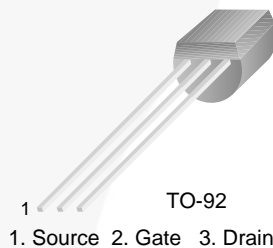


## 2N7000BU / 2N7000TA

### Advanced Small-Signal MOSFET

#### Features

- Fast Switching Times
- Improved Inductive Ruggedness
- Lower Input Capacitance
- Extended Safe Operating Area
- Improved High-Temperature Reliability



#### Description

These N-channel enhancement mode field effect transistors are produced using Fairchild'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.

#### Ordering Information

Part Number	Marking	Package	Packing Method
2N7000BU	2N7000	TO-92 3L	Bulk
2N7000TA	2N7000	TO-92 3L	Ammo

#### Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

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 <sup>(1)</sup>	1000	mA
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	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	$^\circ\text{C}$

#### Note:

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

### Thermal Characteristics<sup>(2)</sup>

Values are at  $T_C = 25^\circ\text{C}$  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	$^\circ\text{C}/\text{W}$

**Note:**

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

### Electrical Characteristics

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

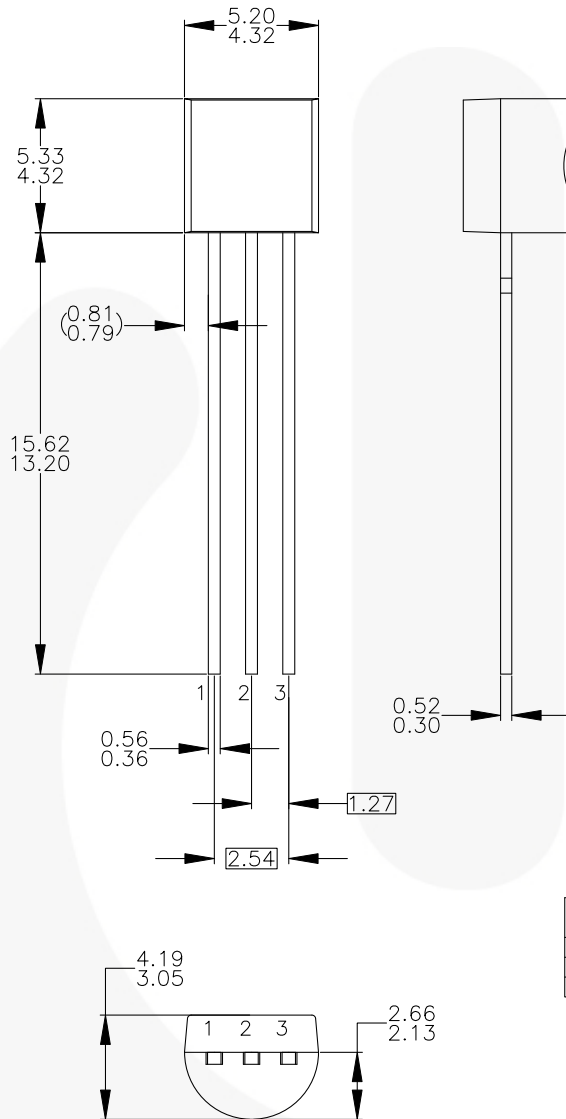
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.3		3.9	V
		$V_{DS} = V_{GS}, I_D = 1\ \text{mA}$	0.4		2.2	
$I_{GSS}$	Gate-Source 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	$\mu\text{A}$
		$V_{DS} = 45\ \text{V}, T_C = 125^\circ\text{C}$			1000	
$R_{DS(ON)}$	Static Drain-Source On-State Resistance <sup>(3)</sup>	$V_{GS} = 10\ \text{V}, I_D = 0.5\ \text{A}$			5.0	$\Omega$
$g_{fs}$	Forward Transconductance <sup>(3)</sup>	$V_{DS} = 15\ \text{V}, I_D = 0.5\ \text{A}$	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	$V_{DD} = 30\ \text{V}, I_D = 0.5\ \text{A}, R_G = 15\ \Omega^{(3),(4)}$			10	ns
$t_r$	Rise Time				10	ns
$t_{d(off)}$	Turn-Off Delay				10	ns
$t_f$	Fall Time				10	ns

**Notes:**

- 3. Pulse test: pulse width = 250  $\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- 4. Essentially independent of operating temperature.

Physical Dimensions

TO-92



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.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:

- P - BIPOLAR
- F - JFET
- M - DMOS
- E - EMITTER
- B - BASE
- C - COLLECTOR
- D - DRAIN
- S - SOURCE
- G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03DREV3.

