

DATA SHEET

PDTC123J series
NPN resistor-equipped transistors;
 $R1 = 2.2 \text{ k}\Omega$, $R2 = 47 \text{ k}\Omega$

Product specification
Supersedes data of 2003 Apr 10

2004 Aug 13

**NPN resistor-equipped transistors;
R1 = 2.2 kΩ, R2 = 47 kΩ**
PDTC123J series
FEATURES

- Built-in bias resistors
- Simplified circuit design
- Reduction of component count
- Reduced pick and place costs.

APPLICATIONS

- General purpose switching and amplification
- Inverter and interface circuits
- Circuit driver.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | TYP. | MAX. | UNIT |
|-----------|---------------------------|------|------|------|
| V_{CEO} | collector-emitter voltage | – | 50 | V |
| I_o | output current (DC) | – | 100 | mA |
| R1 | bias resistor | 2.2 | – | kΩ |
| R2 | bias resistor | 47 | – | kΩ |

DESCRIPTION

NPN resistor-equipped transistor (see “Simplified outline, symbol and pinning” for package details).

PRODUCT OVERVIEW

| TYPE NUMBER | PACKAGE | | MARKING CODE | PNP COMPLEMENT |
|-------------|---------------|--------|--------------------|----------------|
| | PHILIPS | EIAJ | | |
| PDTC123JE | SOT416 | SC-75 | 28 | PDTA123JE |
| PDTC123JEF | SOT490 | SC-89 | 28 | PDTA123JEF |
| PDTC123JK | SOT346 | SC-59 | 49 | PDTA123JK |
| PDTC123JM | SOT883 | SC-101 | DW | PDTA123JM |
| PDTC123JS | SOT54 (TO-92) | SC-43 | TC123J | PDTA123JS |
| PDTC123JT | SOT23 | – | *25 ⁽¹⁾ | PDTA123JT |
| PDTC123JU | SOT323 | SC-70 | *49 ⁽¹⁾ | PDTA123JU |

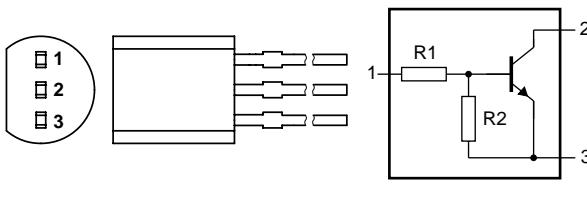
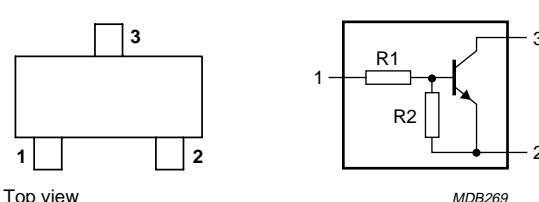
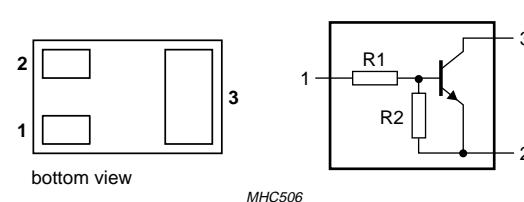
Note

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

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SIMPLIFIED OUTLINE, SYMBOL AND PINNING

| TYPE NUMBER | SIMPLIFIED OUTLINE AND SYMBOL | PINNING | |
|--|--|-------------|------------------------------|
| | | PIN | DESCRIPTION |
| PDTC123JS |  | 1 2 3 | base collector emitter |
| PDTC123JE PDTC123JEF PDTC123JK PDTC123JT PDTC123JU |  | 1 2 3 | base emitter collector |
| PDTC123JM |  | 1 2 3 | base emitter 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 | – | 50 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 50 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 10 | V |
| V_I | input voltage positive negative | | – – | +12 –5 | V |
| I_O | output current (DC) | | – | 100 | mA |
| I_{CM} | peak collector current | | – | 100 | mA |
| P_{tot} | total power dissipation SOT54 SOT23 SOT346 SOT323 SOT416 SOT490 SOT883 | $T_{amb} \leq 25^\circ\text{C}$ note 1 note 1 note 1 note 1 notes 1 notes 1 and 2 notes 2 and 3 | – – – – – – – | 500 250 250 200 150 250 250 | mW mW mW mW mW mW mW |
| T_{stg} | storage temperature | | –65 | +150 | °C |
| T_j | junction temperature | | – | 150 | °C |
| T_{amb} | operating ambient temperature | | –65 | +150 | °C |

Notes

1. Refer to standard mounting conditions.
2. Reflow soldering is the only recommended soldering method.
3. Refer to SOT883 standard mounting conditions; FR4 with 60 µm copper strip line.

