>	75	-	mAdc	
Forward Transconductance (V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 200 mAdc)		9fs	100	-	μmhos	
DYNAMIC CHARACTERIST	rics			-	-!	
Input Capacitance		C <sub>iss</sub>	_	60	pF	
Output Capacitance	$(V_{DS} = 25 \text{ V}, V_{GS} = 0,$	C <sub>oss</sub>	-	25		
Reverse Transfer Capacitance	f = 1.0 MHz)	C <sub>rss</sub>	_	5.0		
SWITCHING CHARACTER	ISTICS (Note 1)			•	•	
Turn-On Delay Time	(V <sub>DD</sub> = 15 V, I <sub>D</sub> = 500 mA,	t <sub>on</sub>	_	10	ns	
Turn-Off Delay Time	$R_G = 25 \Omega$ , $R_L = 30 \Omega$ , $V_{gen} = 10 V$ )	t <sub>off</sub>	-	10	1	

<sup>1.</sup> Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

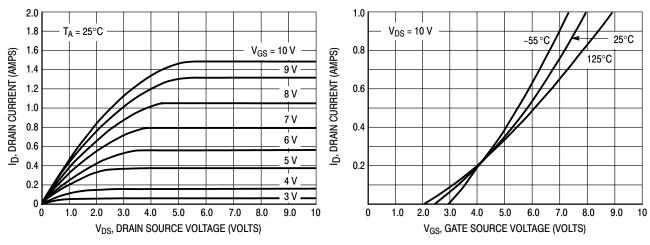


Figure 1. Ohmic Region

Figure 2. Transfer Characteristics

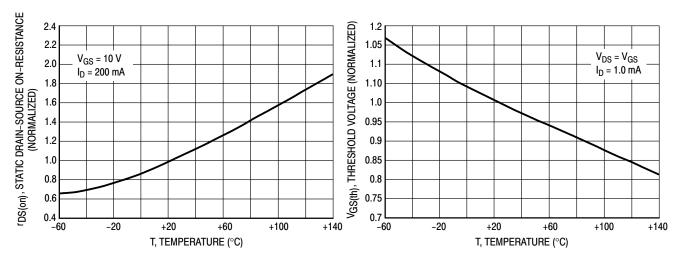


Figure 3. Temperature versus Static Drain-Source On-Resistance

Figure 4. Temperature versus Gate Threshold Voltage

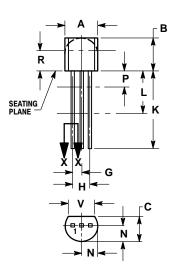
#### **ORDERING INFORMATION**

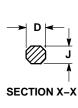
Device	Package	Shipping <sup>†</sup>	
2N7000	TO-92	1000 Unit/Box	
2N7000G	TO-92 (Pb-Free)	1000 Unit/Box	
2N7000RLRA	TO-92	2000 Tape & Reel	
2N7000RLRAG	TO-92 (Pb-Free)	2000 Tape & Reel	
2N7000RLRM	TO-92	2000 Ammo Pack	
2N7000RLRMG	TO-92 (Pb-Free)	2000 Ammo Pack	
2N7000RLRP	TO-92	2000 Ammo Pack	
2N7000RLRPG	TO-92 (Pb-Free)	2000 Ammo Pack	
2N7000ZL1	TO-92	2000 Ammo Pack	
2N7000ZL1G	TO-92 (Pb-Free)	2000 Ammo Pack	

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

#### **PACKAGE DIMENSIONS**

TO-92 CASE 29-11 **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.

	INCHES		MILLIM	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.175	0.205	4.45	5.20
В	0.170	0.210	4.32	5.33
С	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
Н	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

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, 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 LISA/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.