

# DATA SHEET

## **BSS89**

N-channel enhancement mode  
vertical D-MOS transistor

Product specification  
Supersedes data of 1997 Jun 20  
File under Discrete Semiconductors, SC13b

1998 Apr 24

# N-channel enhancement mode vertical D-MOS transistor

**BSS89**

**FEATURES**

- Direct interface to C-MOS, TTL, etc.
- High-speed switching
- No secondary breakdown.

**APPLICATIONS**

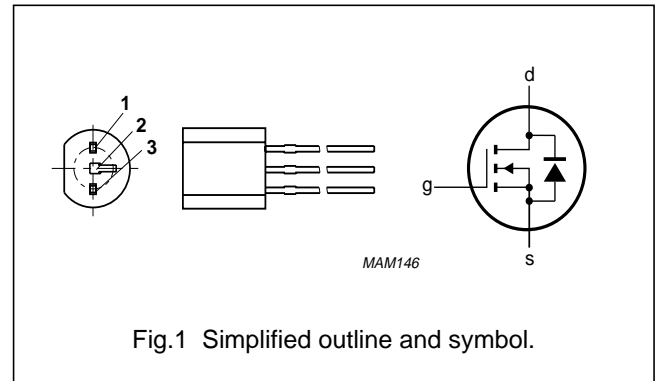
- Line current interruptor in telephone sets
- Relay, high-speed and line transformer drivers.

**DESCRIPTION**

N-channel enhancement mode vertical D-MOS transistor in a TO-92 variant package.

**PINNING - TO-92 variant**

PIN	SYMBOL	DESCRIPTION
1	g	gate
2	d	drain
3	s	source



**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{DS}$	drain-source voltage (DC)		–	–	200	V
$V_{GSO}$	gate-source voltage (DC)	open drain	–	–	$\pm 20$	V
$I_D$	drain current (DC)		–	–	300	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	–	–	1	W
$R_{DSon}$	drain-source on-state resistance	$I_D = 400\text{ mA}; V_{GS} = 10\text{ V}$	–	4.5	6	$\Omega$
$ y_{fs} $	forward transfer admittance	$I_D = 400\text{ mA}; V_{DS} = 25\text{ V}$	140	350	–	mS

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## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage (DC)		–	200	V
$V_{GSO}$	gate-source voltage (DC)	open drain	–	$\pm 20$	V
$I_D$	drain current (DC)		–	300	mA
$I_{DM}$	peak drain current		–	1.2	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$ ; note 1	–	1	W
$T_{stg}$	storage temperature		–55	+150	°C
$T_j$	junction temperature		–	150	°C

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	125	K/W

### Note to the Limiting values and Thermal characteristics

- Device mounted on a printed-circuit board, maximum lead length 4 mm; mounting pad for drain lead minimum  $10 \times 10$  mm.

## CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$ ; $I_D = 250\ \mu\text{A}$	200	–	–	V
$V_{GSth}$	gate-source threshold voltage	$V_{DS} = V_{GS}$ ; $I_D = 1\ \text{mA}$	0.8	–	2.8	V
$I_{DSS}$	drain-source leakage current	$V_{DS} = 60\ \text{V}$ ; $V_{GS} = 0$	–	–	200	nA
		$V_{DS} = 200\ \text{V}$ ; $V_{GS} = 0$	–	0.1	60	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{DS} = 0$ ; $V_{GS} = \pm 20\ \text{V}$	–	–	$\pm 100$	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\ \text{V}$ ; $I_D = 400\ \text{mA}$	–	4.5	6	$\Omega$
$ y_{fs} $	forward transfer admittance	$I_D = 400\ \text{mA}$ ; $V_{DS} = 25\ \text{V}$	140	350	–	mS
$C_{iss}$	input capacitance	$V_{DS} = 25\ \text{V}$ ; $V_{GS} = 0$ ; $f = 1\ \text{MHz}$	–	45	–	pF
$C_{oss}$	output capacitance	$V_{DS} = 25\ \text{V}$ ; $V_{GS} = 0$ ; $f = 1\ \text{MHz}$	–	15	–	pF
$C_{rss}$	reverse transfer capacitance	$V_{DS} = 25\ \text{V}$ ; $V_{GS} = 0$ ; $f = 1\ \text{MHz}$	–	3.5	–	pF
<b>Switching times</b> (see Figs 2 and 3)						
$t_{on}$	turn-on time	$V_{GS} = 0$ to $10\ \text{V}$ ; $V_{DD} = 50\ \text{V}$ ; $I_D = 250\ \text{mA}$	–	5	–	ns
$t_{off}$	turn-off time	$V_{GS} = 10$ to $0\ \text{V}$ ; $V_{DD} = 50\ \text{V}$ ; $I_D = 250\ \text{mA}$	–	15	–	ns

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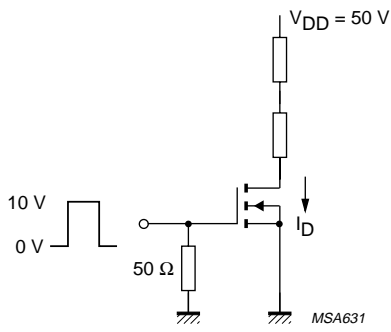


Fig.2 Switching time test circuit.