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|---|---|---|---|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient SOT54 SOT23 SOT346 SOT323 SOT416 SOT490 SOT883 | in free air note 1 note 1 note 1 note 1 note 1 notes 1 and 2 notes 2 and 3 | 250 500 500 625 833 500 500 | K/W K/W K/W K/W K/W K/W K/W |

Notes

1. Refer to standard mounting conditions.
2. Reflow soldering is the only recommended soldering method.
3. Refer to SOT883 standard mounting conditions; FR4 with 60 µm copper strip line.

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CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------------|--------------------------------------|--|------|------|------|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 50 V; I _E = 0 | – | – | 100 | nA |
| I _{CEO} | collector-emitter cut-off current | V _{CE} = 30 V; I _B = 0 | – | – | 1 | μA |
| | | V _{CE} = 30 V; I _B = 0; T _j = 150 °C | – | – | 50 | μA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 | – | – | 180 | μA |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 10 mA | 100 | – | – | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 5 mA; I _B = 0.25 mA | – | – | 100 | mV |
| V _{i(off)} | input-off voltage | I _C = 100 μA; V _{CE} = 5 V | – | 0.6 | 0.5 | V |
| V _{i(on)} | input-on voltage | I _C = 5 mA; V _{CE} = 0.3 V | 1.1 | 0.75 | – | V |
| R1 | input resistor | | 1.54 | 2.2 | 2.86 | kΩ |
| R2 R1 | resistor ratio | | 17 | 21 | 26 | |
| C _c | collector capacitance | I _E = i _e = 0; V _{CB} = 10 V; f = 1 MHz | – | – | 2.5 | pF |

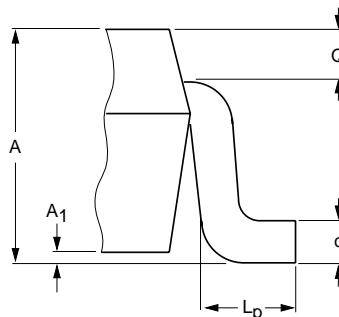
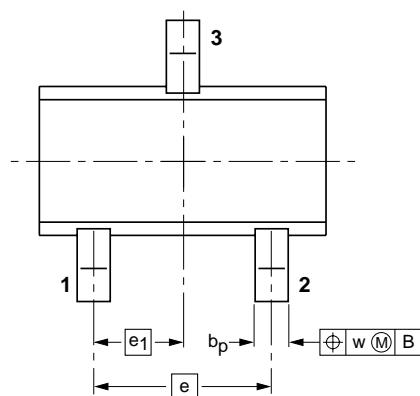
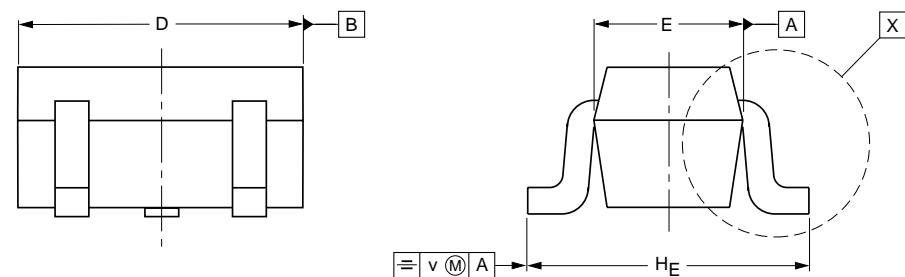
NPN resistor-equipped transistors;
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PDTC123J series

