

# 2N7000

Preferred Device

## Small Signal MOSFET 200 mAmps, 60 Volts N-Channel TO-92

### 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 ( $t_p \leq 50 \mu\text{s}$ )	$V_{GS}$ $V_{GSM}$	$\pm 20$ $\pm 40$	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 $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/16" from case for 10 seconds	$T_L$	300	$^\circ\text{C}$

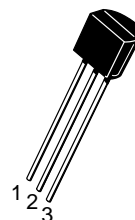
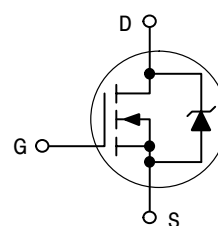


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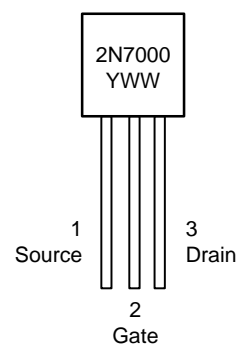
**200 mAmps**  
**60 VOLTS**  
 **$R_{DS(on)} = 5 \Omega$**

N-Channel



TO-92  
CASE 29  
Style 22

### MARKING DIAGRAM & PIN ASSIGNMENT



Y = Year  
WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

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

## 2N7000

### 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	$\mu\text{Adc}$ 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	–	$\mu\text{mhos}$

#### 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 (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  $\leq 2.0\%$ .

## 2N7000

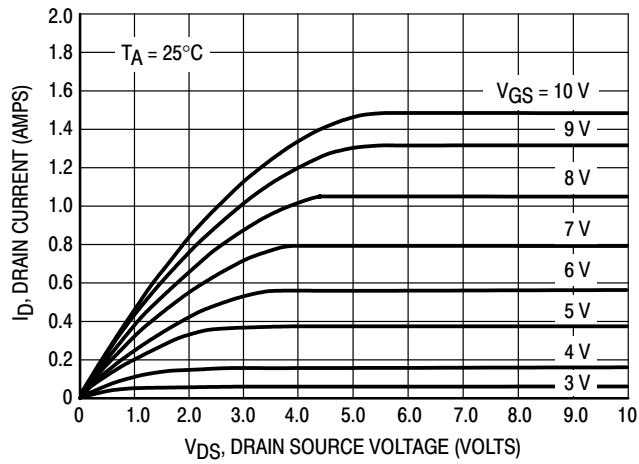


Figure 1. Ohmic Region

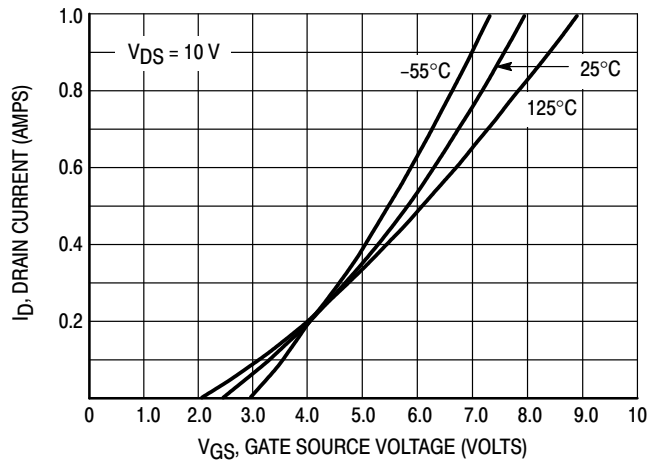


Figure 2. Transfer Characteristics

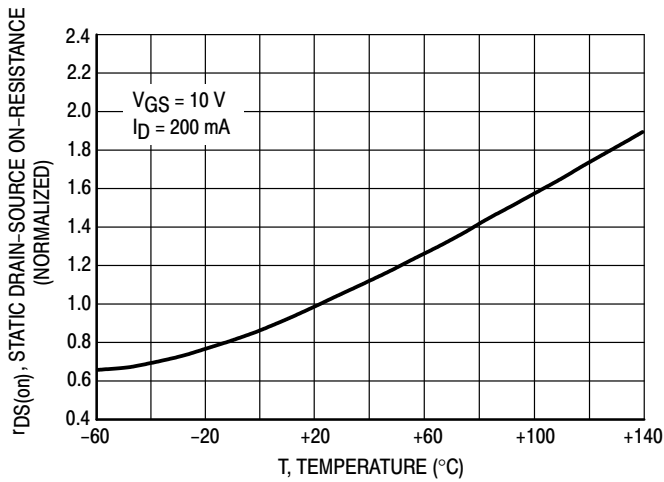


Figure 3. Temperature versus Static Drain-Source On-Resistance

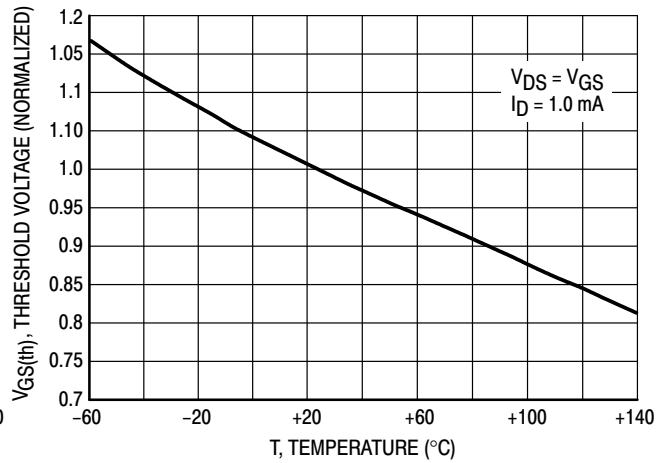


Figure 4. Temperature versus Gate Threshold Voltage

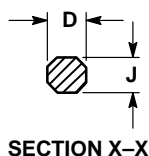
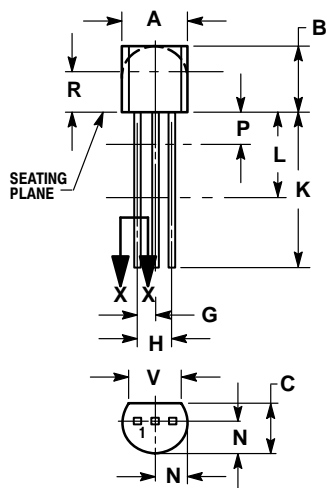
## ORDERING INFORMATION

Device	Package	Shipping
2N7000	TO-92	1000 Unit/Box
2N7000RLRA	TO-92	2000 Tape & Reel
2N7000RLRM	TO-92	2000 Ammo Pack
2N7000RLRP	TO-92	2000 Ammo Pack
2N7000ZL1	TO-92	2000 Ammo Pack

# 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:
1. SOURCE
  2. GATE
  3. DRAIN

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