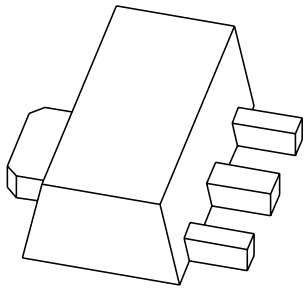


# DATA SHEET



**PBSS5320X**

20 V, 3 A

PNP low  $V_{CEsat}$  (BISS) transistor

Product data sheet  
Supersedes data of 2003 Nov 27

2004 Nov 04

**20 V, 3 A**  
**PNP low  $V_{CEsat}$  (BISS) transistor**

**PBSS5320X**

**FEATURES**

- SOT89 (SC-62) package
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability:  $I_C$  and  $I_{CM}$
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements.

**APPLICATIONS**

- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - LCD backlighting.
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs)
  - Inductive load driver (e.g. relays, buzzers and motors).

**DESCRIPTION**

PNP low  $V_{CEsat}$  transistor in a SOT89 plastic package.  
 NPN complement: PBSS4320X.

**MARKING**

| TYPE NUMBER | MARKING CODE |
|-------------|--------------|
| PBSS5320X   | S45          |

**ORDERING INFORMATION**

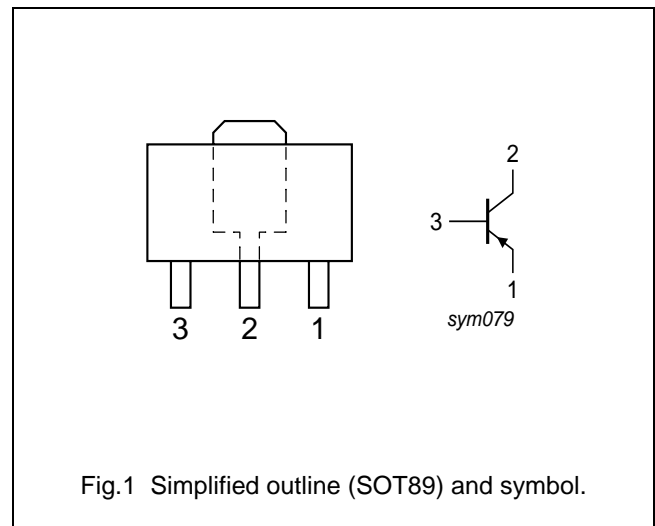
| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION  | VERSION |
| PBSS5320X   | SC-62   | plastic surface mounted package; collector pad for good heat transfer; 3 leads | SOT89   |

**QUICK REFERENCE DATA**

| SYMBOL      | PARAMETER                 | MAX. | UNIT       |
|-------------|---------------------------|------|------------|
| $V_{CEO}$   | collector-emitter voltage | -20  | V          |
| $I_C$       | collector current (DC)    | -3   | A          |
| $I_{CM}$    | peak collector current    | -5   | A          |
| $R_{CEsat}$ | equivalent on-resistance  | 105  | m $\Omega$ |

**PINNING**

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | emitter     |
| 2   | collector   |
| 3   | base        |



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**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