PACKAGE OUTLINES

Plastic surface mounted package; 3 leads

SOT416



0 0.5 1 mm
 scale

DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ max | b _p | c | D | E | e | e ₁ | H _E | L _p | Q | v | w |
|------|--------------|-----------------------|----------------|--------------|------------|------------|---|----------------|----------------|----------------|--------------|-----|-----|
| mm | 0.95 0.60 | 0.1 | 0.30 0.15 | 0.25 0.10 | 1.8 1.4 | 0.9 0.7 | 1 | 0.5 | 1.75 1.45 | 0.45 0.15 | 0.23 0.13 | 0.2 | 0.2 |

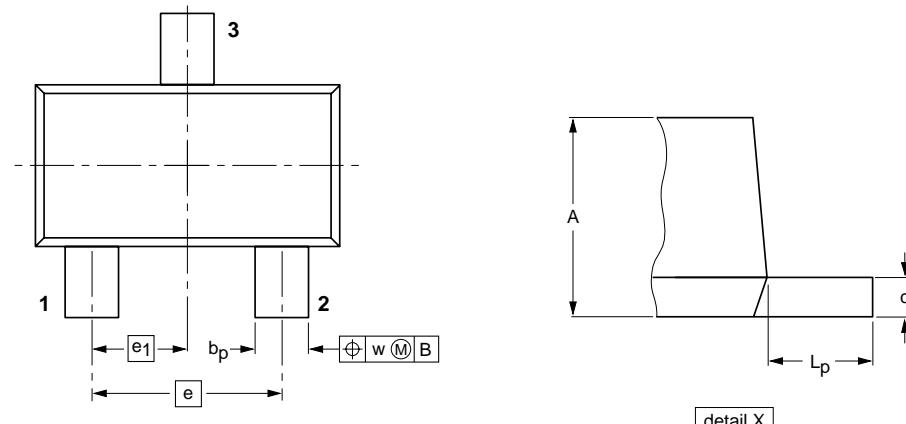
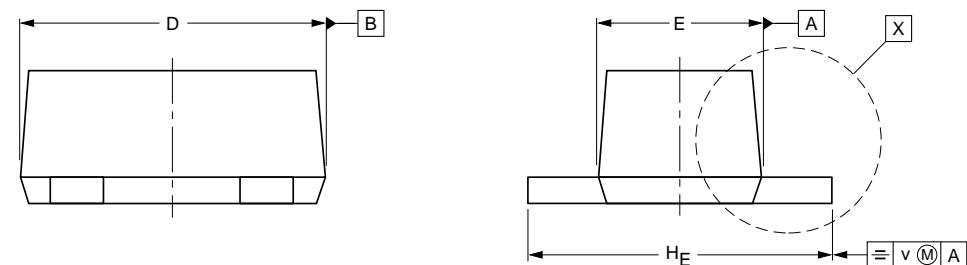
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|------|-------|------------------------|------------|
| | IEC | JEDEC | EIAJ | SC-75 | | |
| SOT416 | | | | | | 97-02-28 |

NPN resistor-equipped transistors;
 R1 = 2.2 kΩ, R2 = 47 kΩ

PDTC123J series

Plastic surface mounted package; 3 leads

SOT490



0 1 2 mm
 scale

DIMENSIONS (mm are the original dimensions)

| UNIT | A | b_p | c | D | E | e | e_1 | H_E | l_p | v | w |
|------|------------|--------------|------------|------------|--------------|-----|-------|------------|------------|-----|-----|
| mm | 0.8 0.6 | 0.33 0.23 | 0.2 0.1 | 1.7 1.5 | 0.95 0.75 | 1.0 | 0.5 | 1.7 1.5 | 0.5 0.3 | 0.1 | 0.1 |

