

# DATA SHEET

## **BSP130**

N-channel enhancement mode  
vertical D-MOS transistor

Product specification  
File under Discrete Semiconductors, SC13b

April 1995

# N-channel enhancement mode vertical D-MOS transistor

**BSP130**

**FEATURES**

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

**DESCRIPTION**

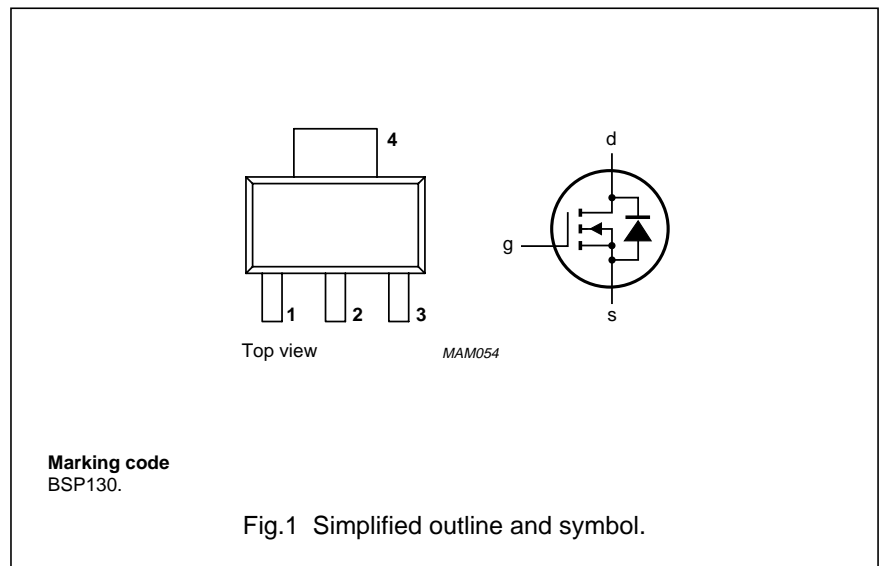
N-channel enhancement mode vertical D-MOS transistor in a SOT223 envelope, intended for use as a line current interruptor in telephone sets and for applications in relay, high-speed and line transformer drivers.

**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 $T_{amb} = 25\text{ }^\circ\text{C}$       | –    | 1.5  | W        |
| $\pm V_{GS0}$ | gate-source voltage         | open drain                                       | –    | 20   | V        |
| $R_{DS(on)}$  | drain-source on-resistance  | $I_D = 250\text{ mA};$<br>$V_{GS} = 10\text{ V}$ | –    | 8    | $\Omega$ |
| $V_{GS(off)}$ | gate-source cut-off voltage | $I_D = 1\text{ mA};$<br>$V_{DS} = V_{GS}$        | 0.8  | 2    | V        |



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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    |   | –    | 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 $T_{amb} = 25\text{ °C}$ ; note 1 | –    | 1.5  | W    |
| $T_{stg}$     | storage temperature     |   | –65  | +150 | °C   |
| $T_j$         | junction temperature    |   | –    | 150  | °C   |

