DATA SHEET

BSP130
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

BSP130

FEATURES

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

DESCRIPTION

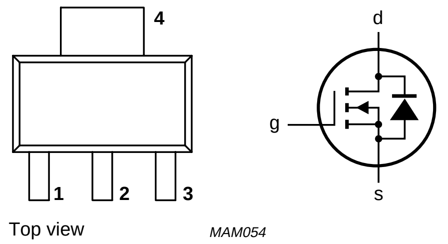
N-channel enhancement mode vertical D-MOS transistor in a SOT223 envelope, intended for use as a line current interruptor in telephone sets and for applications in relay, high-speed and line transformer drivers.

PINNING - SOT223

PIN	DESCRIPTION
1	gate
2	drain
3	source
4	drain

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	300	V
I_D	DC drain current		–	300	mA
P_{tot}	total power dissipation	up to T_{amb} = 25 °C	–	1.5	W
$\pm V_{GSO}$	gate-source voltage	open drain	–	20	V
$R_{DS(on)}$	drain-source on-resistance	I_D = 250 mA; V_{GS} = 10 V	–	8	Ω
$V_{GS(off)}$	gate-source cut-off voltage	I_D = 1 mA; $V_{DS} = V_{GS}$	0.8	2	V



Marking code
BSP130.

Fig.1 Simplified outline and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	300	V
$\pm V_{GSO}$	gate-source voltage	open drain	–	20	V
I_D	DC drain current		–	300	mA
I_{DM}	peak drain current		–	1.4	A
P_{tot}	total power dissipation	up to T_{amb} = 25 °C; note 1	–	1.5	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient; note 1	83.3 K/W

Note

1. Device mounted on an epoxy printed-circuit board, 40 x 40 x 1.5 mm, mounting pad for the drain tab minimum 6 cm^2.

STATIC CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 10 μA; V_{GS} = 0	300	–	–	V
$\pm I_{GSS}$	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	100	nA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}	0.8	–	2	V
$R_{DS(on)}$	drain-source on-resistance	I_D = 20 mA; V_{GS} = 2.4 V	–	7.9	14	Ω
		I_D = 250 mA; V_{GS} = 10 V	–	6.7	8	Ω
I_{DSS}	drain-source leakage current	V_{DS} = 240 V; V_{GS} = 0	–	–	100	nA
$\lvert Y_{fs} \rvert$	transfer admittance	I_D = 250 mA; V_{DS} = 25 V	200	380	–	mS
C_{iss}	input capacitance	V_{DS} = 25 V; V_{GS} = 0; f = 1 MHz	–	57	90	pF
C_{oss}	output capacitance	V_{DS} = 25 V; V_{GS} = 0; f = 1 MHz	–	15	30	pF
C_{rss}	feedback capacitance	V_{DS} = 25 V; V_{GS} = 0; f = 1 MHz	–	2.6	15	pF
Switching times (see Figs 2 and 3)						
t_{on}	turn-on time	I_D = 250 mA; V_{DD} = 50 V; V_{GS} = 0 to 10 V	–	2.5	10	ns
t_{off}	turn-off time	I_D = 250 mA; V_{DD} = 50 V; V_{GS} = 10 to 0 V	–	17	30	ns

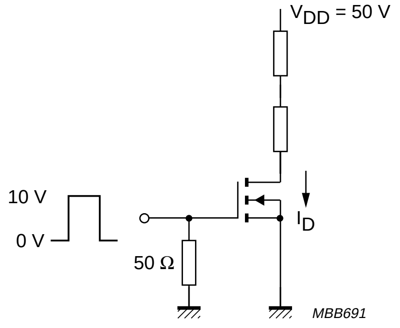


Fig.2 Switching times test circuit.

