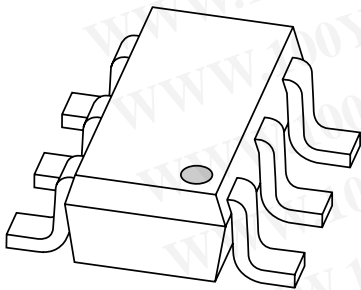


DATA SHEET



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PBSS4240DPN 40 V low V_{CEsat} NPN/PNP transistor

Product data sheet

2003 Feb 20

40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN

FEATURES

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain h_{FE} at high I_C
- High efficiency leading to reduced heat generation
- Reduced printed-circuit board area requirements.

APPLICATIONS

- Power management:
 - Complementary MOSFET driver
 - Dual supply line switching.
- Peripheral driver:
 - Half and full bridge motor drivers
 - Multi-phase stepper motor driver.

DESCRIPTION

NPN/PNP low V_{CEsat} transistor pair in a SOT457 (SC-74) plastic package.

MARKING

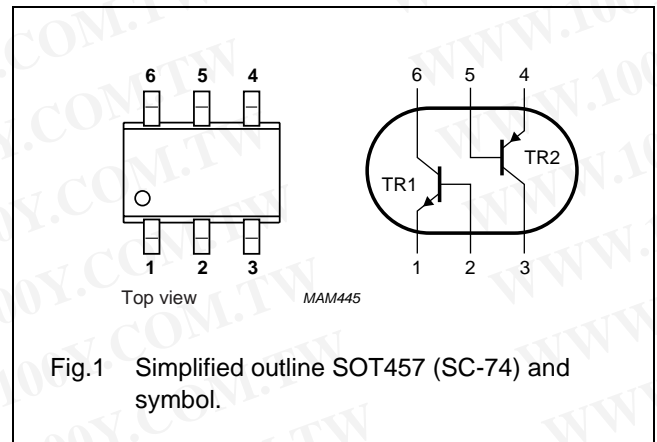
| TYPE NUMBER | MARKING CODE |
|-------------|--------------|
| PBSS4240DPN | M3 |

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | | UNIT |
|-------------|-----------------------------------|------|------|-----------|
| | | NPN | PNP | |
| V_{CEO} | emitter-collector voltage | 40 | -40 | V |
| I_C | collector current (DC) | 1.35 | -1.1 | A |
| I_{CRP} | repetitive peak collector current | 2 | -2 | A |
| I_{CM} | peak collector current | 3 | -3 | A |
| R_{CEsat} | equivalent on-resistance | 200 | 260 | $m\Omega$ |

PINNING

| PIN | DESCRIPTION |
|------|--------------------|
| 1, 4 | emitter TR1; TR2 |
| 2, 5 | base TR1; TR2 |
| 6, 3 | collector TR1; TR2 |



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LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|--------------------------------------|--------------------------------------|------|------|------|
| Per transistor unless otherwise specified; for the PNP transistor with negative polarity | | | | | |
| V_{CBO} | collector-base voltage | open emitter | – | 40 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 40 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 5 | V |
| I_C | collector current (DC) NPN PNP | | – | 1.35 | A |
| | | | – | –1.1 | A |
| I_{CRP} | repetitive peak collector current | note 1 | – | 2 | A |
| I_{CM} | peak collector current | single peak | – | 3 | A |
| I_B | base current (DC) | | – | 300 | mA |
| I_{BM} | peak base current | | – | 1 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$; note 2 | – | 370 | mW |
| | | $T_{amb} \leq 25\text{ °C}$; note 3 | – | 310 | mW |
| | | $T_{amb} \leq 25\text{ °C}$; note 1 | – | 1.1 | W |
| T_{stg} | storage temperature | | –65 | +150 | °C |
| T_j | junction temperature | | – | 150 | °C |
| T_{amb} | operating ambient temperature | | –65 | +150 | °C |
| Per device | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$; note 2 | – | 600 | mW |

Notes

- Operated under pulsed conditions: duty cycle $\delta \leq 20\%$; pulse width $t_p \leq 10\text{ ms}$; mounting pad for collector standard footprint.
- Device mounted on a printed-circuit board; single-sided copper; tinplated; mounting pad for collector 1 cm^2 .
- Device mounted on a printed-circuit board; single-sided copper; tinplated; standard footprint.

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|-----------------------|---|---------------------|-------|------|
| Per transistor | | | | |
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | in free air; note 1 | 340 | K/W |
| | | in free air; note 2 | 110 | K/W |

Notes

- Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm^2 .
- Operated under pulsed conditions: pulse width $t_p \leq 10\text{ ms}$; duty cycle $\delta \leq 0.20$; mounting pad for collector standard footprint.