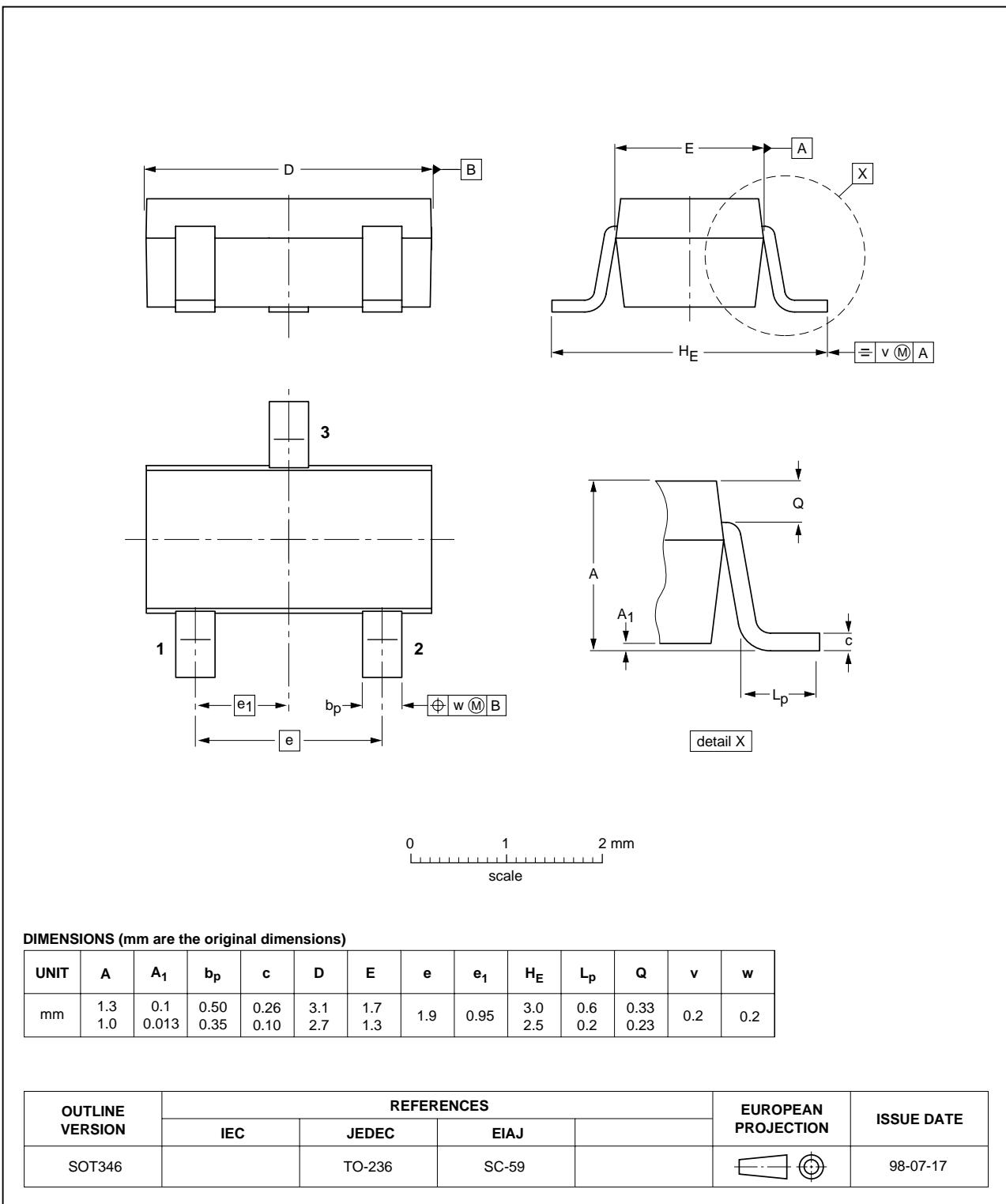
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|-------|---------------------|------------|
| | IEC | JEDEC | EIAJ | SC-89 | | |
| SOT490 | | | | | | 98-10-23 |