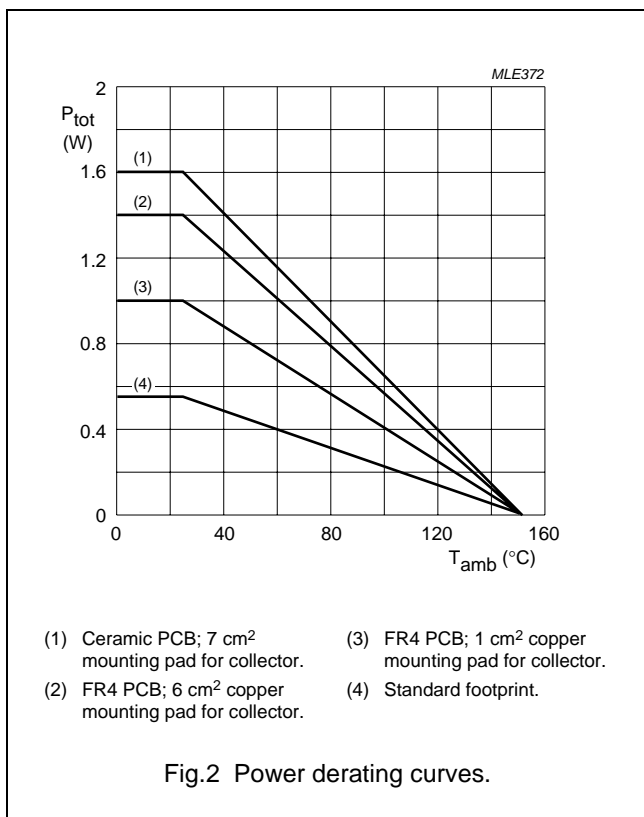
| SYMBOL    | PARAMETER                 | CONDITIONS  | MIN. | MAX.                   | UNIT              |
|-----------|---------------------------|---|------|------------------------|-------------------|
| $V_{CBO}$ | collector-base voltage    | open emitter  | –    | –20                    | V                 |
| $V_{CEO}$ | collector-emitter voltage | open base   | –    | –20                    | V                 |
| $V_{EBO}$ | emitter-base voltage      | open collector  | –    | –5                     | V                 |
| $I_C$     | collector current (DC)    | note 4  | –    | –3                     | A                 |
| $I_{CM}$  | peak collector current    | limited by $T_{j(max)}$   | –    | –5                     | A                 |
| $I_B$     | base current (DC)         |   | –    | –0.5                   | A                 |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25\text{ °C}$<br>note 1<br>note 2<br>note 3<br>note 4 | –    | 550<br>1<br>1.4<br>1.6 | mW<br>W<br>W<br>W |
| $T_{stg}$ | storage temperature       |   | –65  | +150                   | °C                |
| $T_j$     | junction temperature      |   | –    | 150                    | °C                |
| $T_{amb}$ | ambient temperature       |   | –65  | +150                   | °C                |

**Notes**

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>.
4. Device mounted on a ceramic printed-circuit board 7 cm<sup>2</sup>, single-sided copper, tin-plated.

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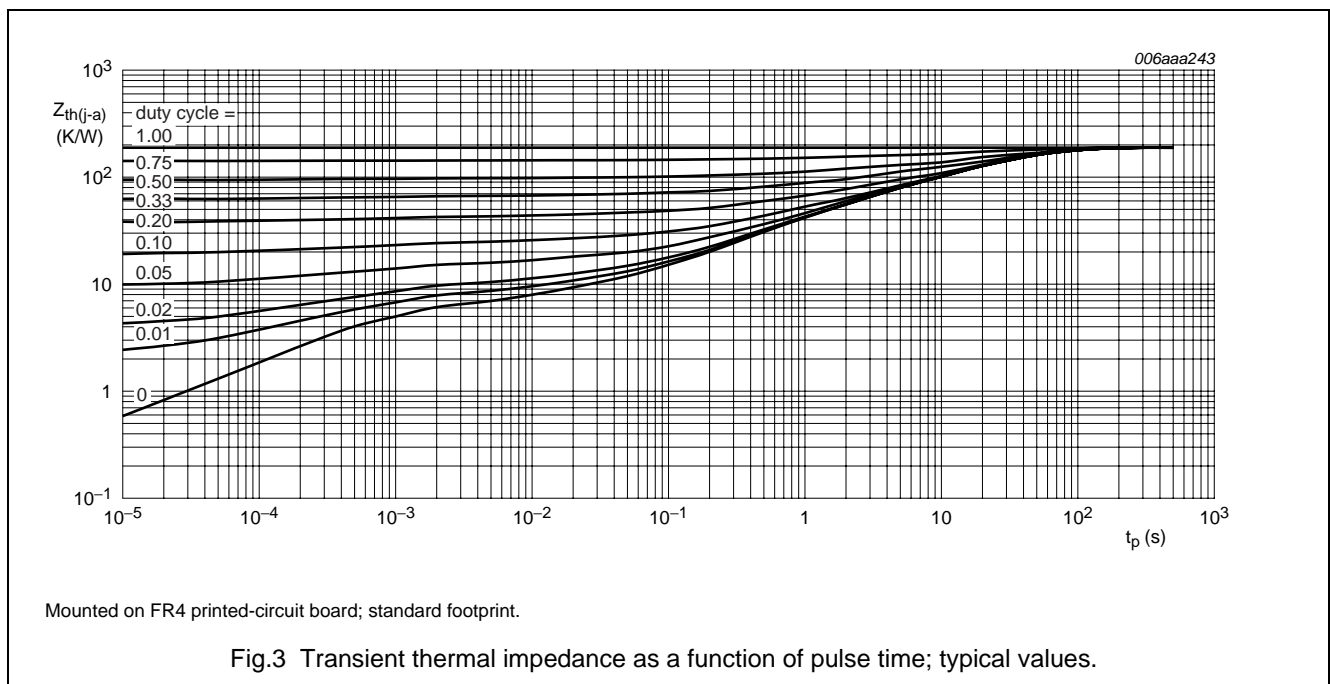
PBSS5320X

