



THE DATASHEET OF BSP250,115



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Team Nexperia

DATA SHEET

BSP250

P-channel enhancement mode
vertical D-MOS transistor

Product specification
Supersedes data of November 1994
File under Discrete Semiconductors, SC13b

1997 Jun 20

P-channel enhancement mode vertical D-MOS transistor

BSP250

FEATURES

- High-speed switching
- No secondary breakdown
- Very low on-resistance.

APPLICATIONS

- Low-loss motor and actuator drivers
- Power switching.

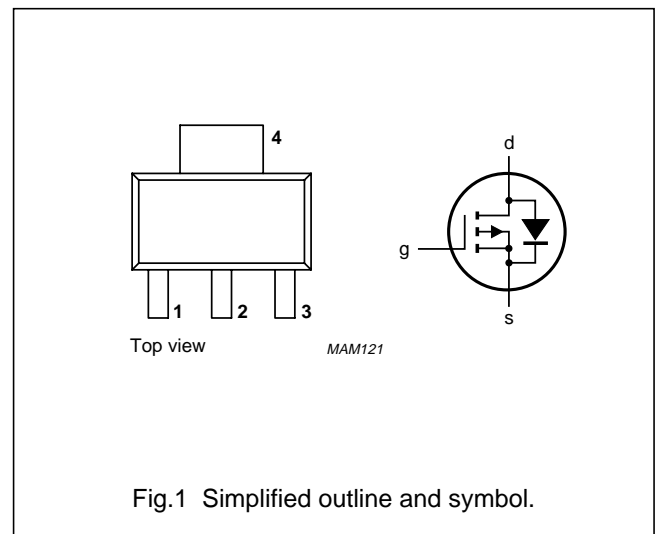
DESCRIPTION

P-channel enhancement mode vertical D-MOS transistor in a SOT223 plastic SMD package.

| CAUTION |
|--|
| The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling. |

PINNING - SOT223

| PIN | SYMBOL | DESCRIPTION |
|-----|--------|-------------|
| 1 | g | gate |
| 2 | d | drain |
| 3 | s | source |
| 4 | d | drain |



QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|------------|------------------------------------|----------------------------------|------|----------|----------|
| V_{DS} | drain-source voltage (DC) | | – | –30 | V |
| V_{SD} | source-drain diode forward voltage | $I_S = -1.25$ A | – | –1.6 | V |
| V_{GSO} | gate-source voltage (DC) | open drain | – | ± 20 | V |
| V_{GSth} | gate-source threshold voltage | $I_D = -1$ mA; $V_{DS} = V_{GS}$ | –1 | –2.8 | V |
| I_D | drain current (DC) | | – | –3 | A |
| R_{DSon} | drain-source on-state resistance | $I_D = -1$ A; $V_{GS} = -10$ V | – | 0.25 | Ω |
| P_{tot} | total power dissipation | $T_s = 100$ °C | – | 5 | W |

