

# DATA SHEET

## **BSP254; BSP254A**

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

**BSP254; BSP254A**

### FEATURES

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

### DESCRIPTION

P-channel vertical D-MOS transistor in a TO-92 variant envelope and intended for use as a line current interruptor in relay, high-speed and line transformer drivers.

### QUICK REFERENCE DATA

| SYMBOL       | PARAMETER                        | CONDITIONS                           | MIN. | TYP. | MAX. | UNIT     |
|--------------|----------------------------------|--------------------------------------|------|------|------|----------|
| $V_{DS}$     | drain-source voltage             |                                      | —    | —    | −250 | V        |
| $V_{GSO}$    | gate-source voltage              | open drain                           | —    | —    | ±20  | V        |
| $ Y_{fs} $   | forward transfer admittance      | $I_D = -200$ mA;<br>$V_{DS} = -25$ V | 100  | 200  | —    | mS       |
| $I_D$        | drain current (DC)               |                                      | —    | —    | −0.2 | A        |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = -10$ V;<br>$I_D = -200$ mA | —    | 10   | 15   | $\Omega$ |
| $P_{tot}$    | total power dissipation          | $T_{amb} = 25$ °C                    | —    | —    | 1    | W        |

### PINNING - TO-92 variant BSP254

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | gate        |
| 2   | drain       |
| 3   | source      |

### PINNING - TO-92 variant BSP254A

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | source      |
| 2   | gate        |
| 3   | drain       |

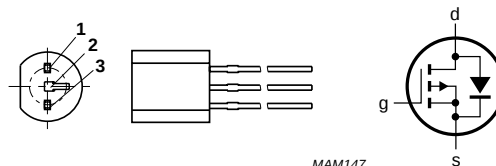


Fig.1 Simplified outline and symbol.

# P-channel enhancement mode vertical D-MOS transistor

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## LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134)

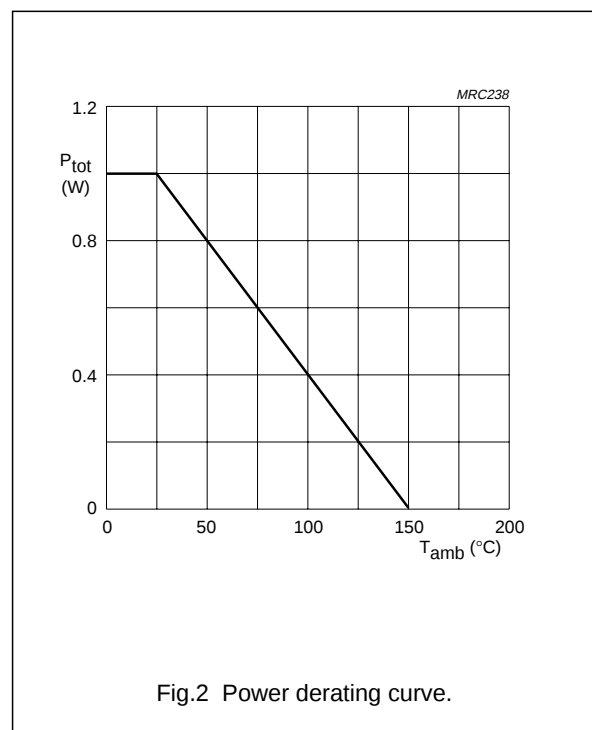
| SYMBOL    | PARAMETER                 | CONDITIONS                                      | MIN. | MAX. | UNIT               |
|-----------|---------------------------|-------------------------------------------------|------|------|--------------------|
| $-V_{DS}$ | drain-source voltage      |                                                 | –    | 250  | V                  |
| $V_{GSO}$ | gate-source voltage       | open drain                                      | –    | 20   | V                  |
| $-I_D$    | drain current             | DC                                              | –    | 0.2  | A                  |
| $-I_{DM}$ | drain current             | peak value                                      | –    | 0.6  | A                  |
| $P_{tot}$ | total power dissipation   | $T_{amb} = 25\text{ }^{\circ}\text{C}$ (note 1) | –    | 1    | W                  |
| $T_{stg}$ | storage temperature range |                                                 | –65  | +150 | $^{\circ}\text{C}$ |
| $T_j$     | junction temperature      |                                                 | –    | 150  | $^{\circ}\text{C}$ |

