DATA SHEET

BS107
N-channel enhancement mode vertical D-MOS transistor

Product specification
File under Discrete Semiconductors, SC13b

April 1995

Philips
Semiconductors

PHILIPS

N-channel enhancement mode vertical D-MOS transistor

BS107

FEATURES

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

DESCRIPTION

N-channel enhancement mode vertical D-MOS transistor in a TO-92 variant envelope. Intended for use as a line current interruptor in telephone sets and for applications in relay, high-speed and line transformer drivers.

PINNING - TO-92 variant

PIN	DESCRIPTION
1	source
2	gate
3	drain

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	drain-source voltage (DC)	200	V
V_{GSth}	gate-source threshold voltage	2.4	V
I_D	drain current (DC)	150	mA
R_{DSon}	drain-source on-state resistance	28	Ω

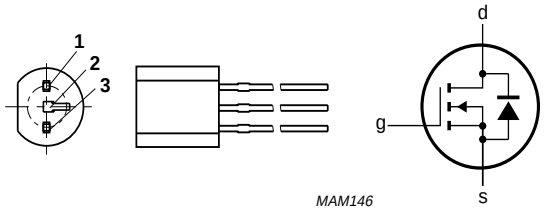


Fig.1 Simplified outline and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	200	V
$\pm V_{GSO}$	gate-source voltage	open drain	–	20	V
I_D	drain current	DC	–	150	mA
I_{DM}	drain current	peak	–	300	mA
P_{tot}	total power dissipation	up to T_{amb} = 25 °C	–	830	mW
T_{stg}	storage temperature range		–65	150	°C
T_j	operating junction temperature		–	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	MAX.	UNIT
$R_{th\ j\text{-}a}$	from junction to ambient	150	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 I_D = 10 μA	200	–	–	V
I_{DSS}	drain-source leakage current	V_{DS} = 130 V V_{GS} = 0	–	–	30	nA
I_{DSX}	drain-source leakage current	V_{DS} = 70 V V_{GS} = 0.2 V	–	–	1	μA
$\pm I_{GSS}$	gate-source leakage current	$\pm V_{GS}$ = 15 V V_{DS} = 0	–	–	10	nA
$V_{GS(th)}$	gate threshold voltage	I_D = 1 mA V_{DS} = V_{GS}	0.8	–	2.4	V
$R_{DS(on)}$	drain-source on-resistance	I_D = 20 mA V_{GS} = 2.6 V	–	20	28	Ω
$R_{DS(on)}$	drain-source on-resistance	I_D = 150 mA V_{GS} = 10 V	–	14	–	Ω
$\lvert Y_{fs} \rvert$	transfer admittance	I_D = 250 mA V_{DS} = 15 V	90	180	–	mS
C_{iss}	input capacitance	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz	–	50	65	pF
C_{oss}	output capacitance	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz	–	16	25	pF
C_{rss}	feedback capacitance	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz	–	4	10	pF
Switching times (see Figs 2 **and** 3**)**						
t_{on}	switching-on time	I_D = 250 mA V_{DD} = 50 V V_{GS} = 0 to 10 V	–	2	10	ns
t_{off}	switching-off time	I_D = 250 mA V_{DD} = 50 V V_{GS} = 0 to 10 V	–	4	20	ns

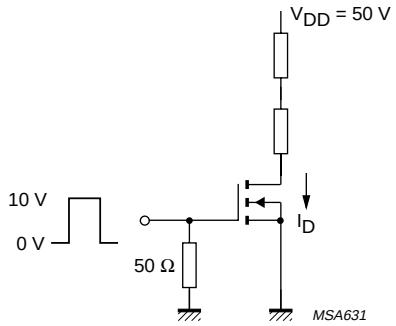


Fig.2 Switching time test circuit.

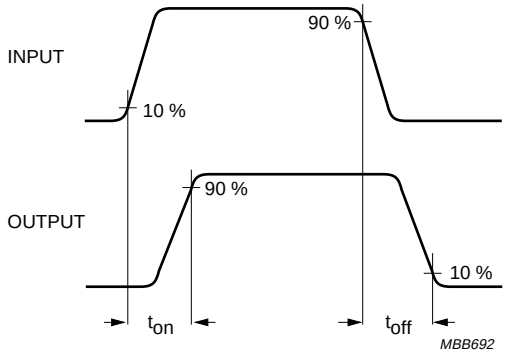


Fig.3 Input and output waveforms.

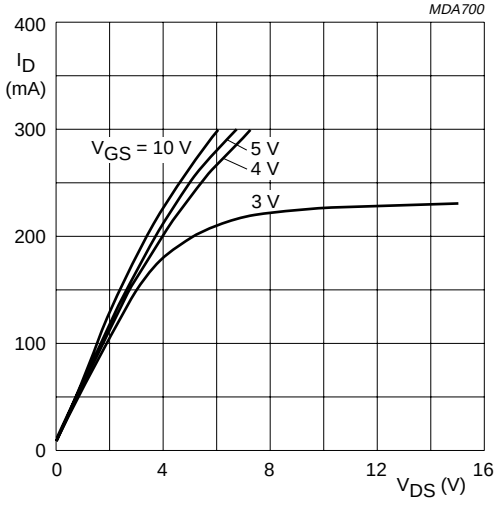


Fig.4 Typical output characteristics; T_j = 25 °C.

