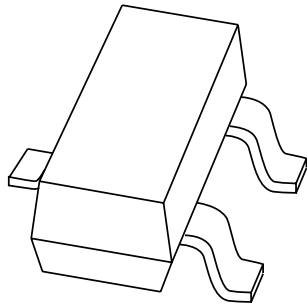


DATA SHEET



PBSS4160T

60 V, 1 A

NPN low V_{CEsat} (BISS) transistor

Product data sheet
Supersedes data of 2003 Jun 24

2004 May 12

60 V, 1 A
NPN low V_{CEsat} (BISS) transistor

PBSS4160T

FEATURES

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency, reduces heat generation
- Reduces printed-circuit board area required
- Cost effective replacement for medium power transistor BCP55 and BCX55.

APPLICATIONS

- Major application segments:
 - Automotive 42 V power
 - Telecom infrastructure
 - Industrial.
- Power management:
 - DC-to-DC conversion
 - Supply line switching.
- Peripheral driver
 - Driver in low supply voltage applications (e.g. lamps and LEDs)
 - Inductive load driver (e.g. relays, buzzers and motors).

DESCRIPTION

NPN low V_{CEsat} transistor in a SOT23 plastic package.
 PNP complement: PBSS5160T.

MARKING

| TYPE NUMBER | MARKING CODE ⁽¹⁾ |
|-------------|-----------------------------|
| PBSS4160T | *U5 |

Note

1. * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China.

ORDERING INFORMATION

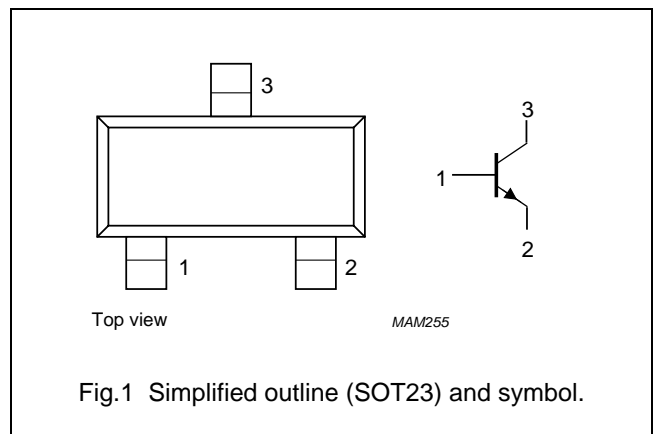
| TYPE NUMBER | PACKAGE | | |
|-------------|---------|--|---------|
| | NAME | DESCRIPTION | VERSION |
| PBSS4160T | – | plastic surface mounted package; 3 leads | SOT23 |

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | UNIT |
|-------------|---------------------------|------|------|
| V_{CEO} | collector-emitter voltage | 60 | V |
| I_C | collector current (DC) | 1 | A |
| I_{CM} | peak collector current | 2 | A |
| R_{CEsat} | equivalent on-resistance | 250 | mΩ |