P-channel enhancement mode
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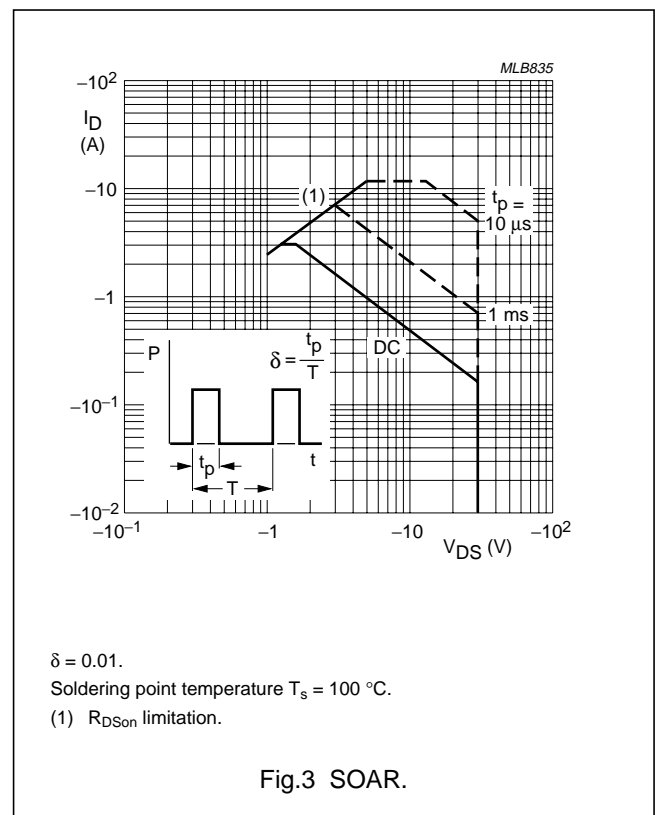
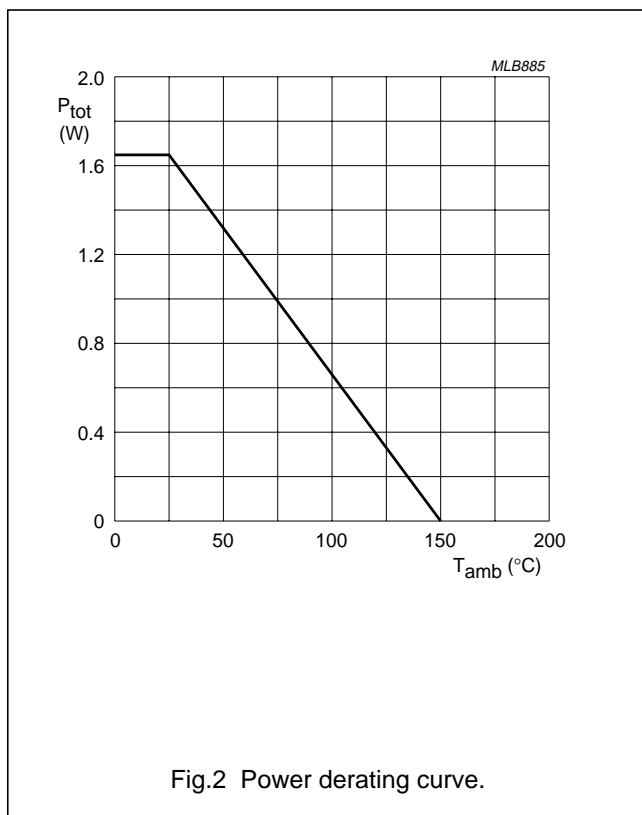
LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---------------------------|--------------------------------|---|------|----------|------------------|
| V_{DS} | drain-source voltage (DC) | | – | –30 | V |
| V_{GSO} | gate-source voltage (DC) | open drain | – | ± 20 | V |
| I_D | drain current (DC) | $T_s \leq 100\text{ }^\circ\text{C}$ | – | –3 | A |
| I_{DM} | peak drain current | note 1 | – | –12 | A |
| P_{tot} | total power dissipation | $T_s = 100\text{ }^\circ\text{C}$ | – | 5 | W |
| | | $T_{amb} = 25\text{ }^\circ\text{C}$; note 2 | – | 1.65 | W |
| T_{stg} | storage temperature | | –65 | +150 | $^\circ\text{C}$ |
| T_j | operating junction temperature | | – | 150 | $^\circ\text{C}$ |
| Source-drain diode | | | | | |
| I_S | source current (DC) | $T_s \leq 100\text{ }^\circ\text{C}$ | – | –1.5 | A |
| I_{SM} | peak pulsed source current | note 1 | – | –6 | A |

Notes

1. Pulse width and duty cycle limited by maximum junction temperature.
2. Device mounted on an epoxy printed-circuit board, 40 × 40 × 1.5 mm; mounting pad for drain lead minimum 6 cm².



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THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1 | 75 | K/W |
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | | 10 | K/W |

Note

- Device mounted on an epoxy printed-circuit board, $40 \times 40 \times 1.5$ mm; mounting pad for drain lead minimum 6 cm^2 .