## THERMAL RESISTANCE

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

### Note

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

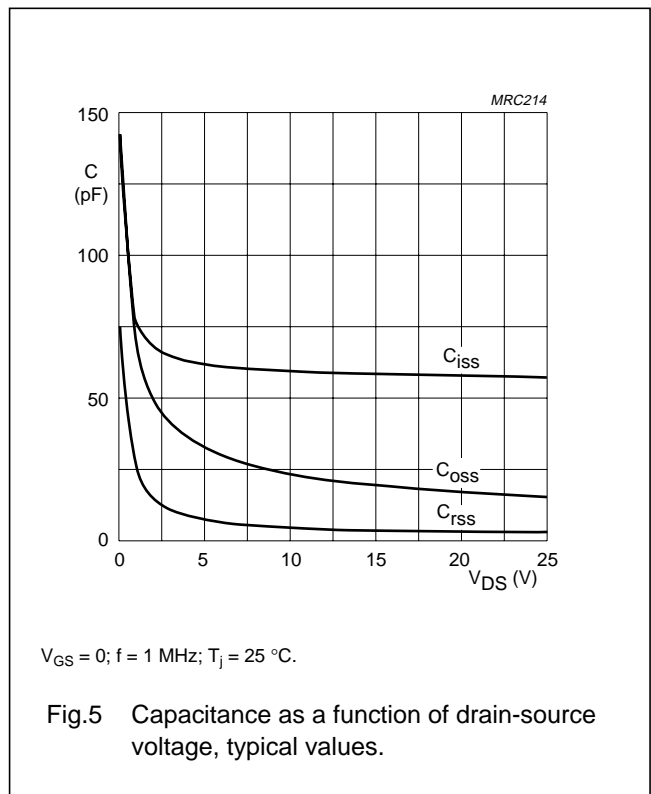
