2N7000

Preferred Device

Small Signal MOSFET 200 mAmps, 60 Volts

N–Channel TO–92

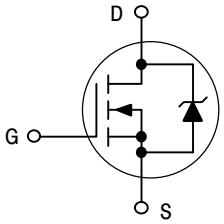
ON Semiconductor®

Features

- AEC Qualified
- PPAP Capable
- Pb–Free Packages are Available*

200 mAMPS
60 VOLTS
$R_{DS(on)}$ = 5 Ω

N–Channel



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain Source Voltage	V_{DSS}	60	Vdc
Drain–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	60	Vdc
Gate–Source Voltage – Continuous – Non–repetitive ($t_p \le 50$ μs)	 V_{GS} V_{GSM}	 ±20 ±40	 Vdc Vpk
Drain Current – Continuous – Pulsed	 I_D I_{DM}	 200 500	mAdc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	350 2.8	mW mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to +150	°C

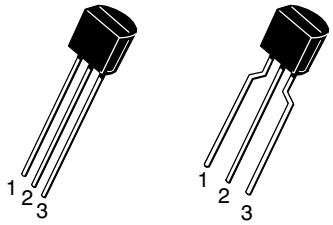
THERMAL CHARACTERISTICS

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_L	300	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

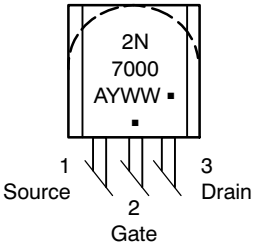
TO–92
CASE 29
STYLE 22



STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

MARKING DIAGRAM AND PIN ASSIGNMENT



A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb–Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

Publication Order Number:
2N7000/D

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Drain−Source Breakdown Voltage	(V_{GS} = 0, I_D = 10 μAdc)	$V_{(BR)DSS}$	60	−	Vdc
Zero Gate Voltage Drain Current	(V_{DS} = 48 Vdc, V_{GS} = 0) (V_{DS} = 48 Vdc, V_{GS} = 0, T_J = 125°C)	I_{DSS}	− −	1.0 1.0	μAdc mAdc
Gate−Body Leakage Current, Forward	(V_{GSF} = 15 Vdc, V_{DS} = 0)	I_{GSSF}	−	−10	nAdc
ON CHARACTERISTICS (Note 1)					
Gate Threshold Voltage	(V_{DS} = V_{GS}, I_D = 1.0 mAdc)	$V_{GS(th)}$	0.8	3.0	Vdc
Static Drain−Source On−Resistance	(V_{GS} = 10 Vdc, I_D = 0.5 Adc) (V_{GS} = 4.5 Vdc, I_D = 75 mAdc)	$r_{DS(on)}$	− −	5.0 6.0	Ω
Drain−Source On−Voltage	(V_{GS} = 10 Vdc, I_D = 0.5 Adc) (V_{GS} = 4.5 Vdc, I_D = 75 mAdc)	$V_{DS(on)}$	− −	2.5 0.45	Vdc
On−State Drain Current	(V_{GS} = 4.5 Vdc, V_{DS} = 10 Vdc)	$I_{d(on)}$	75	−	mAdc
Forward Transconductance	(V_{DS} = 10 Vdc, I_D = 200 mAdc)	g_{fs}	100	−	μmhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0, f = 1.0 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 V, I_D = 500 mA, R_G = 25 Ω, R_L = 30 Ω, V_{gen} = 10 V)	t_{on}	−	10	ns
Turn−Off Delay Time		t_{off}	−	10	

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

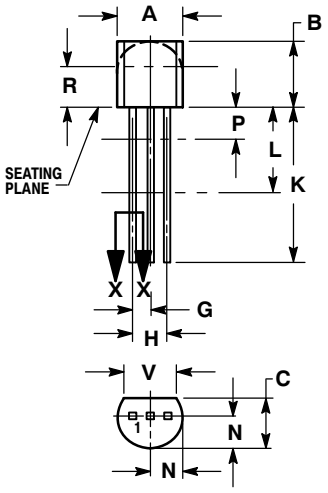
ORDERING INFORMATION

Device	Package	Shipping†
2N7000	TO−92	1000 Units / Bulk
2N7000G	TO−92 (Pb−Free)	1000 Units / Bulk
2N7000RLRA	TO−92	2000 Tape & Reel
2N7000RLRAG	TO−92 (Pb−Free)	2000 Tape & Reel
2N7000RLRMG	TO−92 (Pb−Free)	2000 Tape & Ammo Box
2N7000RLRPG	TO−92 (Pb−Free)	2000 Tape & Ammo Box

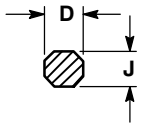
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

TO−92 (TO−226)
CASE 29−11
ISSUE AM



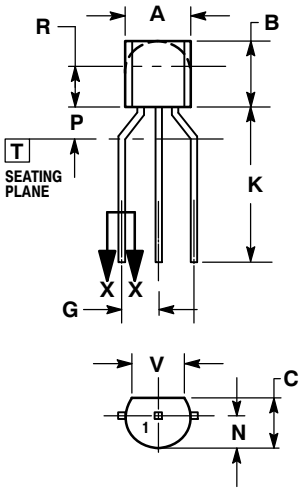
STRAIGHT LEAD
BULK PACK



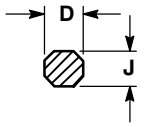
SECTION X−X

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		MILLIMETERS	
DIM	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	---



BENT LEAD
TAPE & REEL
AMMO PACK



SECTION X−X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	MILLIMETERS	
DIM	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLE 22:
PIN 1. SOURCE
2. GATE
3. DRAIN