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 | $V_{GS} = 0; I_D = -10\ \mu\text{A}$ | -30 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $V_{GS} = V_{DS}; I_D = -1\ \text{mA}$ | -1 | - | -2.8 | V |
| I_{DSS} | drain-source leakage current | $V_{GS} = 0; V_{DS} = -24\ \text{V}$ | - | - | -100 | nA |
| I_{GSS} | gate leakage current | $V_{GS} = \pm 20\ \text{V}; V_{DS} = 0$ | - | - | ± 100 | nA |
| I_{Don} | on-state drain current | $V_{GS} = -10\ \text{V}; V_{DS} = -1\ \text{V}$ | -3 | - | - | A |
| | | $V_{GS} = -4.5\ \text{V}; V_{DS} = -5\ \text{V}$ | -1 | - | - | A |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = -4.5\ \text{V}; I_D = -0.5\ \text{A}$ | - | 0.33 | 0.4 | Ω |
| | | $V_{GS} = -10\ \text{V}; I_D = -1\ \text{A}$ | - | 0.22 | 0.25 | Ω |
| $ y_{fs} $ | forward transfer admittance | $V_{DS} = -20\ \text{V}; I_D = -1\ \text{A}$ | 1 | 2 | - | S |
| C_{iss} | input capacitance | $V_{GS} = 0; V_{DS} = -20\ \text{V}; f = 1\ \text{MHz}$ | - | 250 | - | pF |
| C_{oss} | output capacitance | $V_{GS} = 0; V_{DS} = -20\ \text{V}; f = 1\ \text{MHz}$ | - | 140 | - | pF |
| C_{rss} | reverse transfer capacitance | $V_{GS} = 0; V_{DS} = -20\ \text{V}; f = 1\ \text{MHz}$ | - | 50 | - | pF |
| Q_G | total gate charge | $V_{GS} = -10\ \text{V}; V_{DS} = -15\ \text{V};$ $I_D = -2.3\ \text{A}$ | - | 10 | 25 | nC |
| Q_{GS} | gate-source charge | $V_{GS} = -10\ \text{V}; V_{DS} = -15\ \text{V};$ $I_D = -2.3\ \text{A}$ | - | 1 | - | nC |
| Q_{GD} | gate-drain charge | $V_{GS} = -10\ \text{V}; V_{DS} = -15\ \text{V};$ $I_D = -2.3\ \text{A}$ | - | 3 | - | nC |