**THERMAL CHARACTERISTICS**

| SYMBOL        | PARAMETER   | CONDITIONS  | VALUE | UNIT |
|---------------|---|-------------|-------|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient         | in free air |       |      |
|               |   | note 1      | 225   | K/W  |
|               |   | note 2      | 125   | K/W  |
|               |   | note 3      | 90    | K/W  |
|               |   | note 4      | 80    | K/W  |
| $R_{th(j-s)}$ | thermal resistance from junction to soldering point |             | 16    | K/W  |

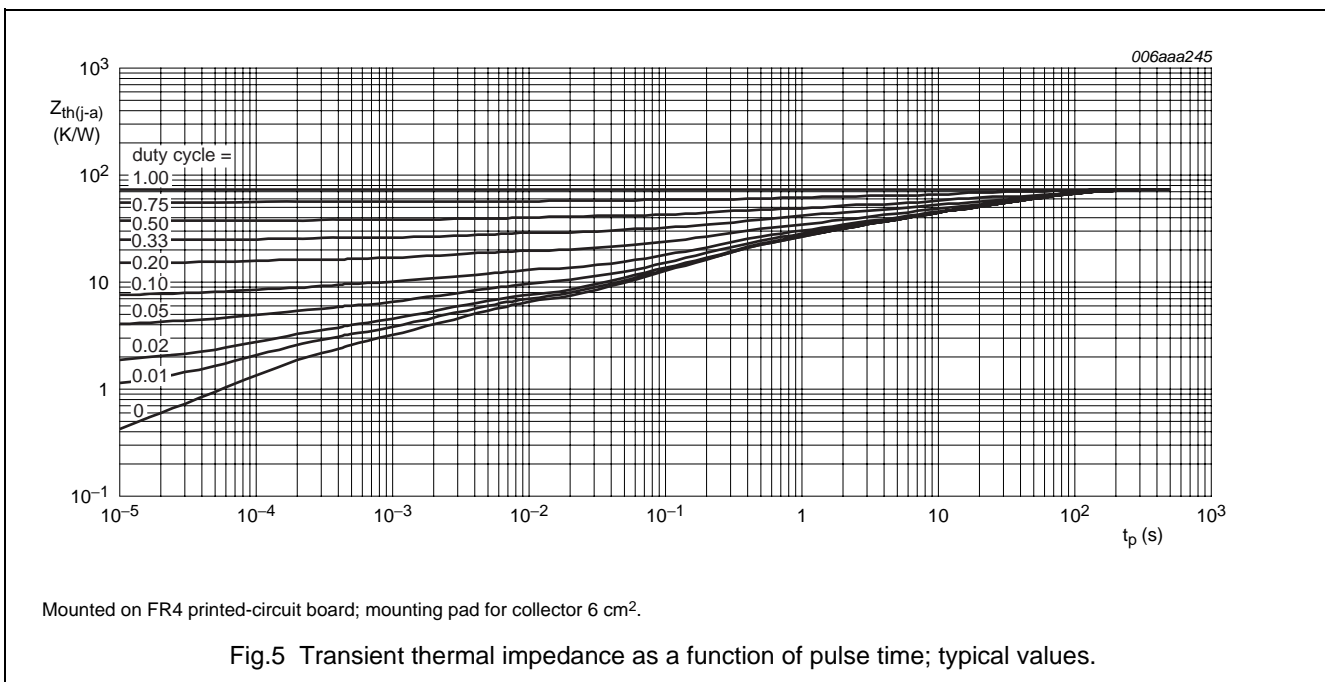
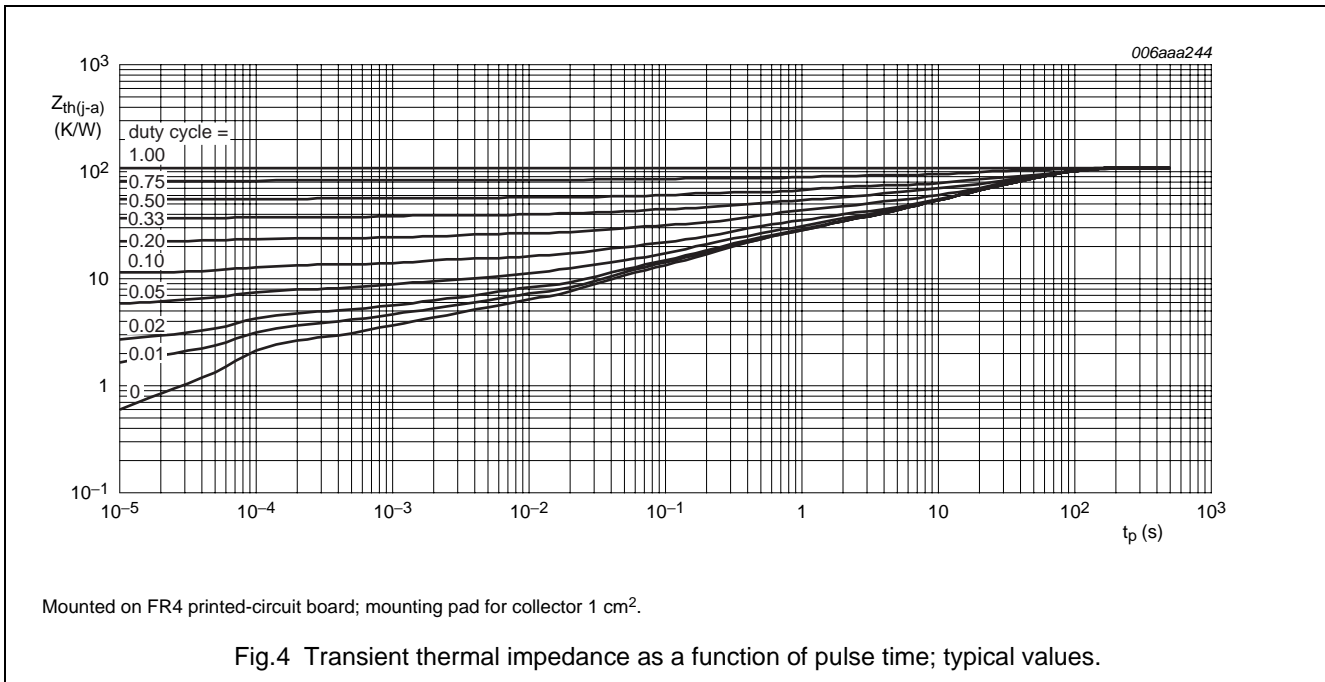
**Notes**