## THERMAL RESISTANCE

| SYMBOL        | PARAMETER                         | MAX. | UNIT |
|---------------|-----------------------------------|------|------|
| $R_{th\ j-a}$ | from junction to ambient (note 1) | 125  | K/W  |

### Note

1. Transistor mounted on printed circuit board, maximum lead length 4 mm, mounting pad for drain lead minimum 10 mm x 10 mm.



# P-channel enhancement mode vertical D-MOS transistor

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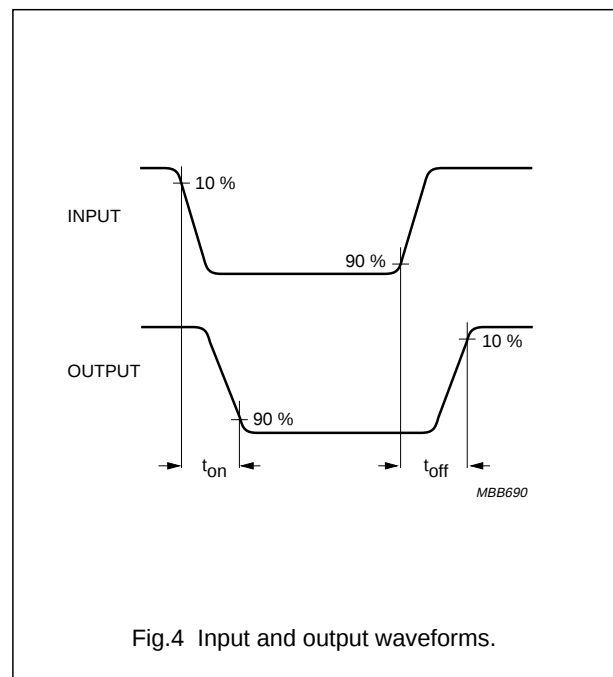
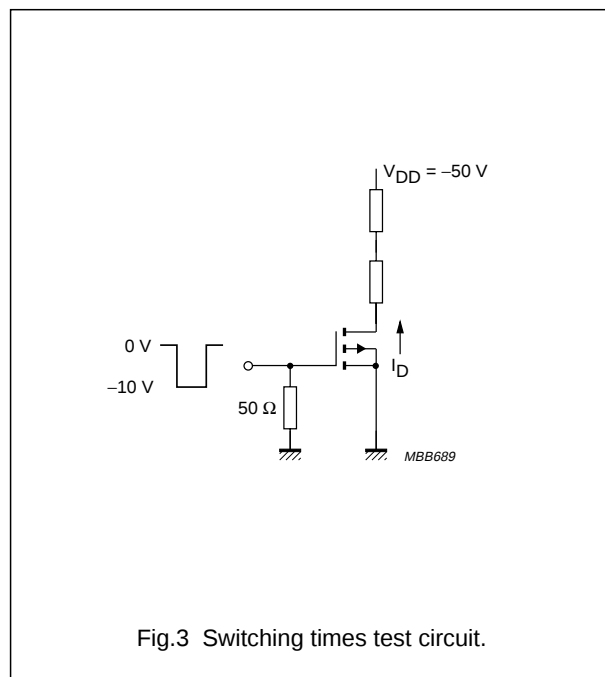
## CHARACTERISTICS