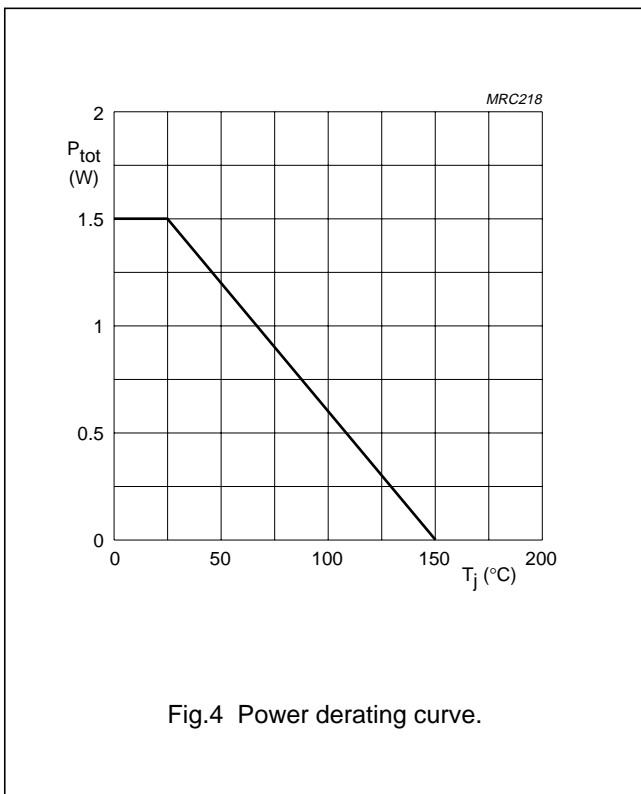
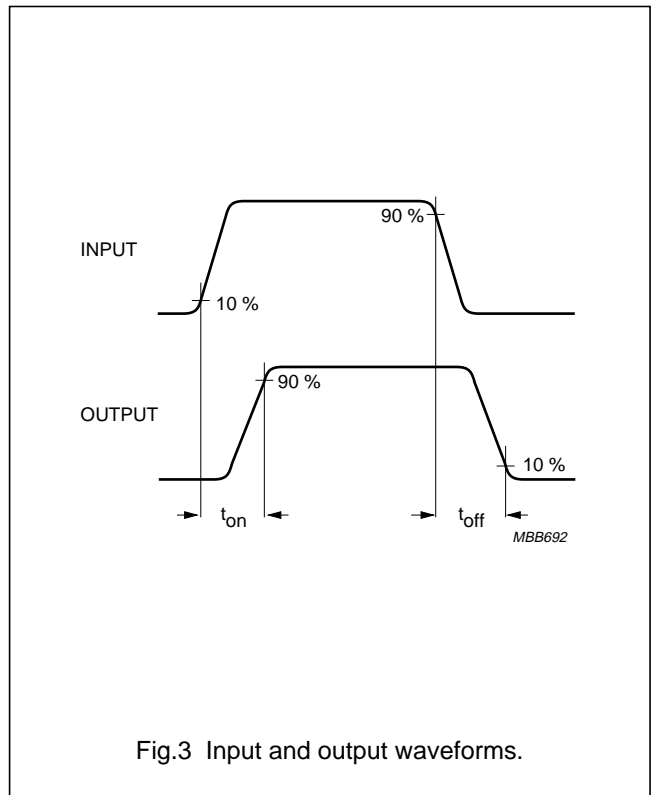
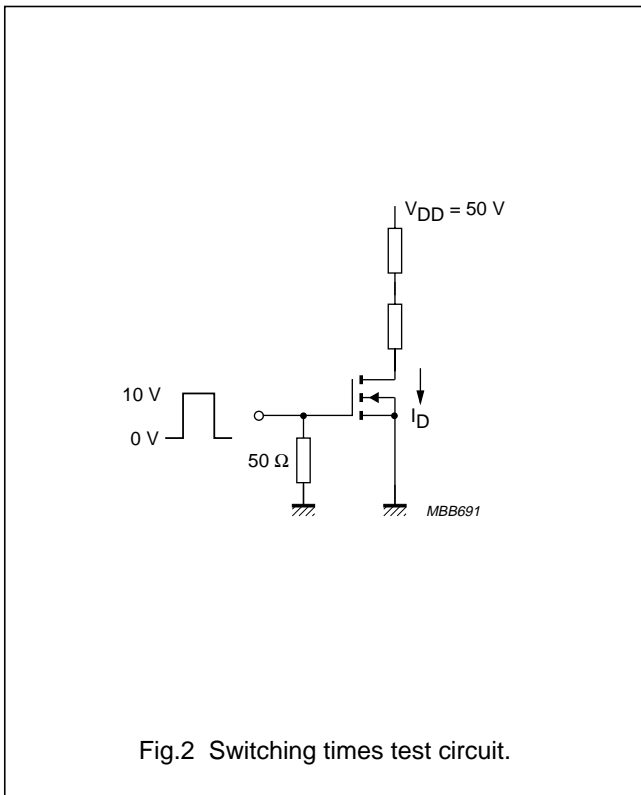
## STATIC CHARACTERISTICS