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>.
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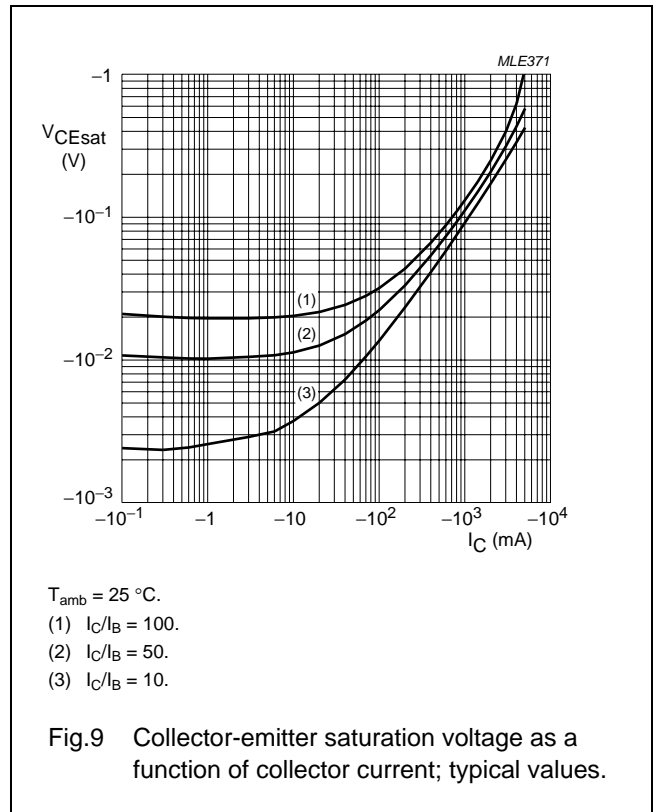
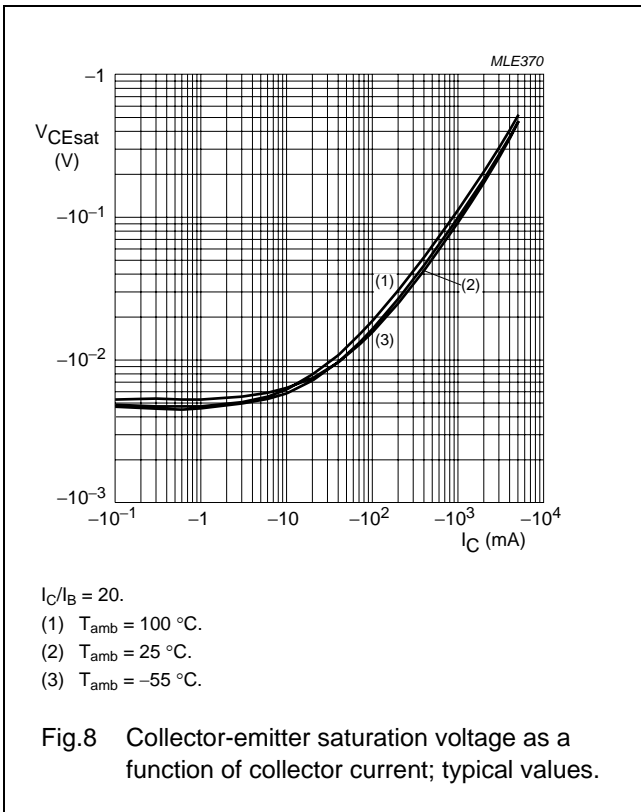