PINNING

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



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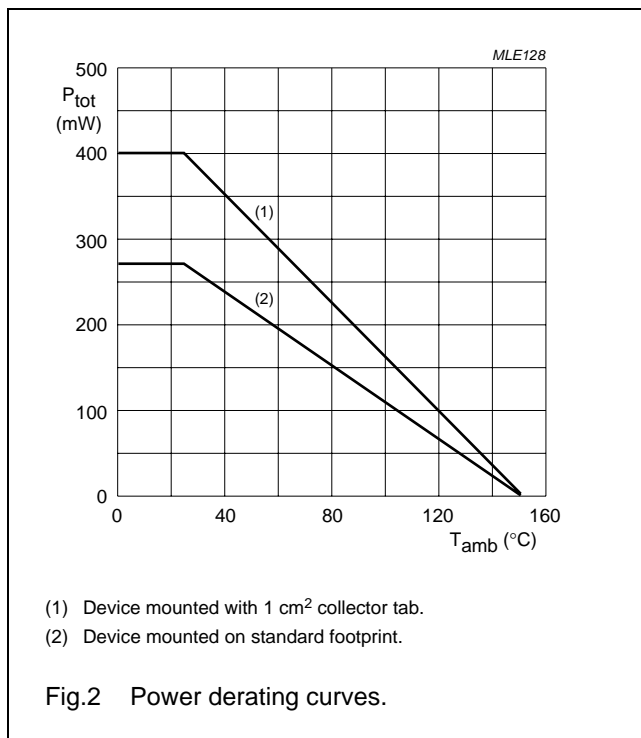
LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|-------------------------------|--|------|------|------------------|
| V_{CBO} | collector-base voltage | open emitter | – | 80 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 60 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 5 | V |
| I_C | collector current (DC) | note 1 | – | 0.9 | A |
| | | note 2 | – | 1 | A |
| I_{CM} | peak collector current | $t = 1 \text{ ms}$ or limited by $T_{j(max)}$ | – | 2 | A |
| I_B | base current (DC) | | – | 300 | mA |
| I_{BM} | peak base current | $t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02$ | – | 1 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25 \text{ } ^\circ\text{C}; \text{ note 1}$ | – | 270 | mW |
| | | $T_{amb} \leq 25 \text{ } ^\circ\text{C}; \text{ note 2}$ | – | 400 | mW |
| | | $T_{amb} \leq 25 \text{ } ^\circ\text{C}; \text{ notes 1 and 3}$ | – | 1.25 | W |
| T_{stg} | storage temperature | | –65 | +150 | $^\circ\text{C}$ |
| T_j | junction temperature | | – | 150 | $^\circ\text{C}$ |
| T_{amb} | operating ambient temperature | | –65 | +150 | $^\circ\text{C}$ |

Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.
2. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated, 1 cm² collector mounting pad.
3. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 10 \text{ ms}$.



