

DATA SHEET

BS170

N-channel vertical D-MOS
transistor

Product specification
File under Discrete Semiconductors, SC13b

April 1995

N-channel vertical D-MOS transistor

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DESCRIPTION

N-channel enhancement mode vertical D-MOS transistor in TO-92 variant envelope and intended for use in relay, high-speed and line-transformer drivers.

FEATURES

- Very low $R_{DS(on)}$.
- Direct interface to C-MOS, TTL, etc.
- High-speed switching.
- No secondary breakdown.

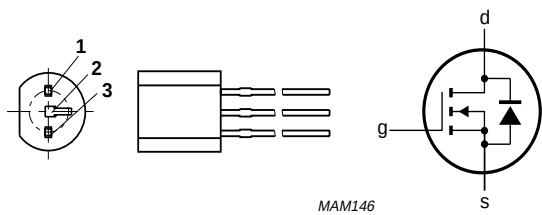
QUICK REFERENCE DATA

Drain-source voltage	V_{DS}	max.	60 V
Gate-source voltage	V_{GS}	max.	15 V
Drain current (DC)	I_D	max.	500 mA
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	830 mW
Junction temperature	T_j	max.	150 $^{\circ}\text{C}$
Drain-source ON-resistance $V_{GS} = 10\text{ V}; I_D = 200\text{ mA}$	$R_{DS(on)}$	max.	5 Ω

PINNING - TO-92 VARIANT

- 1 = source
- 2 = gate
- 3 = drain

PIN CONFIGURATION



Note: Various pin configurations available.

Fig.1 Simplified outline and symbol.

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RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	V_{DS}	max.	60 V
Drain-gate voltage	V_{DG}	max.	60 V
Gate-source voltage	V_{GS}	max.	15 V
Drain current (DC) at $T_c = 25\text{ }^{\circ}\text{C}$	I_D	max.	500 mA
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	830 mW
Storage temperature range	T_{stg}		-55 to +150 $^{\circ}\text{C}$
Junction temperature	T_j	max.	150 $^{\circ}\text{C}$

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j-a}$	=	150 K/W
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CHARACTERISTICS $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Drain-source breakdown voltage $V_{GS} = 0$; $I_D = 100\text{ }\mu\text{A}$	$V_{(BR)DS}$	min. typ.	60 V 90 V
Gate threshold voltage $V_{GS} = V_{DS}$; $I_D = 1\text{ mA}$	$V_{GS(th)}$	min. max.	0.8 V 3.0 V
Gate-source leakage current $V_{GS} = 15\text{ V}$; $V_{DS} = 0$	I_{GSoff}	max.	10 nA
Drain cut-off current $V_{DS} = 25\text{ V}$; $V_{GS} = 0$	I_{DSS}	max.	0.5 μA
Drain-source ON-resistance (note 1) $V_{GS} = 10\text{ V}$; $I_D = 200\text{ mA}$	$R_{DS(on)}$	typ. max.	2.5 Ω 5.0 Ω
Forward transconductance (note 1) $V_{DS} = 10\text{ V}$; $I_D = 200\text{ mA}$; $f = 1\text{ kHz}$	g_{fs}	typ.	200 mS
Capacitances at $f = 1\text{ MHz}$ $V_{DS} = 10\text{ V}$; $V_{GS} = 0$	C_{iss}	typ. max.	25 pF 40 pF
	C_{os}	typ. max.	22 pF 30 pF
	C_{rs}	typ. max.	6 pF 10 pF
Switching times at $I_D = 200\text{ mA}$ $I_D = 200\text{ mA}$; $V_{DS} = 50\text{ V}$; $V_{GS} = 0$ to 10 V	t_{on}	typ. max.	4 ns 10 ns
	t_{off}	typ. max.	4 ns 10 ns

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Note

1. $t_p = 80 \mu\text{s}$; $\delta = 0,01$.

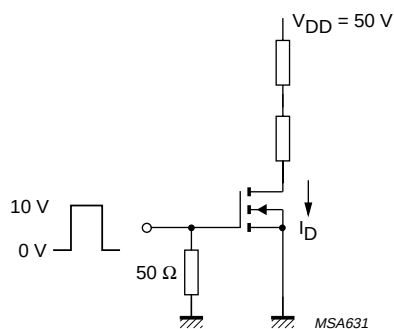


Fig.2 Switching times test circuit.