NPN resistor-equipped transistors;
 R1 = 2.2 kΩ, R2 = 47 kΩ

PDTC123J series

Plastic surface mounted package; 3 leads

SOT346

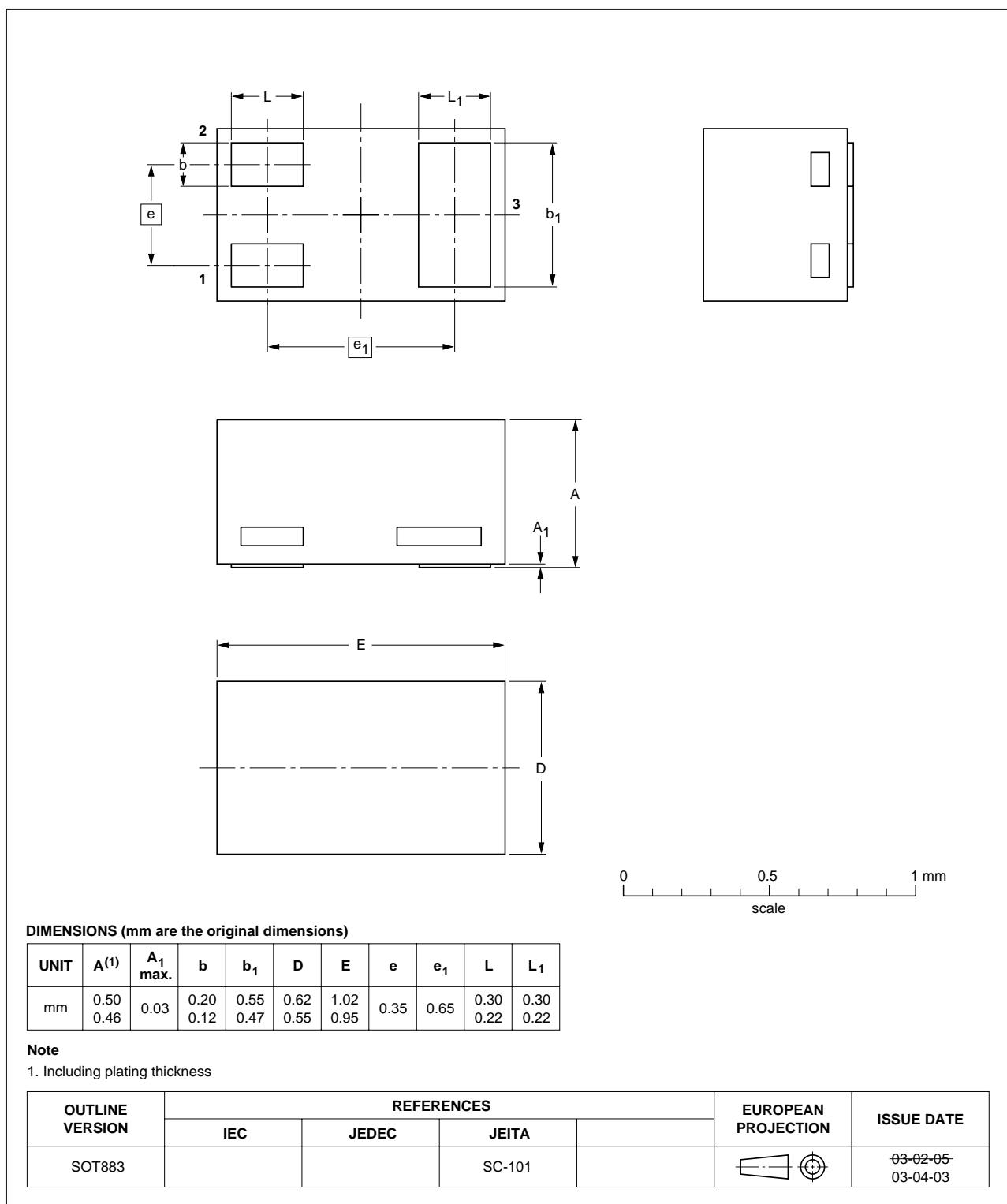


NPN resistor-equipped transistors;
 R1 = 2.2 k Ω , R2 = 47 k Ω

PDTC123J series

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm

SOT883

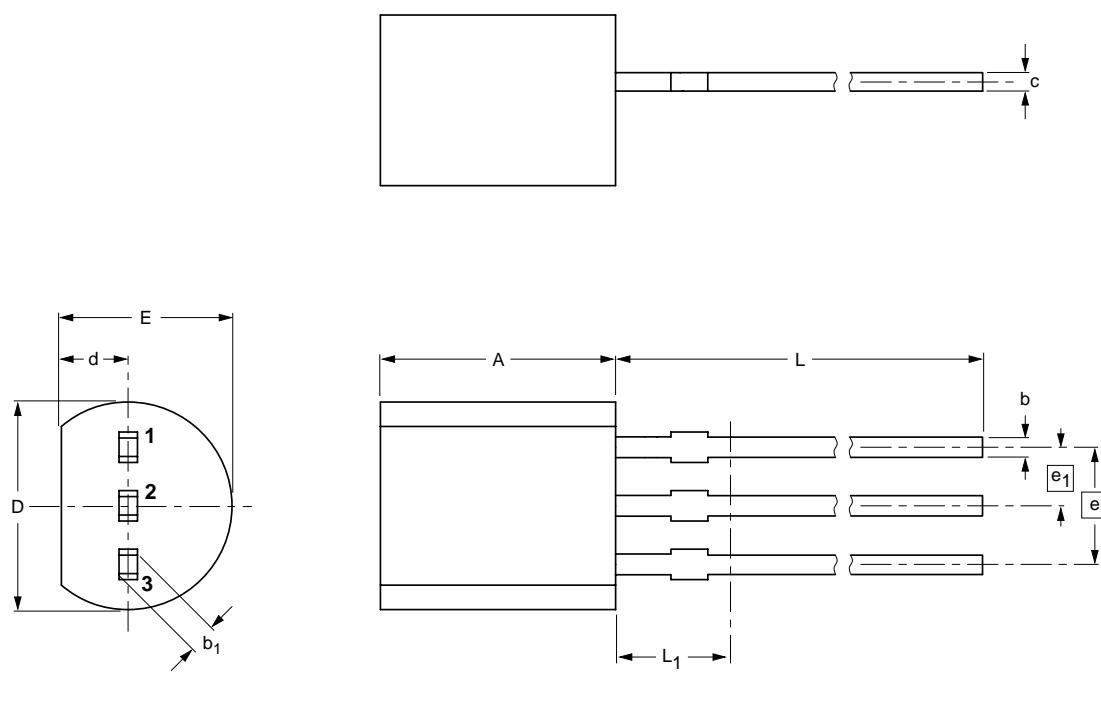


NPN resistor-equipped transistors;
 R1 = 2.2 k Ω , R2 = 47 k Ω

PDTC123J series

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

SOT54



DIMENSIONS (mm are the original dimensions)

| UNIT | A | b | b ₁ | c | D | d | E | e | e ₁ | L | L ₁₍₁₎ max. |