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CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|--------------------------------------|---|------|------|------|------------------|
| Per transistor unless otherwise specified; for the PNP transistor with negative polarity | | | | | | |
| I_{CBO} | collector-base cut-off current | $V_{CB} = 40\text{ V}; I_E = 0$ | – | – | 100 | nA |
| | | $V_{CB} = 40\text{ V}; I_E = 0; T_j = 150\text{ }^{\circ}\text{C}$ | – | – | 50 | μA |
| I_{CEO} | collector-emitter cut-off current | $V_{CE} = 30\text{ V}; I_B = 0$ | – | – | 100 | nA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = 5\text{ V}; I_C = 0$ | – | – | 100 | nA |
| h_{FE} | DC current gain | $V_{CE} = 5\text{ V}; I_C = 1\text{ mA}$ | 300 | – | – | |
| f_T | transition frequency | $I_C = 50\text{ mA}; V_{CE} = 10\text{ V};$ $f = 100\text{ MHz}$ | 150 | – | – | MHz |
| C_c | collector capacitance | $V_{CB} = 10\text{ V}; I_E = I_e = 0;$ $f = 1\text{ MHz}$ | – | – | 12 | pF |
| TR1 (NPN) | | | | | | |
| h_{FE} | DC current gain | $V_{CE} = 5\text{ V}; I_C = 500\text{ mA}$ | 300 | – | 900 | |
| | | $V_{CE} = 5\text{ V}; I_C = 1\text{ A}$ | 200 | – | – | |
| | | $V_{CE} = 5\text{ V}; I_C = 2\text{ A};$ note 1 | 75 | – | – | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 100\text{ mA}; I_B = 1\text{ mA}$ | – | 60 | 75 | mV |
| | | $I_C = 500\text{ mA}; I_B = 50\text{ mA}$ | – | 80 | 100 | mV |
| | | $I_C = 1\text{ A}; I_B = 100\text{ mA}$ | – | 150 | 200 | mV |
| | | $I_C = 2\text{ A}; I_B = 200\text{ mA};$ note 1 | – | 300 | 400 | mV |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 1\text{ A}; I_B = 100\text{ mA}$ | – | – | 1.2 | V |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = 5\text{ V}; I_C = 1\text{ A}$ | – | – | 1.1 | V |
| R_{CEsat} | equivalent on-resistance | $I_C = 1\text{ A}; I_B = 100\text{ mA}$ | – | – | 200 | $\text{m}\Omega$ |
| TR2 (PNP) | | | | | | |
| h_{FE} | DC current gain | $V_{CE} = -5\text{ V}; I_C = -100\text{ mA}$ | 300 | – | 800 | |
| | | $V_{CE} = -5\text{ V}; I_C = -500\text{ mA}$ | 250 | – | – | |
| | | $V_{CE} = -5\text{ V}; I_C = -1\text{ A}$ | 160 | – | – | |
| | | $V_{CE} = -5\text{ V}; I_C = -2\text{ A};$ note 1 | 50 | – | – | |
| V_{CEsat} | saturation voltage | $I_C = -100\text{ mA}; I_B = -1\text{ mA}$ | – | -90 | -120 | mV |
| | | $I_C = -500\text{ mA}; I_B = -50\text{ mA}$ | – | -100 | -145 | mV |
| | | $I_C = -1\text{ A}; I_B = -100\text{ mA}$ | – | -180 | -260 | mV |
| | | $I_C = -2\text{ A}; I_B = -200\text{ mA};$ note 1 | – | -400 | -530 | mV |
| V_{BEsat} | saturation voltage | $I_C = -1\text{ A}; I_B = -50\text{ mA}$ | – | – | -1.1 | V |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = -5\text{ V}; I_C = -1\text{ A}$ | – | – | -1 | V |
| R_{CEsat} | equivalent on-resistance | $I_C = -1\text{ A}; I_B = -100\text{ mA};$ note 1 | – | – | 260 | $\text{m}\Omega$ |