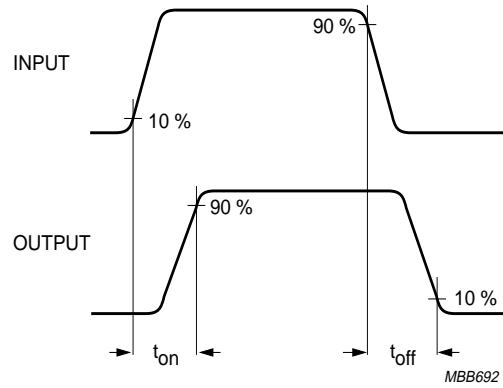


Fig.3 Input and output waveforms.

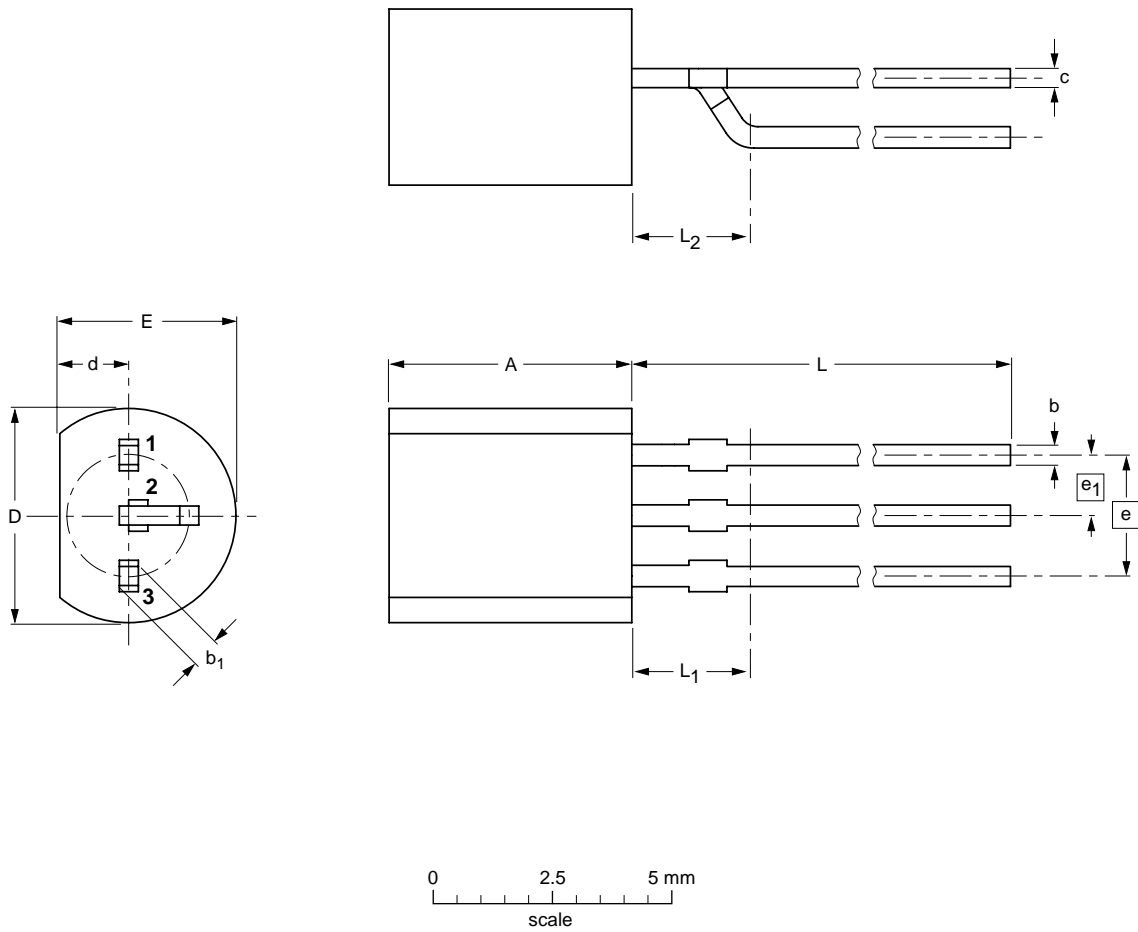
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PACKAGE OUTLINE

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 variant	SC-43		98-03-26

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### DEFINITIONS

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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