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

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

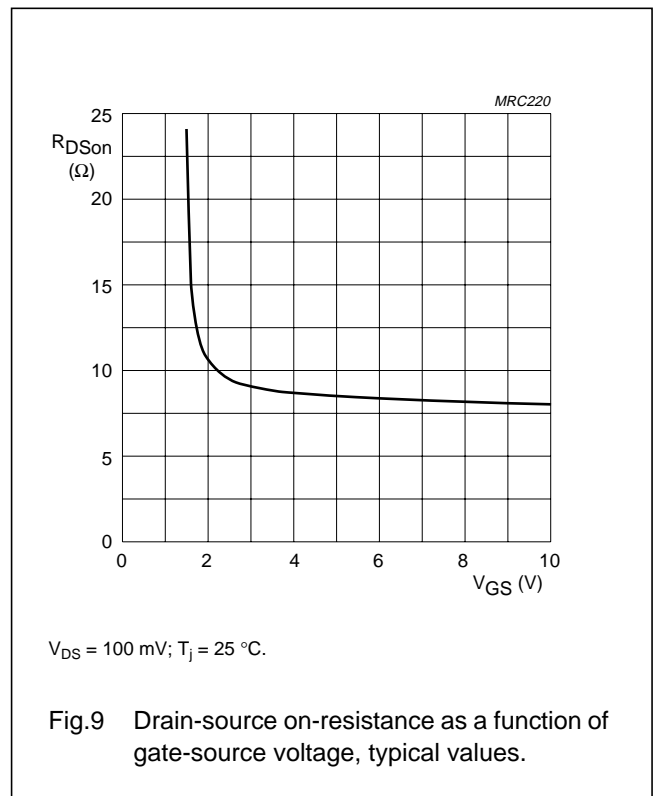
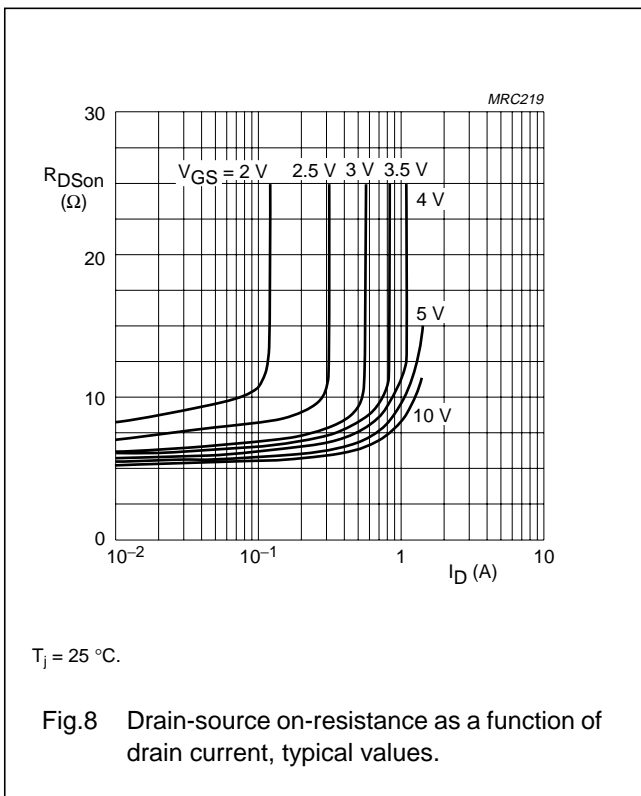
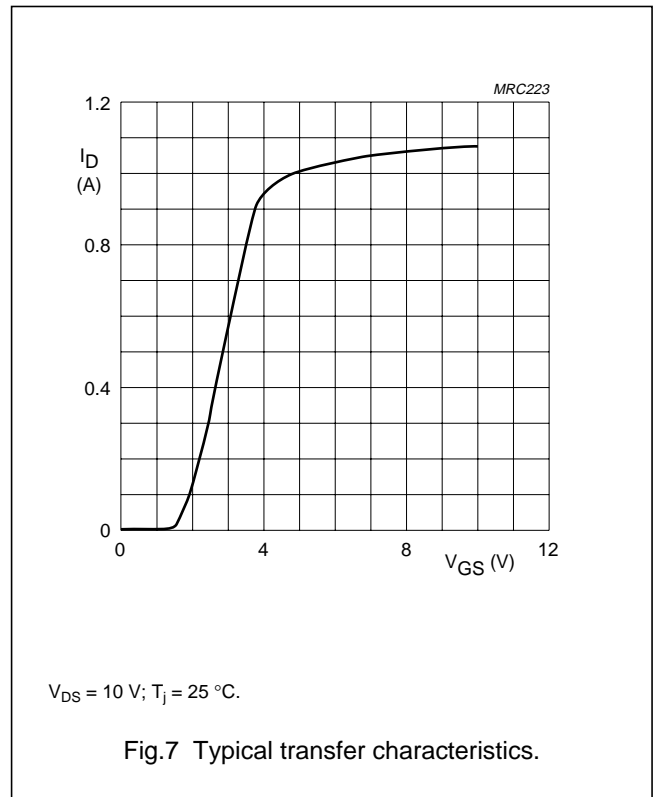
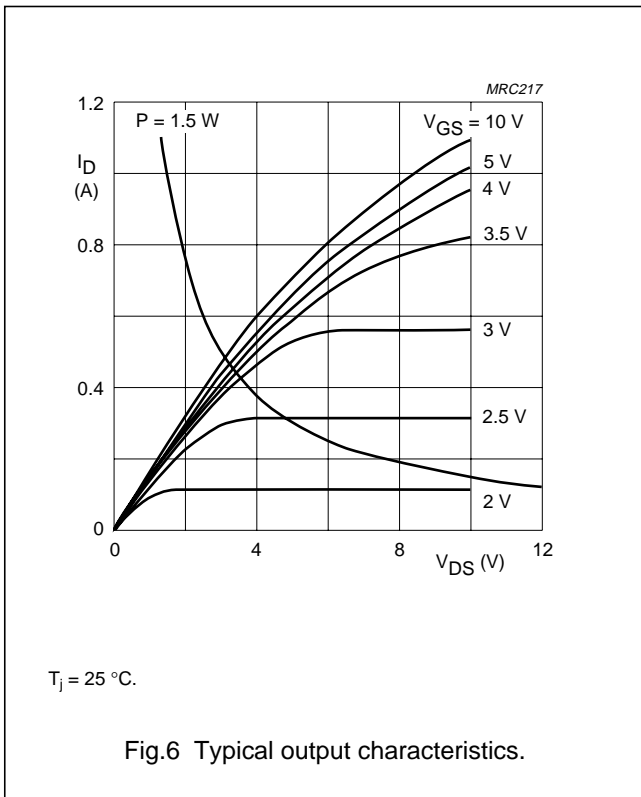
N-channel enhancement mode vertical  
D-MOS transistor