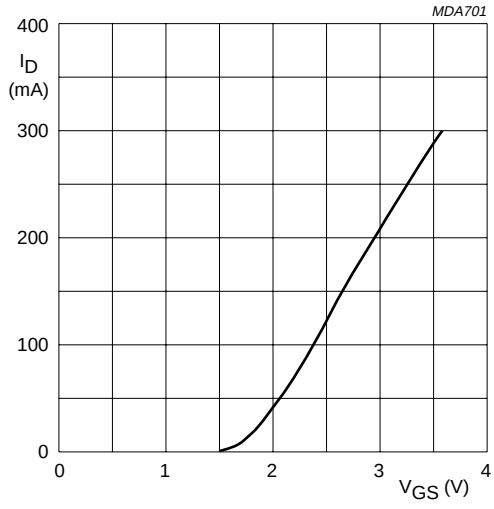


Fig.5 Typical transfer characteristic; V_{DS} = 10 V; T_j = 25 °C.

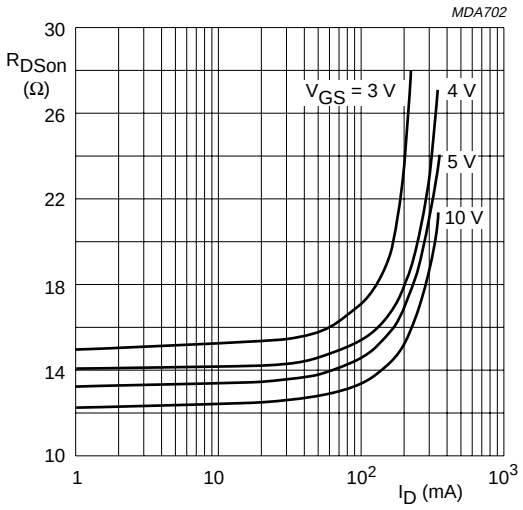


Fig.6 Typical on-resistance as a function of drain current; T_j = 25 °C.

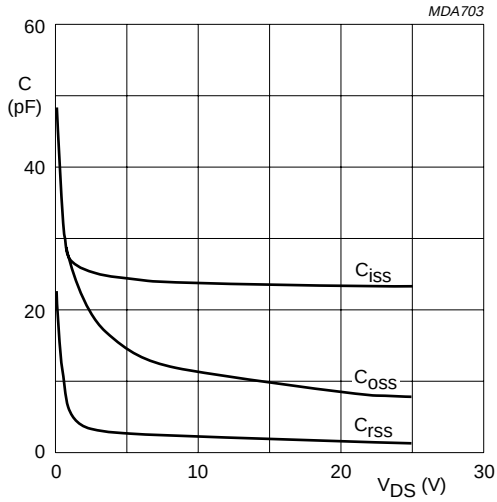
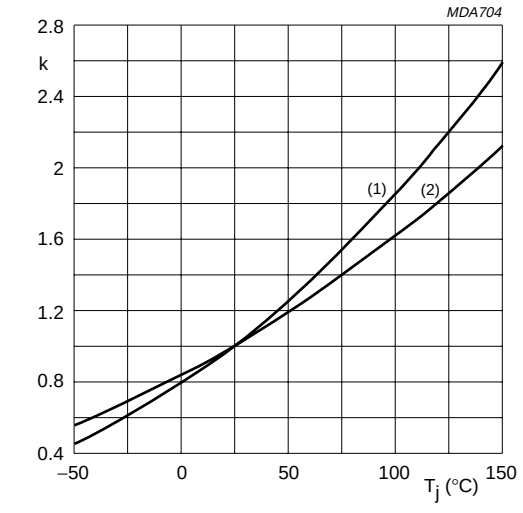


Fig.7 Typical capacitances as a function of drain-source voltage; V_{GS} = 0; f = 1 MHz; T_j = 25 °C.



(1) I_D = 150 mA; V_{GS} = 10 V
(2) I_D = 20 mA; V_{GS} = 2.6 V

Fig.8 Temperature coefficient of drain-source on-resistance; $k = \frac{R_{DS(on)} \text{ at } T_j}{R_{DS(on)} \text{ at } 25\ °C}$; typical $R_{DS(on)}$ at 150 mA/10 V

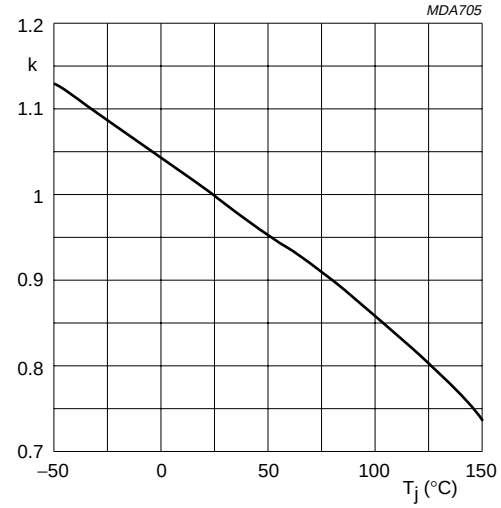


Fig.9 Temperature coefficient of gate-source threshold voltage;

$k = \frac{V_{GS(th)} \text{ at } T_j}{V_{GS(th)} \text{ at } 25\ °C}$; typical $V_{GS(th)}$ at 1 mA.