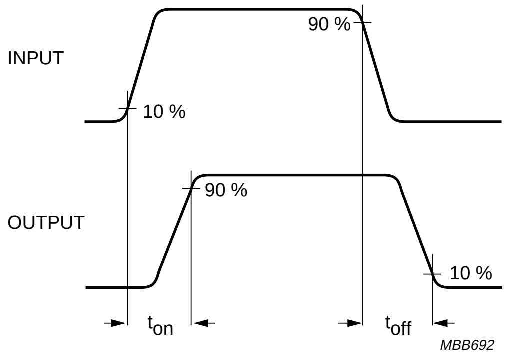


Fig.3 Input and output waveforms.

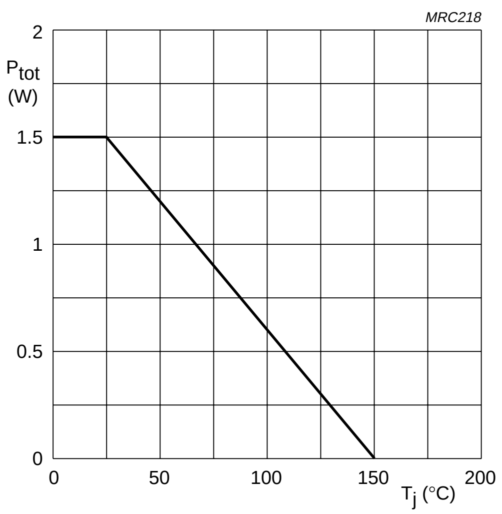
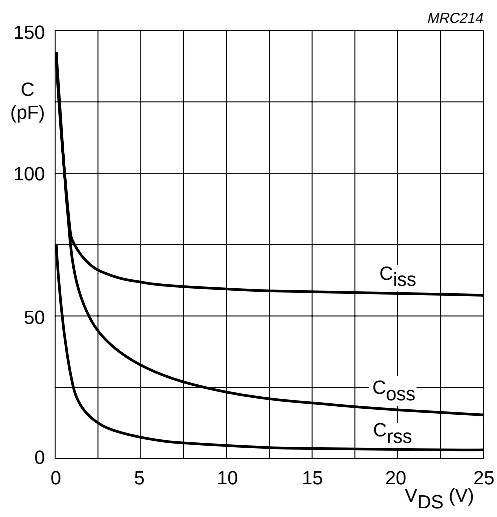
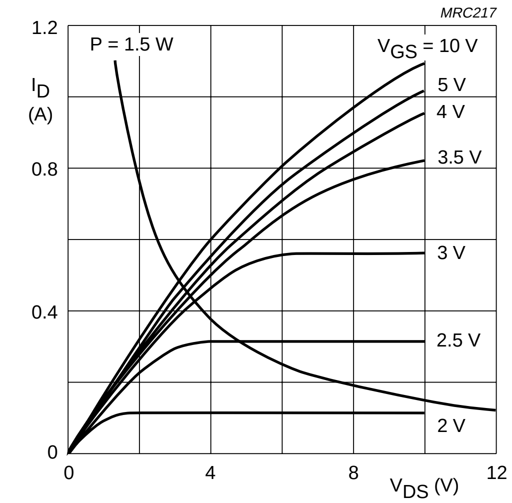


Fig.4 Power derating curve.



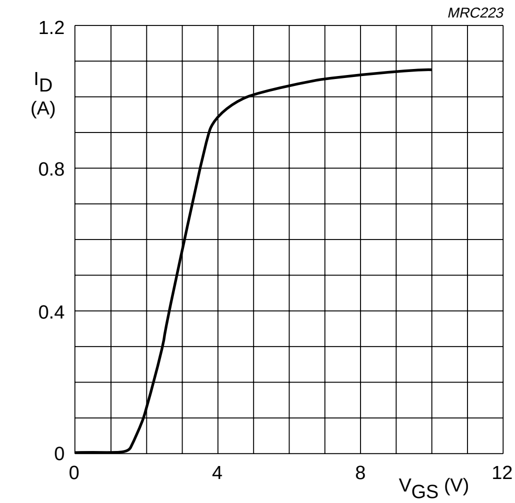
V_{GS} = 0; f = 1 MHz; T_j = 25 °C.