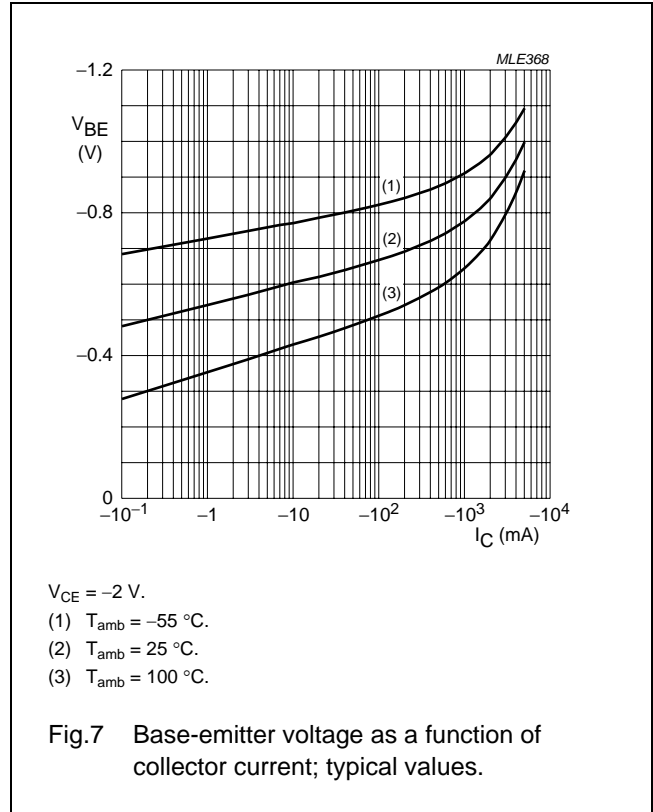
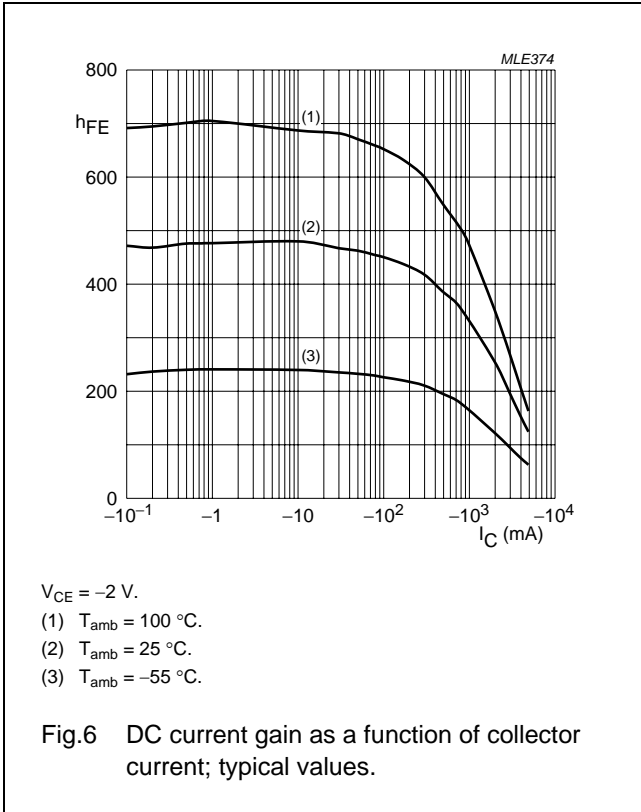
**CHARACTERISTICS** $T_{amb} = 25\text{ °C}$  unless otherwise specified.