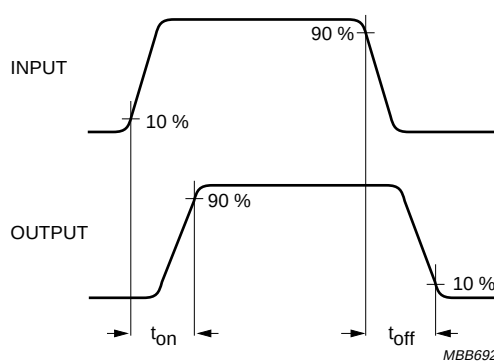


Fig.3 Input and output waveforms.

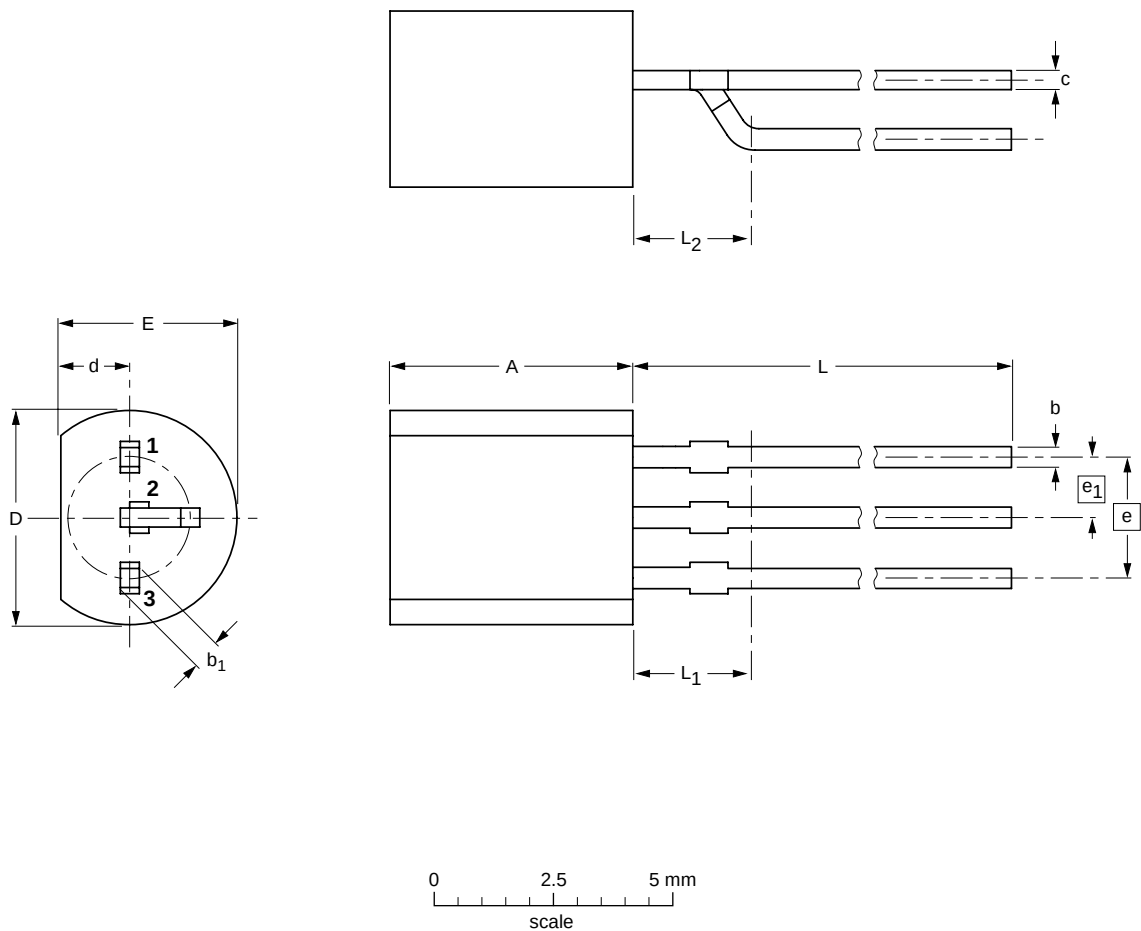
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads (on-circle)

SOT54 variant



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b ₁	c	D	d	E	e	e ₁	L	L ₁ ⁽¹⁾ max	L ₂ max
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5	2.5

Notes

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT54 variant		TO-92	SC-43			97-04-14

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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