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Kind regards,

Team Nexperia

DATA SHEET

BSP220

P-channel enhancement mode
vertical D-MOS transistor

Product specification
File under Discrete Semiconductors, SC13b

April 1995

P-channel enhancement mode vertical D-MOS transistor

BSP220

FEATURES

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

DESCRIPTION

P-channel enhancement mode vertical D-MOS transistor in a miniature SOT223 envelope and intended for use in relay, high-speed and line transformer drivers.

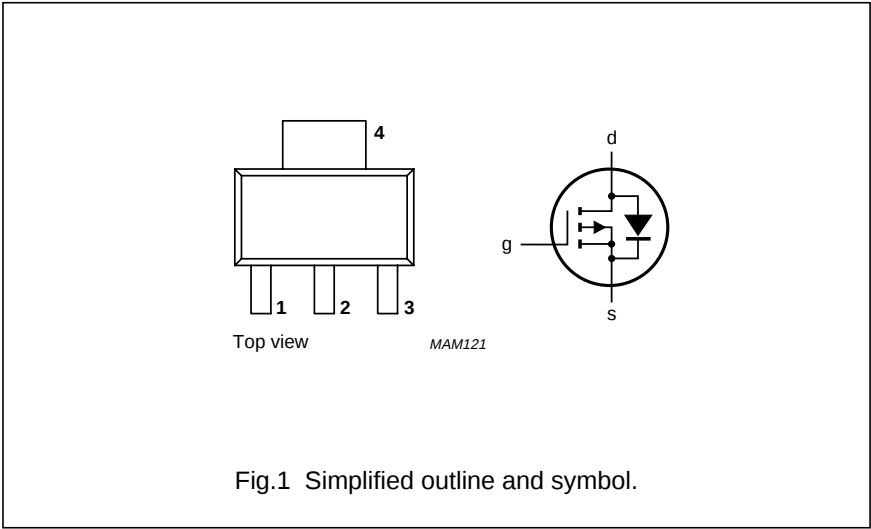
PINNING - SOT223

PIN	DESCRIPTION
1	gate
2	drain
3	source
4	drain

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$-V_{DS}$	drain-source voltage		200	V
$-I_D$	drain current	DC value	225	mA
$R_{DS(on)}$	drain-source on-resistance	$-I_D = 200\text{ mA}$ $-V_{GS} = 10\text{ V}$	12	Ω
$-V_{GS(th)}$	gate-source threshold voltage		2.8	V

PIN CONFIGURATION



P-channel enhancement mode vertical D-MOS transistor

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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 value	–	225	mA
$-I_{DM}$	drain current	peak value	–	600	mA
P_{tot}	total power dissipation	up to $T_{amb} = 25\text{ °C}$ (note 1)	–	1.5	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

Note

1. Device mounted on an epoxy printed-circuit board 40 x 40 x 1.5 mm; mounting pad for the drain lead minimum 6 cm².

THERMAL RESISTANCE

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-a}$	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 lead minimum 6 cm².

P-channel enhancement mode vertical D-MOS transistor

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CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$-V_{(BR)DSS}$	drain-source breakdown voltage	$-I_D = 10\text{ }\mu\text{A}$ $V_{GS} = 0$	200	—	—	V
$-I_{DSS}$	drain-source leakage current	$-V_{DS} = 160\text{ V}$ $V_{GS} = 0$	—	—	1	μA
$\pm I_{GSS}$	gate-source leakage current	$\pm V_{GS} = 20\text{ V}$ $V_{DS} = 0$	—	—	100	nA
$-V_{GS(th)}$	gate-source threshold voltage	$-I_D = 1\text{ mA}$ $V_{GS} = V_{DS}$	0.8	—	2.8	V
$R_{DS(on)}$	drain-source on-resistance	$-I_D = 200\text{ mA}$ $-V_{GS} = 10\text{ V}$	—	10	12	Ω
$ Y_{fs} $	transfer admittance	$-I_D = 200\text{ mA}$ $-V_{DS} = 25\text{ V}$	100	200	—	mS
C_{iss}	input capacitance	$-V_{DS} = 25\text{ V}$ $V_{GS} = 0$ $f = 1\text{ MHz}$	—	65	90	pF
C_{oss}	output capacitance	$-V_{DS} = 25\text{ V}$ $V_{GS} = 0$ $f = 1\text{ MHz}$	—	20	30	pF
C_{rss}	feedback capacitance	$-V_{DS} = 25\text{ V}$ $V_{GS} = 0$ $f = 1\text{ MHz}$	—	6	15	pF
Switching times (see Figs 2 and 3)						
t_{on}	turn-on time	$-I_D = 250\text{ mA}$ $-V_{DD} = 50\text{ V}$ $-V_{GS} = 0\text{ to }10\text{ V}$	—	5	20	ns
t_{off}	turn-off time	$-I_D = 250\text{ mA}$ $-V_{DD} = 50\text{ V}$ $-V_{GS} = 0\text{ to }10\text{ V}$	—	20	30	ns