|------|------------|--------------|----------------|--------------|------------|------------|------------|------|----------------|--------------|---------------------------|
| mm | 5.2 5.0 | 0.48 0.40 | 0.66 0.55 | 0.45 0.38 | 4.8 4.4 | 1.7 1.4 | 4.2 3.6 | 2.54 | 1.27 | 14.5 12.7 | 2.5 |

Note

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

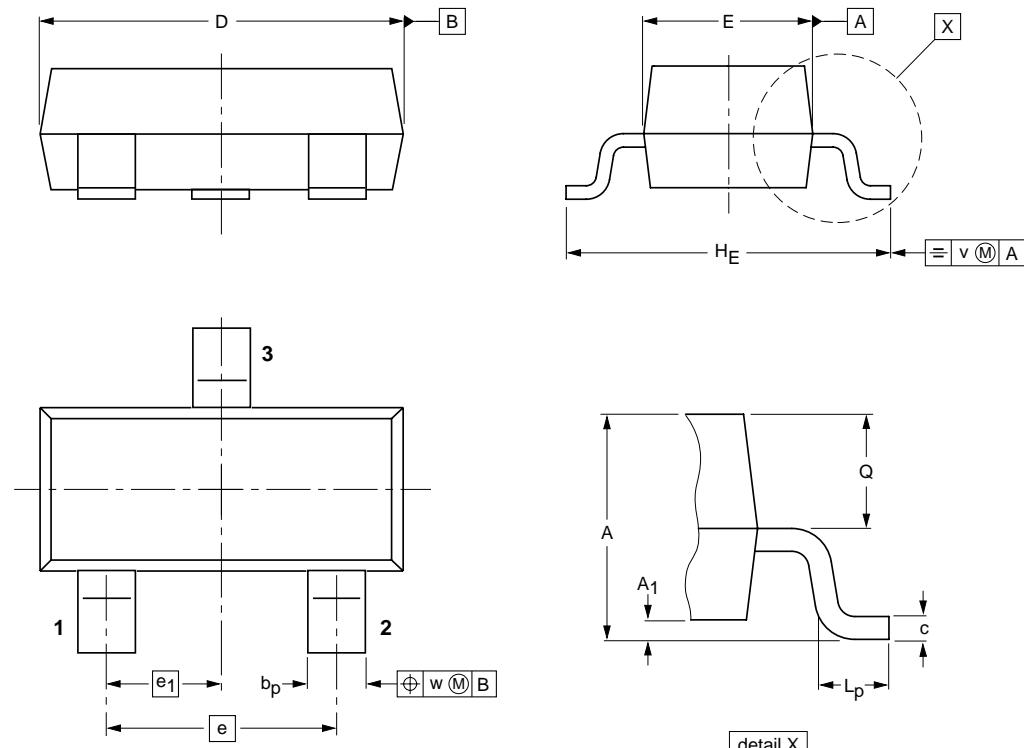
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|--------|--|------------------------|-----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT54 | | TO-92 | SC-43A | | | -97-02-28 04-06-28 |