Fig.5 Capacitance as a function of drain-source voltage, typical values.



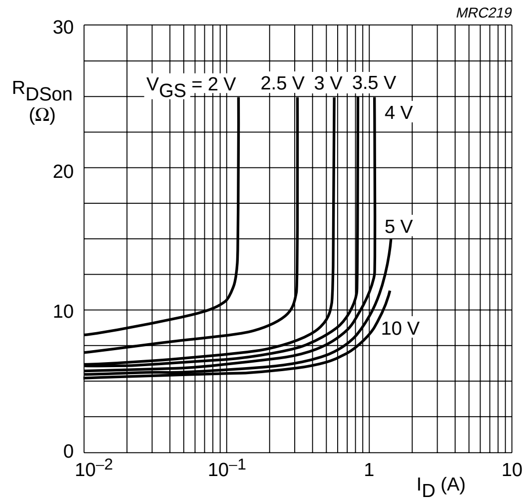
T_j = 25 °C.

Fig.6 Typical output characteristics.



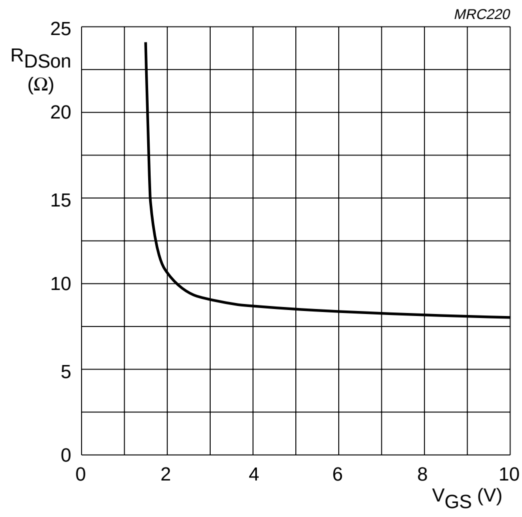
V_{DS} = 10 V; T_j = 25 °C.

Fig.7 Typical transfer characteristics.



T_j = 25 °C.

Fig.8 Drain-source on-resistance as a function of drain current, typical values.



V_{DS} = 100 mV; T_j = 25 °C.

Fig.9 Drain-source on-resistance as a function of gate-source voltage, typical values.