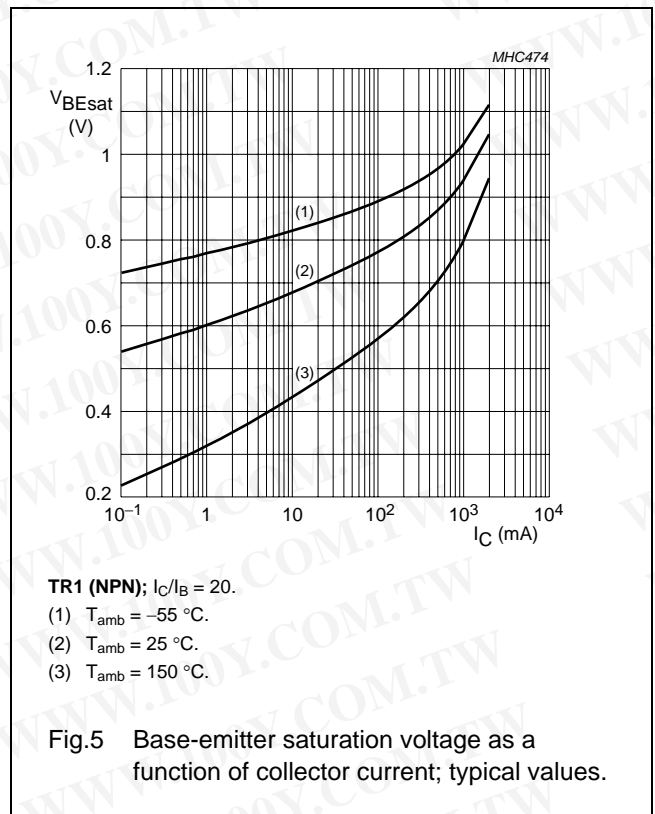
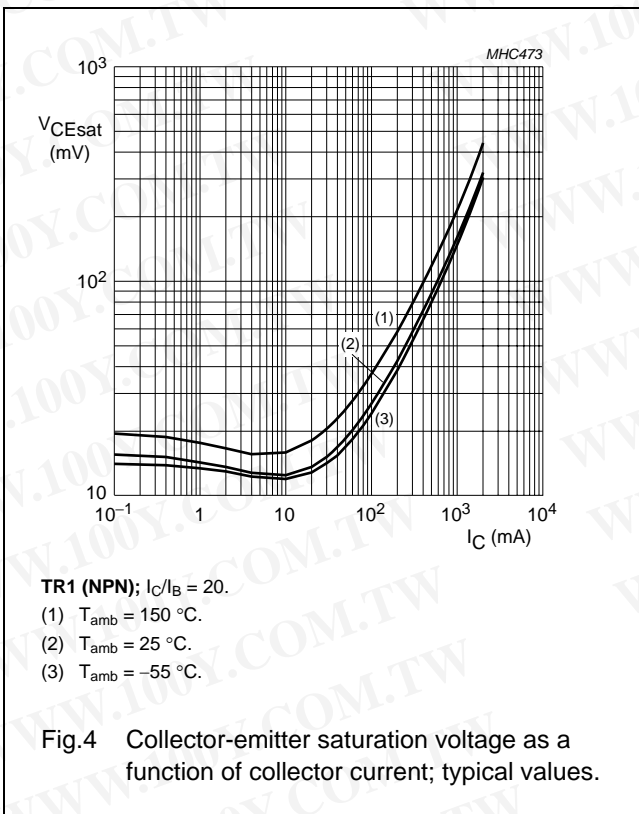