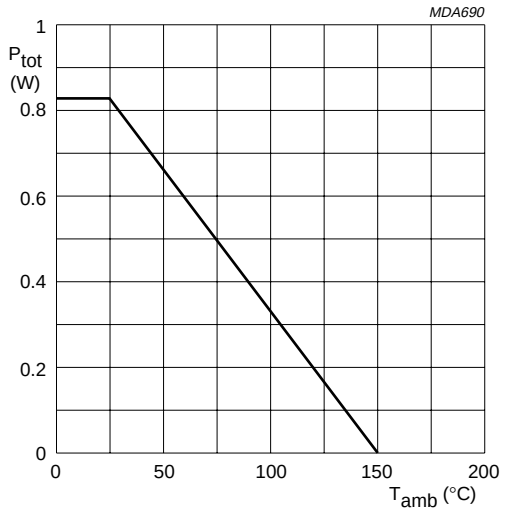
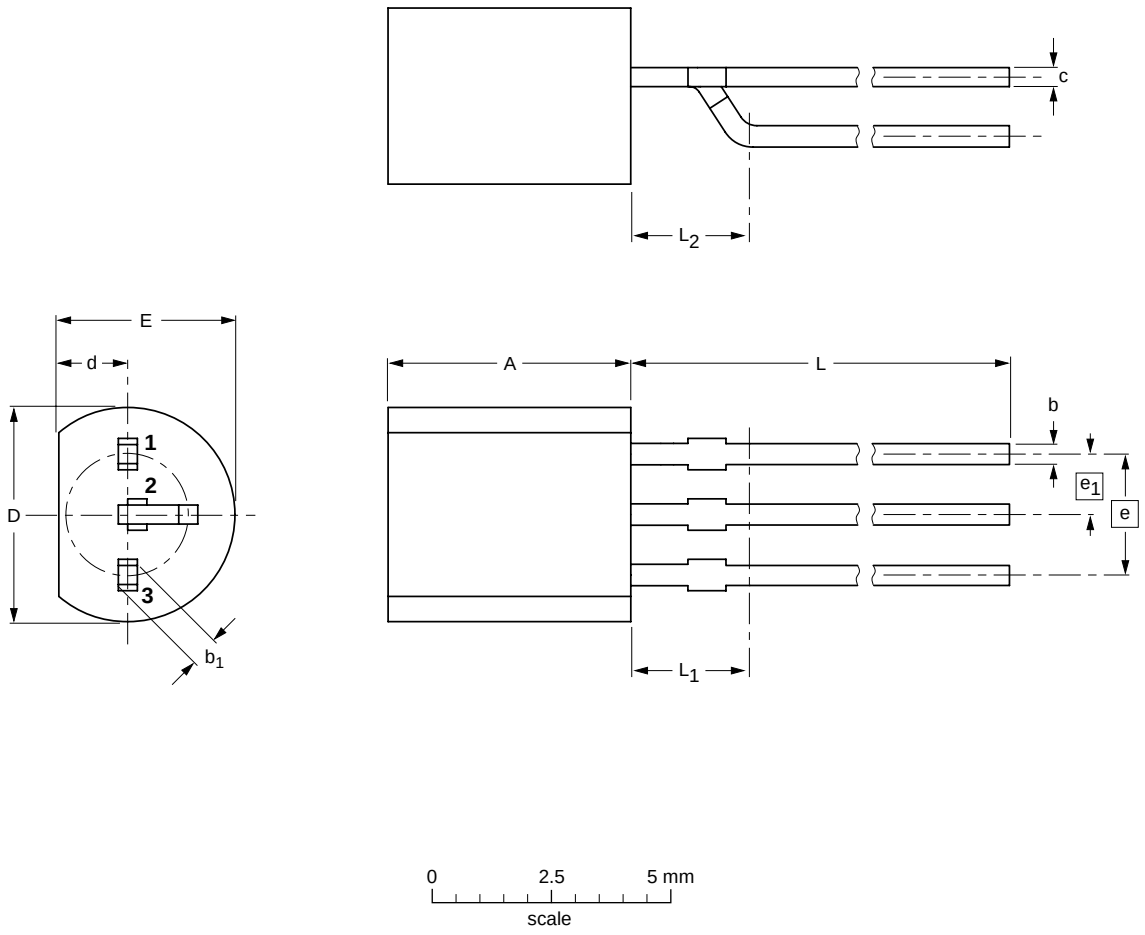


Fig.10 Power derating curve.

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

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.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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NOTES

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