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

| SYMBOL         | PARAMETER                      | CONDITIONS                                        | MIN. | TYP. | MAX. | UNIT          |
|----------------|--------------------------------|---------------------------------------------------|------|------|------|---------------|
| $-V_{(BR)DSS}$ | drain-source breakdown voltage | $-V_{GS} = 0$<br>$-I_D = 10\text{ }\mu\text{A}$   | 250  | —    | —    | V             |
| $-I_{DSS}$     | drain-source leakage current   | $-V_{DS} = 200\text{ V}$<br>$V_{GS} = 0$          | —    | —    | 1    | $\mu\text{A}$ |
| $\pm I_{GSS}$  | gate-source leakage current    | $\pm V_{GS} = 20\text{ V}$<br>$V_{DS} = 0$        | —    | —    | 100  | nA            |
| $-V_{GS(th)}$  | gate-source threshold voltage  | $V_{GS} = V_{DS}$<br>$-I_D = 1\text{ mA}$         | 0.8  | —    | 2.8  | V             |
| $R_{DS(on)}$   | drain-source on-resistance     | $-V_{GS} = 10\text{ V}$<br>$-I_D = 200\text{ mA}$ | —    | 10   | 15   | $\Omega$      |
| $ Y_{fs} $     | transfer admittance            | $-V_{DS} = 25\text{ V}$<br>$-I_D = 200\text{ mA}$ | 100  | 200  | —    | mS            |
| $C_{iss}$      | input capacitance              | note 1                                            | —    | 65   | 90   | pF            |
| $C_{oss}$      | output capacitance             | note 1                                            | —    | 20   | 30   | pF            |
| $C_{rss}$      | feedback capacitance           | note 1                                            | —    | 6    | 15   | pF            |
| $t_{on}$       | turn-on time                   | note 2                                            | —    | 5    | 10   | ns            |
| $t_{off}$      | turn-off time                  | note 2                                            | —    | 20   | 30   | ns            |

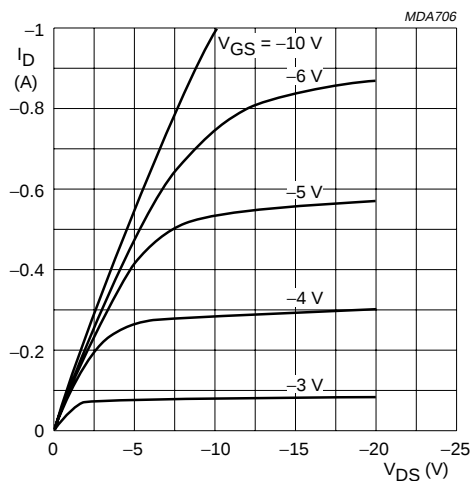
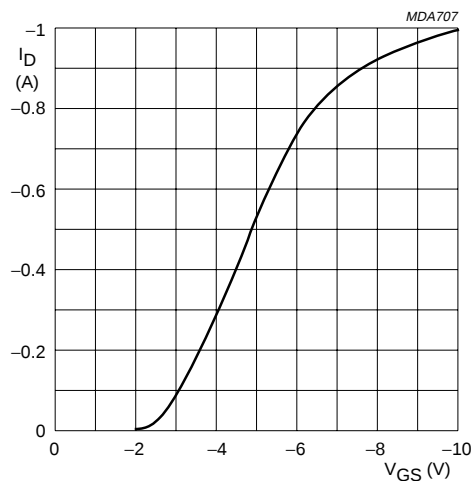
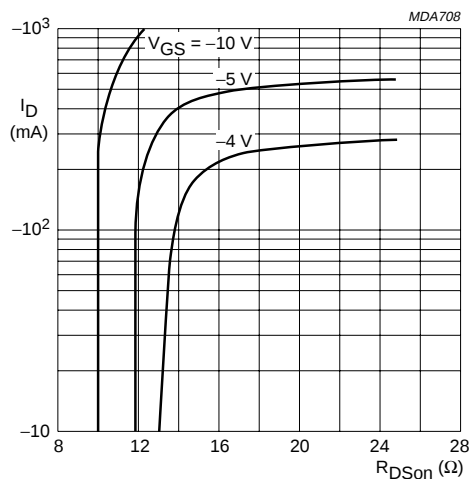
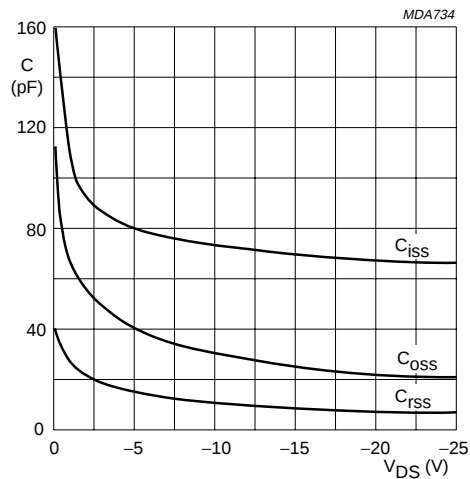
## Notes