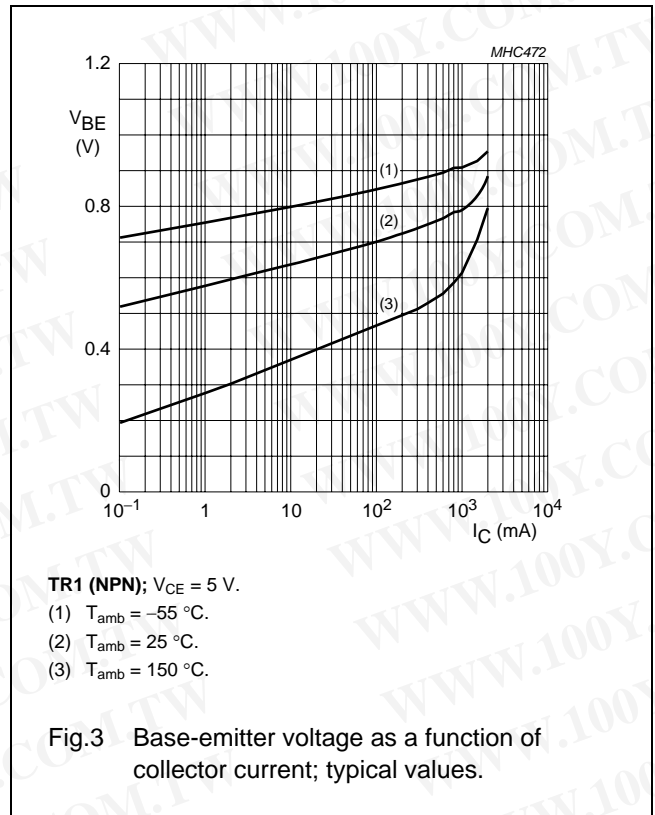
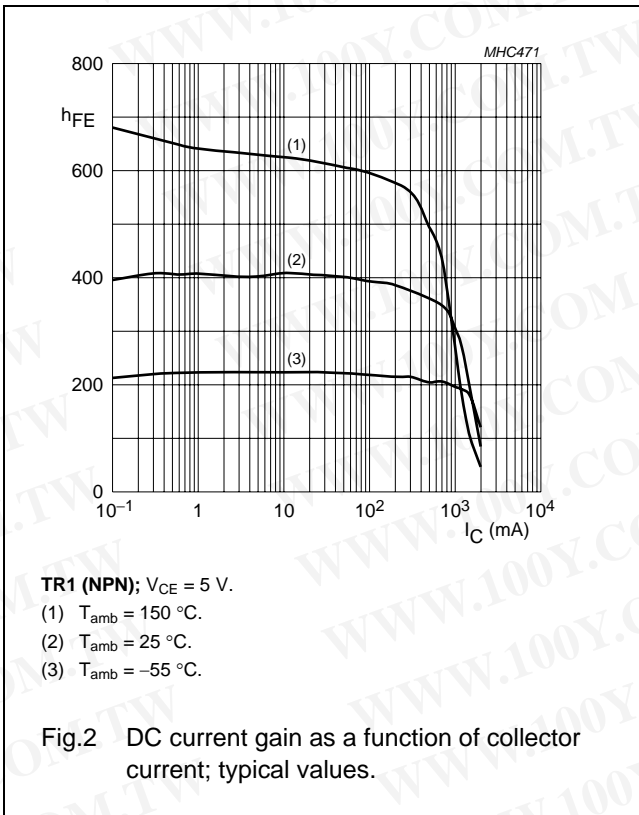
Note