P-channel enhancement mode vertical
D-MOS transistor

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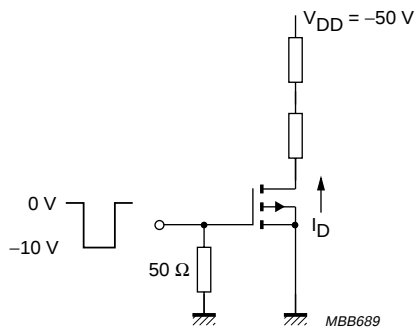


Fig.2 Switching time test circuit.

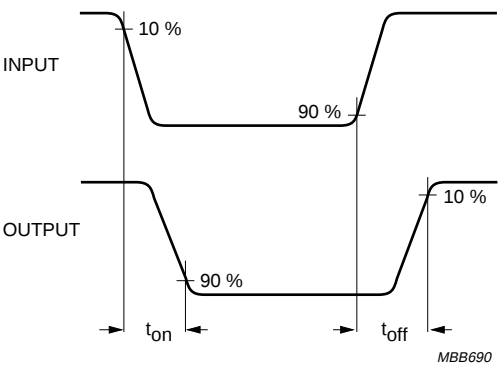


Fig.3 Input and output waveforms.

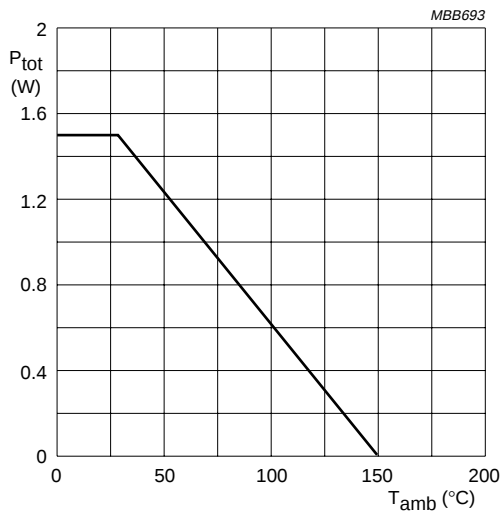


Fig.4 Power derating curve.

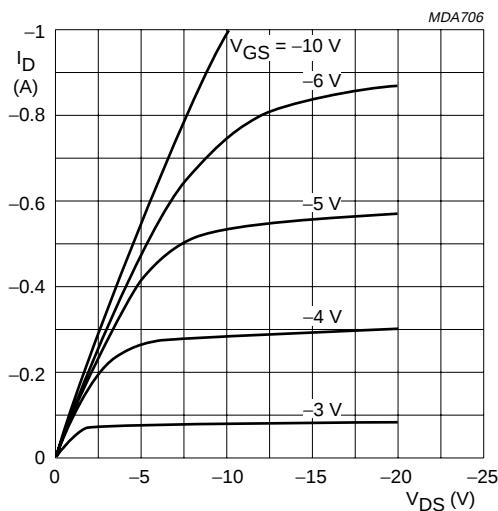


Fig.5 Typical output characteristics; $T_j = 25\text{ °C}$.

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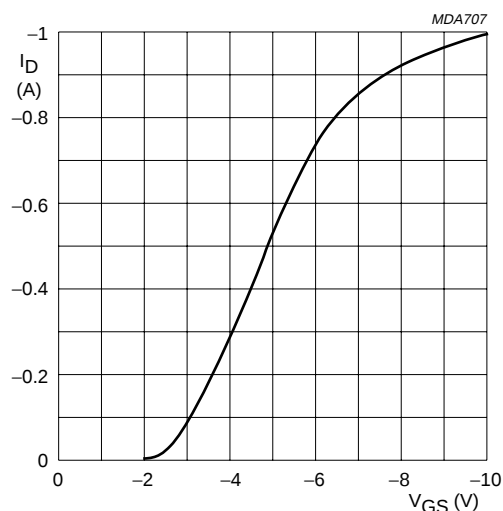


Fig.6 Typical transfer characteristic; $-V_{DS} = 10$ V;
 $T_j = 25$ °C.