Figure 1. 3-LEAD, TO-92, JEDEC TO-92 COMPLIANT STRAIGHT LEAD CONFIGURATION

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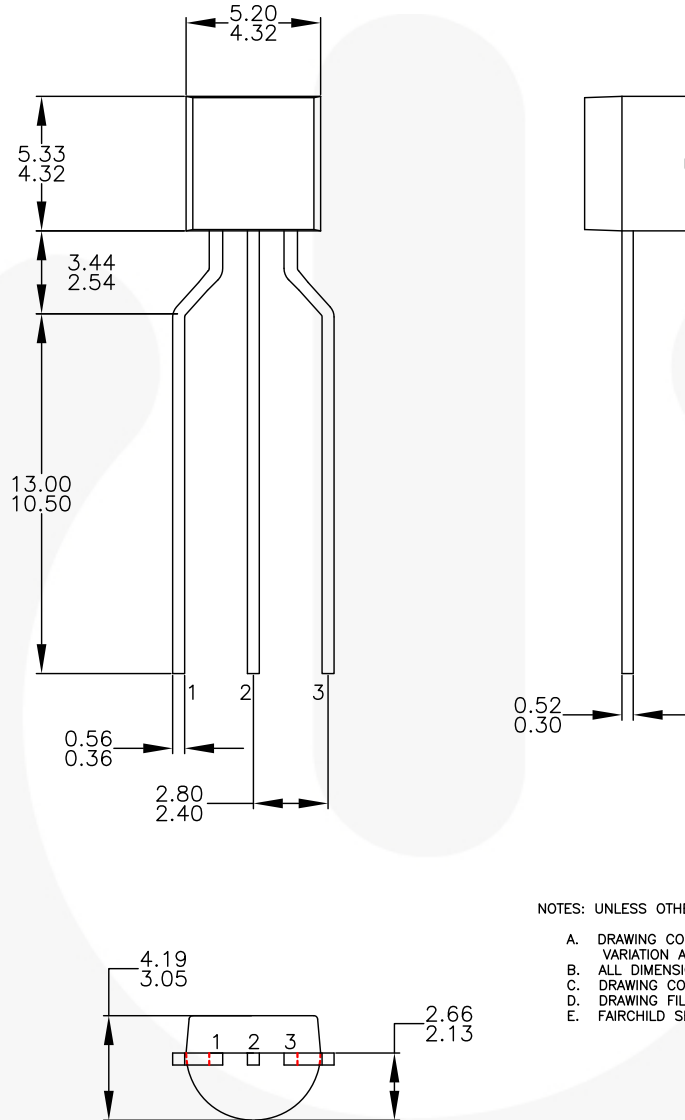
<http://www.fairchildsemi.com/dwg/ZA/ZA03D.pdf>

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:

[http://www.fairchildsemi.com/packinq\\_dwg/PKG-ZA03D\\_BK.pdf](http://www.fairchildsemi.com/packinq_dwg/PKG-ZA03D_BK.pdf)

Physical Dimensions (Continued)

TO-92



NOTES: UNLESS OTHERWISE SPECIFIED

- A. DRAWING CONFORMS TO JEDEC MS-013, VARIATION AC.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5M-2009.
- D. DRAWING FILENAME: MKT-ZA03FREV3.
- E. FAIRCHILD SEMICONDUCTOR.

Figure 2. 3-LEAD, TO-92, MOLDED 0.200 IN LINE SPACING LD FORM (J61Z OPTION) (ACTIVE)

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For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:

[http://www.fairchildsemi.com/packaging\\_dwg/PKG-ZA03F.pdf](http://www.fairchildsemi.com/packaging_dwg/PKG-ZA03F.pdf)



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| AX-CAP®*                 | FRFET®   | PowerTrench®                          | SYSTEM GENERAL®  |
| BitSiC™                  | Global Power Resource™                         | PowerXS™                              | TinyBoost®       |
| Build it Now™            | GreenBridge™                                   | Programmable Active Droop™            | TinyBuck®        |
| CorePLUS™                | Green FPS™                                     | QFET®                                 | TinyCalc™        |
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| DEUXPEED®                | ISOPLANAR™                                     | Saving our world, 1mW/W/kW at a time™ | TinyWire™        |
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| ESBC™                    | MicroFET™                                      | Solutions for Your Success™           | μSerDes™         |
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| FACT Quiet Series™       | MillerDrive™                                   | SuperFET®                             | Ultra FRFET™     |
| FACT®                    | MotionMax™                                     | SuperSOT™-3                           | UniFET™          |
| FAST®                    | mWSaver®                                       | SuperSOT™-6                           | VcX™             |
| FastvCore™               | OptoHiT™                                       | SuperSOT™-8                           | VisualMax™       |
| FETBench™                | OPTOLOGIC®                                     | SupreMOS®                             | VoltagePlus™     |
| FPS™                     | OPTOPLANAR®                                    | SyncFET™                              | XS™              |

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No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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