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

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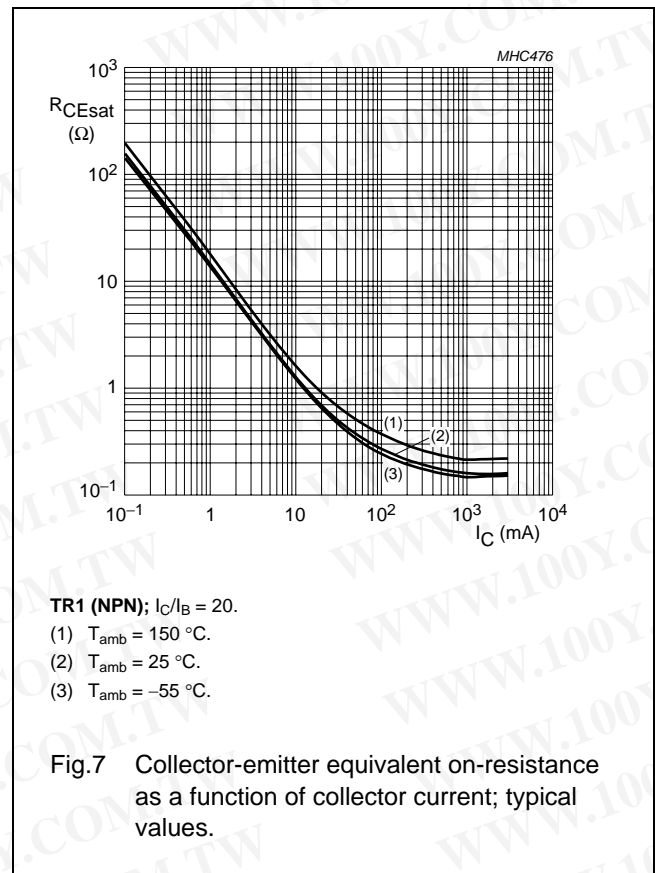
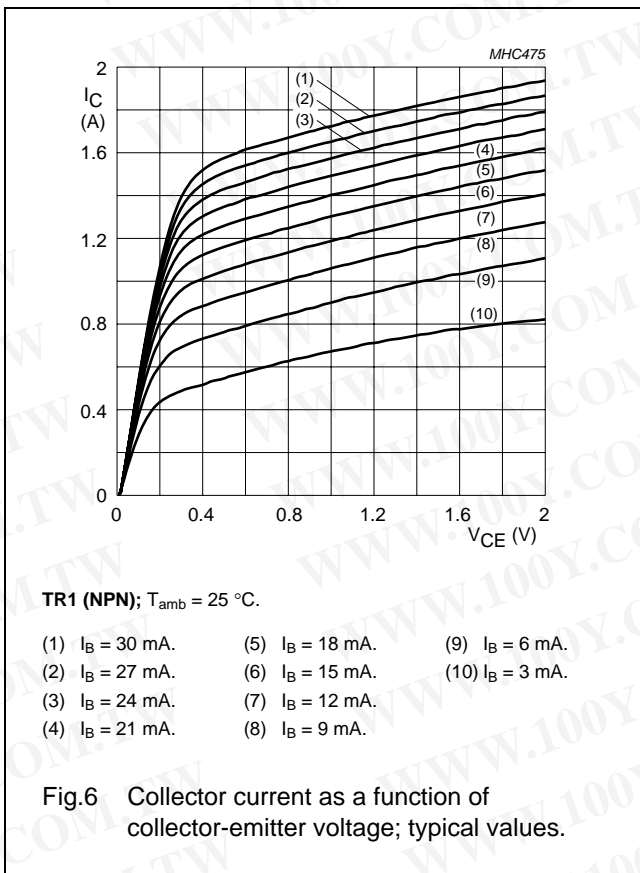
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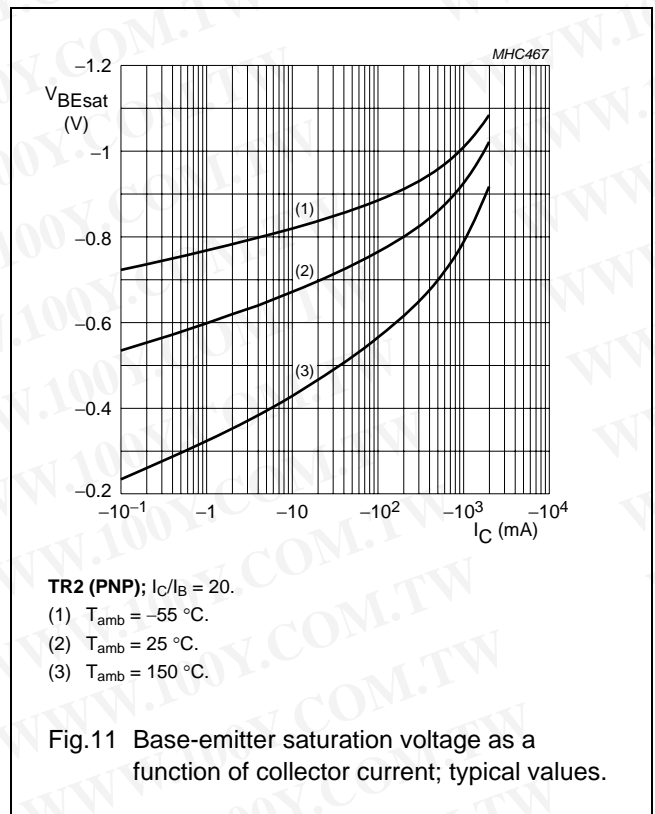
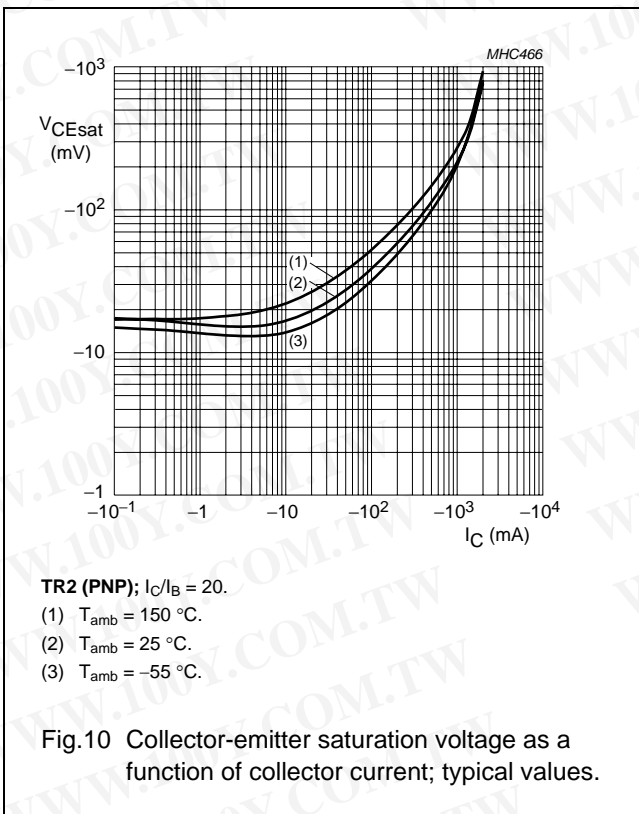