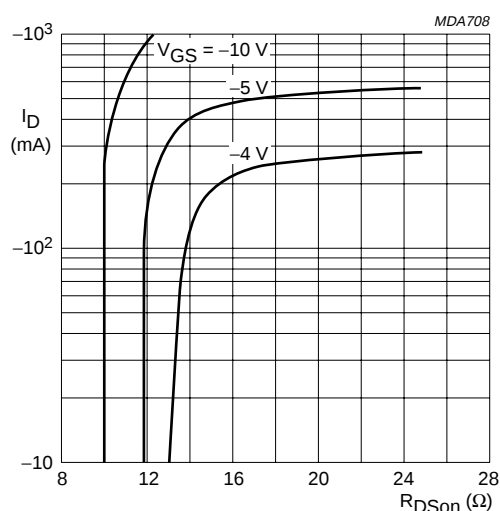


Fig.7 Typical on-resistance as a function of drain
current; $T_j = 25$ °C.

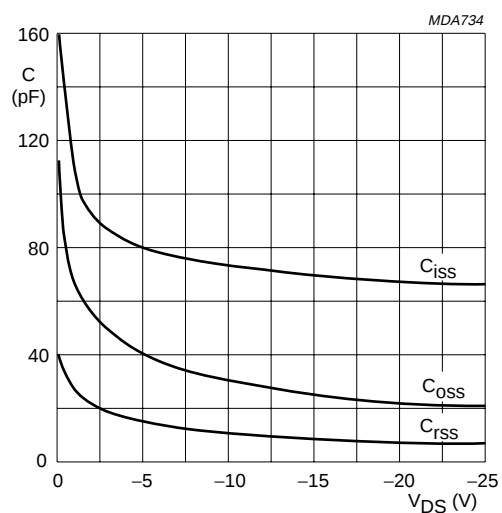


Fig.8 Typical capacitances as a function of
drain-source voltage; $V_{GS} = 0$; $f = 1$ MHz;
 $T_j = 25$ °C.

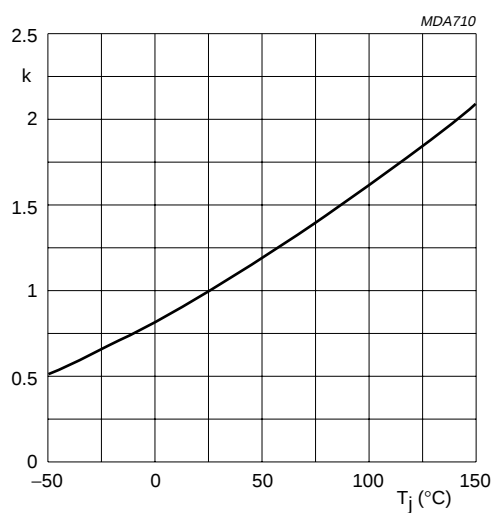


Fig.9 Temperature coefficient of drain-source
on-resistance;

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

typical $R_{DS(on)}$ at -200 mA/ -10 V.

P-channel enhancement mode vertical D-MOS transistor

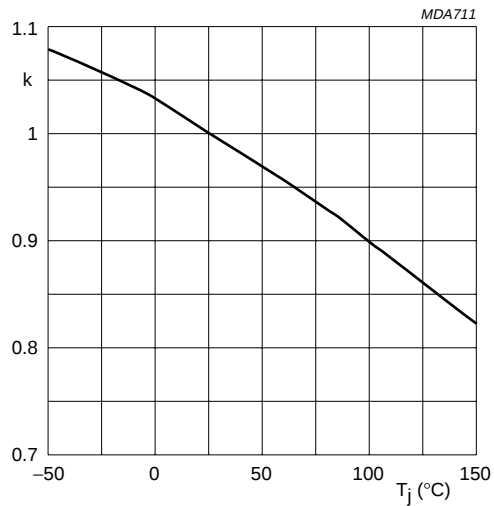
BSP220

Fig.10 Temperature coefficient of gate-source threshold voltage;

$$k = \frac{V_{GS(th)} \text{ at } T_j}{V_{GS(th)} \text{ at } 25^\circ\text{C}};$$