NPN resistor-equipped transistors;
 R1 = 2.2 kΩ, R2 = 47 kΩ

PDTC123J series

Plastic surface mounted package; 3 leads

SOT23



0 1 2 mm
 scale

DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ max. | b _p | c | D | E | e | e ₁ | H _E | L _p | Q | v | w |
|------|------------|------------------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm | 1.1 0.9 | 0.1 | 0.48 0.38 | 0.15 0.09 | 3.0 2.8 | 1.4 1.2 | 1.9 | 0.95 | 2.5 2.1 | 0.45 0.15 | 0.55 0.45 | 0.2 | 0.1 |

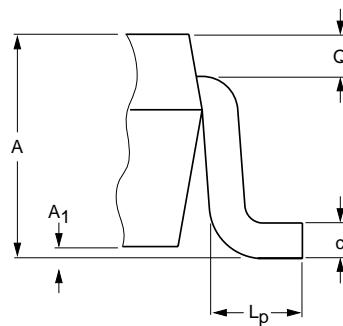
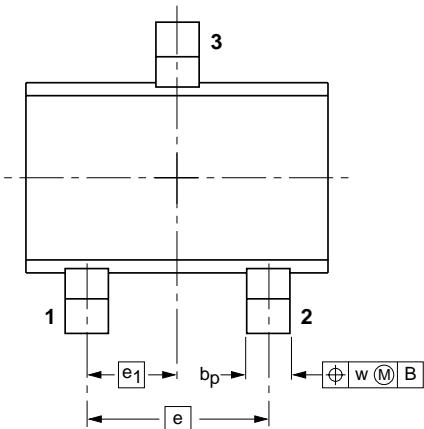
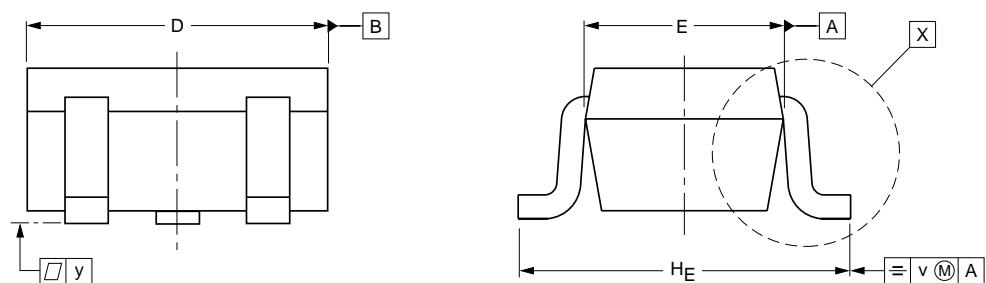
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|----------|------|--|------------------------|------------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT23 | | TO-236AB | | | | -97-02-28- 99-09-13 |

NPN resistor-equipped transistors;
 R1 = 2.2 k Ω , R2 = 47 k Ω

PDTC123J series

Plastic surface mounted package; 3 leads

SOT323



0 1 2 mm
 scale

DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ max | b _p | c | D | E | e | e ₁ | H _E | L _p | Q | v | w |
|------|------------|-----------------------|----------------|--------------|------------|--------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm | 1.1 0.8 | 0.1 | 0.4 0.3 | 0.25 0.10 | 2.2 1.8 | 1.35 1.15 | 1.3 | 0.65 | 2.2 2.0 | 0.45 0.15 | 0.23 0.13 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT323 | | | SC-70 | | | 97-02-28 |

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PDTC123J series

DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾⁽³⁾ | DEFINITION |
|-------|----------------------------------|----------------------------------|--|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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