Switching times

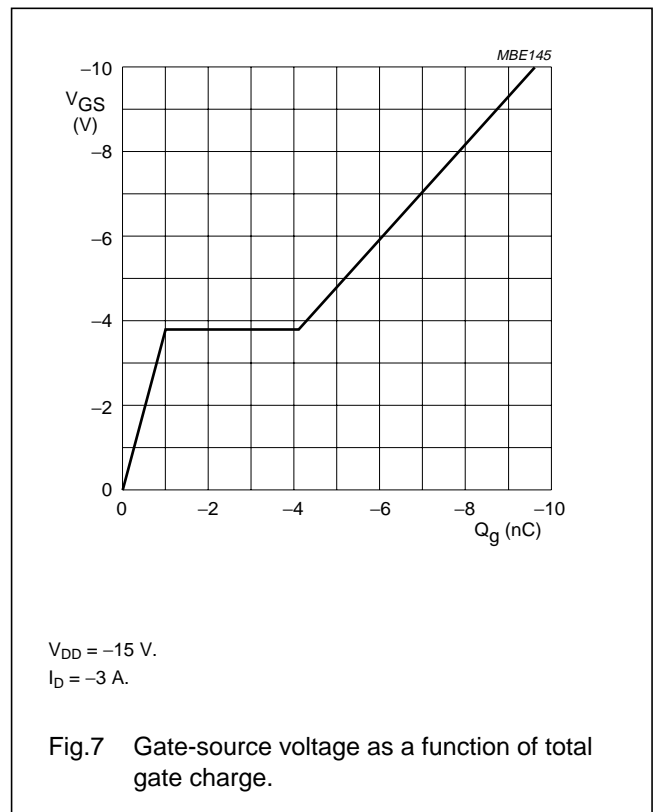
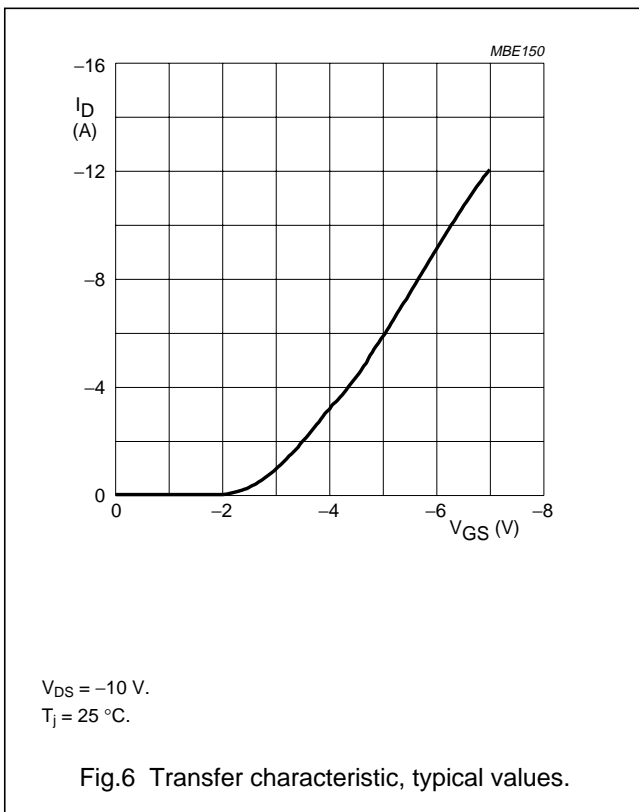
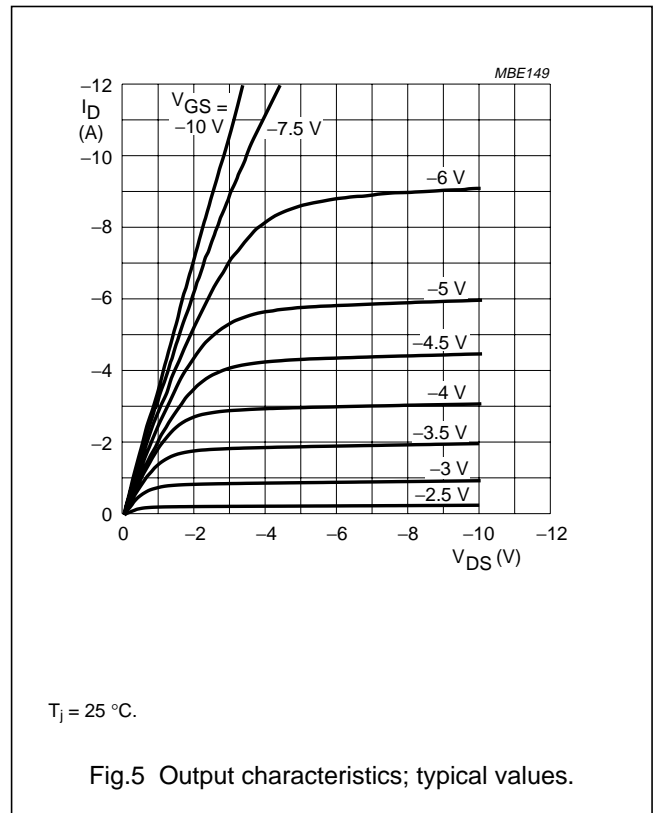
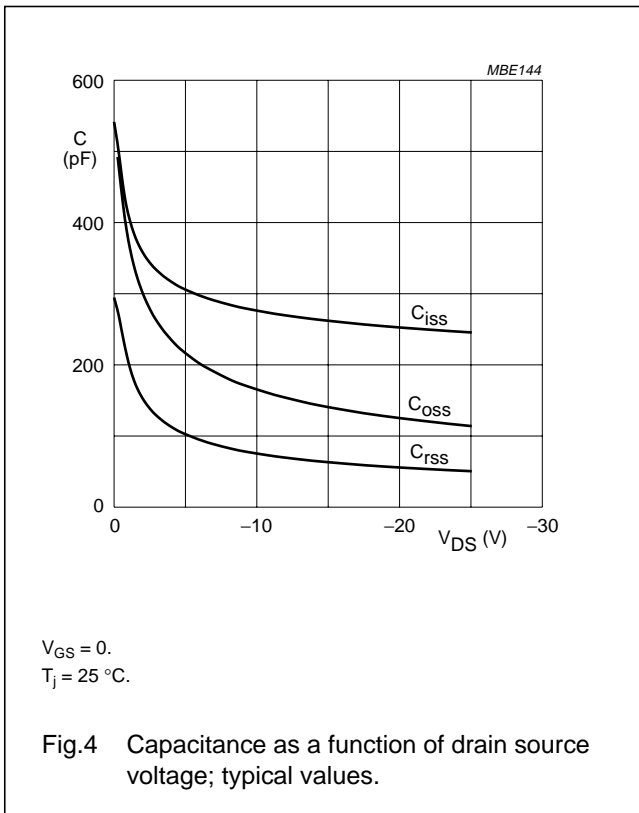
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|-----------|---------------|---|---|----|-----|----|
| t_{on} | turn-on time | $V_{GS} = 0\ \text{to}\ -10\ \text{V}; V_{DD} = -20\ \text{V};$ $I_D = -1\ \text{A}; R_L = 20\ \Omega$ | - | 20 | 80 | ns |
| t_{off} | turn-off time | $V_{GS} = -10\ \text{to}\ 0\ \text{V}; V_{DD} = -20\ \text{V};$ $I_D = -1\ \text{A}; R_L = 20\ \Omega$ | - | 50 | 140 | ns |