60 V, 1 A
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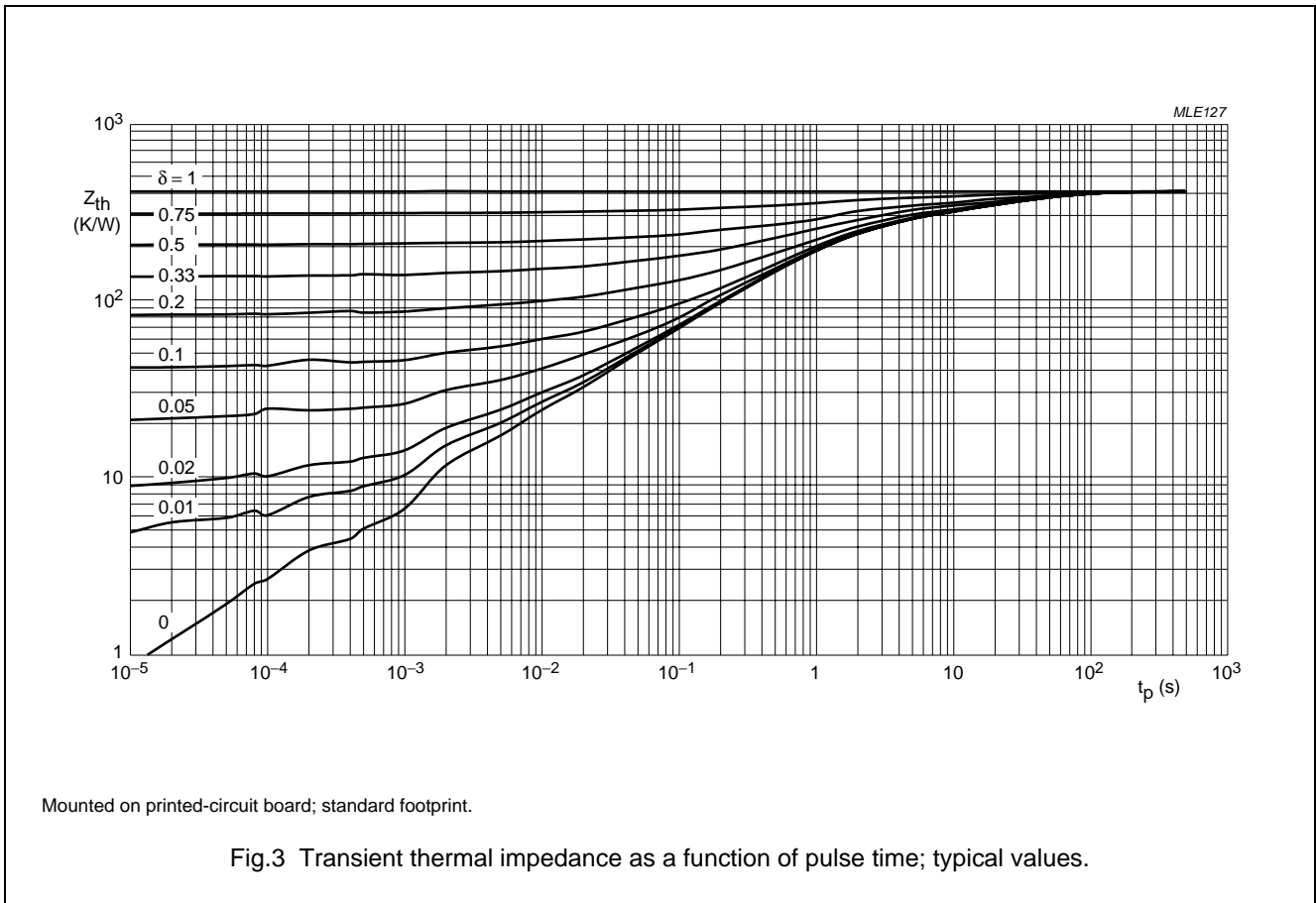
PBSS4160T

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|---|----------------------------|-------|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air; note 1 | 465 | K/W |
| | | in free air; note 2 | 312 | K/W |
| | | in free air; notes 1 and 3 | 100 | K/W |

Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and 1 cm² collector mounting pad.
3. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 10$ ms.



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PBSS4160T

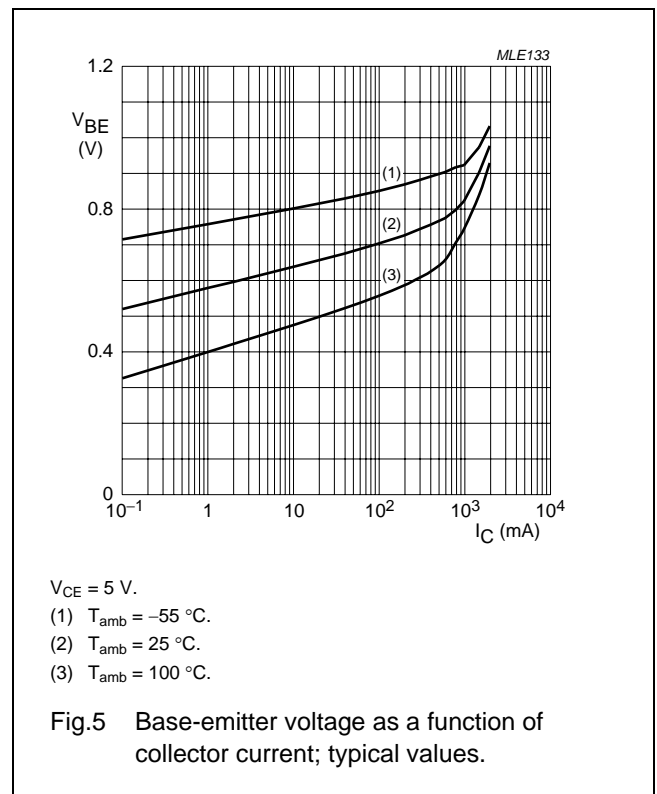
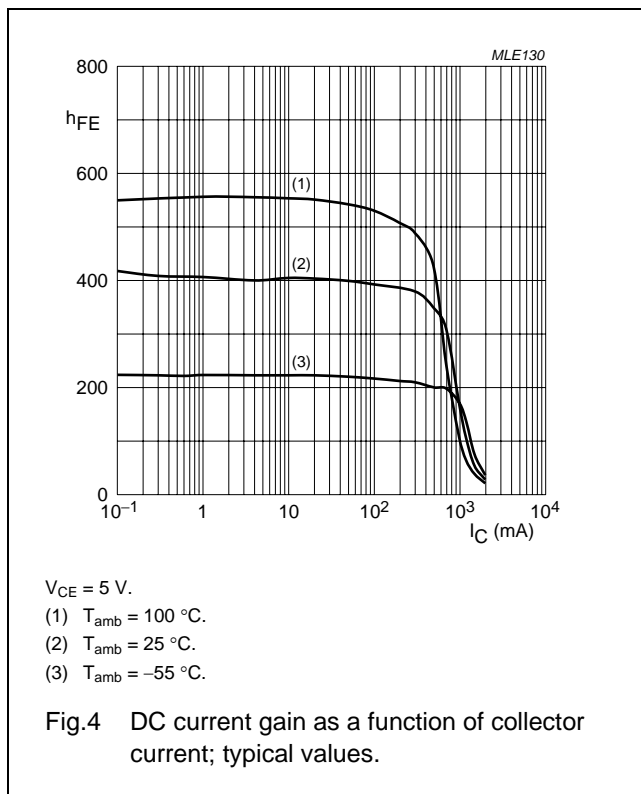
CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------|--------------------------------------|---|------|------|------|------------------|
| I_{CBO} | collector-base cut-off current | $V_{CB} = 60\text{ V}; I_E = 0\text{ A}$ | – | – | 100 | nA |
| | | $V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ }^{\circ}\text{C}$ | – | – | 50 | μA |