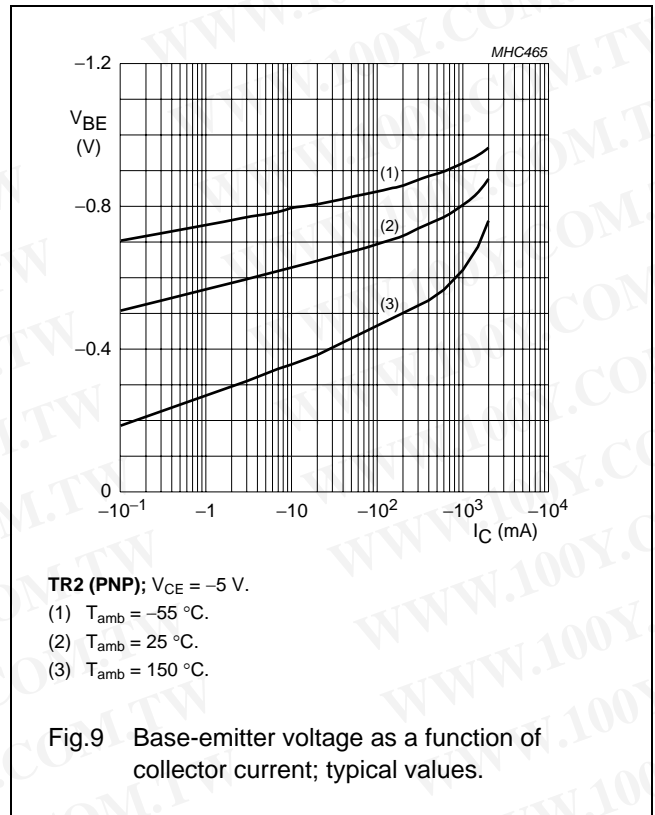
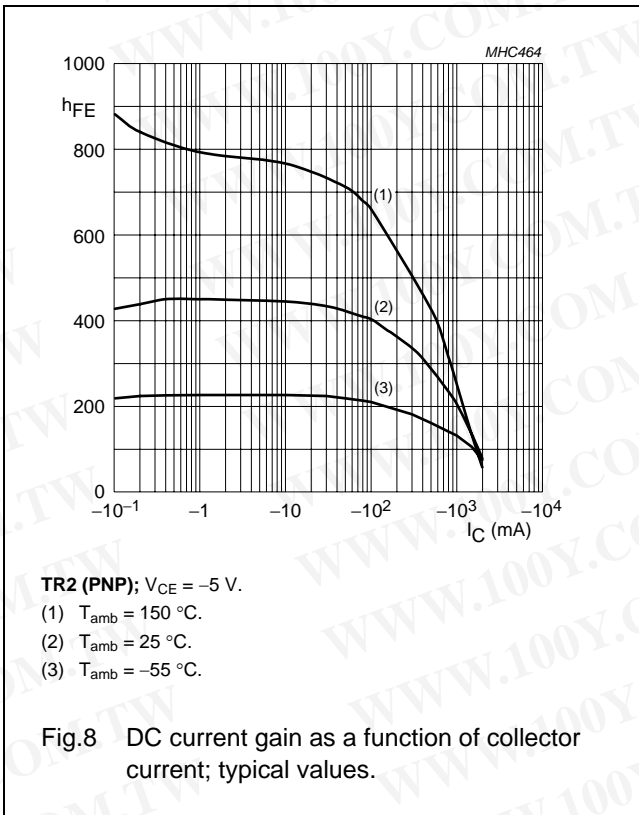
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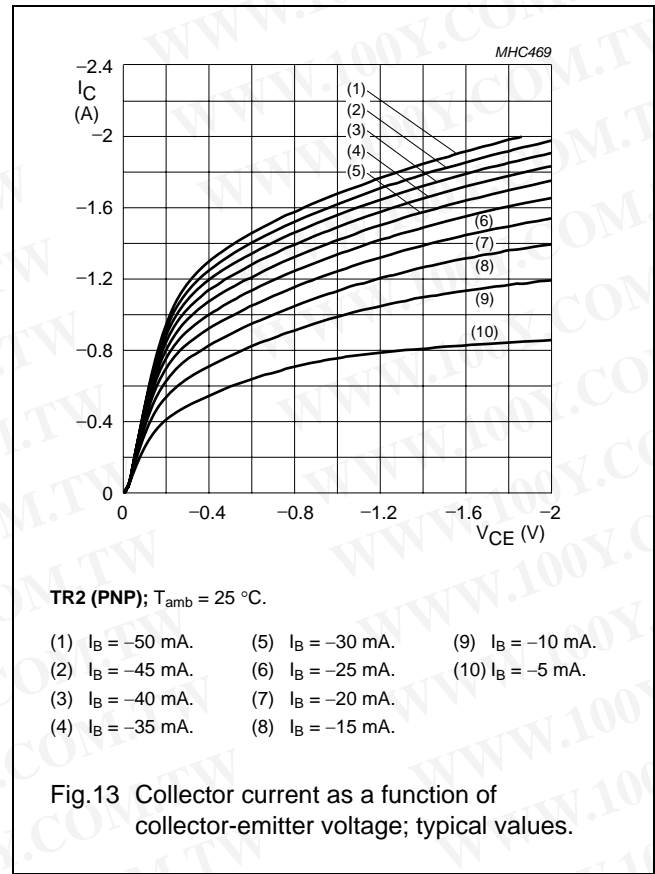
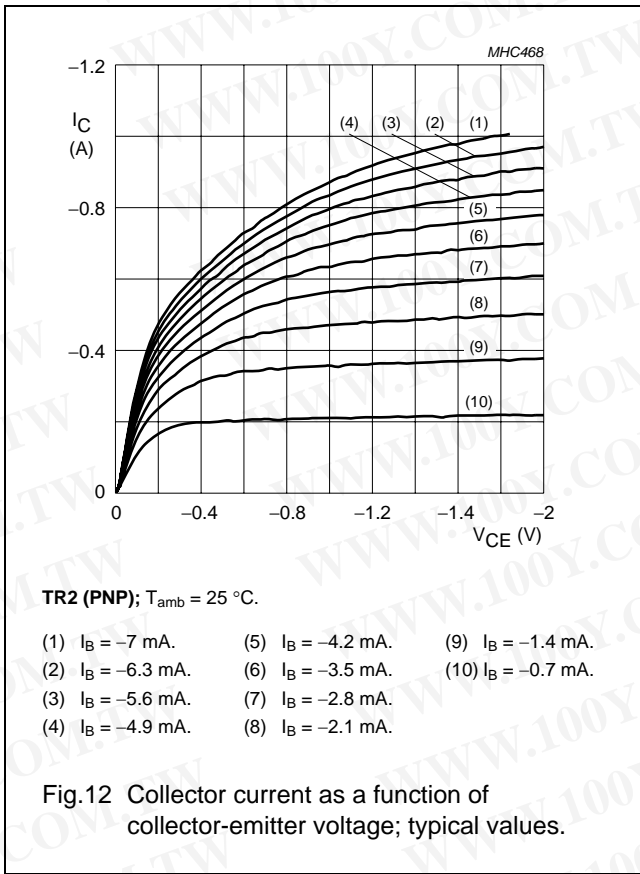
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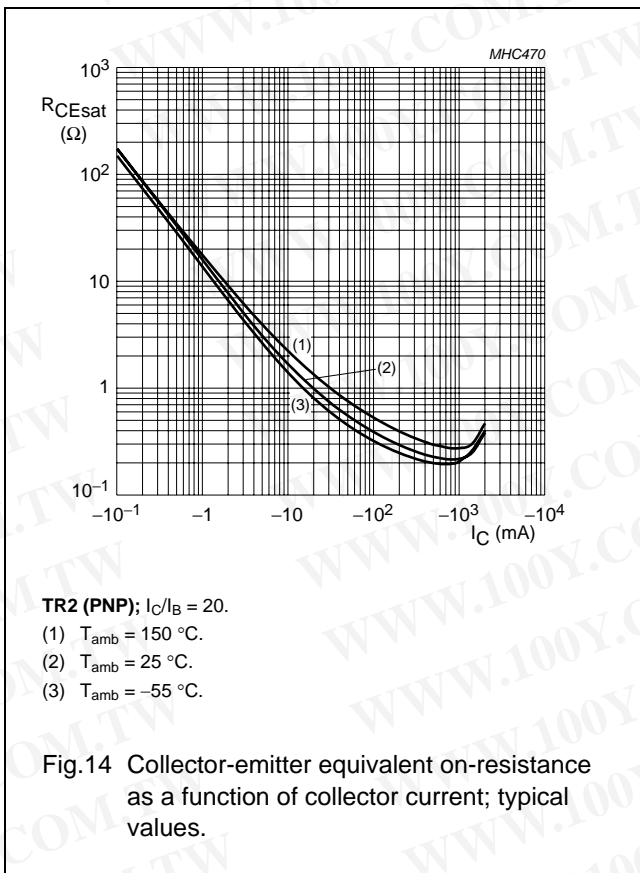