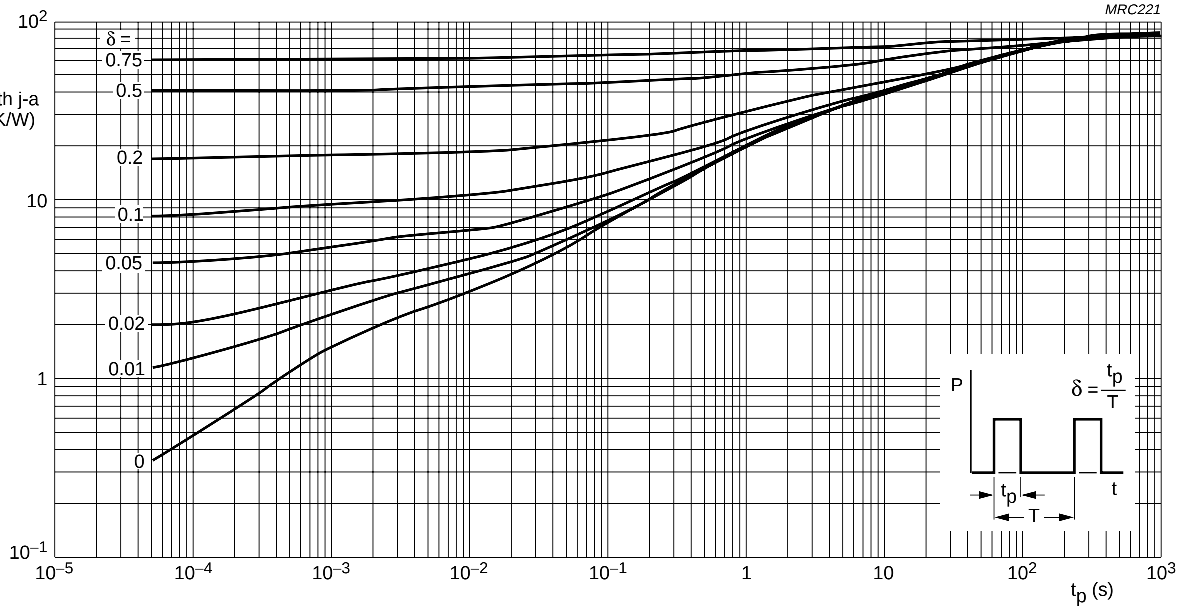
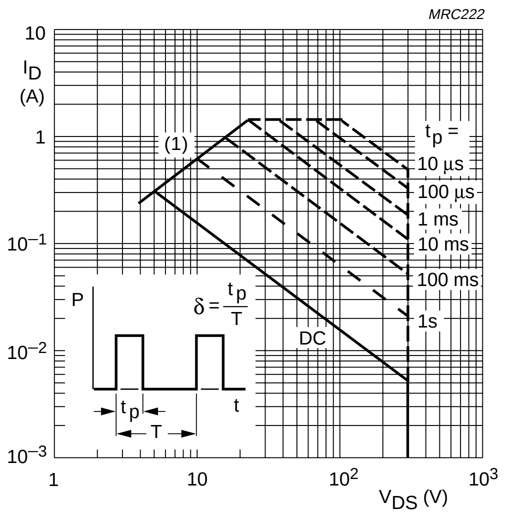


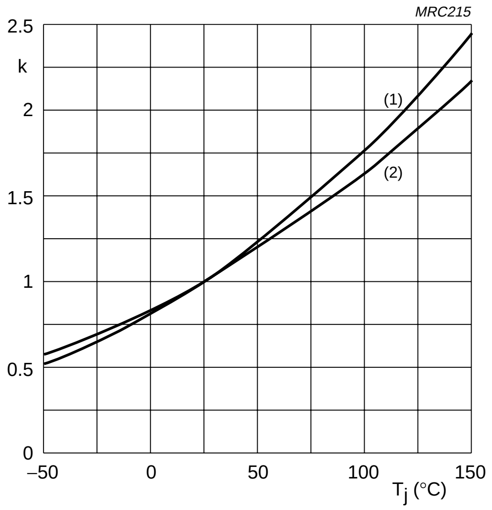
Fig.10 Transient thermal resistance from junction to ambient as a function of pulse time.



$\delta = 0.01$; $T_{amb} = 25$ °C.

(1) $R_{DS(on)}$ limitation.

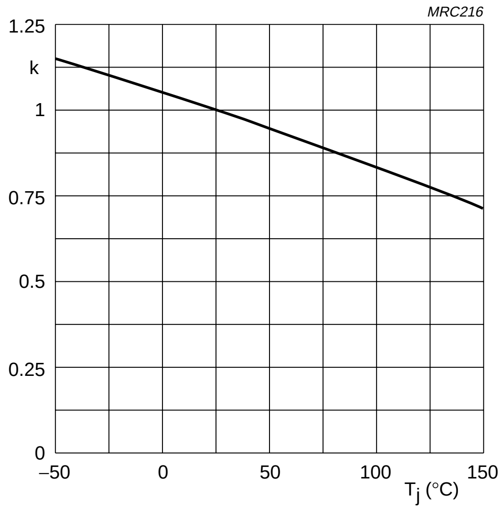
Fig.11 SOAR curve.



$k = \frac{R_{DS(on)} \text{ at } T_j}{R_{DS(on)} \text{ at } 25\ °C}$

Typical $R_{DS(on)}$;
(1) I_D = 250 mA; V_{GS} = 10 V.
(2) I_D = 20 mA; V_{GS} = 2.4 V.