| I_{CES} | collector-emitter cut-off current | $V_{CE} = 60\text{ V}; V_{BE} = 0\text{ A}$ | – | – | 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 | $V_{CE} = 5\text{ V}; I_C = 1\text{ mA}$ | 250 | 400 | – | |
| | | $V_{CE} = 5\text{ V}; I_C = 500\text{ mA}; \text{note 1}$ | 200 | 350 | – | |
| | | $V_{CE} = 5\text{ V}; I_C = 1\text{ A}; \text{note 1}$ | 100 | 150 | – | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 100\text{ mA}; I_B = 1\text{ mA}$ | – | 90 | 110 | mV |
| | | $I_C = 500\text{ mA}; I_B = 50\text{ mA}$ | – | 110 | 140 | mV |
| | | $I_C = 1\text{ A}; I_B = 100\text{ mA}; \text{note 1}$ | – | 200 | 250 | mV |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 1\text{ A}; I_B = 50\text{ mA}$ | – | 0.95 | 1.1 | V |
| R_{CEsat} | equivalent on-resistance | $I_C = 1\text{ A}; I_B = 100\text{ mA}; \text{note 1}$ | – | 200 | 250 | $\text{m}\Omega$ |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = 5\text{ V}; I_C = 1\text{ A}$ | – | 0.82 | 0.9 | V |
| f_T | transition frequency | $I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$ | 150 | 220 | – | MHz |
| C_c | collector capacitance | $V_{CB} = 10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$ | – | 5.5 | 10 | pF |

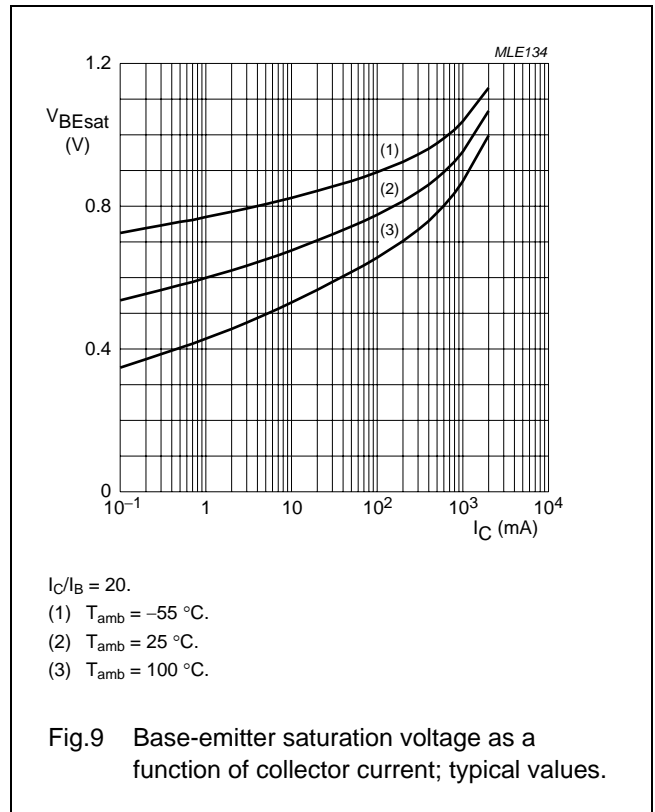
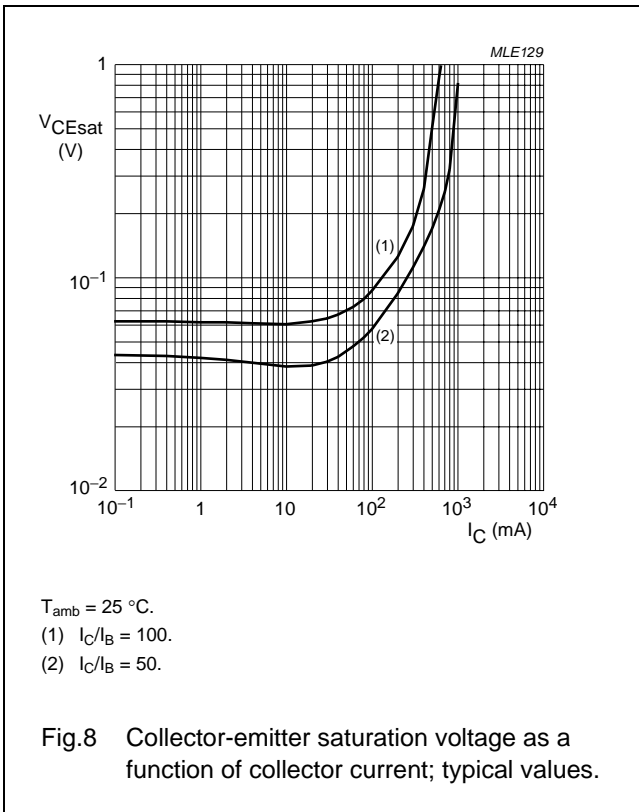
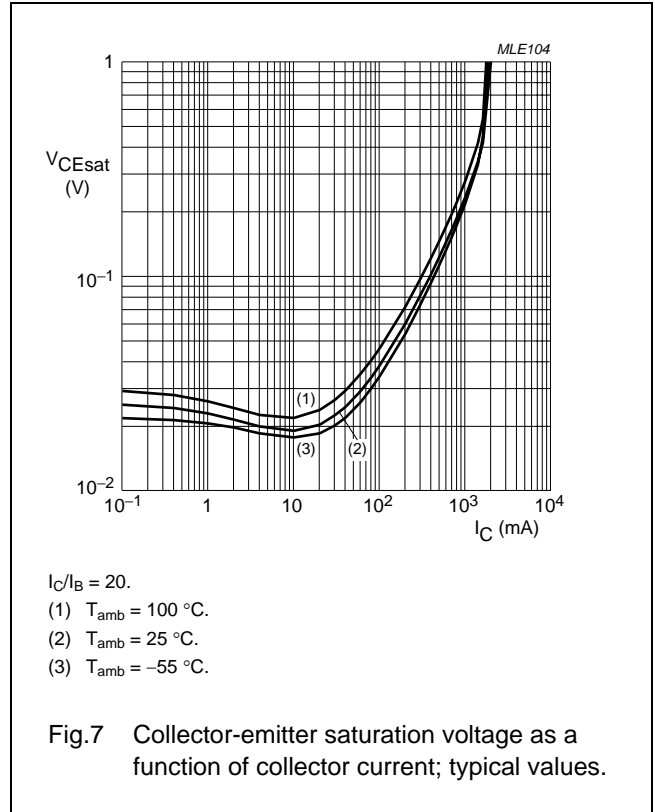
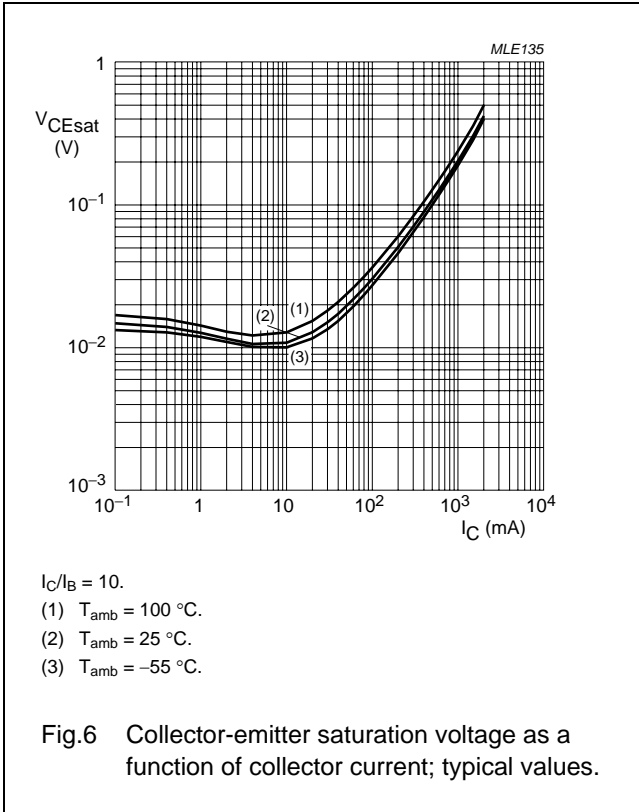
Note

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



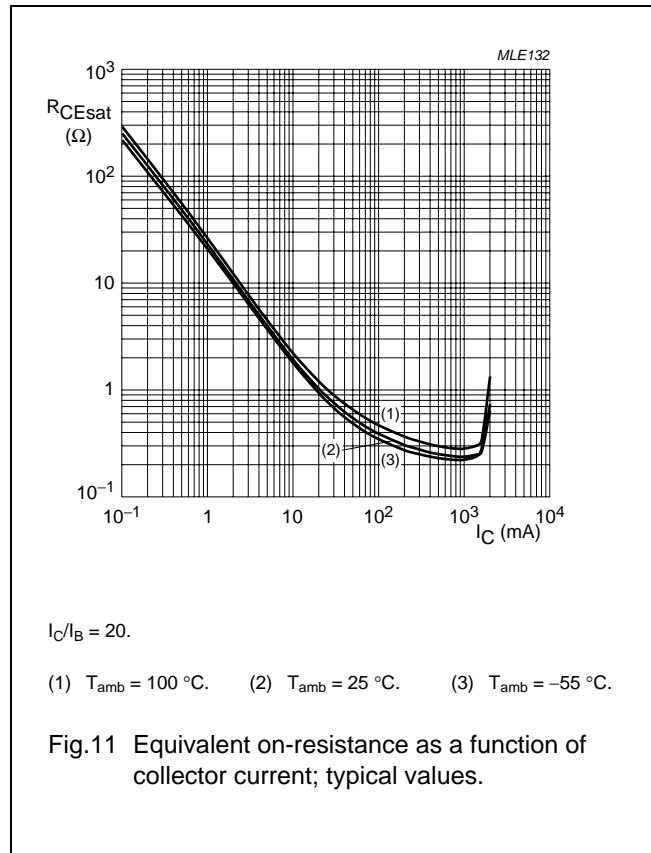
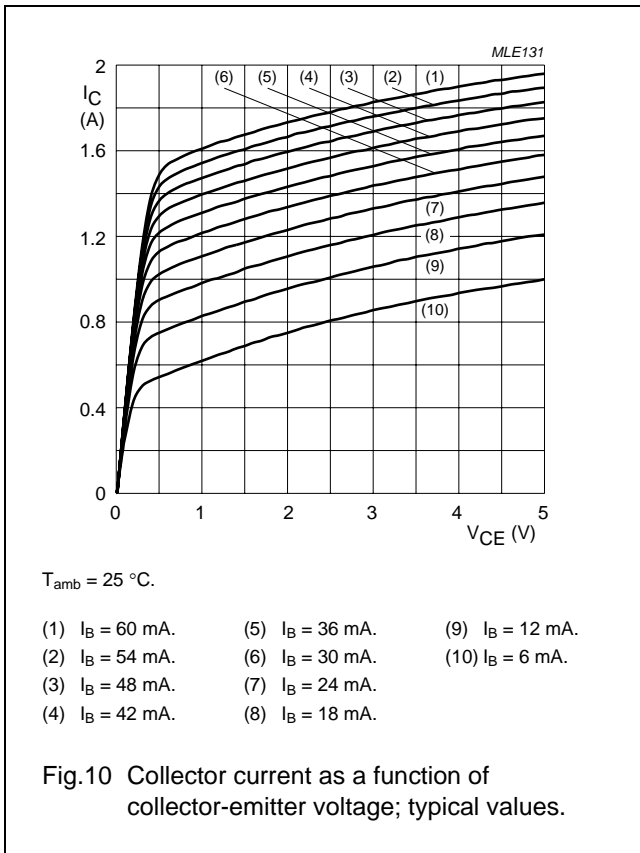
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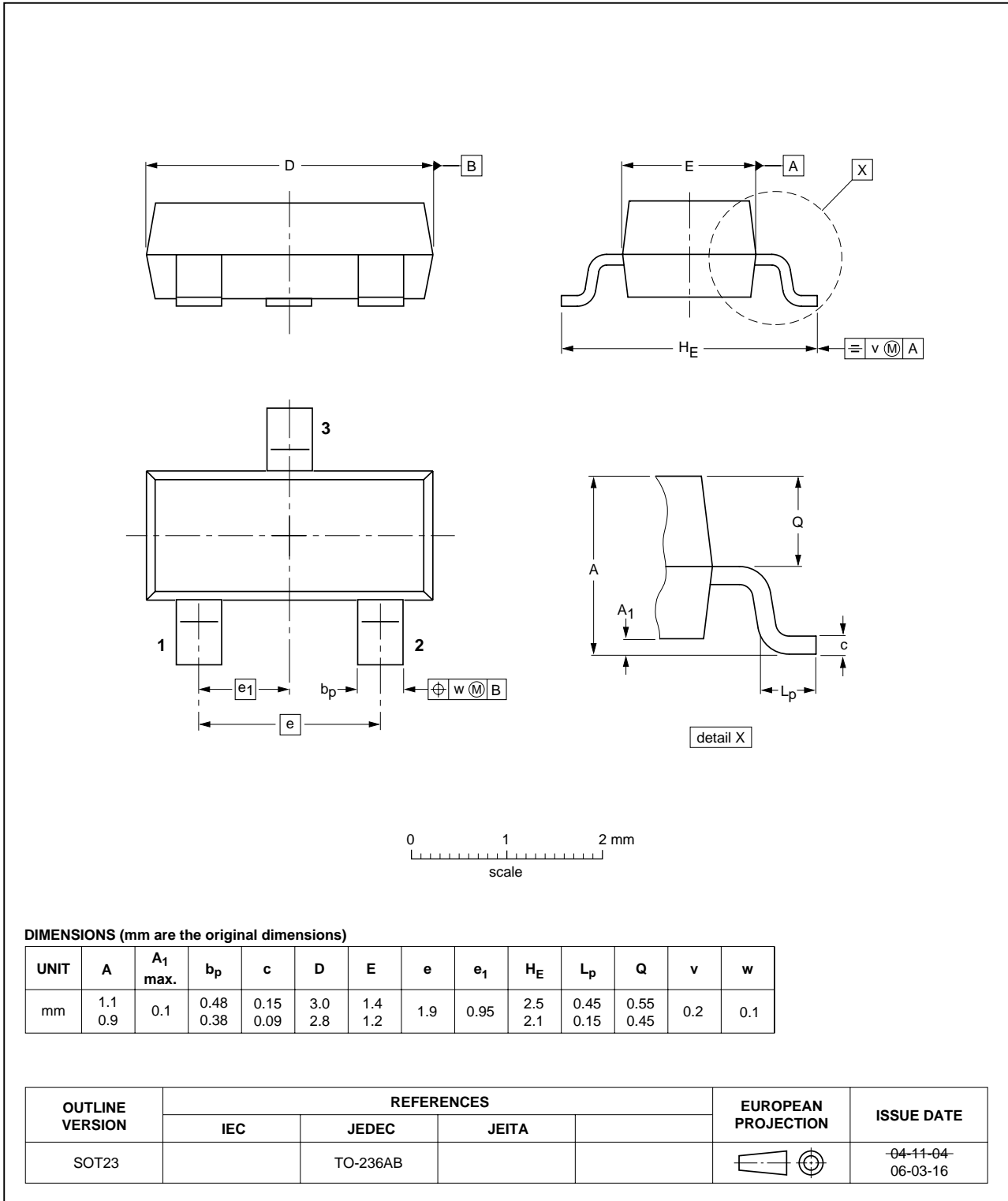
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



60 V, 1 A
NPN low V_{CEsat} (BISS) transistor

PBSS4160T

DATA SHEET STATUS

| DOCUMENT STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾ | 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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