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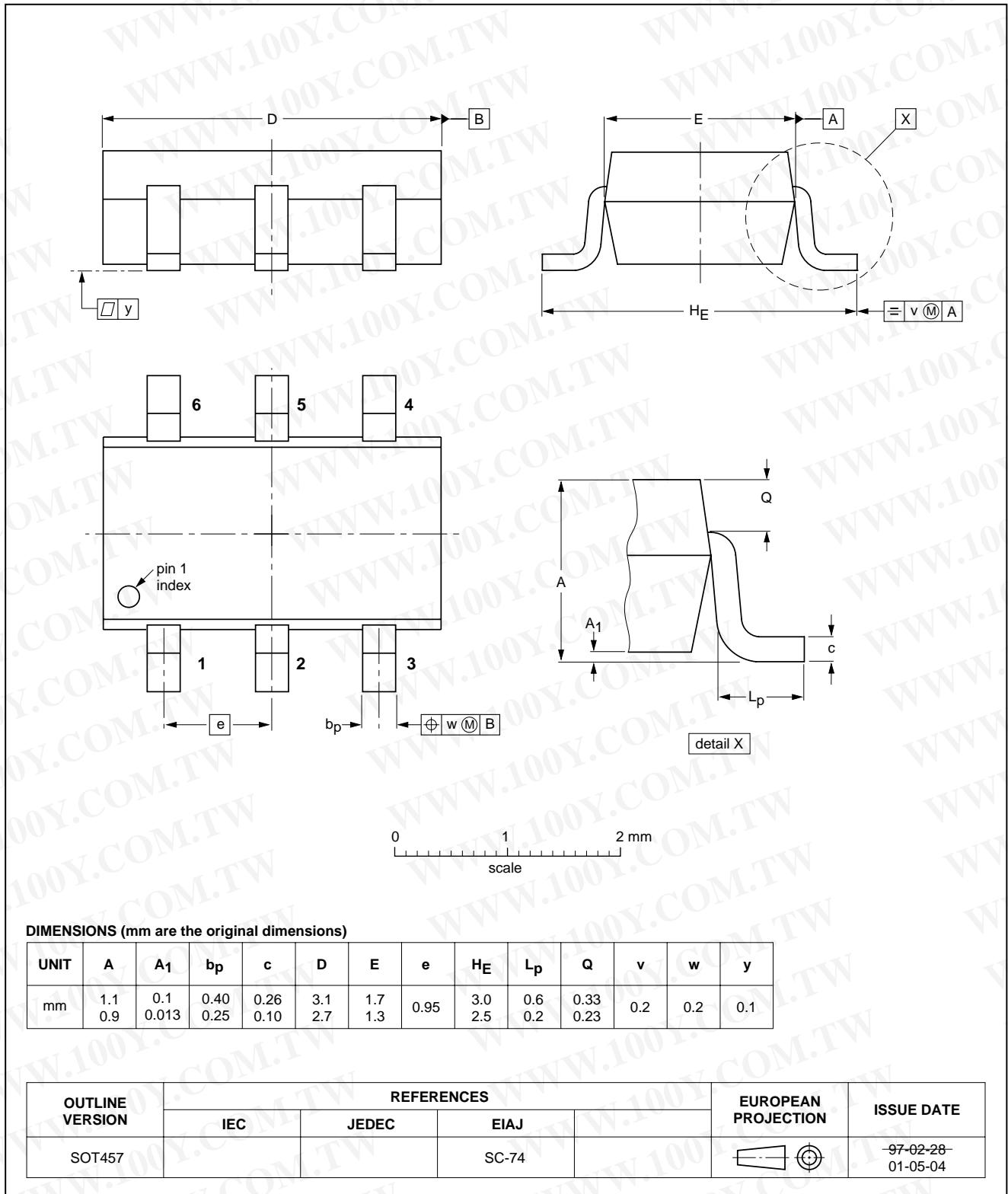
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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457



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|--------------------------------|-------------------------------|---|
| 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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Printed in The Netherlands

613514/01/pp12

Date of release: 2003 Feb 20

Document order number: 9397 750 10783

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