| SYMBOL      | PARAMETER                            | CONDITIONS  | MIN. | TYP. | MAX. | UNIT             |
|-------------|--------------------------------------|---|------|------|------|------------------|
| $I_{CBO}$   | collector-base cut-off current       | $V_{CB} = -20\text{ V}; I_E = 0\text{ A}$                         | –    | –    | –100 | nA               |
|             |                                      | $V_{CB} = -20\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ °C}$    | –    | –    | –50  | $\mu\text{A}$    |
| $I_{CES}$   | collector-emitter cut-off current    | $V_{CE} = -20\text{ V}; V_{BE} = 0\text{ V}$                      | –    | –    | –100 | nA               |
| $I_{EBO}$   | emitter-base cut-off current         | $V_{EB} = -5\text{ V}; I_C = 0\text{ A}$                          | –    | –    | –100 | nA               |
| $h_{FE}$    | DC current gain                      | $V_{CE} = -2\text{ V}$  |      |      |      |                  |
|             |                                      | $I_C = -0.1\text{ A}$   | 220  | –    | –    |                  |
|             |                                      | $I_C = -0.5\text{ A}$   | 220  | –    | –    |                  |
|             |                                      | $I_C = -1\text{ A}; \text{note 1}$                                | 200  | –    | –    |                  |
|             |                                      | $I_C = -2\text{ A}; \text{note 1}$                                | 150  | –    | –    |                  |
|             |                                      | $I_C = -3\text{ A}; \text{note 1}$                                | 100  | –    | –    |                  |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = -0.5\text{ A}; I_B = -50\text{ mA}$                        | –    | –    | –70  | mV               |
|             |                                      | $I_C = -1\text{ A}; I_B = -50\text{ mA}$                          | –    | –    | –130 | mV               |
|             |                                      | $I_C = -2\text{ A}; I_B = -100\text{ mA}$                         | –    | –    | –230 | mV               |
|             |                                      | $I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{note 1}$          | –    | –    | –300 | mV               |
| $R_{CEsat}$ | equivalent on-resistance             | $I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{note 1}$          | –    | 90   | 105  | $\text{m}\Omega$ |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = -2\text{ A}; I_B = -100\text{ mA}$                         | –    | –1.1 | –    | V                |
|             |                                      | $I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{note 1}$          | –    | –    | –1.2 | V                |
| $V_{BEon}$  | base-emitter turn-on voltage         | $V_{CE} = -2\text{ V}; I_C = -1\text{ A}$                         | –1.1 | –    | –    | V                |
| $f_T$       | transition frequency                 | $I_C = -100\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$  | 100  | –    | –    | MHz              |
| $C_c$       | collector capacitance                | $V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$ | –    | –    | 50   | pF               |