Fig.12 Temperature coefficient of drain-source on-resistance.



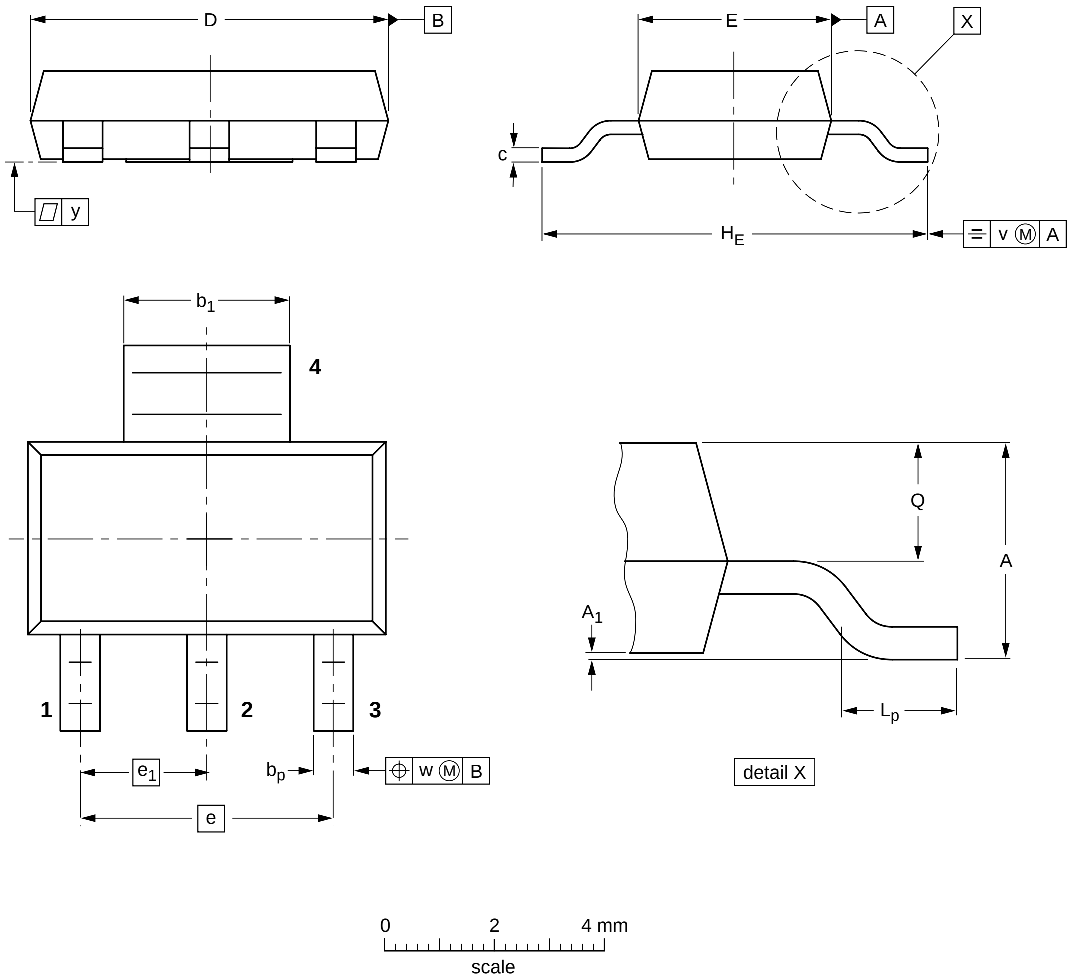
$k = \frac{V_{GS(th)} \text{ at } T_j}{V_{GS(th)} \text{ at } 25\ °C}$.

Typical $V_{GS(th)}$ at 1 mA.

Fig.13 Temperature coefficient of gate-source threshold voltage.

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads　　**SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT223						~~96-11-11~~ 97-02-28

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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