Source-drain diode

| | | | | | | |
|----------|------------------------------------|--|---|-----|------|----|
| V_{SD} | source-drain diode forward voltage | $V_{GD} = 0; I_S = -1.25\ \text{A}$ | - | - | -1.6 | V |
| t_{rr} | reverse recovery time | $I_S = -1.25\ \text{A}; di/dt = 100\ \text{A}/\mu\text{s}$ | - | 150 | 200 | ns |

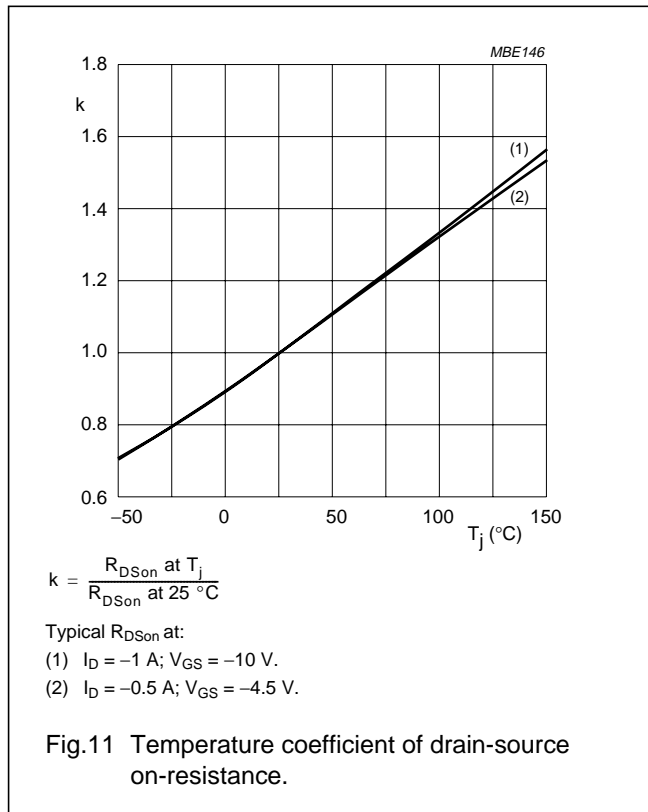
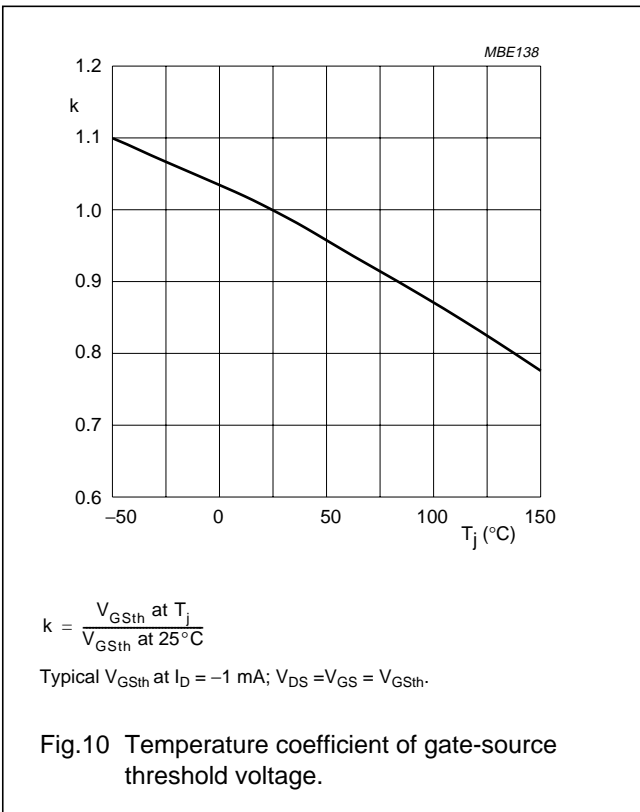
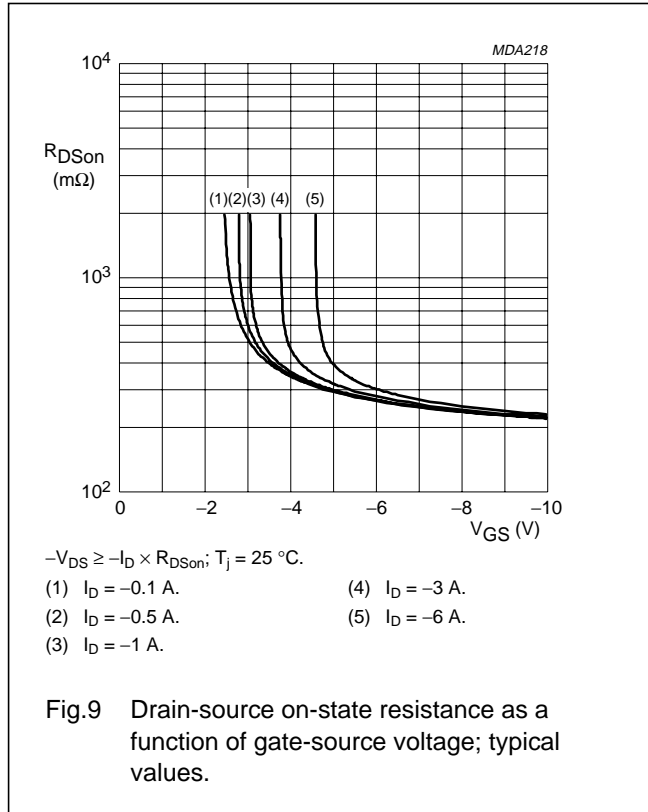
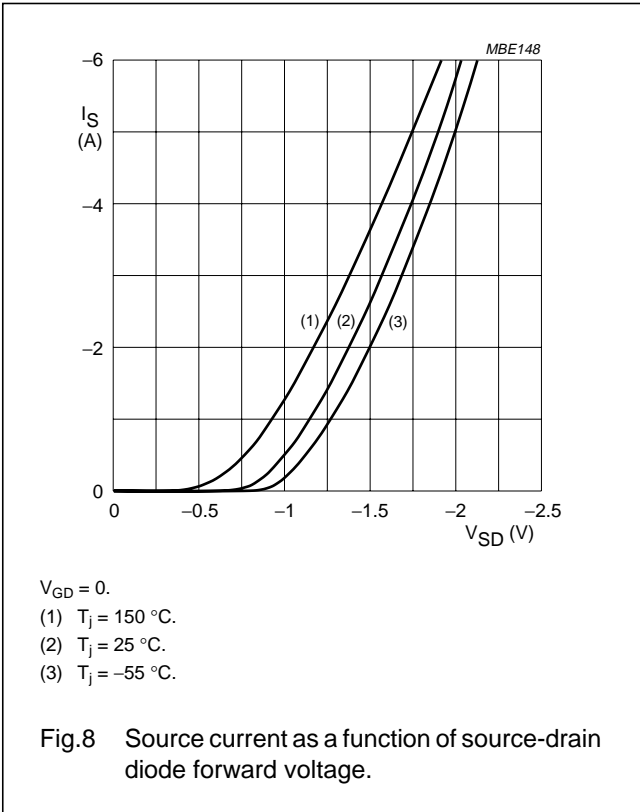
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BSP250



