

MOSFET – Advanced Small-Signal

2N7000BU / 2N7000TA

Description

These N-channel enhancement mode field effect transistors are produced using onsemi's proprietary, high cell density, DMOS technology. These products minimize on-state resistance while providing rugged, reliable, and fast switching performance. They can be used in most applications requiring up to 400 mA DC and can deliver pulsed currents up to 2 A. These products are particularly suited for low-voltage, low-current applications, such as small servo motor control, power MOSFET gate drivers, and other switching applications.

Features

- Fast Switching Times
- Improved Inductive Ruggedness
- Lower Input Capacitance
- Extended Safe Operating Area
- Improved High-Temperature Reliability
- This is a Pb-Free Device

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage	60	V
I_D	Continuous Drain Current ($T_C = 25^\circ\text{C}$)	200	mA
	Continuous Drain Current ($T_C = 100^\circ\text{C}$)	110	
I_{DM}	Drain Current Pulsed (Note 1)	1000	mA
V_{GS}	Gate-to-Source Voltage	± 30	V
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8-inch from Case for 5 Seconds	300	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

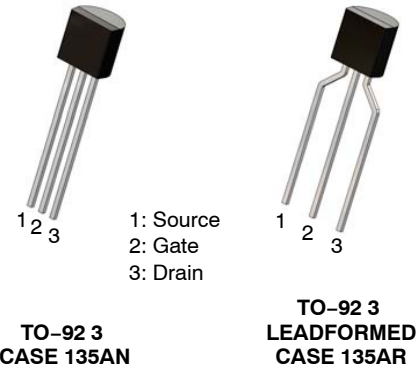
1. Repetitive rating: pulse width limited by maximum junction temperature.

THERMAL CHARACTERISTICS (Note 2)

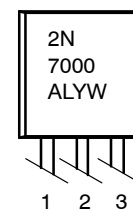
(Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.)

Symbol	Parameter	Value	Unit
P_D	Total Power Dissipation ($T_C = 25^\circ\text{C}$)	400	mW
	Linear Derating Factor	3.2	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	312.5	$^\circ\text{C}/\text{W}$

2. Device mounted on FR-4 PCB, board size = 101.5 mm x 114.5 mm.



MARKING DIAGRAM



2N7000 = Device Code
A = Assembly Site
L = Wafer Lot Number
YW = Assembly Start Week

ORDERING INFORMATION

Device	Package	Shipping [†]
2N7000BU	TO-92 3 / (Pb-Free)	10000 / Bulk Bag
2N7000TA	TO-92 3 (Pb-Free)	2000 / Fan-Fold

2N7000BU / 2N7000TA

ELECTRICAL CHARACTERISTICS

(Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
B_{VDSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.3	-	3.9	V
		$V_{DS} = V_{GS}, I_D = 1\ \text{mA}$	0.4	-	3.0	
I_{GSS}	Gate-Source Leakage, Forward	$V_{GS} = 15\ \text{V}$	-	-	100	nA
	Gate-Source Leakage, Reverse	$V_{GS} = -15\ \text{V}$	-	-	-100	
I_{DSS}	Drain-to-Source Leakage Current	$V_{DS} = 60\ \text{V}$	-	-	1	mA
		$V_{DS} = 45\ \text{V}, T_C = 125^\circ\text{C}$	-	-	1000	
$R_{DS(ON)}$	Static Drain-Source On-State Resistance (Note 3)	$V_{GS} = 10\ \text{V}, I_D = 0.5\ \text{A}$	-	-	5.0	Ω
g_{fs}	Forward Transconductance (Note 3)	$V_{DS} = 15\ \text{V}, I_D = 0.5\ \text{A}$	0.1	0.3	-	S
C_{iss}	Input Capacitance	$V_{GS} = 0\ \text{V}, V_{DS} = 25\ \text{V}, f = 1\ \text{MHz}$	-	30	-	pF
C_{oss}	Output Capacitance		-	12	-	pF
C_{rss}	Reverse Transfer Capacitance		-	3.0	-	pF
$t_{d(on)}$	Turn-On Delay	$V_{DD} = 30\ \text{V}, I_D = 0.5\ \text{A},$ $R_G = 15\ \Omega$ (Note 3), (Note 4)	-	-	10	ns
t_r	Rise Time		-	-	10	ns
$t_{d(off)}$	Turn-Off Delay		-	-	10	ns
t_f	Fall Time		-	-	10	ns