1. Measured at  $f = 1\text{ MHz}$ ;  $-V_{DS} = 25\text{ V}$ ;  $V_{GS} = 0$ .
2.  $-V_{GS} = 0$  to  $10\text{ V}$ ;  $-I_D = 250\text{ mA}$ ;  $-V_{DD} = 50\text{ V}$ .



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Fig.5 Typical output characteristics;  $T_j = 25\text{ }^{\circ}\text{C}$ .Fig.6 Typical transfer characteristic;  $V_{DS} = -10\text{ V}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .Fig.7 Typical on-resistance as a function of drain current,  $T_j = 25\text{ }^{\circ}\text{C}$ .Fig.8 Typical capacitances as a function of drain-source voltage;  $V_{GS} = 0$ ;  $f = 1\text{ MHz}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .

# P-channel enhancement mode vertical D-MOS transistor

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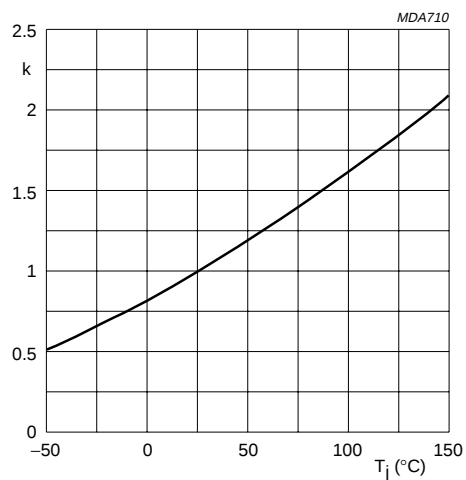