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

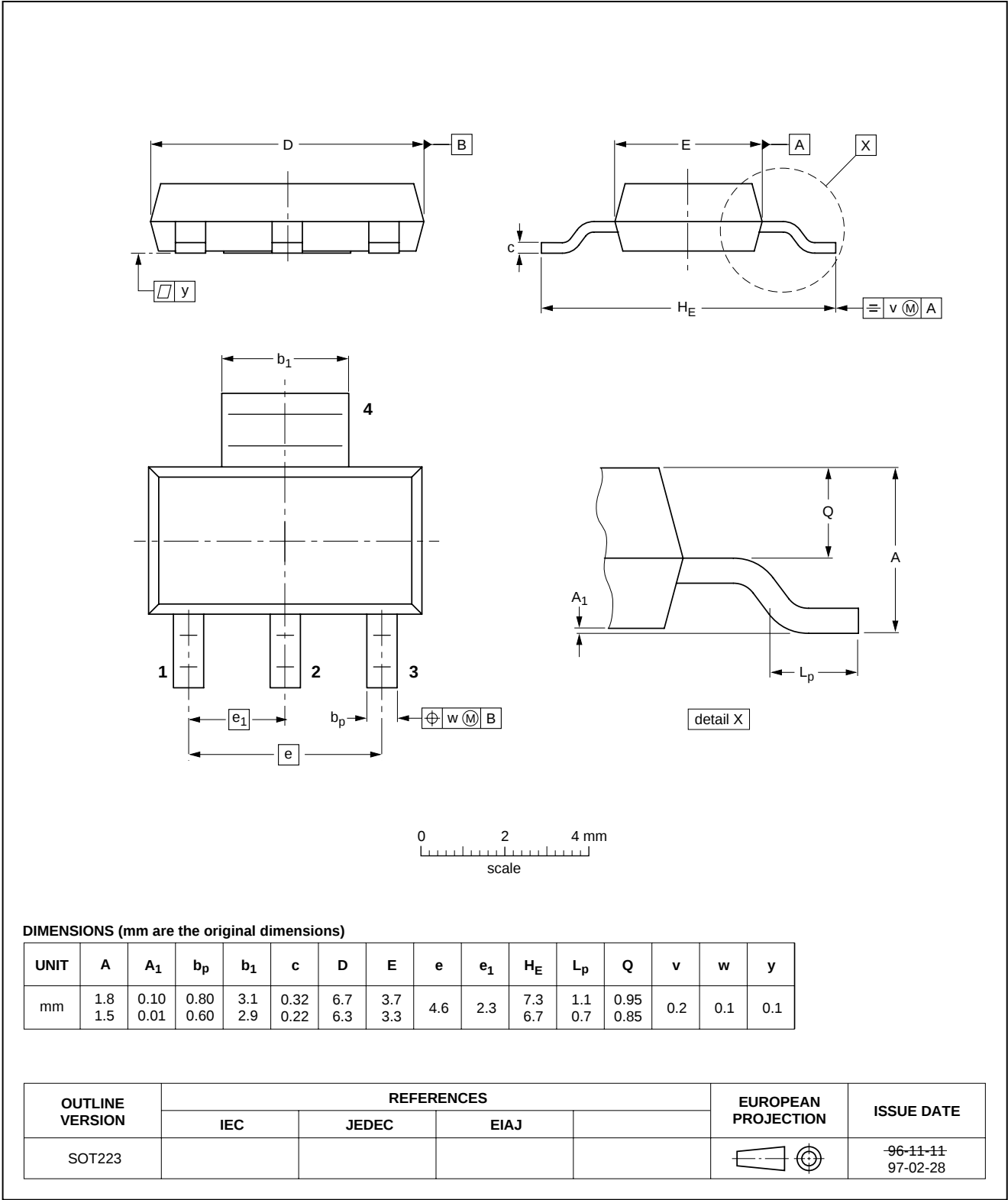
P-channel enhancement mode vertical
D-MOS transistor

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PACKAGE OUTLINE

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

SOT223



**P-channel enhancement mode vertical
D-MOS transistor**

BSP220**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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P-channel enhancement mode vertical D-MOS transistor	BSP220
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NOTES

P-channel enhancement mode vertical
D-MOS transistor

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