

2N7000

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_{DSS}	60	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$)	V_{DGR}	60	Vdc
Gate-Source Voltage - Continuous - Non-repetitive ($t_p \leq 50 \mu\text{s}$)	V_{GS} V_{GSM}	± 20 ± 40	Vdc Vpk
Drain Current - Continuous - Pulsed	I_D I_{DM}	200 500	mA dc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	350 2.8	mW 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	$^\circ\text{C}$



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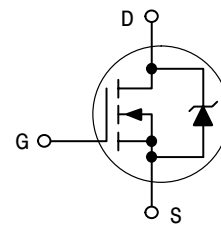
<http://onsemi.com>

200 mAmps

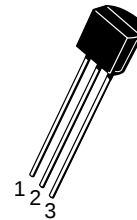
60 Volts

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

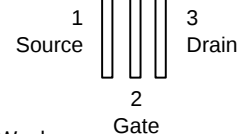
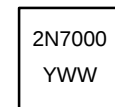
N-Channel



MARKING DIAGRAM & PIN ASSIGNMENT



TO-92
CASE 29
Style 22



Y = Year
WW = Work Week

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.

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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 1.0	μAdc mAdc
Gate-Body Leakage Current, Forward ($V_{GSF} = 15 \text{ Vdc}$, $V_{DS} = 0$)	I_{GSSF}	–	–10	nAdc

ON CHARACTERISTICS (Note 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
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 (Note 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 $\leq 2.0\%$.

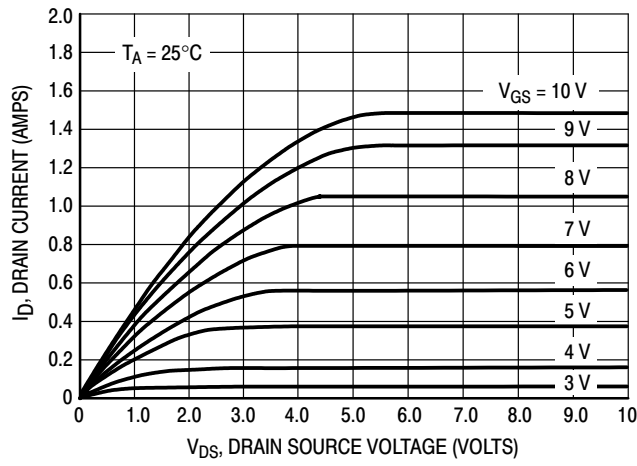


Figure 1. Ohmic Region

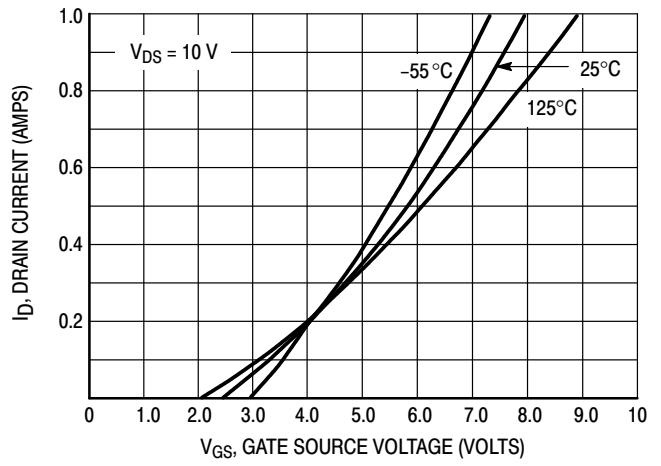


Figure 2. Transfer Characteristics

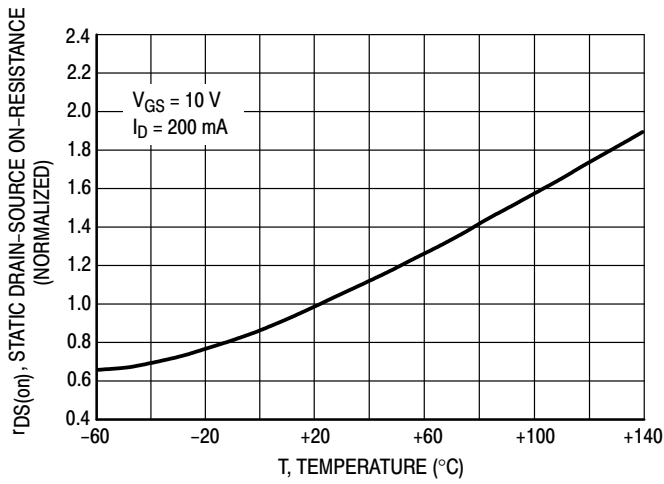


Figure 3. Temperature versus Static Drain-Source On-Resistance

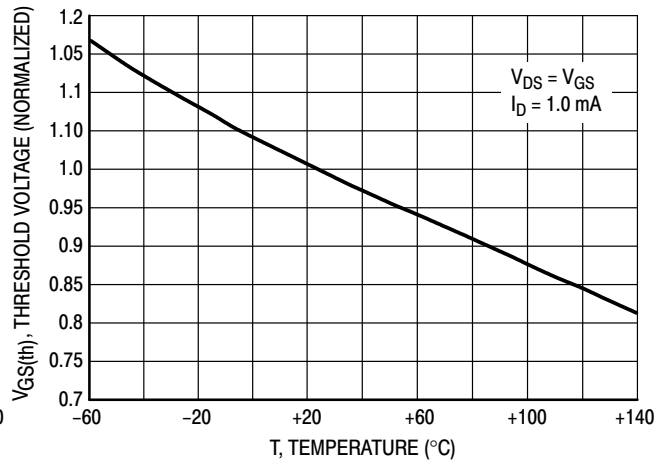


Figure 4. Temperature versus Gate Threshold Voltage

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ORDERING INFORMATION

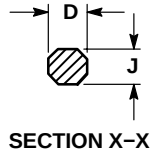
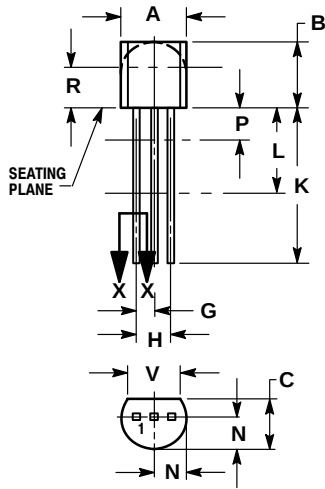
Device	Package	Shipping [†]
2N7000	TO-92	1000 Unit/Box
2N7000G	TO-92 (Pb-Free)	1000 Unit/Box
2N7000RLRA	TO-92	2000 Tape & Reel
2N7000RLRAG	TO-92 (Pb-Free)	2000 Tape & Reel
2N7000RLRM	TO-92	2000 Ammo Pack
2N7000RLRMG	TO-92 (Pb-Free)	2000 Ammo Pack
2N7000RLRP	TO-92	2000 Ammo Pack
2N7000RLRPG	TO-92 (Pb-Free)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

[†]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.

2N7000

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.

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	---

STYLE 22:

- PIN 1. SOURCE
2. GATE
3. DRAIN

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