Fig.9

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

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

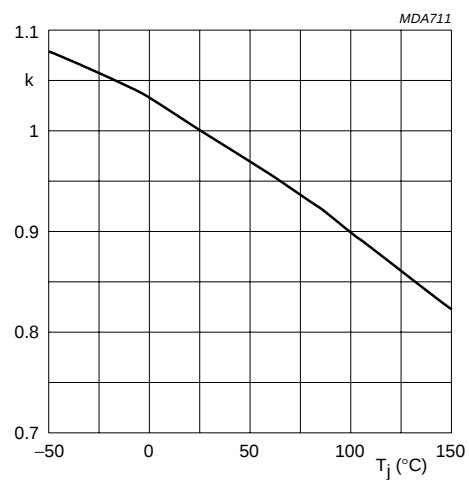


Fig.10

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

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

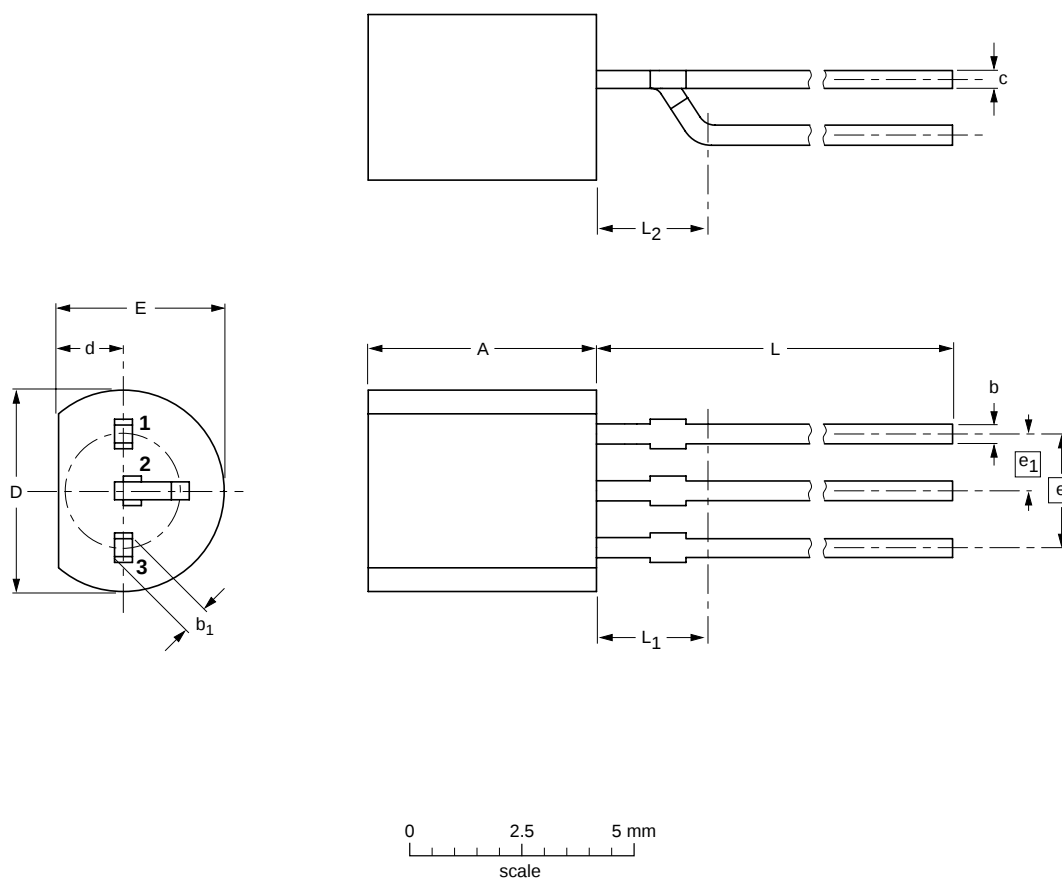
### P-channel enhancement mode vertical D-MOS transistor

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## PACKAGE OUTLINES

**Plastic single-ended leaded (through hole) package; 3 leads (on-circle)**

### SOT54 variant



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

| UNIT | A   | b    | b <sub>1</sub> | c    | D   | d   | E   | e    | e <sub>1</sub> | L    | L <sub>1</sub> <sup>(1)</sup><br>max | L <sub>2</sub><br>max |
|------|-----|------|----------------|------|-----|-----|-----|------|----------------|------|--------------------------------------|-----------------------|
| mm   | 5.2 | 0.48 | 0.66           | 0.45 | 4.8 | 1.7 | 4.2 | 2.54 | 1.27           | 14.5 | 2.5                                  | 2.5                   |
|      | 5.0 | 0.40 | 0.56           | 0.40 | 4.4 | 1.4 | 3.6 |      |                |      |                                      |                       |

## Notes

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE |
|--------------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|------------|
|                    | IEC        | JEDEC | EIAJ  |  |                                                                                       |            |
| SOT54 variant      |            | TO-92 | SC-43 |  |  | 97-04-14   |

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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>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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Printed in The Netherlands

137107/00/01/pp12

Date of release: April 1995

Document order number: 9397 750 02484

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