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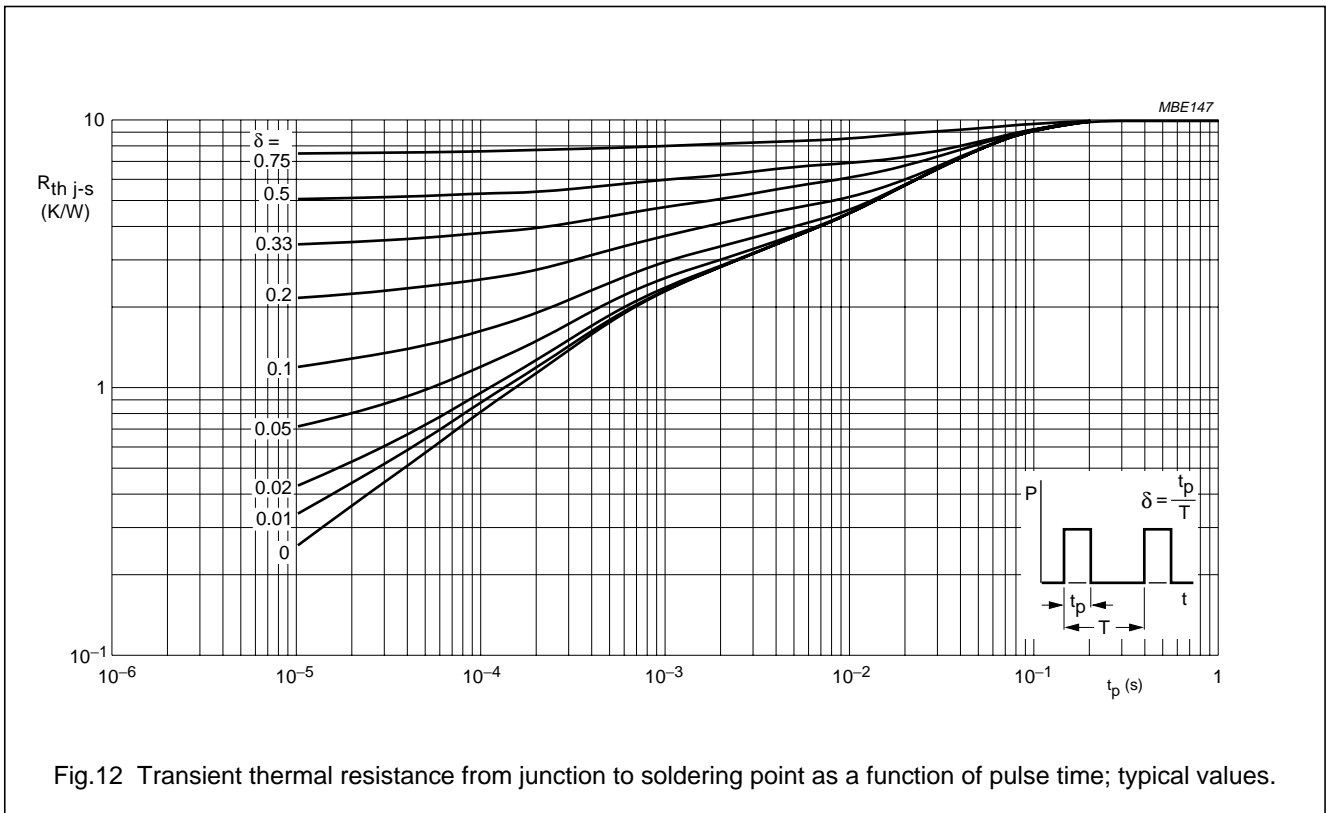


Fig.12 Transient thermal resistance from junction to soldering point as a function of pulse time; typical values.

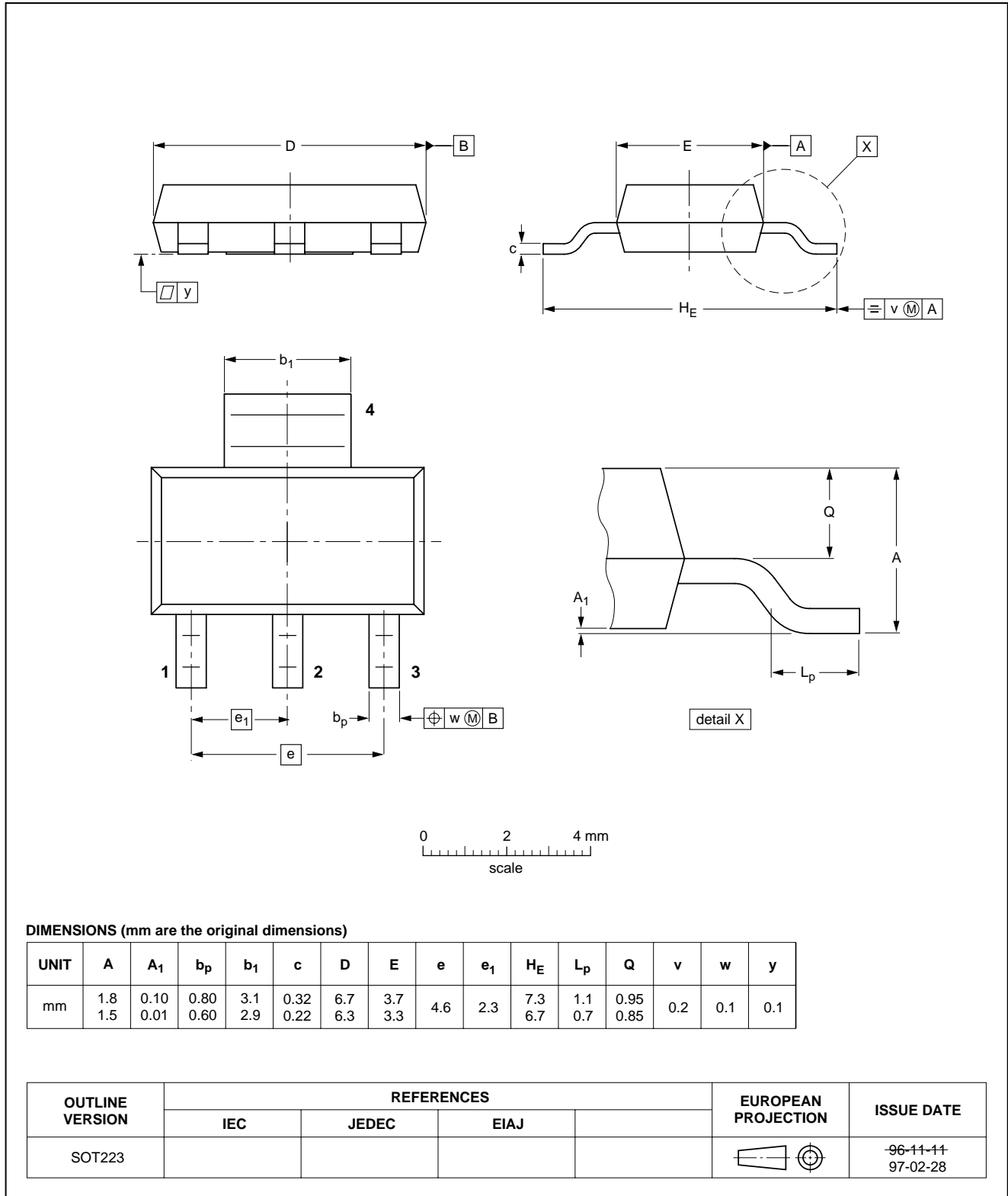
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PACKAGE OUTLINE

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

SOT223



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

BSP250**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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D-MOS transistor

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