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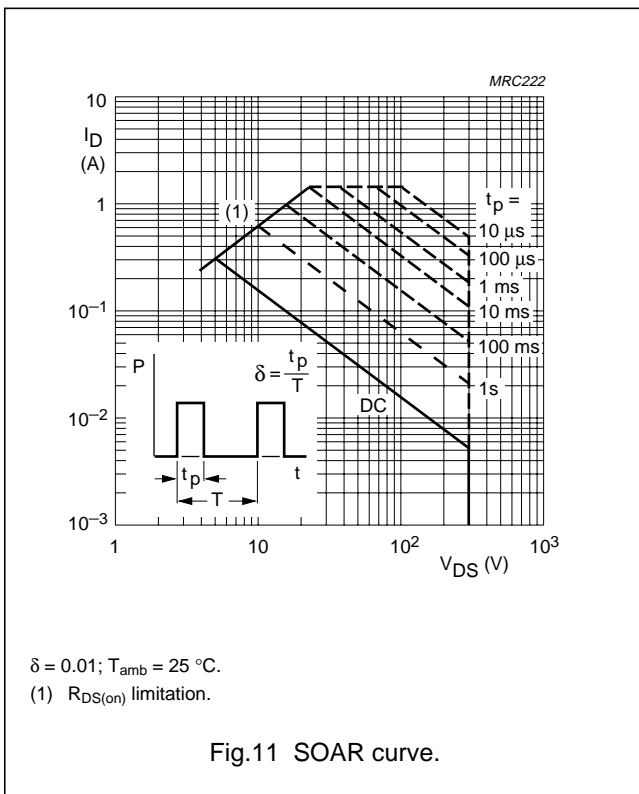
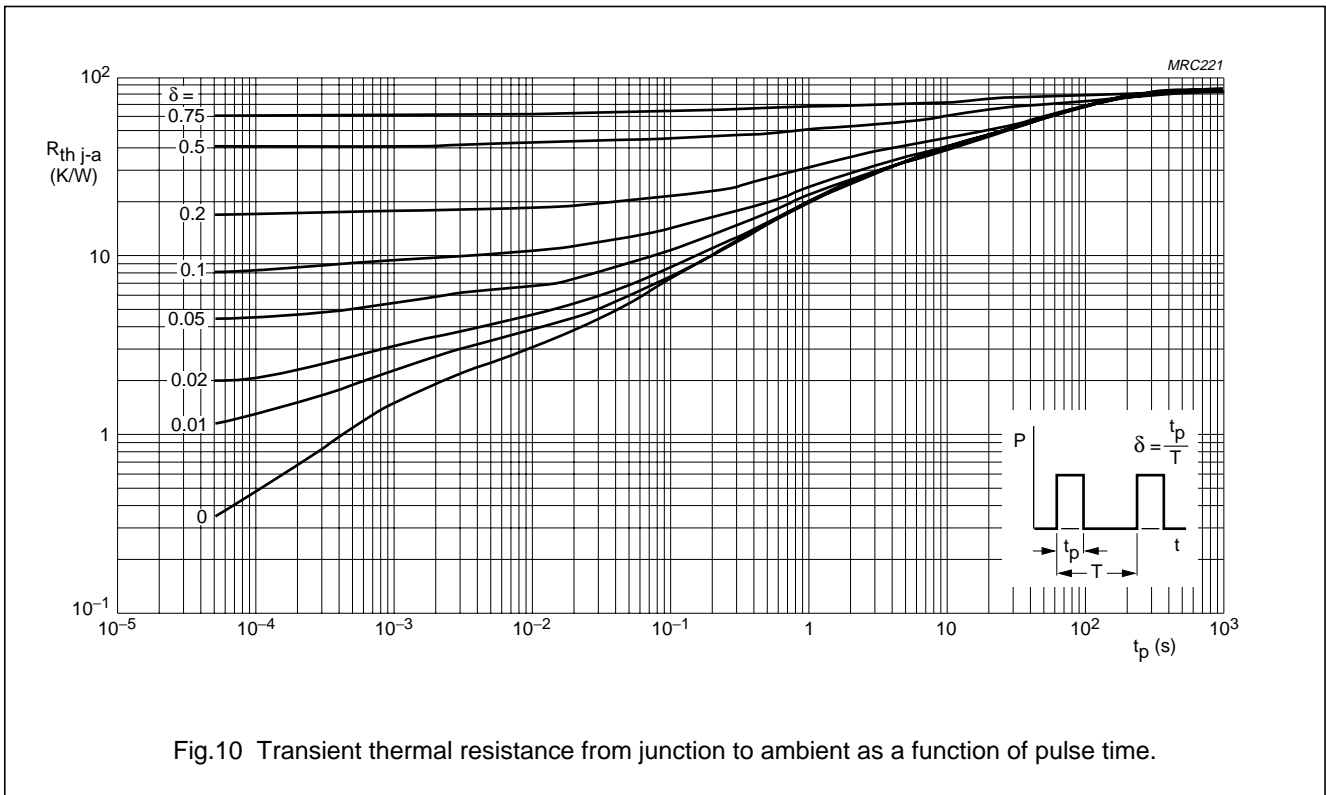
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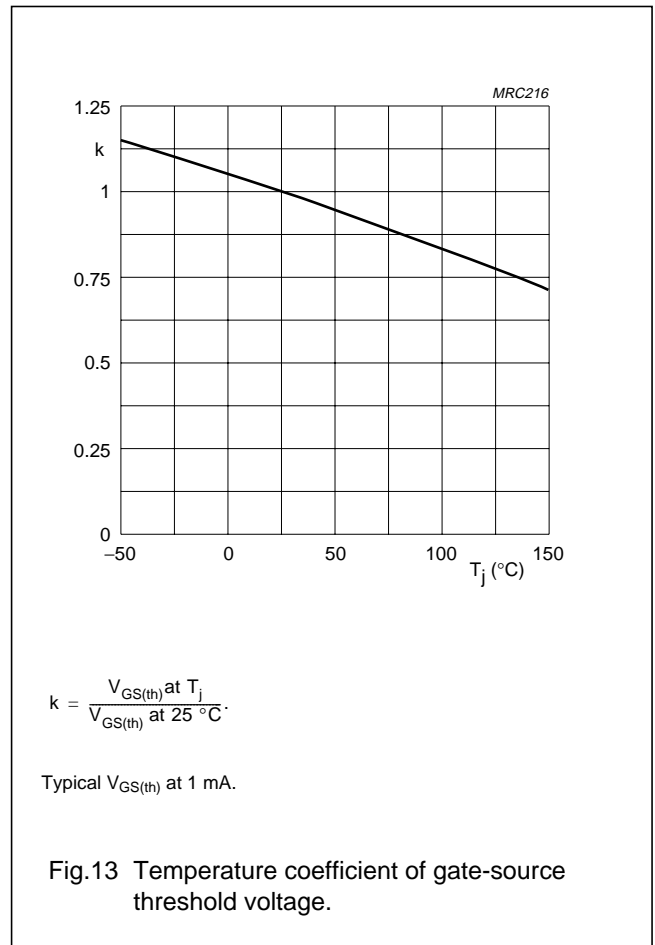
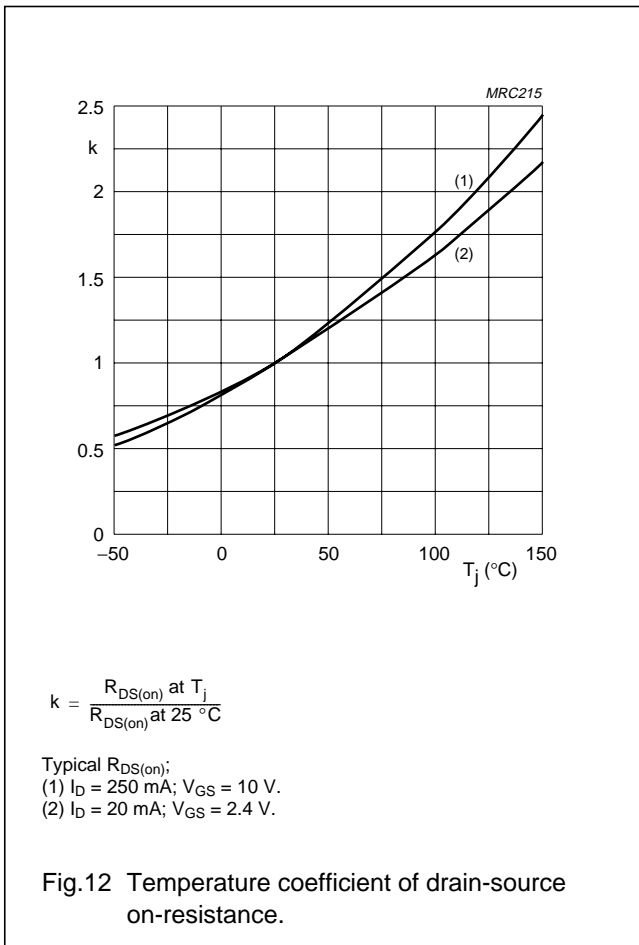
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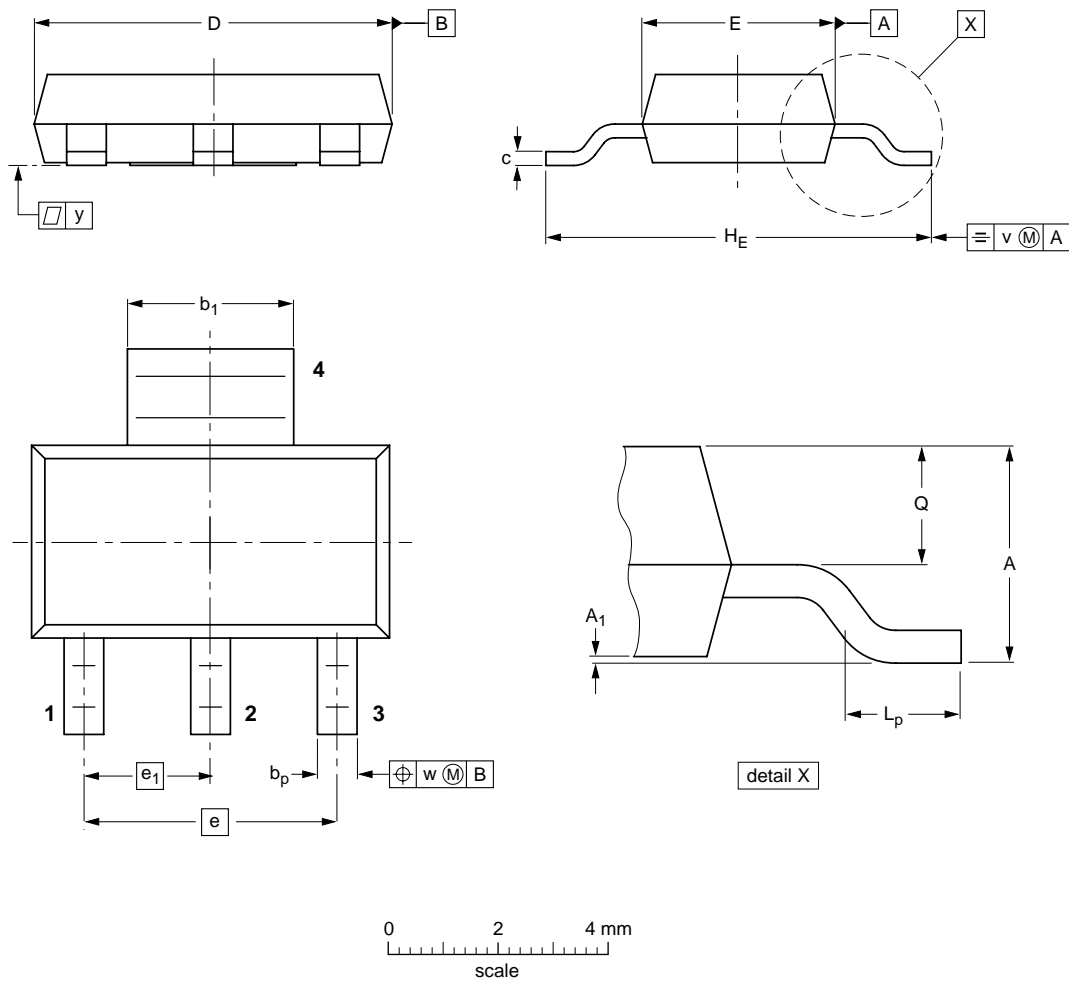
# N-channel enhancement mode vertical D-MOS transistor

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## PACKAGE OUTLINE

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

SOT223



**DIMENSIONS (mm are the original dimensions)**

| UNIT | A          | A <sub>1</sub> | b <sub>p</sub> | b <sub>1</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   | y   |
|------|------------|----------------|----------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|-----|
| mm   | 1.8<br>1.5 | 0.10<br>0.01   | 0.80<br>0.60   | 3.1<br>2.9     | 0.32<br>0.22 | 6.7<br>6.3 | 3.7<br>3.3 | 4.6 | 2.3            | 7.3<br>6.7     | 1.1<br>0.7     | 0.95<br>0.85 | 0.2 | 0.1 | 0.1 |

| OUTLINE VERSION | REFERENCES |       |      |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|-------|------|--|---------------------|----------------------|
|                 | IEC        | JEDEC | EIAJ |  |                     |                      |
| SOT223          |            |       |      |  |                     | 96-11-11<br>97-02-28 |



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**BSP130****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>Application information</b>  |   |
| 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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