**Note**1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

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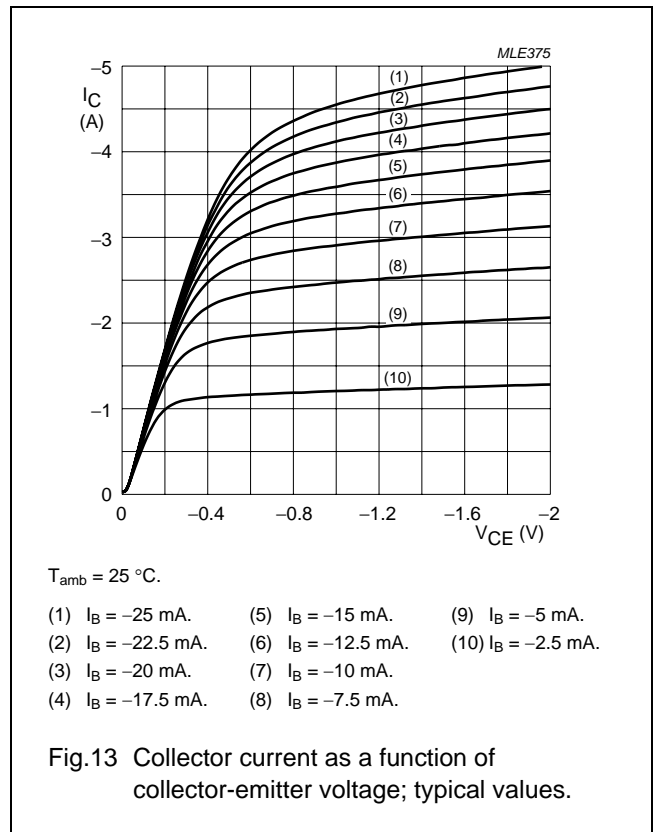
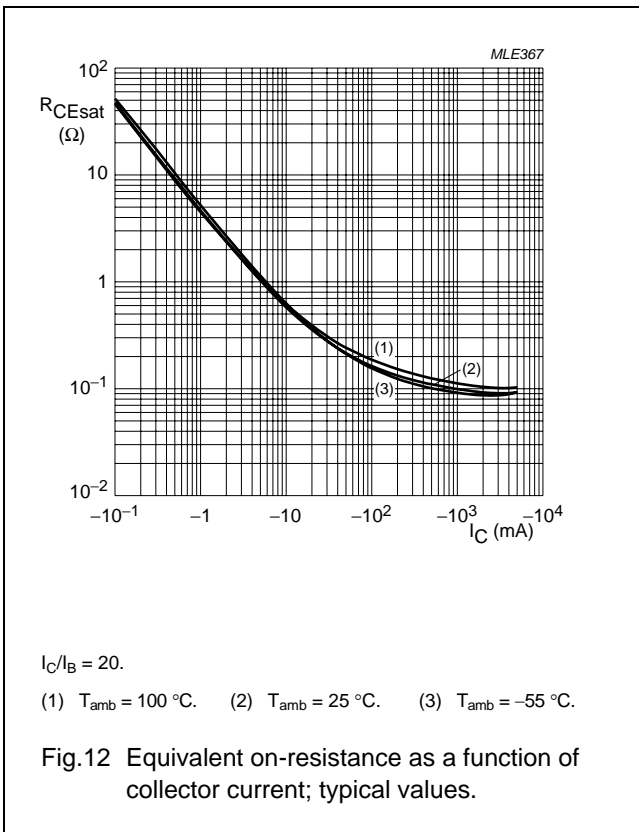
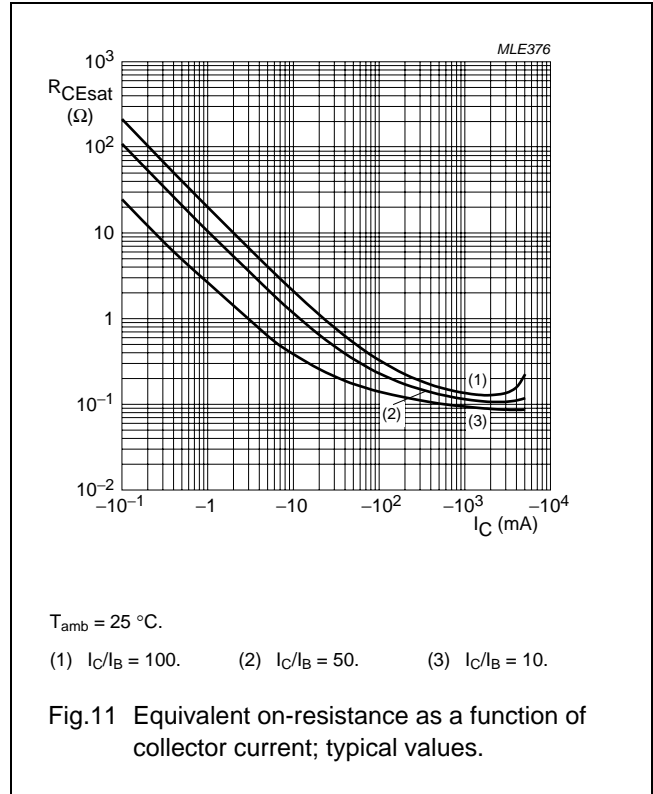
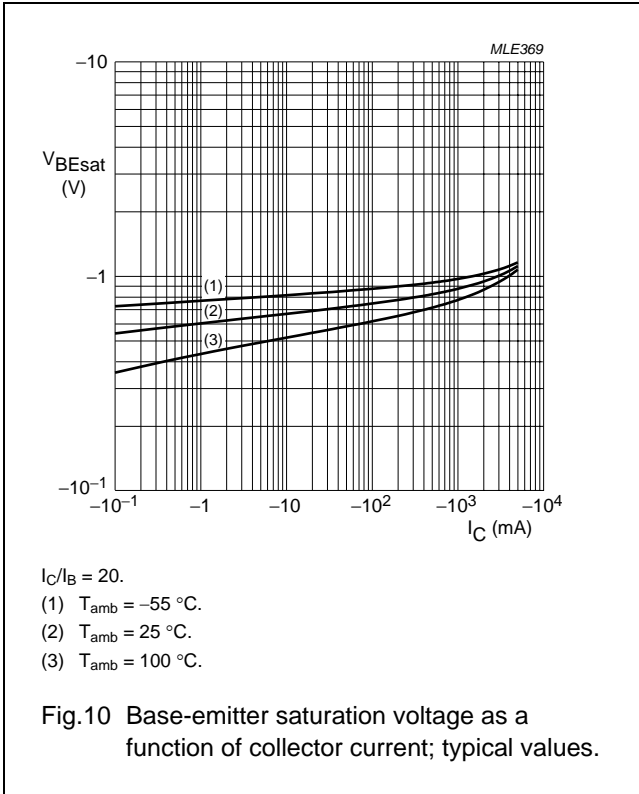
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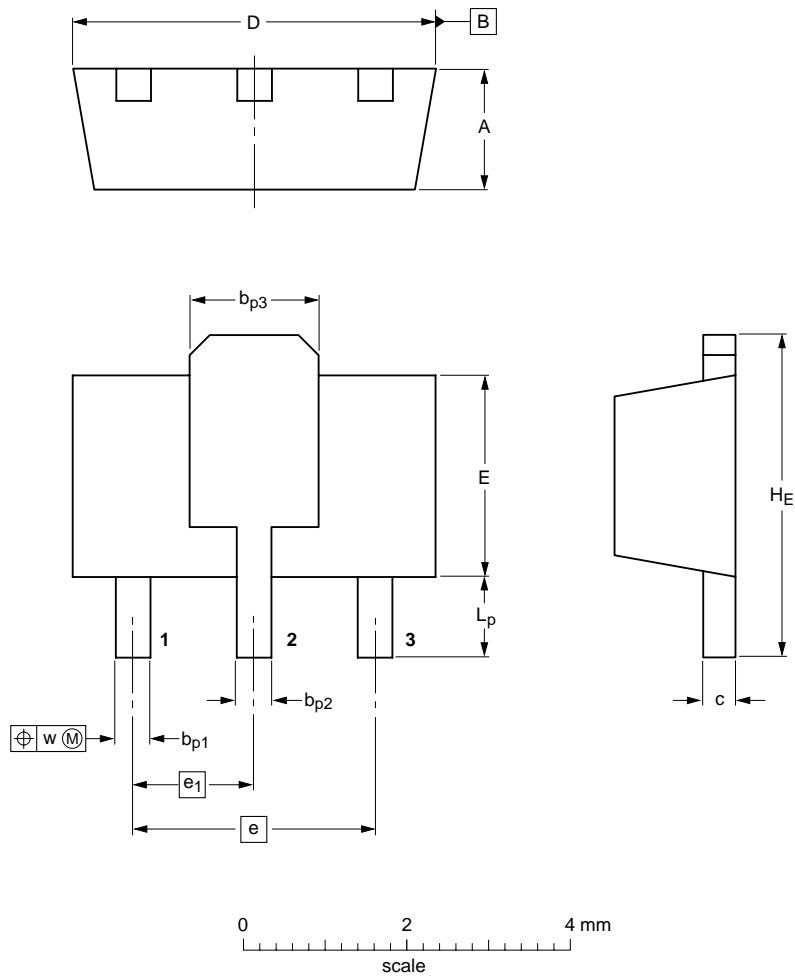
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PACKAGE OUTLINE

Plastic surface-mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | b <sub>p1</sub> | b <sub>p2</sub> | b <sub>p3</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | w    |
|------|------------|-----------------|-----------------|-----------------|--------------|------------|------------|-----|----------------|----------------|----------------|------|
| mm   | 1.6<br>1.4 | 0.48<br>0.35    | 0.53<br>0.40    | 1.8<br>1.4      | 0.44<br>0.23 | 4.6<br>4.4 | 2.6<br>2.4 | 3.0 | 1.5            | 4.25<br>3.75   | 1.2<br>0.8     | 0.13 |

| OUTLINE VERSION | REFERENCES |        |       | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|--------|-------|---------------------|----------------------|
|                 | IEC        | JEDEC  | JEITA |                     |                      |
| SOT89           |            | TO-243 | SC-62 |                     | 04-08-03<br>06-03-16 |

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**DATA SHEET STATUS**

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION  |
|--------------------------------|-------------------------------|---|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

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## **Customer notification**

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## **Contact information**

For additional information please visit: <http://www.nxp.com>

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