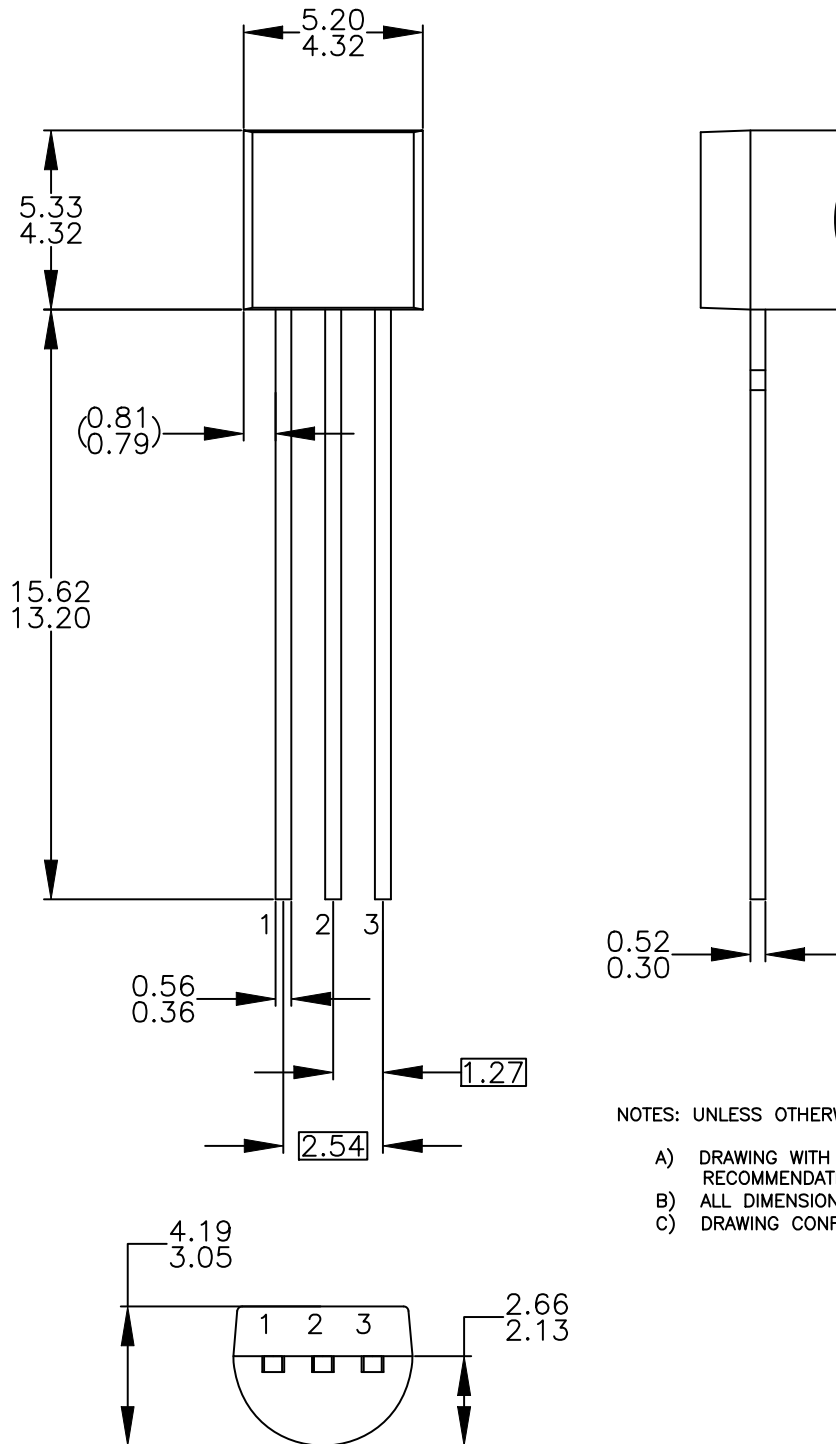
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulse test: pulse width = $250\ \mu\text{s}$, duty cycle $\leq 2\%$

4. Essentially independent of operating temperature.

TO-92 3 4.825x4.76
CASE 135AN
ISSUE O

DATE 31 JUL 2016



NOTES: UNLESS OTHERWISE SPECIFIED

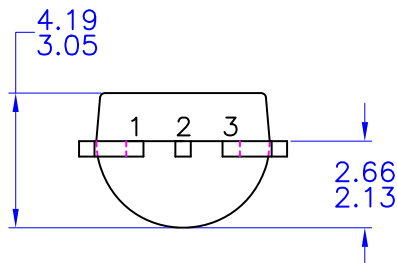
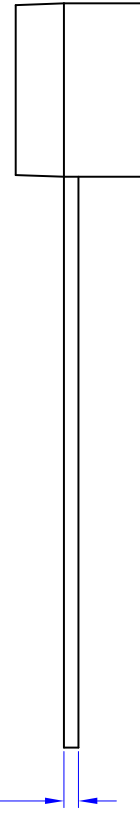
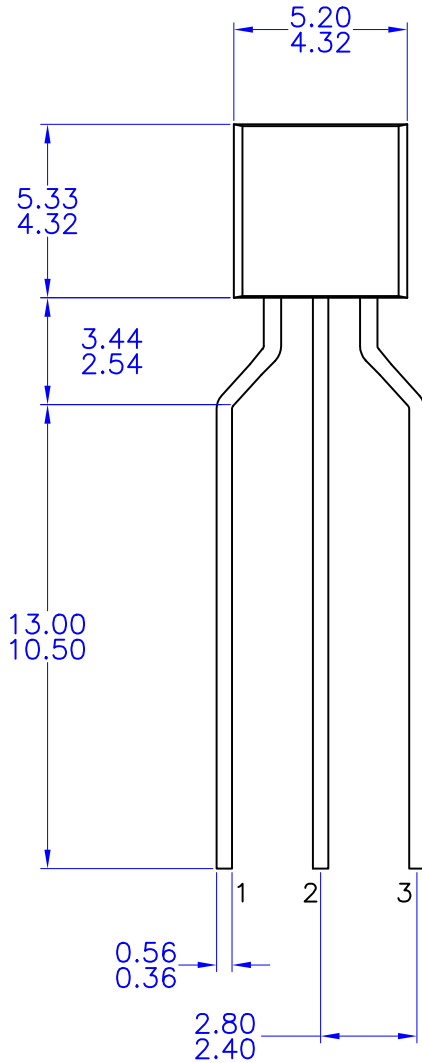
- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-2009.

DOCUMENT NUMBER:	98AON13880G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-92 3 4.825X4.76	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

TO-92 3 4.83x4.76 LEADFORMED
CASE 135AR
ISSUE O

DATE 30 SEP 2016



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994

DOCUMENT NUMBER:	98AON13879G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-92 3 4.83X4.76 LEADFORMED	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales